The Swedish Journal Of Scientific Research

ISSN:2001-9211

Volume 2 Issue 12, December 2015

The Swedish Journal of Scientific Research (sjsr)

ISSN 2001-9211. Volume 2 . Issue 12. December. 2015

"A COMPARATIVE STUDY OF SPORT ACTIVITY CHILDREN PRACTITIONERS & NON-PRACTITIONERS (12-9 YEARS OLD) DUE TO PROFILE NET OF ANTHROPOMETRIC MEASUREMENTS"

Yasser Maauf Thanon[1], Azad Ali Hasan[1]

[1]*University of Garmiyan for Human & Sport Sciences, School of Sport Education*

yaser.thanon@yahoo.com Az_ad1984@yahoo.com

Abstract

Many scientific research and documentation of medical bodies indicate that the practice of physical activity on a regular basis are associated with many health benefits and is beneficial to the functions of the various organs of the body , people differ among themselves in terms of mental abilities , personality traits , and standards of physical and preparations , tendencies , trends , and the ability to physical performance ,And when we try to explain these differences and we measure and characterize it, we do so we have We put the phenomenon of individual differences for study and research. Individual differences be either in character type, or in the degree of the existence of such, through the views of some schools to some schools high school during the period of supervision of the students of the fourth phase in the material Tabiq researcher noted the existence of individual differences for some physical measurements, especially in the reconstruction following the primary stage, a stage of adolescence which is one of the most important stages of building physical and configured Farad researcher find out the cause of these differences and do physical activity role in the configuration of physical characteristic that leads to such a difference.The purpose of research to identify the individual differences between practitioners and non- practitioners sporting activity through the shape profile measurements of the physical network , the research sample included students study elementary, middle and they are not practitioners of sports activity was selected as the school career of Khanaqin babes practitioners of sports activity, Underwent physical measurements (main experiment) 8-11 / 2/2015 was taken (15) compared to physically between the lengths of the oceans and the thickness of fat and after processing the data statistically researcher concluded that there is excellence in physical measurements and in favor of practitioners of sports activity , the researcher recommends worthwhile lessons Sports primary and secondary schools because of their importance for the proper strength as a researcher recommends further research of other age groups.

Keywords: Practitioners, sport, activity, children, anthropometric measurements

1. INTRODUCTION

A lot of scientific researches and documents of medical authorities show that regular practice of sport activity is related to a lot of healthy benefits and this also benefits various body apparatuses (Williams & Wilkins, 2000, 2-21). Statistics issued in countries worldwide and USA show that 35% of deaths of coronary heart disease, 35% of diabetes and 32% of colon cancer are due to physical inactivity. Estimations in USA also refer that diseases related to lack of movement cause death to numbers of persons that are more in 14 doubles than deaths caused by AIDS. All of this negative effect is due to physical inactivity and the increasing role of the importance of physical activity for human life which led to issue guiding documents and scientific recommendations by many scientific associatios and health organizations asserting the importance of physical activity for health. They also recommend the necessity of practicing the minimum of activity regularly by men, women, the old and the young. People differ in terms of mental capacities, personal features, anthropometric measurements, preparations, tendencies, attitudes and the ability of physical performance. When we attempt to explain and measure these differences, by this way, we are applying individual differences under research. Individual differences are whether in the type of

characteristics or in the degree of the presence of these characteristics. The difference between length and weight is the difference in the characteristic type. Length difference is a difference in degree. Therefore, the difference between length and weight (type difference) does not subject to measurement as there is no common measurement for both of them. Anthropometric measurements are highly related to many vital fields as physical growth is related to health, social and emotional consistency for the child in middle years as well as relation with achievement and intelligence. There is also a relation between healthy children's physical and mental growth anthropometrically. In two of the best studies in this field found that there are positive relations between intelligence and a number of anthropometric measurements in ages between (2) and (17) years. As for sports, it was proven that anthropometric measurements are related to many motor capacities and distinction in different activities. Some researches proved that there is a direct relation between fist strength, length and weight. In addition, Cureton found that athletes in some games are distinguished from others in many anthropometric measurements such as trunks length, shoulder width and narrow pelvic (Hassanin 2003, 22-38).

Problem of the Study

Through viewing some secondary schools during the supervision period on 4th stage students at application stage, the researcher found that there are individual differences of some anthropometric measurements, and especially in ages that came after the primary stage which is the adolescence stage that is considered one of the most important stages of body building and formation. The researcher wanted to know the reason of these differences and the role of physical activity in special anthropometric formation that leads to such differences.

Objective of the Study

The study aims to define individual differences among practitioners and non-practitioners of physical activity for children (9-12 years old) due to profile net of morphological measurements.

Hypothesis of the Study

There are statistically significant differences between morphological measurements due to profile net among practitioners and non-practitioners of physical activity for children (9-12 years old).

2. METHODOLOGY

The researcher used the descriptive method as it is proper with the nature of the study.

Sample of the Study

The sample of the study consists of (40) students collected purposively among them 20 students were selected and the researcher ensured they are non-practitioners of sport activity. The rest of the sample (the other 20 students) selected from the football school at Khaniqin city as practitioners of sport activity.

Field Procedures of the Study

Upon taking anthropometric measurements, the following conditions should be considered:

- Measurement should be made by a similar manner in terms of measurement series.
- Using the same measurement tools.
- Measurements should be taken at the same timing daily.
- Measurements (and members of the sample wearing logn pants) (Khater & Al Bek, 1988, 88)
- Measurements of body lengths and diameters for the approximate half of a cm. In addition, body widths were measured at the approximate ml and the thickness of skin folds at the approximate ml. measurements were performed as follows and according to the series mentioned below:
- Body weight: measured through medical scale at the approximate 1/5 kg as the tested stands at the middle of scale base in a way that body weight is distributed on feet.
- Body length: measured at the standard erect posture as heels are stuck together and arms are hung at body sides. Measurement is taken by a graded wall as the wall is touched by the heels, the bottom, shoulder blades and head back and then measurement is taken at the approximate 1/5 cm.
- Arm length with palm: the distance from the lateral edge of the dorsal bend of shoulder bones till the tip of middle finger while stretched.
- Humerus length: measuring the distance from lateral top of the dorsal bend of blade bones till the elbow bend (ulna bone) which is the distance from shoulder to the elbow.
- Forearm length: measuring the distance from elbow bend of the ulna till the radius bend which is the distance from elbow to the wrist.

- Leg length: measured by counting the average between the following two measurements:
- Measuring the distance from the anterior superior iliac spine till the medial heel of tibia bone.
- Measuring the distance from the pubic symphysis till the medial heel of tibia bone.
- Thigh length: measuring the average distance of the inguinal canal till the top edge of the patella bone.
- Leg length: measuring the distance between the line of knee joint and medial heel of tibia bone putting a leg over the other.
- Chest diameter (normal): fixing a measuring tape from top back and under the axilla at the level of breast nipples. Arms should also be extended downwards noting that measurement is taken at the normal inhale posture. (Radwan, 1997, 73-99).
- Abdomen diameter: measured by putting the measuring tape horizontally at the level of the navel and the measurement is taken after normal exhale period (Khater & Al Bek, 1984, 96).
- Humerus Diameter: measured while both arms are hung from middle of the distance of lateral top of the dorsal bend and the end of lateral edge of humerus bone to make measurement spot while the arm is bent with the palm at an angle of 90 degree and the palm is pointing upwards.
- Thigh Diameter: the tested stands in a way that the distance between feet equals the width of shoulders and then measuring tape is put horizontally right at the end.
- Leg diameter: measured by putting the measuring tape around the maximum diameter of the leg. This can be obtained by moving the tape upwards and downwards till we get the required measurement.
- Thickness of skin bend at the iliac fold: this measurement is taken from the area above the forward relief of the iliac bone (right side) and at the anterior line of the axilla with a diagonal line downwards and inwards 45degrees. This fold is diagonal. The person who measures holds the skin fold from below the spot by the flow master pen and then pulls it outwards. After that, he puts caliper jaws above the vertical axis of the skin fold (Radwan, 1997: 176 – 197).
- Thickness of Skin Fold beneath Shoulder Blade: this measurement is taken from under the angle of right blade bone (from 1 to 2 cm) in a diagonal direction downwards and another one outwards with an angle of 45 degrees. This skin fold is diagonal (Hassanin, 1995: 136). In order to have accurate measurement of skin folds, the tester should follow a number of notes including accurate detection of the measured area, separating skin and adipose tissues from the body's muscular tissues in addition to the area of skin fold by the caliper and not using hand fingers. Moreover, measurement should be made at a time limit (2 – 5 sec) after putting the device at the position and then three repetitions are taken for measurement and the rate is counted. (Kir Knedal, D. et al, 168).

Designing the Profile of Anthropometric Measurements

In order to design the profile for anthropometric measurements, we have to mention the way we used through which we can define the level of measurements whether at middle, higher or less levels as well as comparing its different units.

Profile Net:

At first column, anthropometric measurements forming the profile – the rest of columns are (5). Counted profiles are presented as follows:

Average rate column – column 4 – the main column.

A. The maximum is the arithmetic mean of measurement (2/1+) the standard deviation of the same measurement.
B. The minimum is the arithmetic mean of measurement (2/1-) the standard deviation of the same measurement.
C. The minimum for columns at the right of average rate of measurement (2, 3) as order is the maximum limit of the directly previous column in order added to (0.01).
D. The maximum of columns at the right of average rate of measurement (2, 3) as order is the arithmetic mean of the sample 1h, 2h (*) consecutively.
E. The minimum of columns at the left of average rate of measurement (4, 5) as order is the maximum of each is the minimum limit of the directly previous column in order subtracted from to (0.01).
F. The minimum of the mentioned cells (4, 5) is the arithmetic mean of the sample subtracted from 1h and 2h as order.

Drawing the Individual's Profile:

In order to draw the profile, a special figure with columns should be drawn asymmetric with these established for the profile net. An individual's measurements or group averages may be set (if the needed is knowing levels of as group and not the individual) to indicate measurements at the middle of columns and due to the level position of each of them due to the asymmetric levels at the profile determined previously.

After that, points of individuals or groups are linked to form the profile net for the person or group and we became able to determine proximity of the shown anthropometric measurements units or those separated from each other or separated from the sample level on which levels of the profile were built (Khater & Al Bek, 1996: 120 – 121).

Final Application of Measurements:

Final application of measurements was performed on 8, 9, 10 and 11 of February, 2015 between 9 and 11 am following all conditions of measurement.

3. DISCUSSION AND PRESENTATION OF RESULTS:

Results:

Table (1): Arithmetic Mean and Standard Deviation S.D of anthropometric measurements for practitioners and non-practitioners of sport activity:

Anthropometric Measurements	Arithmetic Mean	Standard Deviation
Weight	37.830	7.140
Length	142.125	7.090
Arm length	58.980	3.960
Humerus length	26.410	2.160
Forearm length	22.360	2.010
Leg length	81.860	4.380
Thigh length	40.770	3.070
Foot length	23.330	1.590
Chest diameter	70.670	5.840
Abdomen diameter	65.250	6.850
Humerus diameter	21.450	2.540
Thigh diameter	40.230	4.360
Leg diameter	30.230	4.130
Thickness of skin bend at the iliac fold	10.225	6.237
Thickness of Skin Fold beneath Shoulder Blade	8.850	6.351

Based on this table, the researcher built nets for the profile levels for anthropometric measurements of practitioners and non-practitioners of sport activity.

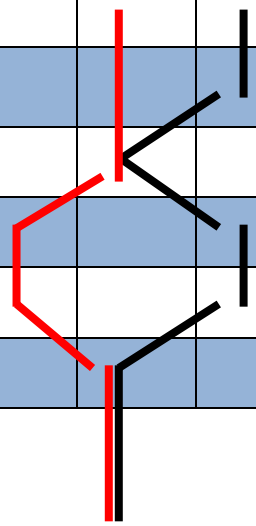
Table (2): the net of the profile of anthropometric measurements of practitioners and non-practitioners of sport activity:

Anthropometric Measurements	Very High Growth	High Growth	Average Growth	Low	Very low
Weight	44.980	41.410	34.260	34.250	30.680
	52.110	44.970	41.400	30.690	23.550
Length	149.225	145.680	138.580	138.570	135.025
	156.305	149.215	145.670	135.035	127.945
Arm length	62.950	60.970	57.000	56.990	55.010
	66.900	62.940	60.960	55.020	51.060
Humerus length	28.580	27.500	25.330	25.320	24.240
	30.730	28.570	27.490	24.250	22.090

Forearm length	24.380	23.375	21.355	21.345	20.340
	26.380	24.370	23.365	20.350	18.340
Leg length	86.250	84.060	79.670	79.660	77.470
	90.620	86.240	84.050	77.480	73.100
Thigh length	43.850	42.315	39.235	39.225	37.690
	46.910	43.840	42.305	37.700	34.630
Foot length	24.930	24.135	22.535	22.525	21.730
	26.510	24.920	24.125	21.740	20.150
Chest diameter	76.520	73.600	67.750	67.740	64.820
	82.350	76.510	73.590	64.830	58.990
Abdomen diameter	72.110	68.685	61.825	61.815	58.390
	78.950	72.100	68.675	58.400	51.550
Humerus diameter	24.000	22.730	20.180	20.170	18.900
	26.530	23.990	22.720	18.910	16.370
Thigh diameter	44.600	42.420	38.050	38.040	35.860
	48.950	44.590	42.410	35.870	31.510
Leg diameter	34.370	32.305	28.165	28.155	26.090
	38.490	34.360	32.295	26.100	21.970
Thickness of skin bend at the iliac fold	16.472	13.353	7.107	7.097	3.978
	22.698	16.462	13.343	3.988	-2.248
Thickness of Skin Fold beneath Shoulder Blade	15.211	12.036	5.674	5.664	2.489
	21.552	15.201	12.026	2.499	-3.852

According to the net of the profile at figure (1), the researcher drew the profile for practitioners and non-practitioners of sport activity:

For non-practitioners	For sport practitioners	Very low	Low	Average growth	High growth	Very high growth	**Anthropometric Measurements**
39.875	41.5						Weight
142.45	145.8						Length
59.25	58.725						Arm length
25.420	27.7						Humerus length
21.275	23.85						Forearm length
81.4	82.325						Leg length



40.55	41						Thigh length
22.8	23.875						Foot length
67.591	72.3						Chest diameter
68.3	61.2						Abdomen diameter
22.675	23.225						Humerus diameter
40.05	42.425						Thigh diameter
31.725	32.75						Leg diameter
15.5	5.95						Thickness of skin bend at the iliac fold
12.7	4.75						Thickness of Skin Fold beneath Shoulder Blade

Figure (1) shows:

Practitioners of sport activity =

Non-practitioners of sport activity =

Figure (1) shows that average measurement for practitioners of sport activity is distinguished from non-practitioners of sport activity at most anthropometric measurements (length, weight, humerus length, forearm length, chest diameter, humerus diameter, thigh diameter, leg diameter, abdomen diameter, Thickness of skin bend at the iliac fold and Thickness of Skin Fold beneath Shoulder Blade). However, practitioners and non-practitioners of sport activity came at the same level due to net profile at the following anthropometric measurements: (arm length, leg length, thigh length and foot length).

Discussing Results:

Through the figure of net profile, results of anthropometric measurements were discussed which practitioners of sport activity were distinct at. Therefore, we find that in results related to body weigh practitioners' weight came at a high level, while non-practitioners came at average growth of the net, so general result refers to an increase in practitioners' mass and weight. Body weight related to strength is one of the most important standards of anthropometric features that a sport practitioner should have (Othman, 1990: 464). As for results of body length, we find that practitioners are distinct with bigger anthropometric measurements than non-practitioners of sport activity at body length and size due to selection process (Hussein, 1979: 180). Concerning body diameters, there is an absolute increase in practitioners at diameters which means as increase in athlete's body mass as well as it is an increase in the horizontal sector that is beneficial as muscular strength is directly related with the anatomic sector of the muscle and with the size of the muscle (Radwan, 1997: 144 – 148). As for skill fold thickness and abdomen diameter, we can find that practitioners lie at the level of the net in low and very low growth as it is known that adipose increase affects the muscle capacity to contract as fats in muscular tissues helps in muscle contraction with internal fracture affecting the efficiency of the operating muscle at movement (Allawi & Radwan, 1994: 222 – 223). Results of multiple studies proved that there is an inverse relation between fat percentages in the body and sport activities. The more fat percentage in the body is, the less athletic performance will be. This is true for all sport activities that require body movement whether vertically or horizontally during playing. (Abdelfatttah & Hassanin, 1997: 380).

4. CONCLUSIONS:

1- The growth in length and weight of sport activity practitioners is higher than in non-practitioners.
2- There is a high growth at most body diameters for the sake of practitioners than non-practitioners of sport activities.
3- There is a lower growth at thickness of skin folds (fats thickness) for practitioners than for non-practitioners of sport activities.
4- There is a higher growth for abdomen diameter for practitioners than for non-practitioners of sport activities.

5. RECOMMENDATIONS:

1- The possibility of make similar research at other age classes and on females.
2- Conducting a comparative study for profile net among practitioners of individual and team sport activities.
3- Good guidance of schools towards anything related to body building of individuals.
4- The possibility to conduct comparative studies between body formation between athletes and non-athletes.

6. REFERENCES:

1- Al Tikrity, Wadia Yassin & Al Abidi & Hassan Mohamed (1999): "Statistical Applications in Sport Education Researches", 2nd Ed, Dar Al Kotob, Al Mawsel University.
2- Hassanin, Mohamed Sobhy, A. (1995): "Measurement & Evaluation in Sport Education", Part 1, 3rd Ed., Dar Al Fikr Al Arabi,Cairo.
3- Hassan, Mahrousa, Ali. (1991): "Determining Model Rates of Profile Net for some Anthropometric Measurements to Achieve High Levels of Fencing Players", Published Research at the Scientific Journal of Physical & Sport Education Researches,Vol. 13, Part 1, Studies & Research, Helwan University.
4- Hussein, Kasem Hassan. (1979): "Theoretical & Practical Basics in Track-and-Field Events for First Stages at Faculties of Sport Education", Baghdad.
5- Khater, Ahmed Mohamed & Al Bek Ali Fahmy. (1984): "Measurement in Sports", Dar Al Maaref, Al Qebla Press, Alexandria.
6- Khater, Ahmed Mohamed & Al Bek Ali Fahmy. (1996): "Measurement in Sports", 4th Ed., Dar Al Fikr Al Arabi, Cairo.
7- Radwan, Mohamed Nasreldin. (1997): "The Reference in Anthropometric Measurements", 1st Ed., Dar Al Fikr Al Arabi, Cairo.
8- Othman, Mohamed. (1990): "Encyclopedia of Athletics", Dar Al Elm for Publishing & Distribution, Kuwait.
9- Allawi, Thilam Younis. (2006): "Profile Net of Anthropometric Measurements for Long Jump Players due to the Effect on Achievement Level", Published Research, Al Rafedin Journal for Sport Sciences, Vol. 12, Issue. 40.
10- Allawi, Mohamed Hassan & Radwan & Mohamed Nasreldin. (1979): "Measurement in Sport Education & Sport Psychology", Dar Al Fikr Al Arabi, Cairo.
11- Allawi, Mohamed Hassan & Radwan & Mohamed Nasreldin. (1994): "Motor; Performance Tests", Dar Al Fikr, Amman.
12- Al Gharib, Ramzia. (1977): "Psychological & Educational Evaluation & Measurement", the Anglo-Egyptian Library, Cairo.
13- Abdelfatttah Aboelela Ahmed & Hassanin, Mohamed Sobhy. (1997): "Sports Physiology & Morphology and Measurement Methods for Evaluation", Dar Al Fikr Al Arabi, Cairo.
14- Mohamed Sobhy Hassanin. (2003): "Measurement & Evaluation in Sport Education", Part 2, 5th Ed., Cairo, Dar Al Fikr Al Arabi Press.
15- American College of Sport Medicine. ACSM s Guidelines for Exercise Testing and Prescription. Baltimore (MD): Williams and Wilkins, 2000, P. 3-21.
16- International Federation of Sport Medicine Position Statement. Physical exercise-an important factor for health. The World of Sport Med 1989, 2: 24-25
17- Kir Knedal , D and others , (1987) : Measurment and Evaluation for Physical Education , 2 ed , Human Kinetics Publisher , Inc . 168
18- Mathews, D.k (1978): Measurment Physical Education, 5 thed, Philadelphia W.B Saunders Co. p73

"DESIGNING & LEGALIZING A TEST TO MEASURE MOTOR EXPECTATION OF VOLLEYBALL PLAYER DUE TO THEIR SPECIALIZATIONS"

Muafaq Sainakh Jafar[1] Rajaa Abdelsamad Ashour[1]

[1]*Collage of Physical Education & Sport Sciences- Al Basrah University*

muafaqjafar@gmail.com dr.raja70@yahoo.com

Abstract:

This study asserted the importance of motor expectation as it is closely related to serve reception skill considering correct reception as the key to gain points. Being late in correct response in ball reception causes failure to reach the ball on time as a result of ball speed in serving skill. The significance of the study is shown in finding a test that helps players who receive the ball to make right expectation for the place of ball landing. The objective was to design and legalize a test of measuring motor expectation of volleyball players. The researchers used the descriptive method, while the sample of the study was from the 1st and premier division players.

Keywords: Test legalization, motor expectation, volleyball

1. INTRODUCTION:

Correct planning based on a scientific basis in learning and training leads to continuous and rapid development in all individual and team sports. Accordingly, trainers are interested in preparing players mentally, physically and skillfully in order to reach the highest levels and expectations that are near to factual playing conditions. Thus, sport practicing is one of the bases of success and progress as it expresses the extent of full consistency between brain and body. The relation between mental element, physical and skill performance became the point of interest for training specialists as the development of athletes depends on right expectation and elapsed time to respond this expectation. This is because any late response for a certain skill performance may cause failure in reaching the ball on time, especially in ball reception skill as a result of ball speed. Hence, the significance of the study is to find a test that helps the player who receives the ball to make right expectation and response to the ball which contributes to overcome the difficulties facing our players in reception forming a great obstacle to our volleyball teams.

Problem of the Study:

The reception skill is the cornerstone of building attack. Therefore, a receiving player has to set his expectation to receive the ball in a correct manner due to his fast response to the ball in addition to skill level that he should adopt in order to complete ball reception. This is the level of world-class teams. From this respect, researchers noticed the contrary for our local teams and even at the level of the national team that there is a clear vacillation at serve reception because of incorrect expectation of the point of ball landing, so this, in turn, leads to late response and losing a lot of points that may end the match. Here, the problem of the study emerges.

Objective of the Study:

The study aims to design and legalize a test to measure motor expectation of volleyball players.

2. METHODOLOGY:

The researchers used the descriptive method using survey as it is proper to solve the problem of the study. Van Dalen refers that: "applied researches aim to determine the nature and characteristics of some phenomena in order to determine, analyze or view the status quo to extract results and set expectations or predictions about the development of these phenomena" (63, 2).

Sample of the Study

The sample of the study is represented in a group of volleyball players (76 players) divided into two parts: design sample and legalizing sample chosen purposively from 1st division clubs including: (Abi El Khasib, Al Madina, Al Qurna, Al Gabayesh, Al Sadek) clubs taking (10) players from each club (43.956% of the studied population) as shown in table No. (1)

Table (1) Numbers and details of the studied sample

Sample of the study	The sample on which scientific basics applied		Technicians Sample		Eliminated Players	Population
	Validity	Reliability	Validity	Reliability		
76	24	12	40	43.956%	15	91

Steps of Designing the Test:

One of the main factors in designing and legalizing tests is to return to references and sources related to tests as a questionnaire was designed and presented to specialist experts.

Field Procedures of the Study:

Muafaq & Raja Test to measure expectation

- **Test Name:** Muafaq & Raja Test to measure ball expectation
- **Purpose of the Test:** measuring ball expectation
- **Tools:** legal volleyball court – 20 volleyballs – measuring tape – various tapes to plan the court – whistle – net to collect balls – a form to measure points.
- **Performance:** the tested player stands inside the court inside square No. (4), the recorder stands outside the court. Next, the recorder asks the player about his expectation of ball landing at which place on the court which is divided into multiple divisions "note that there are a lot of divisions of the court as in figure no. (1)". At the position of each division, there is a pole with a number. The player has to expect ball landing in the square in which the pole number is found and whistles to declare the start of first stage serve and so on till the end of the ten attempts. Next, the tested player says his expectation of the ball landing place at the moment of its release from the hand of the server player.
- **Counting points:** in case of ball landing anywhere, there will be a point for anywhere in which the ball lands based on the following order:

Place of ball landing	Points
- At the correct expectation place inside, outside court or at the net	- 5 points
- Besides the correct expected place	- 2 points
- Far from the correct expected place inside court	- 1 point
- Ball outside the court	- Zero
- Ball falling between two places	- The most point counts

Conditions of Testing:

1- There should be understanding from the tested persons.
2- They should understand a key for the test points.
3- There should be a preparation by the tested persons.

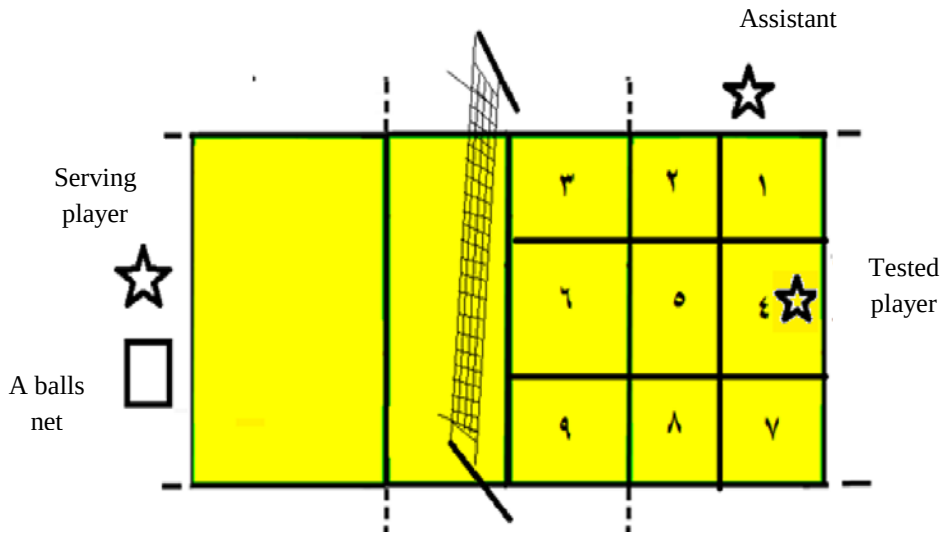


Figure (1): Planning of the volleyball court in expectation test

Exploratory Trial:

The exploratory trial was performed for the purpose of determining difficulties facing the researchers. These were very important as the researchers faced great difficulty in how to explain the test and how to start it which led to repeat the testing till a certain stage and then mastering test performance by some players (outside the sample of the study) to determine the most important difficulties including alerting players to move and stand taking the reception position in the place in which the ball lands during hearing the whistle. This was a very important point.

Coefficients of the Test

Test Reliability:

In order to ensure test reliability in the study, the researchers used retesting method on a sample consisting of 14 players representing Al Basra University volleyball team. The retesting was made after five days and correlation coefficient was counted as in table (2)

Table (2) Arithmetic mean, Standard Deviation S.D, counted and tabulated R value of the test

Statistical treatments / Variables	Measure Unit	Distinct Players		Beginners		Counted T Value	Tabulated T Value	Significance
		Mean -	S.D	Mean	S.D			
Expectation	Point	31.285	6.207	22.857	7.720	3.744	2.68	Significant

- Tabulated (T) value under significance level 0.05 and freedom degree 12 = 0.612 (7, 343).

Test Validity:

"It is the test's ability to distinguish between two logically distinct groups in terms of the measured characteristic" (166, 1), as both researchers performed the test on two even samples in number but different in levels as shown in table (3).

Table (3) Arithmetic mean, Standard Deviation S.D, counted and tabulated T value of the test

Statistical treatments / Variables	Measure Unit	1st Test		2nd Test		Counted R Value	Tabulated R Value	Significance
		Mean -	S.D	Mean	S.D			
Expectation	Point	31.167	4.427	35.917	15.253	0.811	0.612	Significant

- Tabulated (T) value under significance level 0.05 and freedom degree 22 = 2.68 (343, 3).

Objectivity:

It means of disagreement between estimators in judging a certain thing or subject (4, 22). As it is known for us, the test is clear and easy for members of the sample as it only requires a player to hear the whistle and immediately move to the expected position of ball landing which shows easy performance of the test and it is not difficult. In addition, scoring points does not contain any complexities except the place of ball landing and the place of player's expectation when moving towards it. All of these positions have points in the data recording form and there is no other explanation or understanding to the position of ball landing.

The Main Trial

The main trial was performed on 15/02/2015 till 15/03/2015 according to sample position.

Detailed presentation of the sample's members, their arithmetic means and standard deviations

Table (4) Arithmetic mean, standard deviation and number of members of the sample according to their specializations:

	Number	Expectation Test		Percentage
		Mean	S.D	
Preparing player	10	30.9	8.006	25%
High player	10	23.8	4.263	25%
Fast player	10	25.5	2.635	25%
Free player	10	30	3.197	25%
Total	40			100%

Discussion of Results of contrast analysis of the (F) counted and tabulated values of Muafaq & Raja Test to measure volleyball players' expectation

Table (4) shows that the highest expectation level emerges at the preparing player as a result of the experiences that he owns which is asserted by Wagih Mahgoub (106, 5) saying that: "the extent of expectation success is according to previous trials to a far extent and on movement analysis, so we find that motor expectation is week for beginners.

Table (5) Results of contrast analysis of the (F) counted and tabulated values of Muafaq & Raja Test to measure volleyball players' expectation

Contrast sources	Total deviation squares	Freedom degree	Average squares (contrast)	Counted (F) value	Tabulated (F) value	Significance
Inter-groups	482.9	3	160.966	6.474	2.86	Significant
Intra-groups	895	36	24.861			
Total	1377.9	39				

- Tabulated (F) value under significance level 0.05 and freedom degrees 3 and 36 = 2.86 (358, 3).

Table (5) in Muafaq & Raja to measure expectation shows that counted (F) value (6.474) is bigger in value than tabulated (F) value (2.86) at significance level 0.05 and freedom degrees 3 and 36. This means that there are significant differences between different playing groups

in volleyball, so the researchers will resort to the Least Significant Difference (LSD) Test to define which groups are better than the others.

Discussing results of differences between means and the LSD values in Muafaq & Raja Test to measure volleyball players' expectation

Table (6) showing means differences and the LSD values in Muafaq & Raja Test to measure volleyball players' expectation

Means Difference		Difference value	LSD value	Significance
Preparing	Free		1.839	Insignificant
30.9	30	0.9		
Preparing	Fast			Significant
30.9	25.5	5.4		
Preparing	High			Significant
30.9	23.8	7.1		
Free	Fast			Significant
30	25.5	4.5		
Free	High			Significant
30	23.8	6.2		
Fast	High			Insignificant
25.5	23.8	1.7		

Table (6) shows that after taking away means' values due to different playing classifications, the researchers compared results of mean differences with the LSD value (1.839). Since the result of the Least Significant Difference (LSD) and group of free player is 0.9 which is less significant difference, this means that there are no significant differences between them and this is applied on both high and speed player groups.

Table (6) also shows that the value of difference in other groups is shown as we notice the distinction of preparing player over high and speed player groups. We also notice the distinction of free player over high and speed player groups. As a result of table (6), it can be found that there are clear differences in expectation level between players' expectations and the preparing player came first among the other specializations. The researcher attributes this distinction to preparing players as due to being calm and concentrated which was asserted by Wagih Mahgoub (107, 5) saying: "the motor system is related to nervous positions and how a layer explains his expectation of the sent tools of the opponent player as the case in serving despite his speed as a player can receive the ball and expect its arrival".

3. Conclusions:

1- The designed measuring test is effective in measuring expectation.
2- There are statistically significant differences between players according to their specializations at the level of expectation of ball landing position
3- The preparing player achieved the highest correct expectation points followed by free player, fast player and then high player.

4. RECOMMENDATIONS:

1- The designed and legalized test to be authorized for the purpose of player's selection.
2- It is necessary to authorize the designed test during training units for players' training.
3- It is recommended to increase interest with reception skill as it is a key to build effective attack and, in turn, achieve winning.
4- It is recommended to authorize scientific basics (depending on the extent of mental processes acquired by the individual such as attention, expectation and perception in players' selection at different sport games.

5. REFERENCES:

1- Ahmed Salman Awda. (1985): "Measurement and Evaluation in training Process", Jordan, Dar Al Amal.
2- Mohamed Hassan Allawi. (1994): "Sport Psychology", 9th Ed., Cairo, dar Al Maaref.
3- Mohamed Nasreldin Radwan. (2003): "Statistical Inference in Physical Education & Sport Sciences", Cairo, 1st Edition, Dar Al Fikr Al Arabi Press.
4- Mostafa Hussein Bahy: "Scientific Treatments between Theory and Practice: Reliability, Validity, Objectivity and Standards", 1st Ed. Cairo, Book Center Press.
5- Wagih Mahgoub & Ahmed Badry. (2002): "Fundamentals of Motor Learning", Al Dar Al Gamea' Press. Al Mawsel.

EFFECT OF COFFEE CONSUMPTION ON ANAEROBIC PERFORMANCE

Elvin Onarici Gungor[1], Ali Onur Cerrah[1], lker Yilmaz[1], Turnagol H.[2], Goger F.[3], Baser K.H.C.[3]

[1]Anadolu University Faculty of Sport Sciences Iki Eylul Campuss Eskisehir, Turkey

[2]Hacettepe University, School of Sport Sciences and Technology (Ankara, Turkiye)

[3]Anadolu University, Faculty of Pharmacy (Eskisehir, Turkiye)

eonarici@anadolu.edu.tr deniz@hacettepe.edu.tr

Abstract

The purpose of this study was to determine the effect of coffee ingestion on anaerobic performance of coffee drinkers. Wingate bicycle tests were applied before and after 10 days coffee consumption. In a randomized and double blind design, one group of subjects consumed coffee (3 mg caffeine/kg/day) and other group of subjects consumed decaf coffee for ten days between two Wingate tests. Wilcoxon Signed Ranks Test test were applied between pre and post-tests of the group. Effect size (ES) was calculated using Cohen's delta to evaluate the size of mean differences. Results of this study indicated that peak power increased in just caffeinated coffee group when compared to baseline ($p<0.05$). As a conclusion it can be said that long time coffee with caffeine ingestion has a positive effect on anaerobic performance.

Key Words: wingate, coffee, decaf

1. INTRODUCTİON

People consume caffeine because of many reasons. It is stated that caffeine causes mental alertness increase, a faster and clearer flow of thought and restlessness. Therefore, feeling sleepy is delayed, because fatigue is reduced. The most important determinant for caffeine effect is the amount of taken dose. The dose related effect is underlined that caffeine disruptively effect on sleep latency and quality and objective measure of total sleep time. This situation occurs because caffeine stimulates the heart muscle, the secretion of gastric acid and urine output. It is stated that caffeine increase mental awareness and this causes sustained intellectual effort without significant disruption of coordinated intellectual or motor activity (Harland, 2000; Hindmarch et al., 2000; Spriet, 2014).

Hindmarch et al., (2000) underline the acute effect of caffeine ingestion that caffeinated beverages may maintain aspects of cognitive and psychomotor performance throughout the day and evening if it is taken repeatedly. Harland (2000) summarized the caffeinated drinks as coffee, tea, colas and caffeinated waters and beverages as chocolate products and medications.

Because caffeine is cheap and has no negative effect on health, it is socially accepted amongst sport players and highly used in sport as a perceived ergogenic effect on athletic performance. When the 3 or 6 $mg.kg^{-1}$ body mass caffeine is consumed, it passes the membranes of all the body's tissues in a short time and beneficial to aerobic cycling performance (Desbrow et al., 2012). Furthermore, caffeine as an ergogenic effect has been found to increase speed, power and aerobic endurance (McDaniel et al., 2010). Drinks and beverages containing caffeine and ephedrine have become common substance in the diets of most athletes and popular among sport persons in recent years (Graham, 2001; Magkos and Kavouras, 2004).

Graham (2001) mentioned that caffeine positive effect in intense exercise is controversial, but no negative effect is exist. Therefore, it is suggested that caffeine can be ergogenic in exercise lasting at least 60 seconds. Furthermore, Magkos and Kavouras (2004), underlines the caffeine ingestion effect on exhaustion that caffeine can increase time to exhaustion during submaximal exercise bouts lasting approximately 30–60 minutes. Speed and power output during such activities may also improve.

There are so many effects of caffeine. In this study we concentrate on the caffeine effects on anaerobic performance. Ergogenic effects of caffeine are known. But the ergogenic effect of caffeine and its mechanism of action on short-term, high-intensity exercise are controversial (Greer et al. 2006).

Many of the studies in literature focused on the acute effects of caffeinated coffee or caffeine drug on anaerobic and aerobic performance. Results of many studies show that there are no acute effects of caffeine on anaerobic performance (Hoffman et al., 2007; Greer et al., 2006; Greer et al., 1998).

In addition these studies Roberts et al. (2007), found no JavaFitTM Energy Extreme effects on the results of Wingate test. JavaFitTM Energy Extreme (JEE, Javalution Coffee Co, Fort Lauderdale, FL) is a functional gourmet coffee that contains a proprietary blend of caffeine, garcinia cambogia, chromium polynicotinate, and citrus aurantium, and is marketed to increase energy expenditure.

Some studies are focused on the aerobic effects of caffeine. Coso et al. (2008), investigated the effect of water, carbohydrate, and caffeine ingestion on fatigue was determined during prolonged exercise in the heat. They stated that caffeine ingestion (6 mg-kg-3 body weight) maintains maximum voluntary contraction and increases maximal cycling power despite dehydration and hyperthermia during prolonged exercise in the heat environment. Furthermore, maximal leg force increases by increasing voluntary activation when caffeine ingestion is combined with water and carbohydrate.

Graham et al. (1998), underlines the endurance and metabolism changes during exercise when caffeine ingestion is applied that other compounds in coffee act to antagonize the responses observed when caffeine is ingested independent of coffee.

Thus, while the exercise effects of caffeine have been studied during submaximal and maximal exercise bouts, it is currently unknown how two weeks coffee ingestion affects anaerobic performance. Therefore, the aim of this study was to investigate the effects of coffee ingestion on maximal anaerobic performance in male and female coffee drinkers. Furthermore, we also examined affects of coffee ingestion on anaerobic exercise performance during a Wingate cycle ergometer test.

The purpose of this study was to determine the effect of caffeine ingestion on anaerobic exercise performance in male and female coffee drinkers.

2. METHODS

Subjects

Ten males (23.1 ± 1.8 years, 176.2± 0.05 cm, 67.9 ± 7.9 kg, BMI 19.3±1.7) and seven females (23.6 ± 9.9 years, 163.2 ± 0.5 cm, 54.5 ± 20.3 kg, BMI 16.6±6.1) volunteered for the current study. After procedure explanation of research, each subject gave his or her written informed consent to participate for the current study. Local Ethic Comity approved research protocol. Subjects also were asked to avoid from taking any other nutritional supplements or ergogenic aids during the 10 days of the research. Female subjects were not menstruation period.

Determination of Hydration Levels

Scientists and clinicians prefer circulatory and urinary indices to identify dehydration (Grandjean et al., 2000). The aim of pre-hydrating is to start the activity normal plasma electrolyte levels. Dehydration increases physiologic strain as measured by core temperature, heart rate and perceived exertion responses during exercise-heat stress (Sawka et al.. 2007)

So hydration level was determined from urine sample of subjects via refractometer. Subjects who have 1000-1020 hydration levels were included in this study.

Experimental Design

Subjects reported to the Human Performance Laboratory on 2 separate occasions. During the first and second visit, subjects performed 30-second Wingate anaerobic power test. Prior to the start of the test, the subjects were instructed to pedal as fast as possible from the beginning and to attempt to maintain maximum pedal speed throughout the test. At the command ‘‘go,’’ the subjects began pedaling as fast as possible against a low resistance that was increased to 7.5% of the subject’s body weight within 2–3 seconds (Beck et al 2006). In a randomized and double blind design, 9 subjects consumed coffee (3 mg caffeine/kg/day) and 8 subjects consumed decaffeinated coffee for ten days between two Wingate test.

Harland., (2000) pointed out that the amount of caffeine in a “cup” of coffee, tea, or hot chocolate is surprisingly change even though it is prepared by the same person and with the same equipment and ingredients every day. So caffeine ratio in caffeinated coffee and decaffeinated coffee was analyzed in pharmacognosy laboratory. Amount of coffee was determined according to caffeine ratio results individually. Eight subjects consumed caffeinated coffee and control group (nine subjects) consumed decaffeinated coffee. Additionally, heart rate (HR), systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured before and after wingate test.
Ten days after the first trial, participants performed the second trial under the same conditions as in the first. Tests were applied before and after coffee consumption.

To analyze anaerobic power performance, all subjects performed the Wingate anaerobic power test (Monark 874 E). After a warm-up period of 5 minutes of pedaling at 60 rev.min^{-1} the subjects pedaled for 30 seconds at maximal speed against a constant force. Peak power, mean power, time to peak power, total works were determined. ‘‘Peak power’’ was defined as the highest mechanical power output elicited during the test. ‘‘Mean power’’ was defined as the average mechanical power during the 30-second test.

Statistical Analyze

Non-Parametric Wilcoxon Signed Ranks Test were applied between pre and post-tests of the groups.

3. RESULTS

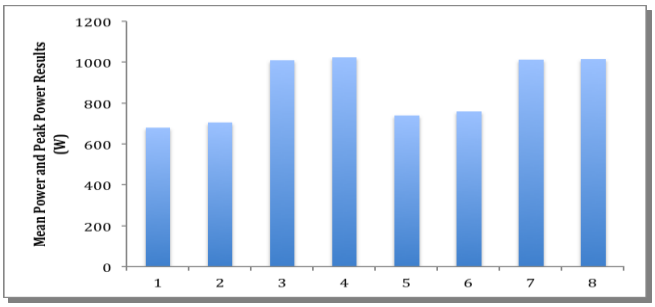
Comparisons of performance results of the wingate test were shown in **Graph 1**. Results of this study indicated that mean power and peak powers both increase in caffeinated coffee group when compared to baseline.

Mean power of coffee consumers groups: pre test, post test responses (679 ±50; 705±57) (p=.028, Z=-2.191[b] (b. Mean power results of post tests are higher than pre test results)).

Mean power of decaffeinated coffee consumers groups: pre test, post test responses (740 ±73; 760±92) (p=.063, Z=--1.859[b]).

Peak power of coffee consumers groups: pre test, post test responses (1010 ±15; 1023±15) (p=.005 Z=-2.812).

Peak power of decaffeinated coffee consumers groups: pre test, post test responses (1012 ±18; 1015±22) (p=.128, Z=-1.521[b]).



Graph 1. Comparison of Performance Results of Wingate Test

1: Mean power of coffee consumers groups (Pre Test)

2: Mean power of coffee consumers groups (Post Test)

3: Peak power of coffee consumers groups (Pre Test)

4: Peak power of coffee consumers groups (Post Test)

5: Mean power of decaffeinated coffee consumers groups (Pre Test)

6: Mean power of decaffeinated coffee consumers groups (Post Test)

7: Peak power of decaffeinated coffee consumers groups (Pre Test)

8: Peak power of decaffeinated coffee consumers groups (Post Test)

4. DISCUSSION

The results of this study indicate that long term coffee with caffeine consumption significantly increase anaerobic performance when compared with decaffeinated coffee. Peak power is more increased than mean power of coffee with caffeine consumers.

Acute caffeine ingestion does not appear to increase one's maximal ability to generate power during short-term cycling exercise (Williams et al., 1988). Results are not supported with this study. The reasons of this situation can be the difference of exercise and coffee consumption protocol. Duration of exercise and whether caffeine ingestion acute or long term can affect the results.

Roberts et al. (2007), investigated the effects of JavaFit Energy extreme functional coffee on aerobic and anaerobic fitness markers in recreationally-active coffee consumers. They found no significant differences between treatments were observed in regards to all of the criterion measures during the Wingate test. Hoffman et al. (2007), also investigated the effects of JavaFit Energy extreme functional coffee on aerobic and anaerobic exercise performance. They also found no significant difference between coffee and placebo ingestion in any of the power performance measures. Greer et al. (1998) searched the caffeine effects during repeated Wingate test. They found that caffeine ingestion did not have any effect on power output (peak or average) in the first two Wingate tests and had a negative effect in the latter two exercise bouts. The performance results are not consistent with this reported by Greer et al. (1998). Bell et al. (2001) investigated the effect of caffeine and ephedrine ingestion on performance of anaerobic exercise. After ephedrine and ephedrine + caffeine ingestion power early in the ride significantly increased compared with the trials when ephedrine was not ingested and caffeine ingested. Greer et al. (2006), found that caffeine increased peak power and mean power. But this effect was not significant. According to the results of Beck et al. (2006), ingestion of the caffeine containing supplement resulted no effect on peak power and mean power.

Literature shows no acute effects of caffeine on anaerobic performance (Roberts et al., 2007; Hoffman et al., 2007; Greer et al., 1998; Bell et al., 2001; Greer et al., 2006; Beck et al. 2006). We sought to examine long time effects of caffeine. It can be the reason of the difference of results of our study and literature.

Doherty et al. (2004), searched the acute effects of caffeine on power output during high intensity cycling. They found that mean power output increased after caffeine ingestion when compare with placebo. So even though the results of studies are supported each other measurement protocols were different.

As a conclusion it can be said that long time coffee with caffeine ingestion has a positive effect on anaerobic performance.

5. REFERENCES

Bell, D.G., Jacops, I., Ellerington, K. (2001). Effect of caffeine and ephedrine ingestion on anaerobic exercise performance, *Medicine and Science in Sports and Exercise*, 33(8): 1399-1403.

Beck, T.W., Housh, T.J., Schmidt, R.J., Johnson, G.O., Housh, D.J., Coburn, J.W., Malek, M.H. (2006). The acute effects of a caffeine containing supplement on strength, muscular endurance, and anaerobic capabilities, *Journal of Strength and Conditioning Research*, 20(3), 506-510

Cohen J. (1988). *Statistical Power Analysis for the Behavioral Sciences*, 2nd edn. Hillsdale, NJ: Lawrence Erlbaum.

Desbrow, B., Biddulph, C., Devlin, B., Grant, G.D., Anoopkumar-Dukie, S., Leveritt, M.D. (2012). The effects of different doses of caffeine on endurance cycling time trial performance, Journal of Sports Sciences, 30(2), 115–120.

Doherty, M., Smith, P.M., Hughes, M.G., Davison, R.C.R. (2004). Caffeine lowers perceptual response and increases power output during high intensity cycling, *Journal of Sport Sciences*, 22, 637-643.

Graham TE. (2001). Caffeine and exercise: metabolism, endurance and performance. *Sports Med*, 31(11), 785-807.

Graham, T.E., Hibbert, E., Sathasicam, P. (1998). Metabolic and exercise endurance effects of coffee and caffeine ingestion. *Journal of Applied Physiology*, 85, 883-889.

Grandjean, A.C., Reimers, K.J., Bannick, K.E., Haven, M.C. (2000). The Effect of Caffeinated, Non-Caffeinated, Caloric and Non-Caloric Beverages on Hydration. *Journal of the American College of Nutrition*, 19(5), 591–600.

Greer, F., McLean, C., Graham, T.E. (1998). Caffeine, performance, and metabolism during repeated Wingate exercise tests, *Journal of Applied Physiology*, 85, 1502-1508.

Greer F., Morales, J., Coles, M. (2006). Wingate performance and surface EMG frequency variables are not affected by caffeine ingestion, *Applied Physiology of Nutrition and Metabolism*, 31, 597-603.

Harland, B.F. (2000). Caffeine and Nutrition, *Nutrition*, 16(7/8), 522-526.

Hoffman, J.R., Kang, J., Ratamess, N.A., Jennings, P.F., Mangine, G.T., Faigenbaum, A.D. (2007). Effect of nutritionally enriched coffee consumption on aerobic and anaerobic exercise performance. *Journal of Strength and Conditioning Research*, 21(2), 456–459.

Hindmarch, I., Rigney, U., Stanley, N., Quinlan, P., Rycroft J., Lane, J. (2000). A naturalistic investigation of the effects of day-long consumption of tea, coffee and water on alertness, sleep onset and sleep quality. *Psychopharmacology*, 149, 203–216.

Lane, S.C., Hawley, J.A., Desbrow, B., Jones, A.M., Blackwell, J.R., Ross, M.L., Zemski, A.J., Burke, L.M., (2014). Single and combined effects of beetroot juice and caffeine supplementation on cycling time trial performance, Appl. Physiol. Nutr. Metab., 39**,** 1050–1057.

McDaniel, L.W., McIntire, K., Streitz, C., Jackson, A., Gaudet, L., (2010) The effects of caffeine on athletic performance, College Teaching Methods & Styles Journal, 6 (1), 33-38

Magkos, F., Kavouras, S.A. (2004). Caffeine and Ephedrine Physiological, Metabolic and Performance-Enhancing Effects. *Sports Med*, 34(13), 871-889.

Pallares, J.G., Fernandez-Elias, V.E., Ortega, J.F., Munoz, G., Munoz-Guerra J., Mora-Rodriguez, R., (2013) Neuromuscular Responses to Incremental Caffeine Doses: Performance and Side Effects, Med. Sci. Sports Exerc., 45(11), 2184–2192.

Roberts, M.D., Taylor, L.W., Wismann, J.A., Wilborn., C.D., Kreider, R.B., Willoughby, D.S. (2007). Effects of ingesting JavaFit Energy Extreme functional coffee on aerobic and anaerobic fitness markers in recreationally-active coffee consumers. *Journal of the International Society of Sports Nutrition*, 4(25), 1-7.

Sawka, M.N., Burke, L.M., Eichner, E.R., Maughan, R.J., Montain, S.J., Stachenfeld, N.S. (2007). Exercise and fluid replacement, *Medicine and Science in Sport and Exercise*. 39(2), 377-390.

Spriet, L.L. (2014). Exercise and Sport Performance with Low Doses of Caffeine, Sports Med., 44(2), S175–S184

Williams, J.H., Signorile, J.F., Barnes, W.S., Henrich, T.W. (1988). Caffeine, maximal power output and fatigue. *British Journal of Sports Medicine*. 22(4), 132-134.

EFFECTS OF ECCENTRIC TRAINING ON THE MECHANICAL AND GEOMETRICAL PROPERTIES OF THE MUSCLE-TENDON PLANTAR FLEXORS SYSTEM

Ben Jeddou I.[1], Ben Salah F. Z.[1] , Arfa Y.[2] , Dustin c.[1].

[1] Service of physical medicine and rehabilitation functional of the National Orthopaedic Institute "Mohamed KASSAB" (KSAR SAÏD, TUNIS).

[2] Institut supérieur de Sport et Education Physique -Ksar Saïd, University of Manouba-Tunis.

yessinearfa@gmail.com

Abstract

Aim: Determine the adjustments to the structures of the musculo-tendinous system of the Plantar flexors of the ankle 10 weeks of eccentric training, as well as the geometry of the triceps surae and muscles of the tendon of Achilles and the mechanical properties of the elastic components of the rheological model of Zajac (1989).

Methods and equipment: Sixty two topics were randomly distributed in a training group (GE, *n* = 31, 5 beginnings, 6 boxers, 5 wrestlers, 7 jumpers in lengths and 8 basketball: 20.9 ± 2.6 years, 178.1 ± 8.3 cm, 68.4 ± 9.2 kg) and a group control (GC, *n* = 31, students of the Military Academy of sports: 23.6 ± 1.8 years, 176.6 ± 11.4 cm 72.0 ± 7.7 kg). All subjects were involved in regular sporting activity (10.5 ± 6.2 hours per week) and have not changed their usual activity during the duration of the study. The 3 experimental sessions were carried out in random order one to two weeks before the start of the training Protocol (pre-test) then a week after the end of the 10 weeks of training (post-test).

Parameters studied: Characterization of the geometry of the muscles of the triceps surae, tendon of Achilles and the stiffness of these and properties mechanical tendon and the stiffness of the PRC.

Results: The results showed that the mechanical properties of the tendon and muscle adapt specific and different way depending on the type of training to optimize the transmission process of skeletal muscle tension and storage-restitution of the elastic potential energy during movement.

Conclusion: The 10 weeks of eccentric training did not alter performance vertical relaxation, flexibility, and strength of the trained subjects. Despite this lack of evolution of functional parameters, eccentric training would induce rather at the level of the intrinsic mechanical properties of muscle tissue (decrease in stiffness of these1) on the mechanical and geometrical properties of the tendon. The nature of the adaptations of the mechanical properties of the muscle and the tendon is associated with a change in intrinsic mechanical properties of muscle and tendon tissue rather than a change to the level of the geometric parameters of the muscle and the tendon.

Keywords: Eccentric training, flexibility, elastic component, musculo-articular stiffness, muscle architecture, dissipated energy.

1. INTRODUCTION

A muscle contraction is eccentric when the mechanical stress imposed on a muscle or muscle group is greater than the force generated by all of the motor units activated involving an increase in the length of the SMT (Enoka, 1996). During this process, the SMT absorbs mechanical energy developed by external work and dissipate this energy as heat with a functioning similar to a shock absorber (Cavagna et al., 1994; Dickinson et al., 2000). Stresses induced by eccentric exercise ranged from strengthening and stretching of the structures of the SMT (Allison and Purdam, 2009). This type of exercise is typically used in the context of training and programs for functional rehabilitation (Figure 1) (Stanish et al. 1986; Alfredson et al., 1998). In addition, changes in the functional behavior of the GTS after eccentric training could be explained by a change in its mechanical and/or geometric properties. The studies presented in this review will concern, insofar as possible, the effects of purely eccentric training (implying that axcentriques shares) on the Plantar flexors of the *vivo*ankle. Studies in animals will be also used to support the assumptions associated with potential physiological mechanisms involved in mechanical and geometrical properties changes observed.

Figure 1: Type of eccentric exercise performed during a rehabilitation program in the context of the treatment of tendinitis of the Achilles (Alfredson et al., 1998).

Data from the literature show that the eccentric training improves performance in force (Duclay et al., 2009). This increase in performance was often associated with an optimization of the nervous mechanisms (modification of muscle activation patterns) and adaptations of mechanical properties of the SMT (stiffness). Similarly to the effects of eccentric on the mechanical properties of the SMT, the assumption of a specific and different from the elastic components of the SMT adaptation was issued in previous work (Pousson et al.., 1990).

Thus, we present in this study the known potential adaptations associated with eccentric training on: *i*) functional performance (strength, flexibility), *ii*) muscle geometry (architecture, Casa, volume) and tendon (CSA, length) and, *iii*) at the level of the elastic components of the model of Zajac (1989) (stiffness of these and the CEP).

1. Effects of eccentric on functional parameters

1.1 The vertical relaxation

Unlike the plyometric training, eccentric exercises promote the power dissipation of the SMT (Cavagna et al., 1994; Dickinson et al., 2000). The performance of relaxation are therefore much less increased after a strength compared to a workout training plyometric (Baker, 1996; Hawkins et al., 2009). Thus, it has been shown that jump squat performance increased from 2 to 3 cm after a workout to eccentric dominant. Whereas the functional role of the eccentric contraction and the need to reuse the elastic potential energy stored by the structures of the SMT to allow a maximum vertical jump performance, eccentric training is very little used in the context of the development of the vertical jump.

1.2 Flexibility

The ankle joint flexibility is not a parameter classically evaluated after eccentric training. It has however been shown that maximum range of motion of the ankle determined dorsal flexion and leg extended increased significantly by about 6 ° after an eccentric Protocol of 6 weeks (Mahieu et al. 2008).

On the other hand, 12 weeks of eccentric training were not sufficient to increase the range of motion of ankle dorsiflexion in patients with tendinopathy (Silbernagel et al., 2001). As previously mentioned, the stresses induced by eccentric exercise ranged from strengthening and stretching of the structures of the SMT (Allison and Purdam, 2009). So similar (to the study of Mahieu et al. (1998)) the flexibility of the ankle after a program of static stretches for 6 weeks was observed (Nelson and Bandy, 2004).

1.3 Isometric force maximum torque

To our knowledge, only two studies have tested the effects of purely eccentric training on the level of CMV in Plantar flexion and showed an increase of this parameter. Duclay and al. (2009) have shown an increase of 13% of the CMV in Plantar flexion in subjects trained in eccentric for 7 weeks confirming the increase of 22% of the CMV in Plantar flexion after 6 weeks of eccentric training (Willems and Stauber, 2002).

However, other studies carried out on other groups muscle *in vivo* or on isolated muscle enhance the effects of eccentric training on maximum force production capacity. If we consider the couple relationship of strength - angle, some authors show that eccentric training improves production force capacity at extreme angles (high muscle lengths) rather than on the entire test range (Blazevich et al. 2007). Also studies in animals show that eccentric training does not necessarily increase the maximum voltage produced by the muscle (Reich et al., 2000).

2. EFFECTS OF TRAINING ON THE GEOMETRY OF SMT

2.1 The triceps surae muscles

Beyond 6 to 8 weeks of training, the improvement of production capacity of force would, regardless of the mode of training (concentric, eccentric and isometric or coupling concentric-eccentric), increased muscle mass (Moritani and deVries, 1979) involving mainly muscle hypertrophy provided that the request is sufficient (Wernbom et al.., 2007).

Muscle hypertrophy in humans is the result of the increase of the muscle fiber CSA. Preferentially affected by muscle hypertrophy fibers are fibers of type II (Hather et al., 1991). The hypertrophic muscle potential is thus linked to the proportion of type II fibres already present within muscle (Hather et al., 1991). The typological changes induced by eccentric training are similar to those caused by other strength training programs, it means increasing the share of intermediate type muscle fibers in muscle (IIa, IIa/IIb) up to 12% of the initial level (Hortobagyi et al., 1996a). Hypertrophy of the muscle fibers can lead to an increase in overall Casa of the muscle but also a change in the muscle architecture.

2.2 Achilles tendon

Although most studies have shown that training in force had no effect on the CSA of the tendon (Kubo et al. 2001a; Kubo et al. 2002b. Hansen et al., 2003; Reeves et al. 2003 a), an increase of the volume of the Achilles tendon has been shown by MRI after 3 months of eccentric training using exercises prescribed by Alfredson et al. (1998) this volume increase was explained by potential hyperemia and/or an increase in the water content of the tendon after training (Shalabi et al.., 2004). In addition, a study on the effects of eccentric training involving heavy loads showed an increase of CSA of the patellar tendon after 12 weeks but only at the level of inserts of the tendon, and not in its central part (Kongsgaard et al.., 2007). Langberg and al. (2007) have also highlighted, after 12 weeks of eccentric exercises, an increase in the synthesis of collagen type I, main component of the tendon tissue, without increase of the degradation processes, within the injured tendon in patients with tendinopathy.

3 Effects of training on the mechanical properties of these

To our knowledge, only one study has evaluated the effects of purely eccentric training on the mechanical properties of the these (Pousson et al. 1990). This study showed an increase in the stiffness of the these, determined by the *quick release*method after 6 weeks of eccentric training of flexor of the elbow for torque strength values relatively low (30 and 45% of CMV) but not to force higher torques (60 and 80% of CMV). However, the authors could not determine if specific adaptations of the fractions active (these1) and passive (these2) of these had occurred.

3.1 Active fraction of these (etuc1)

Characterization of the mechanical properties of these 1 is very difficult *in vivo*, and to our knowledge, no study has evaluated the effects of purely eccentric training on the specific mechanical properties of this component *in vivo*. However, from the data obtained on isolated muscle, it is possible to make some additional hypotheses on the effects associated with eccentric training on the stiffness of the active fraction of these.

3.2 passive fraction of the these (these2) / of the Achilles tendon

Training most often generates an increase in stiffness of Achilles (Magnusson et al., 2003b; Reeves et al. 2003b; Kubo et al. 2006; Burgess et al., 2007). Only two studies have evaluated the effects of eccentric training on the stiffness of Achilles (Mahieu et al., 2008; Duclay et al., 2009). The study of Duclay et al. (2009) showed a significant increase of approximately 20% of the Achilles tendon stiffness after 7 weeks of training. In a less obvious way, a tendency to the insignificant increase in the stiffness of the Achilles tendon was determined by Mahieu et al.. (2008) after 6 weeks of training. Can noted that a study evaluating the effects of ballistic stretching 6 weeks showed a significant decrease in stiffness of the tendon (Mahieu et al., 2007).

The objective of the eccentric contraction to dissipate the elastic energy, no study reported the effects of this type of Protocol on the CD of the Achilles tendon. It may be noted that some authors have reported a decrease in the energy dissipated by the tendon after strength training and stretching chronic (Kubo et al. 2002a protocols; Kubo et al. 2002b. Reeves et al., 2003b).

4 Effects of training on the stiffness of the CEP

Effects of eccentric training on the passive mechanical properties have been evaluated in only one study in humans. Thus, a decrease of 23% of the torque force passive resistive during dorsiflexion of the ankle has been characterized after 6 weeks of eccentric training (Mahieu et al., 2008), showing an adaptation of the overall mechanical properties of the CEP of the ankle Plantar flexors.

1. Materials and methods

1.1 Population

Sixty two subjects have volunteered to participate in this study and were randomly distributed in a training group (GE, n = 31, 5 beginnings, 6 boxers, 5 wrestlers, 7 jumpers in lengths and 8 basketball: 20.9 ± 2.6 years, 178.1 ± 8.3 cm, 68.4 ± 9.2 kg) and a group control (GC, n = 31, students of the Military Academy of sports: 23.6 ± 1.8 years) (, 176.6 ± 11.4 cm 72.0 ± 7.7 kg). All subjects were

involved in regular sporting activity (10.5 ± 6.2 hours per week) and have not changed their usual activity during the duration of the study.

1.2 Eccentric training Protocol

Eccentric training program was based largely on the Protocol of plyometric training, where possible (subjects not realizing that eccentric contraction of the jumps below). More specifically, the subjects of the GE performed: *i)* exercises described by Alfredson et al. ((1998) (figure 1), and *ii)* functions below (i.e., from a platform whose height varies between 40 and 80 cm). For all the eccentric exercises, subjects had to achieve eccentric actions on the right leg or both legs, and then perform the concentric action with left leg only. The progression of training was conducted in terms of volume (number of exercises per session, number of eccentric exercise solicitations) and intensity (height of the functions below, exercises on one or two supports). The Protocol of eccentric training lasted 10 weeks and included 24 hour sessions for a total of approximately 4800 eccentric contractions (from 200 to 600 eccentric contractions by sessions).

1.3 Experimental protocol

The objective was to include the most relevant tests in two experimental sessions of reasonable duration (less than or equal to 1 h 15'). For studies assessing the effects of workouts eccentric and eccentric, the global protocol was thus consists of 2 sessions including various tests: 1) characterization of the geometry of the triceps surae muscles (architecture and Casa: anatomical cross-sectional), of the Achilles tendon (CSA: Surface cross section and length) and these: stiffness of elastic component series (etuc1 and CES2 stiffness dissociation) and 2) the evaluation of the mechanical properties of the tendon (stiffness and dissipative properties) and the stiffness of the CEP: parallel elastic component (dissociation of the stiffness of pec1 and pec2). A third session was then designed to assess performance in vertical jump. These 3 sessions were conducted in random order one to two weeks before the start of the training Protocol (pre-test) then a week after the end of the 10 weeks of training (post-test). The tests were as far as possible at the same time of day in pre-test and post-test.

The experimental protocol was identical to that used in a plyometric training. However, an additional measurement of the surface of section of the tendon (CSAT SO) was realized at the level of the insertion of the Achilles tendon on the SO under the same procedure used for the measurement of CSAT.

2 analysis Statistics

After checking the normality of the distribution data, parametric statistical tests were conducted using Statistica software ® software (Statsoft Inc., Tulsa, OK, had). Analysis of variance for repeated two-factor (group × test) measures was used to evaluate changes in performance in vertical jump as well as all of the listed parameters. A Newman-Keuls post-hoc analysis was performed if necessary. The threshold of significance was set at $P < 0.05$

3. RESULTS

3.1 Functional parameters

Table 1: Performance in vertical jump training and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

GE GC

Pre-test post-test pre-test post-test

	GE		**GC**	
	Prétest	**Posttest**	**Prétest**	**Posttest**
SJ (cm)	32.1 ± 4.4	34.7 ± 6.7	34.6 ± 6.4	35.2 ± 6.9
CMJ (cm)	40.3 ± 6.8	41.6 ± 6.5	40.1 ± 6.5	39.9 ± 5.7
Multibond (cm)	25.6 ± 4.3	25.0 ± 4.1	26.2 ± 3.7	23.0 ± 5.4
DJ (cm)	37.0 ± 8.5	40.7 ± 6.8	35.6 ± 6.3	36.7 ± 5.8

SJ: jump squat, CMY: counter movement jump, multibond, DJ: jump below (50cm), GE:

Group training, GC: control group. Mean ± standard deviation.

There is no interaction between the factors "group" and "test" for SJ, the CMJ and the multibond after 10 weeks of eccentric training ($P > 0.05$). However, it may be noted a trend towards the increase in performance by DJ for GE ($P = 0.10$). Relaxation test results are presented in table 1.

Table 2: Maximal voluntary Contraction and rate of climb in maximum force for training and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		GC	
	Prétest	**Posttest**	**Prétest**	**Posttest**
CMV (N.m)	136 ± 22	132 ± 26	129 ± 18	127 ± 17
RTDmax (N.m.s-1)	1536 ± 297	1515 ± 319	1437 ± 335	1394 ± 316

CMV: maximal voluntary contraction, RTD max: rate of climb in maximum force, GE: Group Training, GC: control group. Mean ± standard deviation.

No significant changes at the level of the CVMP and the RTD Max was found (P > 0.05). The values of CMV and RTDmax are presented in table 2

Table 3: Maximum Amplitudes of the ankle for the training group and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		GC	
	Prétest	**Posttest**	**Prétest**	**Posttest**
RoMT FP (°)	61.4 ± 5.7	63.4 ± 4.2	58.8 ± 9.1	57.6 ± 7.8
RoMT FD (°)	49.1 ± 4.2	52.4 ± 6.0	50.2 ± 8.0	49.4 ± 6.6
RoMF FD (°)	60.0 ± 6.3	62.2 ± 6.5	56.6 ± 10.0	56.4 ± 11.2

RoM T FP: maximum amplitude of the measured ankle leg cocked in plantar flexion, RoM T FD: Maximum amplitude measured ankle leg cocked in dorsiflexion, RoM F FD: amplitude Maximum ankle knee flexed to 80 ° in dorsiflexion, GE: Group training, GC: control group. Mean ± standard deviation.

There is no interaction between factors 'group' and 'test' for RoM T FP and RoM F FD after the 10 weeks of eccentric training (P > 0.05). However, it may be noted a trend towards the increase of RoMT FD for GE (P = 0.07). The results of flexibility are presented in table 3

3.2 Geometry of the muscle-tendon of the triceps surae system

3.2.1 Achilles tendon

Table 4: Lengths, maximum elongation and cross sectional area of the tendon of Achilles for the training group and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		GC	
	Prétest	**Posttest**	**Prétest**	**Posttest**
LT GL (mm)	222 ± 19	219 ± 19 †	220 ± 16	220 ± 16
LT GM (mm)	197 ± 25	194 ± 24 †	194 ± 25	196 ± 24
LT SO (mm)	49 ± 14	48 ± 13	43 ± 15	43 ± 15
△Lmax (mm)	14.4 ± 2.6	15.2 ± 2.9	15.6 ± 2.9	15.7 ± 2.2
CSAT (mm^2)	67.6 ± 7.2	66.6 ± 10.4	59.2 ± 11.6	58.9 ± 9.2
CSAT SO (mm^2)	52.8 ± 8.6	57.0 ± 9.2	59.1 ± 9.4	55.3 ± 6.1

L T GL: length of the lateral gastrocnemius, L Achilles tendon T GM: length of the medial gastrocnemius, L Achilles tendon T SO: the Achilles of the soleus tendon length, ΔL max: maximum elongation of the tendon of the medial gastrocnemius to 90% of contraction maximum voluntary, CSA T: area of cross section of the Achilles tendon, GE: Group training, GC: control group. Mean ± standard deviation. Post-hoc † P < *0.05* analysis

Interaction between factors "group" and "test" has been found for L T GL and L T GM (P < 0.05) (table 4). For GE, significant decreases of 1.3% (i.e., 3 mm) and 1.7% (i.e., 3.5 mm) for LT GL and LT GM respectively were determined after the eccentric

training (P < 0.05) (table 4). On the other hand, no interaction was determined for the other Achilles tendon (P > 0.05) geometrical parameters even though we may note a tendency to the insignificant increase in CSAT SO of around 8.5% (P = 0.09). No significant difference was found for the whole of the geometric parameters of the tendon of Achilles GoC (P > 0.05) (table 4).

3.2.2 The lever arm

No interaction between the factors "group" and "test" found after the eccentric training for GE and the GC on the lever arm of the Plantar flexors of the ankle (P > 0.05) (Figure 2).

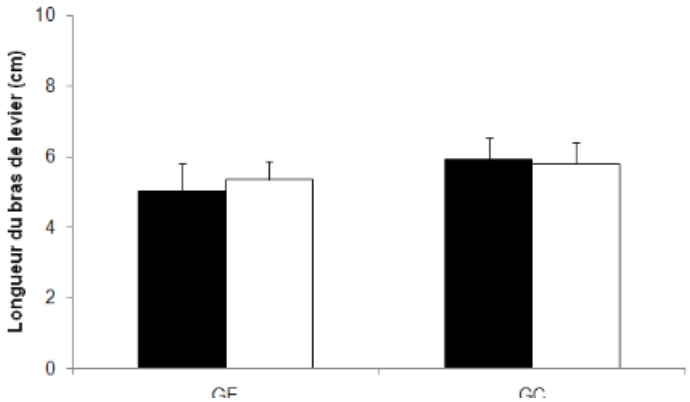


Figure 2: Length of the lever arm of the Plantar flexors for group training (GE) andthe group control (GC) (■) and after (□) 10 weeks of eccentric training.

These results show the absence of effect of eccentric training on the length of the arm of the ankle Plantar flexors.

3.2.3 Stiffness of these

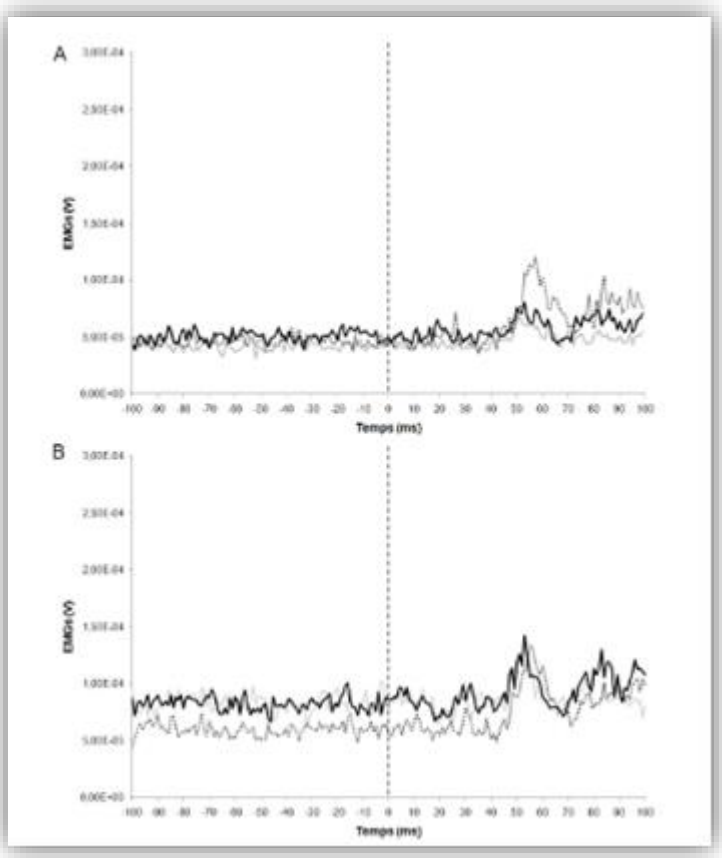


Figure 3: Relations averaged between the lateral gastrocnemius muscle EMG activity ( ), medial gastrocnemius ( ) and soleus ( ) before 100ms and after the start of

(i.e., 0) stretching for valid tests for group training before (A) and after

(B) 10 weeks of eccentric training.

To check the time of appearance of the stretch reflex, relations EMG of the muscles of the TS according to the time when the stretching associated with the SRS method are presented in Figure 3.

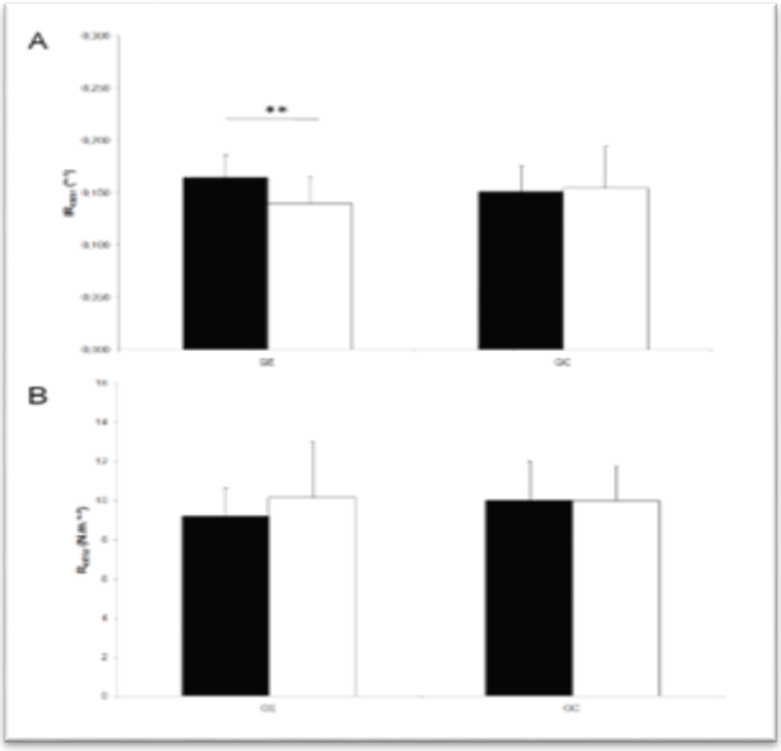


Figure 4: A - average index of stiffness of the active of the elastic component fraction series (IRCES1) and B - stiffness of the passive fraction of the elastic component series (RCES2) for the Group

Training (GE) and the control (GC) Group ( ) and after ( ) 10 weeks of training

Eccentric. * Significant difference between the pre-test and post-test (P < 0.05) values.

It not been observed change of EMG activity during the first 45 milliseconds after the onset of stretch. The activity of the TA does not change during the 100ms after the start of the stretch. Thus, reflex activity did not affect the settings characterized from the SRS method and their potential evolutions with the drive later in this chapter. The interactions between the factors "group" and "test" were found for RminIRetuc1 and Retuc1 90% ($P < 0.05$). The post-hoc analysis shows, for GE, a decrease of Rmin ($P < 0.05$) and a significant decrease of IRetuc1 and Retuc1 90% 14.2% and 11.9% respectively ($P < 0.05$) (Figure 4). No significant differences in the level of Rmax and RCES2 was found after the 10 weeks of training for the GE ($P > 0.05$).

3.2.4 Mechanical properties of the Achilles tendon

Mean relations between force and elongation of Achilles tendon for the two groups are presented in Figure 5. The application of linear regression and the Sten-Knudsen model on the relations of force-elongation of each topic for the two tests show a very good correlation coefficient (R2 way = 0.97 ± 0.02 and 0.99 ± 0.01, respectively), which allows us to identify the tendon stiffness (RTA) estimated at between 50 and 90% of the minimum CMV and Sten-Knudsen stiffness index (IRSK) before and after training.

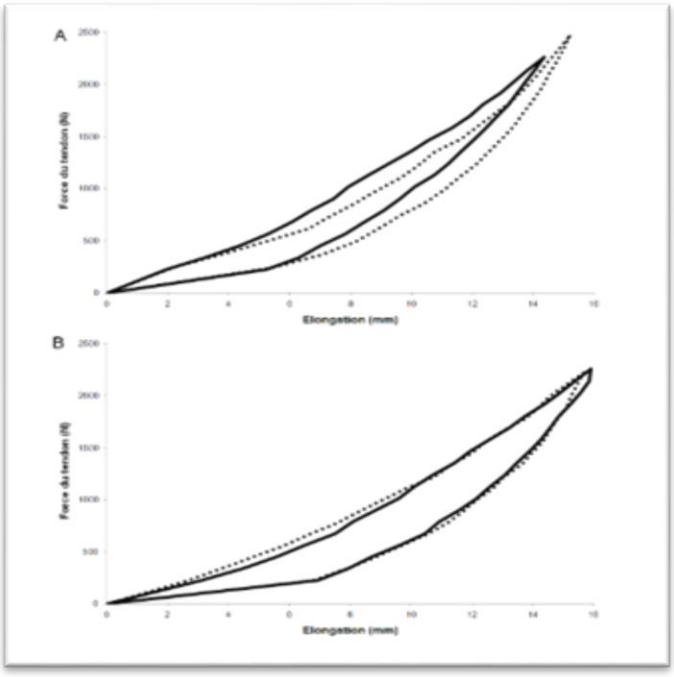


Figure 5: Average relationships between force and elongation of Achilles for the Group gear box (A) and (B) before controlled the Group ( ) and after ( ) 10 weeks of training eccentric.

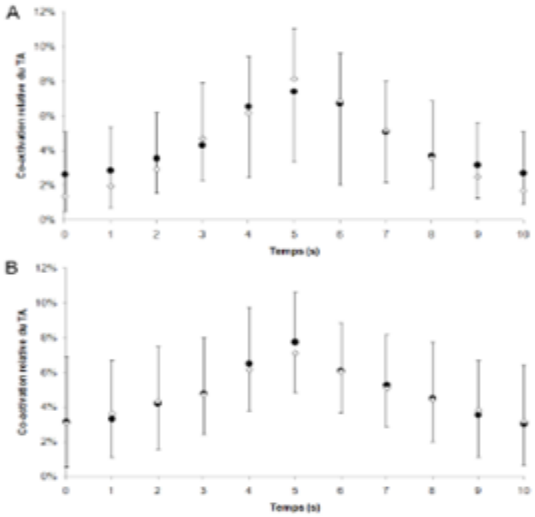


Figure 6: Average relationships between the relative of the Tibialis Anterior (TA) co-stimulation during the ramp Isometric Contraction for training (A) and (B) control group ( ) and After ( ) 10 weeks of eccentric training.

These force-length relationship were not corrected the co-stimulation of the TA during ramp contraction but this co-stimulation has not evolved significantly after 10 weeks for the GE and GC (Figure 6). The co-stimulation has no influence on potentially eccentric training effects on the mechanical properties of the tendon so characterized.

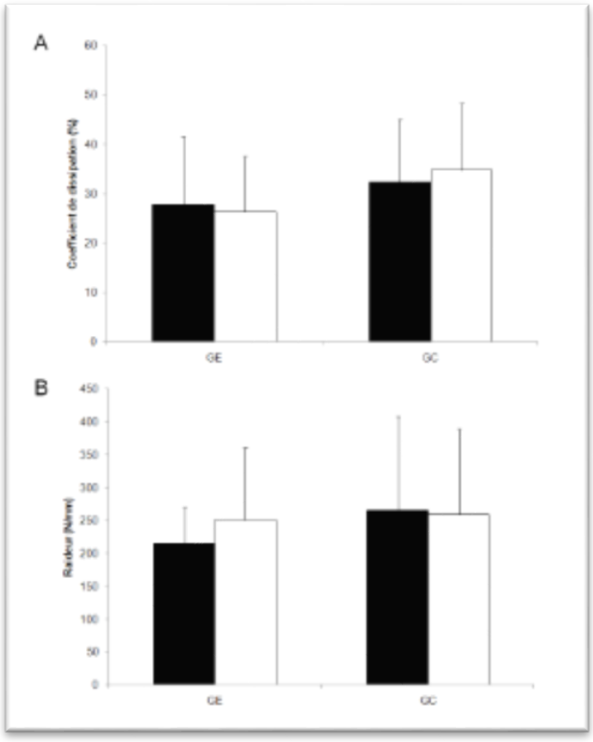


Figure 7: Average values of coefficient of dissipation (A) and (B) tendon stiffness for the Group training (GE) and the control (GC) Group ( ) and after ( ) 10 weeks eccentric training.

No interaction between factors "group" and "test" was found after the eccentric for the GE and GC for IR SK R TA R TA CSA **T** and CD ($P > 0.05$) (table 5 and Figure 7). No significant difference in the stiffness and the dissipative properties of the Achilles tendon was found after the eccentric for the GC ($P > 0.05$).

Table 5: Settings of stiffness of tendon of Achilles for the training group and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		**GC**	
	Prétest	**Posttest**	**Prétest**	**Posttest**
IRSK (mm-1)	0.076 ± 0.049	0.096 ± 0.050	0.114 ± 0.074	0.089 ± 0.065
RTA (N.mm-1)	215.8 ± 55.0	251.1 ± 109.2	265.5 ± 143.2	259.9 ± 129.9
RTA/CSA**T** (N.mm-3)	3.24 ± 0.96	3.83 ± 1.75	4.60 ± 2.39	4.53 ± 2.45

IR SK: StenKnudsen stiffness index, R TA: stiffness of the Achilles tendon, R TA/CSA T: normalized stiffness of the Achilles tendon, GE: Group training, GC: control group. Mean ± standard deviation.

The average stress-strain relations of the tendon of the GE before and after training are presented in Figure 8.

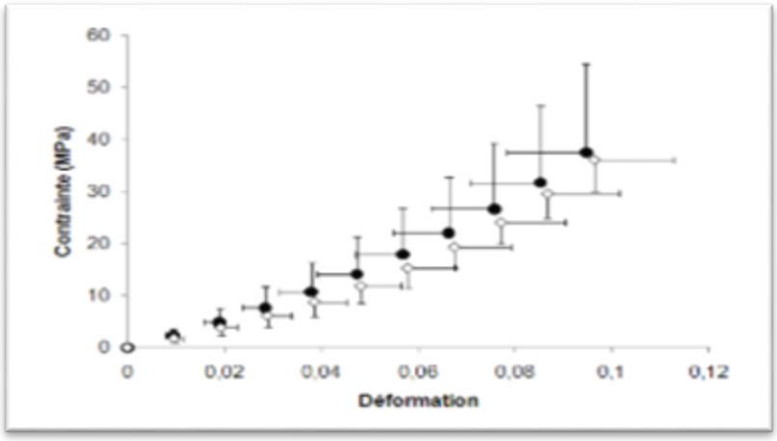


Figure 8: Average relationships between stress and deformation of the Achilles tendon for the Group before training ( ) and after ( ) 10 weeks of eccentric training.

4. STIFFNESS OF THE CEP

4.1 Relationship couple - elongation

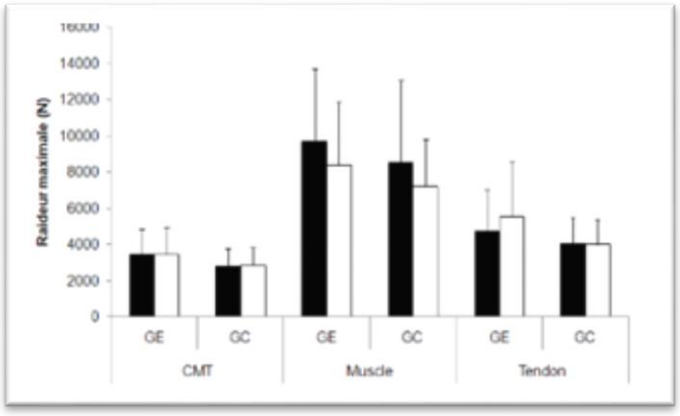


Figure 9: Average values of maximum muscle-tendon (SMT), System stiffness of the muscle and the tendon of the Plantar flexors for group training (GE) and group control (GC) Front ( ) and after ( ) 10 weeks of eccentric training.

No significant difference was found after 10 weeks of eccentric training for maximum passive stiffness of the SMT, muscle and tendon (RSMTmaxRMmax and RTmax respectively) whatever the relevant group (P > 0.05) (Figure 9).

Similarly, no significant change was observed between the pre-test and post-test for IR SMT and IR M for both groups ($P > 0.05$).

4.2 The gastrocnemius SMT force-length relationship

Table 6: Values of different mechanical parameters determined from the relationship forcelongueur of system musculo-tendon of the gastrocnemius for group training and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		GC	
	Prétest	**Posttest**	**Prétest**	**Posttest**
IRG (m-1)	87.46 ± 12.86	89.22 ± 11.22	85.32 ± 10.49	83.79 ± 15.47
RGmax (N.m-1)	62450 ± 25975	66273 ± 15705	46140 ± 16675	48254 ± 19785
L0 G (m)	0.372 ± 0.019	0.373 ± 0.018	0.371 ± 0.026	0.366 ± 0.031
LF=1 SMT (m)	0.423 ± 0.018	0.424 ± 0.017	0.423 ± 0.022	0.421 ± 0.025

IR G: passive stiffness index, R Gmax : maximum passive stiffness, L 0 G : initial length, L F = 1 SMT : length for a passive 1N force developed by the GTS of the gastrocnemius, GE: Group training, GC: control group. Mean ± standard deviation.

No significant difference was found for IR G R Gmax L 0 G and L F = 1 in the two groups considered (P > 0.05) between the pre-test and post-test (table 6).

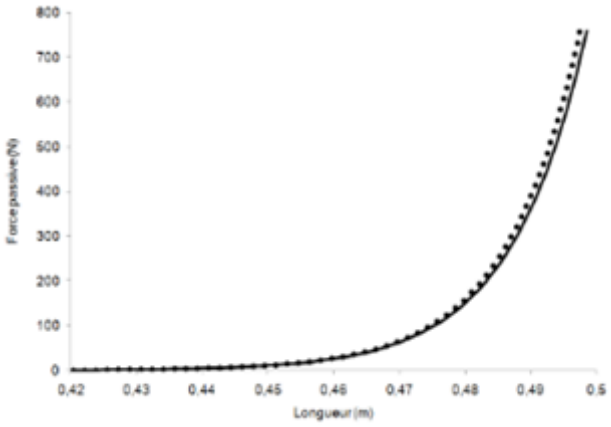


Figure 10: Average relationships between passive strength and the length of the musculo-tendon system of the gastrocnemius for the front drive Group ( ) and after ( ) 10 weeks of eccentric training.

The GE relations between force passive and the length of the GTS of the gastrocnemius for both tests are presented in Figure 10.

4.3 Force-length of the muscle and the tendon of the gastrocnemius relationships

IR G T and L 0 T increased significantly by 21.8% and 6.4% respectively for GE (P < 0.05) (table 7).

Table 7: Values of different mechanical parameters evaluated from the relationship forcelongueur of the muscle and the tendon of the gastrocnemius for group training and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		GC	
	Prétest	**Posttest**	**Prétest**	**Posttest**
IRG M (m-1)	168.1 ± 44.0	153.8 ± 27.7	152.7 ± 36.5	144.0 ± 40.2
L0 M (m)	0.216 ± 0.029	0.212 ± 0.029	0.216 ± 0.016	0.212 ± 0.022
LF=1 M (m)	0.247 ± 0.026	0.246 ± 0.027	0.251 ± 0.017	0.248 ± 0.020
IRG T (m-1)	152.9 ± 16.6	185.9 ± 32.6 †	168.0 ± 22.8	170.9 ± 36.6
L0 T (m)	0.137 ± 0.022	0.145 ± 0.024 †	0.137 ± 0.026	0.136 ± 0.032
LF=1 T (m)	0.170 ± 0.023	0.174 ± 0.024 †	0.168 ± 0.025	0.167 ± 0.028

IR G M : index of stiffness of the muscle of the gastrocnemius, L 0 M : initial length of the muscle of the gastrocnemius, L F = 1 M : length of the muscle of the gastrocnemius for a passive force of 1N, IR G T : index of stiffness of the tendon of the gastrocnemius, L 0 T : initial length of the tendon of the gastrocnemius, L F = 1 T : length of the tendon of the gastrocnemius for a passive force of 1N, GE: Group training, GC: control group. Mean ± standard deviation. Post-hoc † P < 0.05 Analysis

No significant changes were observed for IR G M and L 0 M in the two groups (P > 0.05) (table 7). Relations for the GE of the gastrocnemius muscle and Achilles tendon force-length and stress deformation are presented in Figure 11

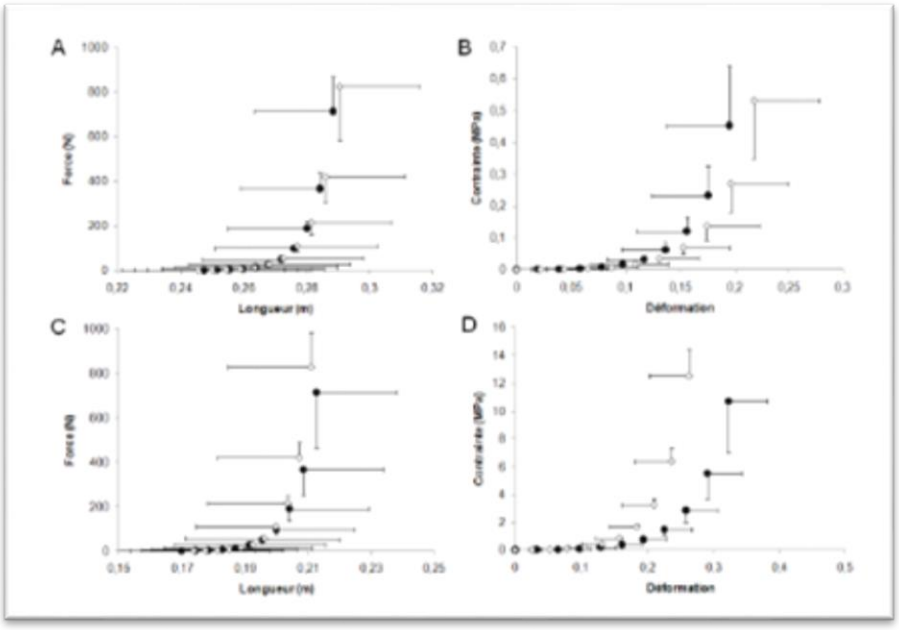


Figure 11: Average relationships between strength and length (A and C) and the stress and strain (B and D) of the gastrocnemius muscle (A and B) and Achilles (C and D) for the Group before workout ( ) and after ( ) 10 weeks of eccentric training.

5. DISCUSSION

The purposes of this study were to determine the effects of 10 weeks of eccentric training on the stiffness of the various components of the geometric model of Zajac (1989) and the properties of dissipative of the Achilles tendon. The results showed a decrease in stiffness of these1 and an increase in the stiffness of the passive of the tendon of the gastrocnemius.

5.1 Functional parameters

No significant changes of functional parameters after the 10 weeks of eccentric training was found. Trends in DJ performance increase and greater joint flexibility of the ankle were observed. These results are consistent with those of the literature that generally show a low performance scales in vertical jump (+ 2.6 cm after eccentric training (Friedmann-Bette et al., In press)). Same way, Mahieu et al. (2008) had found a tendency to the increase of flexibility (non-significant increase of 6 ° in dorsiflexion) after 6 weeks of eccentric training using exercises recommended by Alfredson et al. (1998) performance in CMV have not changed after the training period in our study, which differs from conventionally eccentric training results that show an improvement of the maximum force capacity (Duclay et al., 2009). Earnings strength are more important after eccentric training involving heavy loads and thus inducing a greater constraint (Higbie et al., 1996; Hortobagyi et al., 1996 Farthing and Chilibeck, 2003). Indeed, some studies have shown that the optimal effects of eccentric muscle solicitation on the maximum force mode occur from supramaximal or maximum loads (Johnson, 1972; Hortobagyi and Katch, 1990). Eccentric training carried out in our study mobilised no additional charges and has been done with the body weight (in order to standardize protocols plyometric workouts and eccentric). The exercises made during our eccentric training Protocol did not force maximum levels except perhaps during the receptions below. In addition, the eccentric exercises in our study were not strictly controlled (like on isokinetic cycle Ergometer or on a weight machine) and compensation during the creation of the movement might have occurred in the mobilization of the body segments (the constraint may be distributed on the knee and hip joints during these receptions below). The relatively low stress in our study level probably explains the absence of significant changes in isometric maximum force production capacity. Furthermore, it has been shown that eccentric exercise causes a shift of the relationship between the maximum force torque and joint angle after workout (Blazevich et al. 2007). Thus, the evolution of the torque force may produce significantly more extreme articular amplitudes (Talbot and Morgan, 1998; Bowers et al., 2004). However, we cannot support this hypothesis insofar as the relationship between the maximum force level and the ankle joint angle was not determined in this study.

5.2 Geometry of the muscle-tendon of the triceps surae system

Although a study on isolated muscle showed no change in the size of the muscles in rats after eccentric training (Reich et al., 2000), most of the studies being interested in the effects of eccentric training on muscle geometry, including one on the muscles of the TS (Duclay et al., 2009), showed an increase of pennation angle the length of the fascicles or Casa after this type of training therefore that the solicitation was important (Higbie et al., 1996; Blazevich et al., 2007 Duclay et al., 2009). In our study, no changes of architecture and Casa of the muscles of the TS was shown. However, an increase in the length of the gastrocnemius muscle was indirectly shown

by decreasing length of the tendons of the GL and GM after drive about 1.5% on average. This slight increase in the length of the muscle does not seem to have had an impact on the architecture of the concerned muscles.

On the tendon, structures a decrease in the length of the tendon of the gastrocnemius was characterized in our study unaltered from the CSA T. Adaptations localized CSA of the tendon had yet been shown at the level of the inserts on the bone and muscle of the patellar tendon after a slow but realized eccentric workout with heavy loads (Kongsgaard et al.., 2007). As mentioned, the CSA of the tendon is not homogeneous throughout its length and small variations in the CSA of the Achilles tendon can occur locally. Therefore, we decided to perform an additional step to also measure the CSA of the tendon insertion on the SO level. Only a trend in the increase of this tendon section was observed (P = 0.09). Also, all these results suggest that the intensity of the eccentric load applied during this training Protocol (submaximal contractions) do not constitute sufficient mechanical stress to induce changes in the geometry of muscle and tendon of the TS in subjects with regular physical activity (~ 9 h of activity per week on average). This might also explain the weak evolution of functional parameters characterized in this study (CMV, flexibility).

5.3 Mechanical properties of the these

A significant decrease in stiffness of the these for low values of torque force (30% of the CMV) has been shown in our study no change in stiffness characterized for a high level of CMV. Insofar as the geometric parameters are not changed by the completed training, changes in the behaviour of elastic components seem be explained only by changes in the intrinsic mechanical properties of underlying tissues. Although our results are different from those obtained by Pousson et al. (1990) (increase in stiffness of the these low couples for), the hypothesis issued a specific adaptation of these1 or these2 to explain our results could be tested using the method alpha.

5.4. Active fraction of the these (these1))

A decrease in stiffness of the fraction activates of the these was found in our study. It would allow the muscle more elastic energy stored during the eccentric contraction. Although the modification of stiffness of tendon / these2 was not significant after the 10 weeks of eccentric training, the decrease of stiffness of these1 could be compensated to achieve, to force high torques, non-significant changes in the overall stiffness of the these (Rmax). This decrease in stiffness of these1 and the lack of change in stiffness of these however explain the decrease of Rmin2. Some physiological mechanisms could not be evaluated in our study and already mentioned previously can, however the decrease of stiffness of these1 after training. Indeed, it has been shown that strength training increased the number of fast-twitch fibers and implied a decrease in stiffness of the muscle in the animal (Don and Marini, 1987). More specifically, eccentric training would alter the typological profile of muscle fibers by an increase in selective hypertrophy of the II fibres and increasing the share of intermediate muscle fibres in muscle IIa, IIa/IIb up + 12% of the initial level (Hortobagyi et al., 1996b). This increase in the relative number of fast-twitch fibers in the muscle would influence the mechanical properties of the muscle towards an increase in muscle compliance (Kovanen et al.., 1984 ;) Gregory et al., 2007). However, these assumptions are to be considered carefully insofar as no significant changes of muscle ACSA and CMV were found in our study.

5.5 Passive fraction of these (CES2) / of the Achilles tendon

No modification of the R CES2 and R TA has been shown after the workout in our study. An increase in the stiffness of the tendon had been determined after several protocols (Reeves et al., 2003b strength training; Kubo et al. 2006) or eccentric (Duclay et al., 2009). In effect, Duclay et al. (2009) showed increased the stiffness of the Achilles tendon after 7 weeks of eccentric training carried out in a muscle building apparatus. The authors explained this increase in stiffness by increasing the synthesis of collagen type I (Kim et al., 2002; Yang et al. 2004) based on studies carried out *in vitro*stretch-induced.

However, our results on the evolution of the stiffness of the Achilles tendon after the workout are in agreement with those of Mahieu et al. (2008) which had tested the effects of 6 weeks of eccentric training mobilizing exercises prescribed by Alfredson et al. (1998) the differences between our results, those of Mahieu et al. (2008) and those of Duclay et al. (2009) tend to show the same kind of phenomenon could occur during eccentric contractions and to impose an important to get chronic tendon stiffness changes tendinous stretch. Furthermore, any modification of the elastic potential energy dissipated by the tendon was observed in our study. We mentioned in the review of literature that some authors had obtained a reduction of the energy dissipated by the tendon after a workout in force or chronic stretching (Kubo et al. 2002; Kubo et al. 2002b. Reeves et al., 2003b). However this result seemed inconsistent with the role of the tendon energy absorber during the eccentric contraction. In our study, the CD of the Achilles tendon has not changed with the drive. Thus, the decrease in CD shown after trainings in strength or chronic stretching (Kubo et al. 2002a; Kubo et al. 2002b. Reeves et al., 2003b) could be qualified by the sink role of tendon in the eccentric contraction. On the other hand, muscle could have participated more significantly than the tendon in the dissipation of this energy during eccentric contractions.

5.6 Stiffness of the CEP

No significant change the stiffness of the rated CEP in a comprehensive manner was shown in our study. These results differ from those obtained by Mahieu et al. (2008) after 6 weeks of eccentric training which showed a reduction in the passive torque resistive product by dorsal flexion of the ankle. Yet the training protocols used in our study and that of Mahieu et al. (2008) mobilized eccentric exercises without additional charges. However, the duration of the Protocol was longer in our study (almost twice as long). Thus, changes in mechanical properties evaluated after 6 weeks of eccentric training could be compensated to the scale of the overall

assessment of the CEP by changes in mechanical properties could intervene in the longer term. We will try to explain this difference in results through the specific mechanical properties of CEP1 and CEP2 evaluated in our study.

Only adaptations notable of mechanical properties passive of the SMT after the 10 weeks of eccentric training are the increase in the index of passive stiffness of the tendon of the gastrocnemius (IRG T) and the increase of the initial length (i.e., L0 T, length for which product tendon one force passive significant resistive). The increase in the stiffness of CEP2 diverges from the evolution of the stiffness of these2. This observation also made after the 10 weeks of plyometric training clearly shows that these two parameters do not exactly match the behaviour same structures. The constraints when tested in the laboratory on the tendinous structures do not report the same mechanical properties (according to the experimental condition active or passive). Furthermore, different constraints within the tendon can induce the implementation of specific physiological mechanisms depending on the type of solicitation (contraction or passive mobilization of the joint). These specific constraints on the various parts of the tendon could lead to adaptations different properties geometric (Kongsgaard et al., 2007) or mechanical (Lyman et al., 2004) according to the considered tendon area. The tendon composed, like muscle, hierarchically, preferentially could involve different structures in active and passive conditions. Although the adaptations of the stiffness of CEP2 do not correspond to the evolution of the stiffness of tendon of Achilles and RCES2, a modification of physiological processes associated with the synthesis of collagen at the level of the tendon may be considered. Thus, an increase in the synthesis of collagen type I fibers has highlighted in the peri-tendineuse region after eccentric training (Langberg et al. 2007). This increase of collagen type I could contribute to increasing the stiffness of CEP2. Yet no change to RTmax (parameter from the couple-lengthening of tendon relationship) was found after the workout. This can be explained by the fact that in this relationship, the force overall torque is put in relation to the lengthening of the tendon of the GM. This global data and lengthening of a local association can hide the characterization of specific adaptation of the gastrocnemius mono-articulaires structures of the ankle. Indeed, one can hypothesize that the gastrocnemius and soleus muscles respond differently to the eccentric training.

On the other hand, an increase in the number of sarcomeres in series identified in animals (Proske and Morgan, 2001) and then indirectly in humans (Brockett et al., 2001) after eccentric training could occur in our study without significantly altering the length of muscle fascicle. This increase of sarcomeres in series would contribute to a small but significant increase in the length of the muscle and change the length for which the muscle or by impact, product tendon one force passive during the stretch. This increase in the number of sarcomeres in series may also explain the increase in compliance of these1. However, these assumptions are to be considered with caution because no significant changes CMV was found in our study.

Thus, the eccentric training generates different adaptations of these 1 and CEP 1 to the extent where these two elastic components of the model are not behaviours of the same structures at the muscle level (the bridges between actin and myosin for these1 mainly muscle for CEP envelopes1)).

6. CONCLUSION:

The 10 weeks of eccentric training did not alter performance vertical relaxation, flexibility, and strength of the trained subjects. Despite this lack of evolution of functional parameters, eccentric training would induce rather at the level of the intrinsic mechanical properties of muscle tissue (decrease in stiffness of these1) on the mechanical and geometrical properties of the tendon. The decrease of stiffness of these1 increase the storage of the elastic potential energy by the muscle. If more energy is stored, the muscle may also dissipate further. Thus, the muscle seems participate predominantly to the dissipation of the potential energy elastic stored and the regulation of global stiffness during the production of couples force relatively weak. On the other hand, the mechanical properties of these2 seem very little to adapt to chronic eccentric solicitation. Only increases the stiffness and the length of the tendon of the gastrocnemius index have been highlighted, which would indicate that during a passive joint and ankle muscle contraction movement of the muscles of the TS, different (with specific mechanical properties) structures may be involved and adapt differently to eccentric training.

The decrease of stiffness of these 1 would increase the storage of the elastic potential energy by the muscle. If more energy is stored, the muscle may also dissipate further. Thus, the muscle seems participate predominantly to the dissipation of the potential energy elastic stored and the regulation of global stiffness during the production of couples force relatively weak. On the other hand, the mechanical properties of these2 seem very little to adapt to chronic eccentric solicitation. Only increases the stiffness and the length of the tendon of the gastrocnemius index have been highlighted, which would indicate that during a passive joint and ankle muscle contraction movement of the muscles of the TS, different (with specific mechanical properties) structures may be involved and adapt differently to eccentric training.

7. REFERENCES:

H, Pietilä Alfredson T, Jonsson P and Lorentzon R (1998) Heavy-load eccentric calf muscle training for the treatment of chronic Achilles tendinosis. Am J Sports Med; 26 (3): 360 - 6

Allison GT and Purdam C (2009) Eccentric loading for Achilles tendinopathy-strengthening or stretching? BR J Sports Med; 43 (4): 276 - 9

AJ, Cannavan Blazevich D, Coleman Dr. and Horne S (2007a). Influence of concentric and eccentric resistance training on architectural adaptation in human quadriceps muscles. J Appl Physiol; 103 (5): 1565-75

Bowers EJ, Morgan DL and Proske U (2004) damage to the human quadriceps muscle from eccentric exercise and the training effect. J Sports Sci; 22(11-12):1005 - 14

Brockett CL, Morgan DL and Proske U (2001) Human hamstring muscles adapt to eccentric exercise by changing optimum length. Med Sci Sports Exerc; 33 (5): 783-90

Burgess KE, Connick MJ, Graham-Smith P and Pearson SJ (2007) Plyometric vs. isometric training influences on tendon and muscle output properties. J Strength Cond Res; 21 (3): 986 - 9

Cavagna GA, NC, Harry JD and Mantovani Heglund M (1994) Storage and release of mechanical energy by contracting frog muscle fibers. J Physiol; 481 (Pt 3): 689-708

Dickinson MH, Farley CT, RJ, Kassab Full MA, Kram R and Lehman S (2000) how animals move: an integrative view. Science; 288 (5463): 100-6

Duclay J, Martin A, Duclay, Cometti G and Pousson M (2009) Behavior of fascicles and the myotendinous junction of human medial gastrocnemius following eccentric strength training. Muscle Nerve; 39 (6): 819 - 27

Enoka RM (1996) Eccentric contractions require unique activation strategies by the nervous system. J Appl Physiol; 81 (6): 2339-46

Farthing JP and Chilibeck PD (2003) the effects of eccentric and concentric training at different velocities on muscle hypertrophy. Eur J Appl Physiol; 89 (6): 578 - 86

Forster, Neeson, watching M and Cornu C (2009) Effects of plyometric training on passive stiffness of gastrocnemii and the musculo-articular complex of the ankle joint. Scand J Med Sci Sports; 19 (6): 811-818

Forster A, Neeson and Cornu C (2010A). In vivo assessment of both active and passive parts of the plantarflexors series elastic component stiffness using the alpha method: a reliability study. Int J Sports Med; 31: 51 - 57

Don F and Marini JF (1987) fiber type transition and stiffness change of soleus muscle of rats trained. Pflugers Arch; 410 (3): 321 - 5

Gregory I, Morgan DL, Allen TJ and Proske U (2007) the shift in muscle's length-tension relationship after exercise attributed to increased series compliance. Eur J Appl Physiol; 99 (4): 431 - 41

H Ansen P, Aagaard P, Kjaer M, Larsson B, and Magnusson SP (2003) Effect of habitual running on human Achilles tendon load-deformation properties and cross-sectional area. J Appl Physiol. 95 (6): 2375-80

Hather BM, Tesch PA, Buchanan P and Dudley GA (1991) influence of eccentric actions on skeletal muscle adaptations to resistance training. ACTA Physiol Scand; 143 (2): 177 - 85

Hawkins SB, TL and McGuigan MR Doyle (2009) the effect of different training programs on eccentric energy utilization in college-aged males. J Strength Cond Res; 23 (7): 1996-2002

Higbie EJ, Cureton KJ, Warren GL, 3rd and Prior BM (1996) Effects of concentric and eccentric training on muscle strength, cross sectional area, and neural activation. J Appl Physiol; 81 (5): 2173 -81

Hortobagyi T, Barrier J, Beard D, Braspennincx J, P, Devita Koens P Dempsey L and Lambert J (1996a). Greater initial adaptations submaximal to muscle lengthening than maximum shortening. J Appl Physiol; 81 (4): 1677-82

Johnson BL (1972) Eccentric vs concentric muscle training for strength development. Med Sci Sports Exerc; 4 (2): 111-115

Kim SG, Akaike T, Sasagaw T, Atomi Y and Kurosawa H (2002) Gene expression of type I and type III collagen by mechanical stretch in anterior cruciate ligament cells. Cell Struct Funct; 27 (3): 139 - 44

Kongsgaard M, Reitelseder S, Pedersen TG, Holm L, Aagaard P, Kjaer M and Magnusson SP (2007) Region specific patellar tendon hypertrophy in humans following resistance training. ACTA Physiol (Oxf); 191 (2): 111 - 21

Kovanen V, Suominen H and Heikkinen E (1984) Mechanical properties of fast and slow skeletal muscle with special reference to collagen and endurance training. J Biomech; 17 (10): 725 - 35

Kubo K, Kanehisa H, Ito M, and Fukunaga T (2001a). Effects of isometric training on the elasticity of human tendon structures in vivo. J Appl Physiol; 91 (1): 26-32

Kubo K, Kanehisa H and Fukunaga T (2002a). Effect of stretching training on the viscoelastic properties of human tendon structures in vivo. J Appl Physiol; 92 (2): 595-601

Kubo K, Kanehisa H and Fukunaga T (2002b). Effects of resistance and stretching training programs on the viscoelastic properties of human tendon structures in vivo. J Physiol; 538(Pt_1):219 - 26

Kubo K, Yata H, Kanehisa H and Fukunaga T (2006) Effects of isometric squat training on the tendon stiffness and jump performance. EUR J Appl Physiol; 96 (3): 305 - 14

H, Ellingsgaard Langberg H, Madsen T, Jansson J, Magnusson SP, Aagaard P and Kjaer M (2007) rehabilitation exercise increases peritendinous Eccentric type I collagen synthesis in humans

Lyman J, Weinhold PS and Almekinders LC (2004) Strain behavior of the distal achilles tendon: implications for insertional achilles tendinopathy. Am J Sports Med; 32 (2): 457-61

Magnusson SP, P and Kjaer Hansen M (2003b). Tendon properties in relationship to muscular activity and physical training. SCAND J Med Sci Sports; 13 (4): 211-23

Mahieu NN, McNair P, De Muynck M, Stevens G, Blanckaert I, Smits N and Antony E (2007) Effect of static and ballistic stretching on the muscle-tendon tissue properties. Med Sci Sports Exerc. 39 (3): 494-501

Mabuza NN, McNair P, Cools A, Haen C, Vandermeulen of K and Antony E (2008) Effect of eccentric training on the plantar flexor muscle-tendon tissue properties. Med Sci Sports Exerc; 40 (1): 117 - 23

Moritani T and deVries HA (1979) neural factors versus hypertrophy in the time race of muscle strength gain. Am J Phys Med; 58 (3): 115 - 30

Nelson RT and Bandy WD (2004) Eccentric Training and Static Stretching Improve Hamstring Flexibility of High School Males. J athletes Train; 39 (3): 254-258

M, Van Hoecke J and Goubel Pousson F (1990) changes in elastic characteristics of human muscle induced by eccentric exercise. J Biomech; 23 (4): 343 - 8

M, Perot Pousson C and Don F (1991) Stiffness changes and fiber type transitions in rat soleus muscle produced by jumping training. Pflugers Arch; 419 (2): 127 - 30

Proske U and Morgan DL (2001) muscle damage from eccentric exercise: mechanism, mechanical signs, adaptation and clinical applications. J Physiol; 537(Pt_2):333 - 45

Reeves ND, Narici MV and Maganaris CN (2003b). Strength training alters the viscoelastic properties of tendons in elderly humans. Muscle Nerve; 28 (1): 74-81

Reeves ND, Maganaris CN and Narici MV (2003a). Effect of strength training on human patella tendon mechanical properties of older individuals. J Physiol; 548(Pt_3):971 - 81

Reich TE, Lindstedt SL, LaStayo PC and Pierotti DJ (2000) Is the spring quality of muscle plastic? Am J Physiol Regul Integr Comp Physiol; 278 (6): R1661-6

Shalabi A, Kristoffersen-Wiberg M, Aspelin P and Movin' T (2004) Immediate Achilles tendon response after strength training evaluated by MRI. Med Sci Sports Exerc; 36 (11): 1841-6

Silbernagel KG, Thomee R, P and Karlsson Thomee J (2001) Eccentric overload training for patients with chronic Achilles tendon pain - a randomised controlled study with reliability testing of the assessment methods. SCAND J Med Sci Sports; 11 (4): 197-206

Stanish WD, RM and Curwin Rubinovich S (1986) Eccentric exercise in chronic tendinitis. Clin Orthop Relat Res (208): 65 - 8

Talbot JA and Morgan DL (1998) the effects of stretch parameters on eccentric exercise-induced damage to toad skeletal muscle. J Muscle Res Cell Motil; 19 (3): 237-45

Wernbom M, Augustsson J and Thomee R (2007) the influence of frequency, intensity, volume and mode of strength training on whole muscle cross sectional area in humans. Sports Med; 37 (3): 225-64

Willems ME and Stauber WT (2002) fatigue and recovery at long and short muscle lengths after eccentric training. Med Sci Sports Exerc; 34 (11): 1738-43

Yang G, Crawford RC and Wang JH (2004). Proliferation and collagen production of human patellar tendon fibroblasts in response to cyclic uniaxial stretching in serum-free conditions. J Biomech; 37 (10): 1543-50

Zaja FE (1989) muscle and tendon: properties, models, scaling, and application to biomechanics and motor control. Crit Rev Biomed Eng; 17 (4): 359-411

RELATIONSHIPS OF PHYSICAL ACTIVITY LEVELS AND QUALITY OF LIFE BEHAVIORS OF STUDENTS

Dilek Yalız Solmaz[1], Gülsün Aydın[1]

[1]*Anadolu University, Faculty of Sport Sciences, Eskisehir/ Turkey*

E-mail: dilekyaliz@anadolu.edu.tr , gaydin@anadolu.edu.tr

Abstract

The purpose of the study was to determine the relationships of physical activity levels and quality of life behaviors of students in Anadolu University at Faculty of Sport Science, Department of Coach Training in Sports. 114 students who were educated in Department of Coach Training in Sports participated in this study. Data were collected using a personal information form, short form SF-36 and IPAQ short form. According to our research results most of the students were attending high intensity physical activities and the highest means according to with SF-6 Health Survey are physical functioning and the lowest mean is vitality status. Highest vitality values belong to 21-23 years old students. The highest general health values belong to 1st class students. Nonsmoker students had the highest physical functioning scores. But there is no significant difference between students' scores in all dimensions according to alcohol use status. As a conclusion of this study, there is a positive relationship between general health status and physical activity.

Key Words: Quality of Life, University student, Physical activity, Behavior

1. INTRODUCTION

Regular physical activity remains an important behavior for promoting health, preventing prevalent musculoskeletal disorders such as mechanical low back pain and decreasing the risk of heart diseases, hypertension, diabetes, osteoporosis, obesity … etc (Daskapan et. al., 2006). In addition, physical activity has favorable effects on blood pressure, lipid and lipoprotein profiles, weight control and body fat distribution, as well as on mental health and psychological well-being (Brown et. al., 2003). Adequate physical activity has also a critical bearing on wellbeing and quality of life (Lovell et.al. 2010).

Quality of life is defined as a conscious cognitive judgment of satisfaction with one's life (Rejeski and Mihalko, 2001). The World Health Organization defines quality of life as individuals' perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. The health related quality of life (HRQL) is a relatively new term in literature, receiving more attention in recent year. The HRQL is developed as a narrower term than the comprehensive "quality of life" terms (Latas, 2014). Health-related quality of life has also evolved to include aspects of life that affect perceived physical or mental health (Brown et. al., 2003).

Quality of life is a new research field in the postmodern world (Edvy, 2013). Over the past decades, it was shown that health-related quality of life assessments are very important in educational settings (Pekmezovic et. al, 2011).

The purpose of the present study was to determine and examine the relationships of physical activity levels and quality of life behaviors of university students in Anadolu University at Faculty of Sport Science, Department of Coach Training in Sports.

2. METHODOLOGY

Participants: 114 students who were educated in Anadolu University, Faculty of Sport Sciences and Department of Coach Training in Sports participated in this study.

Data Collection Tools: Data were collected using a personal information form, HRQL from the Medical Outcomes Survey short form-36 (SF-36) and International Physical Activity Questionnaire (IPAQ) short form. The data were gathered during 2014-2015 Academic Year.

HRQL from the Medical Outcomes Survey short form-36 (SF-36): The SF-36 Health Survey is a generic questionnaire consisting of 36 items clustered to measure eight health concepts (Lim et. al., 2008). The SF-36 was first published in 1992, respectively, with the revised version of the questionnaire published in 2000. The revised version is very similar to its original form, with major differences involving changes in item wording, revision of the response scale to incorporate a greater number of response options, and norm-based scoring (Busija et. al., 2011).

It yields an eight-scale profile of scores as well as summary physical and mental measures (Busija et. al., 2011). The Turkish validated version of the SF-36 questionnaire was applied to students. This self-administered questionnaire contains 36 questions measuring eight domains of functioning: physical functioning (PF), role- functioning/physical (RP), pain (P), emotional wellbeing (EW), role-functioning/emotional (RE), social functioning (SF), vitality (VT), and general health (GH) status. PF covers limitations in daily life due to health problems. The RP scale measures role limitations due to physical health problems. The P scale assesses pain frequency and pain interference with usual roles. The GH scale measures individual perceptions of general health. The VT scale assesses energy levels and fatigue. The SF scale measures the extent to which ill health interferes with social activities. The RE scale assesses role limitations due to emotional problems, and the EW scale measures psychological distress (Busija et. al., 2011). Each of the SF-36 subscales is scored from 0 to 100, with a higher score representing better health. The eight SF-36 scales can be summarized into a physical component summary (PCS) and a mental component summary (MCS) scores (Khanna et. al., 2010).

International Physical Activity Questionnaire (IPAQ) short form: The International Physical Activity Questionnaire (IPAQ) was developed in an attempt to standardize assessment of the prevalence of PA in different countries and cultures around the world (Ekelund et. al., 2006; Craig et. al., 2003). IPAQ is designed to assess the levels of habitual physical activity for individuals ranging from young to middle-aged adults. In addition, there are different forms of IPAQ depending on several variations which include length of questionnaire (short or long form), reference period (last 7 day or usual week) and mode of administration (self-report or interviewer-based) (Craig et. al., 2003) suggested that the last 7-day, short form of the International Physical Activity Questionnaire can be used for national and regional researches.

Analysis: In the data analysis, "frequencies, percentage, mean, standard deviation, t-test, ANOVA" were used. Moreover, Product-Moment Correlation coefficients were calculated in order to see the relationship between physical activity levels and quality of life behaviors. The significance level is accepted as .05 and .01 during the statistical analysis.

3. RESULTS

Tables which are showing about opinions of students participating on research's findings are given below.

Table 1: Demographic characteristics of participants

Variable	f	%
Gender		
Male	100	87.7
Female	14	12.3
Grade Levels		
1st class	38	33.3
2nd class	22	19.3
3rd class	36	31.6
4th class	18	15.8
Ages		
18-20 age	31	27.2
21-23 age	65	57.0
24 and over age	18	15.8
Smoking status		
Smokers	34	29.8
Non-smokers	77	67.5
Quit smoking	3	2.6
Alcohol use status		
User	49	43.0
Non-user	61	53.5
Quit using alcohol	4	3.5

According to Table 1, 12.3% of the students in the study population were female, 87.7% are male. According to the grade levels, it is observed that students are 1st class of 33.3%, 2nd class of 19.3%, 3rd class of 31.6% and 4th class of 15.8%. According to the ages, it is observed that students are 18-20 age of 27.2%, 21-23 age of 57.0% and 24 and over age of 15.8%. According to the smoking and alcohol use status %29.8 of students are smokers, % 67.5 nonsmokers, % 43 alcohol users and % 53.5 of students are non-alcohol users.

Table 2: The level of the students' physical activity

	F	%
Low Intensity	9	7.9
Middle Intensity	36	31.6
High Intensity	69	60.5

According to Table 2, when we examined the frequency and percentage distribution of students' physical activity levels who are studying at Department of Coach Training in Sports, it is determined that %7.9 of students were attending low intensity physical activity while %31.6 of them were attending middle intensity physical activity and %60.5 of them were attending high intensity physical activity.

Table 3: The level of the students' quality of life behaviors

	N	Mean	Sd
Physical functioning	114	89.21	15.79
Role functioning/physical	114	81.80	31.60
Role functioning/emotional	114	69.88	39.90
Vitality	114	65.53	14.99
Emotional well-being	114	66.91	14.48
Social functioning	114	69.41	22.00
Pain	114	77.89	20.45
General health	114	71.27	17.25

According to Table 3, when we examined students' quality of life behaviors with SF-6 Health Survey in eight domains of functioning, the highest point means belong to in physical functioning (M=89.21), role functioning/physical (M=81.80) and pain (M=77.89). the lowest point means belong to general health (M=71.27), role functioning/emotional (M=69.88), social functioning (M=69.41), emotional well-being (M=66.91) and vitality (M=65.53).

Table 4. Gender- specific mean T scores of quality of life behaviors

	Male	Female	
	Mean ± SD	Mean ± SD	*P* value*
Physical functioning	88.4 ± 16.6	95.0 ± 5.88	0.01*
Role functioning/physical	82.5 ± 31.3	76.8 ± 34.6	0.53
Role functioning/emotional	70.3 ± 39.0	66.7 ± 47.1	0.75
Vitality	65.3 ± 14.8	67.1 ± 16.8	0.67
Emotional well-being	66.3 ± 14.4	71.1 ± 15.0	0.25
Social functioning	69.3 ± 21.8	70.5 ± 24.3	0.84
Pain	78.4 ± 19.5	74.6 ± 26.9	0.53
General health	71.3 ± 17.6	71.1 ± 15.2	0.96

*Significance of difference between male and female ($P<0.05$)

According to Table 4, when male and female students evaluate quality of life behaviors scores, there is no significant difference between students' role functioning/physical (p=0.53), role functioning/emotional (p=0.75), vitality (p=0.67), emotional well-being (p=0.25),

social functioning (p=0.84), pain (p=0.53) and general health (p=0.96) according to gender. However, physical functioning mean of female students were found to have scored higher than the male ones (M=95.0 and M=88.4 respectively). Also, the difference between these scores was found to be statistically significant (p=0.01).

Table 5. Ages- ANOVA scores of quality of life behaviors

	18-20 ages	21-23 ages	24 and over age	
	Mean ± SD	Mean ± SD	Mean ± SD	*P* value*
Physical functioning	93.5 ± 9.9	87.5 ± 17.5	87.8 ± 16.7	0.20
Role functioning/physical	91.9 ± 26.1	79.2 ± 30.8	73.6 ± 39.7	0.08
Role functioning/emotional	67.7 ± 41.7	67.7 ± 40.4	81.5 ± 34.7	0.41
Vitality	64.7 ± 14.4	68.4 ± 15.2	56.7 ± 11.8	0.01*
Emotional well-being	70.3 ± 15.8	66.9 ± 14.2	61.1 ± 11.5	0.09
Social functioning	73.8 ± 26.1	67.1 ± 19.3	70.1 ± 23.5	0.38
Pain	75.4 ± 25.3	78.4 ± 18.5	80.3 ± 18.3	0.69
General health	75.5 ± 18.6	69.8 ± 16.9	69.4 ± 15.7	0.28

*Significance of difference between male and female (*P*<0.05)

According to Table 5, there is no significant difference between students' physical functioning (p=0.20), role functioning/physical (p=0.08), role functioning/emotional (p=0.41), emotional well-being (p=0.09), social functioning (p=0.38), pain (p=0.69) and general health (p=0.28) according to ages. However, there is a statistically significant difference in vitality of students according to ages (p=0.01).

Table 6. Grade Levels- ANOVA scores of quality of life behaviors

	1st class	2nd class	3rd class	4th class	
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	*P* value*
Physical functioning	94.1 ± 10.3	84.1 ± 21.7	87.2 ± 17.5	89.2 ± 10.7	0.08
Role functioning/physical	88.8 ± 29.5	71.6 ± 37.2	82.6 ± 29.8	77.8 ± 30.8	0.21
Role functioning/emotional	71.9 ± 39.9	68.2 ± 40.5	74.1 ± 39.9	59.2 ± 40.5	0.61
Vitality	66.1 ± 14.2	62.5 ± 11.4	64.7 ± 18.2	69.7 ± 13.3	0.49
Emotional well-being	70.7 ± 14.8	63.6 ± 12.6	65.1 ± 15.3	66.4 ± 13.6	0.22
Social functioning	73.0 ± 24.6	61.4 ± 12.1	70.5 ± 23.6	79.4 ± 21.5	0.25
Pain	76.0 ± 24.1	75.9 ± 18.3	81.0 ± 17.8	78.1 ± 20.2	0.71
General health	75.7 ± 18.5	63.2 ± 16.4	71.9 ± 16.7	70.6 ± 14.0	0.05*

*Significance of difference between male and female (*P*<0.05)

According to Table 6, there is no significant difference between students' physical functioning (p=0.08), role functioning/physical (p=0.21), role functioning/emotional (p=0.61), vitality (p=0.49), emotional well-being (p=0.22), social functioning (p=0.25) and pain (p=0.71) according to grade levels. However, there is a statistically significant difference in and general health of students according to grade levels (p=0.05).

Table 7. Smoking use status- ANOVA scores of quality of life behaviors

	Smoker	Non-smoker	Quit Smoking	
	Mean ± SD	Mean ± SD	Mean ± SD	*P* value*

Physical functioning	82.1 ± 18.3	92.5 ± 13.3	86.7 ± 23.1	0.00*
Role functioning/physical	78.7 ± 35.4	82.8 ± 30.4	91.7 ± 14.4	0.70
Role functioning/emotional	64.7 ± 38.4	72.3 ± 40.2	66.7 ± 57.7	0.65
Vitality	62.9 ± 15.7	66.4 ± 14.9	73.3 ± 5.8	0.36
Emotional well-being	62.5 ± 14.2	68.6 ± 14.4	74.7 ± 12.2	0.07
Social functioning	64.7 ± 22.5	71.8 ± 21.8	62.5 ± 12.5	0.25
Pain	76.4 ± 20.7	78.8 ± 20.4	71.7 ± 23.6	0.74
General health	62.6 ± 15.1	74.5 ± 16.8	85.0 ± 17.3	0.00*

*Significance of difference between male and female (P<0.05)

According to Table 7, there is no significant difference between students' role functioning/physical (p=0.70), role functioning/emotional (p=0.65), vitality (p=0.36), emotional well-being (p=0.07), social functioning (p=0.25) and pain (p=0.74) according to smoking use status. However, there is a statistically significant difference in physical functioning (p=0.00) and general health (p=0.00) of students according to smoking use status.

Table 8. Alcohol use status- ANOVA scores of quality of life behaviors

	User	Non-user	Quit using alcohol	*P* value*
	Mean ± SD	Mean ± SD	Mean ± SD	
Physical functioning	88.2 ± 15.5	90.6 ± 14.9	80.0 ± 30.3	0.35
Role functioning/physical	86.2 ± 30.6	78.7 ± 32.2	75.0 ± 35.4	0.42
Role functioning/emotional	71.4 ± 41.4	69.4 ± 38.6	58.3 ± 50.0	0.81
Vitality	63.5 ± 15.7	66.8 ± 14.8	71.3 ± 4.8	0.38
Emotional well-being	66.2 ± 15.6	67.5 ± 13.9	67.0 ± 10.0	0.90
Social functioning	74.2 ± 18.5	65.2 ± 23.6	75.0 ± 28.9	0.08
Pain	78.9 ± 17.2	77.2 ± 22.8	76.3 ± 24.3	0.90
General health	67.7 ± 15.4	74.7 ± 17.5	63.6 ± 22.9	0.07

*Significance of difference between male and female (P<0.05)

According to Table 8, there is no significant difference between students' physical functioning (p=0.35), role functioning/physical (p=0.70), role functioning/emotional (p=0.65), vitality (p=0.36), emotional well-being (p=0.07), social functioning (p=0.25), pain (p=0.74) and general health (p=0.07) according to alcohol use status.

Table 9: Correlations between sub-dimensions of quality of life behaviors and physical activity

	*r**	*P* value
Physical functioning	0.133	0.158
Role functioning/physical	0.073	0.440
Role functioning/emotional	-0.009	0.923
Vitality	-0.029	0.759
Emotional well-being	0.043	0.648
Social functioning	0.093	0.326
Pain	0.045	0.636
General health	0.199*	0.034*

*Pearson correlation coefficient

Correlation is significant at the 0.01 level.

Correlation is significant at the 0.05 level.

According to Pearson Correlation analysis, it is observed that the highest correlation is between general health perceptions (r=.199; p<0.05) and physical activity. Moreover, it has been found out that there is a positive and significant relationship between general health status (r=.199; p<0.05) and physical activity. It has also been found out that there is a positive yet no significant relationship between physical activity and physical functioning (r= .133, p>.01), role functioning/physical (r=.073, p>.01), emotional well-being (r= .043, p>.01), social functioning (r= .093, p>.01) and pain (r=.045, p>.01). It has also been found out that there is a negative yet no significant relationship between physical activity and role functioning/emotional (r= -.009, p>.01) and energy/fatigue (r= -.029, p>.01).

4. DISCUSSION AND CONCLUSION

In a summary, when we examined the physical activity levels most of the students were attending high intensity physical activities and then middle and low intensity physical activities.

According to our research results the highest means according to with SF-6 Health Survey are physical functioning and role functioning/physical status and the lowest mean is vitality status. These results are similar with the research results determined by Pekmezovic et. al (2011).

Physical functioning values of female students were found higher than the male ones. In contrast to our research results, Pekmezovic et. al (2011) mentioned that male students scored better compared to female students, in any of the eight dimensions except for the role functioning physical status and Paro et. al. (2010) determined that female students had lower physical functioning, pain, vitality, social functioning, and role emotional values than male students. According to age differences highest vitality value belongs to 21-23 years old students and then 28-20 years old, the lowest vitality value belongs to 24 years and more. The highest to lowest general health values in turn belong to 1^{st,} 3rd, 4th and 2nd class students. According to smoking status nonsmoker students had the highest physical functioning scores. But there is no significant difference between students' scores in all dimensions of SF-6 Health Survey according to alcohol use status.

According to our research results, scores of students for all SF-36 subscales are with a higher score representing better health (Khanna et. al., 2010). In contrast to our study Henning et. al. (2012) determined that all student groups examined in their study appeared to be experiencing lower levels of quality of life when compared to the general population. The same results were found in another research too. In this research the medical students showed poor HRQOL, mainly because of the mental component. Lower HRQOL was associated with FIES support, females, sleepiness, headaches and lack of regular physical activity (Lins et. al., 2015). Regular physical activity improves physical and mental health in students and regular physical activity as a part of strategies to improve the quality of life in students (Pekmezovic et. al., 2011). As a conclusion of this study, there is a positive relationship between general health status and physical activity but no significant relationship between physical activity and the other status.

5. LIMITATIONS AND FUTURE RESEARCH

The sample population of this study limited to University students in Department of Coach Training in Sports. A bigger sample that is able to represent the other universities, faculties and departments would enable the research to reach yield even more meaningful clearer and more generalized results about university students' health related quality of life (HRQL) and physical activity levels which is one of the factor effecting HRQL.

6. REFERENCES

- Brown, D.W., Balluz, L.S., Heath, G.W., Moriarty, D.G., Ford, E.S., Giles, W.H., Mokdada, A.H. (2003). Associations between recommended levels of physical activity and health-related quality of life: Findings from the 2001 Behavioral Risk Factor Surveillance System (BRFSS) survey. Preventive Medicine, 37, 520-528.
- Busija, L., Pausenberger, E., Haines, T.P., Haymes, S., Buchbinder, R., Osborne, R.H. (2011). Adult measures of general health and health-related quality of life. Arthritis Care & Research, 63(11), 383-S412.
- Craig, C.L., Marshall, A.L., Sjo¨stro¨m, M., Bauman, A.E., Booth, M.L., Ainsworth, B.E., Pratt, M., Ekelund, U,, Yngve, A., Sallis, J.F., Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. Medicine and Science in Sports and Exercise, 35, 1381-95.
- Daskapan, A., Tuzun, E.H., Eker, L. (2006). Perceived barriers to physical activity in university students. Journal of Sports Science and Medicine, 5, 615-620.
- Edvy, L. (2013). Quality of life indicators of university students in Hungary. Physical Culture and Sport Studies and Research, 58(1), 53-60.
- Ekelund U., Sepp, H., Brage, S., Becker, W., Jakes, R., Hennings, M., Wareham, N.J. (2006). Criterion-related validity of the last 7-day, short form of the international physical activity questionnaire in Swedish adults. Public Health Nutrition, 9(2), 258-265.

- Henning MA, Krägeloh CU, Hawken SJ, Zhao Y, Doherty I. (2012). The quality of life of medical students studying in New Zealand: a comparison with nonmedical students and a general population reference group. Teach Learn Med., 24(4), 334-40.
- Khanna, P.P., Perez-Ruiz, F., Maranian, P., Khanna, D. (2010). Long-term therapy for chronic gout results in clinically important improvements in the health-related quality of life: short form-36 is responsive to change in chronic gout. Rheumatology, 50(4), 740-745.
- Latas, M., Stojkoviü, T., Raliü, T., Jovanoviü, S., Špiriü, Z., Milovanoviü, S. (2014). Medical students` health-related quality of life – A comparative study. Vojnosanit Pregl, 71(8), 751-56.
- Lim, L-Y, Seubsman, S., Sleigh, A. (2008). Thai SF-36 health survey: tests of data quality, scaling assumptions, reliability and validity in healthy men and women. Health and Quality of Life Outcomes, 6(52)1-9.
- Lins, L., Carvalho, F.M., Menezes, M.S., Silva, L.P. Damasceno, H. (2015). Health-related quality of life of students from a private medical school in Brazil. Int J Med Educ., 6,149-154.
- Lovell, G.P., Ansari, W.E., Parker, J.K. (2010). Perceived exercise benefits and barriers of non-exercising female university students in the United Kingdom. Int. J. Environ. Res. Public Health, 7(3), 784-798.
- Paro, H.B.M.S., Morales, N.M.O., Silva, C.H.M., Rezende, C.H.A., Pinto, R.M.C., Morales, R.R., et al. (2010). Health-related quality of life of medical students. Medical Education, 44, 227-235.
- Pekmezovic, T., Popovic, A., Tepavcevic, D.K., Gazibara, T., Paunic, M. (2011). Factors associated with health-related quality of life among Belgrade University students. Qual Life Res., 20, 391-397.
- Rejeski, W.J., Mihalko, S.L. (2001). Physical activity and quality of life in older adults. Journals of Gerontology, 56A (Special Issue II), 23-3523.

"THE EFFECT OF USING BLOOD VESICLE-RICH PLASMA & SPECIAL REHABILITATION TRAINING ON ACCELERATING RECOVERY FROM TENNIS ELBOW INJURIES"

Mohamed Fadel Elwan

College of Physical Education & Sport Sciences. Diyala University

Abstract:

The tennis elbow injury was the center of the researcher's interest as he decided to exert his utmost effort in order to find modern therapeutic means (medical and rehabilitation training) to reach complete recovery stage from this injury. In his study, the researcher aims to define the effect of using blood vesicle-rich plasma on accelerating recovery from tennis elbow injury. In addition, the study aims to define the effect of special rehabilitation training after using blood vesicle-rich plasma on accelerating recovery from tennis elbow injury. To apply this study, the researcher selected two athletes injured with partial fracture in the tennis elbow (musculus extensor carpi radialis) who have similar injuries to overcome differences and to ensure homogeneity among sample members. The researcher used blood plasma and training as a basis for treatment and he found that blood plasma used in the form of local injection contributed to accelerate recovery of injured players and quick return to normal posture. In addition, the study found selective treatment of certain muscles or tendons to contribute to guide therapeutic work to specific points.

Keywords: blood plasma, blood vesicles, rehabilitation training, tennis elbow injuries.

1. INTRODUCTION:

With the development of science, diagnostic and therapeutic techniques at present, more awareness was created to use these techniques to their maximum limits in order to get maximum benefits. Each student utilized these techniques in his/her work field according to their specialization till maximum limits in order to benefit from scientific development and support development cycle towards advancing consistently. This depends on scientific studied method combined with researchers' creativity and passion to solve problems and shorten time in order to reach their goals and achieve their research and scientific objectives as quick as possible. These scientific researches resulted in development in all aspects of life. Therefore, the significance of the study lies in defining the effect of using modern medical techniques combined with special rehabilitation training in order to accelerate time reaching recovery from tennis elbow injury.

Problem of the Study

Sport injuries are among the worst fears of athletes and they are always described as the ghost which chases the athletes along their sport careers, especially some common injuries for a lot of athletes that stand as a stumbling block in their sport development. It is not necessary to mention many of prominent names in sport whose sporting careers ended with injuries

From previous illustration and many others, the researcher became motivated to highlight one of the common injuries and find solutions to mitigate the severity of this injury, shorten recovery time and then rehabilitate the injured area to return to sport activity with prevention from repeating this injury as a result of incomplete recovery. The tennis elbow injury was the main center of the researcher's attention and he decided to exert his utmost effort in order to find modern therapeutic means (medical and rehabilitation training) to reach complete recovery stage from this injury.

Objectives of the Study:

1- Define the effect of using blood vesicle-rich plasma on accelerating recovery from tennis elbow injury.
2- Define the effect of special rehabilitation training after using blood vesicle-rich plasma on accelerating recovery from tennis elbow injury.

Hypotheses of the Study:

1- There are statistically significant hypotheses towards accelerating recovery from tennis elbow injury after injection of blood vesicle-rich plasma at the injured place.
2- Physical training has a statistically significant effect towards accelerating recovery from tennis elbow injury after injection of blood vesicle-rich plasma at the injured place.

2. METHODOLOGY:

The researcher used the empirical method to solve problem of the study.

Sample of the Study:

The researcher selected two athletes injured with partial fracture in the tennis elbow (musculus extensor carpi radialis) who have similar injuries to overcome differences and to ensure homogeneity among sample members.

Procedures of the Study:

Procedures of the study depended on two main factors and one secondary factor:

1- Diagnosis & Medical Treatment:

With the help of a specialized medical crew, the researcher performed examination using ultrasound waves (Sonar). After a week, the researcher performed it after ensuring that there is no swelling, side effects or accompanying injuries such as skin injuries, a fracture of a part of elbow bones or bone fragments at the injured area.

10 cc were extracted from the blood of the injured person himself and then put them in a special tube. Blood was put in the centrifugal device for (5) minutes to separate blood plasma from red blood cells and then blood plasma was extracted and red blood cells were left in the tube. Next, the injured person stands on a seat and the arm is put bended on a table in a convenient way for the injured person. After that, the injured area should be sterilized with accurate detection of the injured place using the sonar device (examination device using ultrasound waves) and blood vesicle-rich plasma at the injured area using a syringe. After injection, the injured area was sterilized again to avoid any pollution that may lead to future side effects.

It was asserted to make the injured person at the sitting position and its arm by the bend posture on the table for (15) minutes. This process is repeated after one or two months since the date of performing the first injection process.

2- Prevention (Secondary) Part

The tester uses a special slap and puts it at the wrist. This slap contains a hard part at the back part of the wrist. This hard part prevents wrist movement backwards as the extensor carpi radialis brevis muscle related to the tennis elbow is the muscle responsible for wrist joint backward movement. This slap prevents any movement that may lead to late healing and allows the injured to perform the rest of moves that are not related to this muscle or the injured tendon. This slap is used at the first month of the injury in a continuous manner for 24 hours and partly at th second month not less than 12 hours daily.

3- Rehabilitation Training

Rehabilitation training starts four weeks after the date of performing injection of blood vesicle-rich plasma. This training should be very low in intensity, repetition and they aim to reduce pain. After that, average intensity training begins and according to the injured person's ability to perform them considering gradual loads (intensity and repetition) and they are divided into:

1- Flexibility Training: training of the motor rate of the elbow and wrist.
2- Strength Training:
A. Isometric Training for extending and bending muscles of the elbow and wrist.
B. Isotonic Training for extending and bending muscles of the elbow joint.
C. Muscle Strengthening Training at palm extension and contraction.

Table (1): the size of partial fracture of the extensor carpi radialis brevis muscle measured in (mm) and the amount of feeling pain during gradual loads:

	Using Blood Vesicle-Rich Plasma & Rehabilitation Training		Un-using Blood Vesicle-Rich Plasma & Rehabilitation Training	
	Tendon fracture size (mm)	Feeling pain	Tendon fracture size (mm)	Feeling pain

Week	3 mm	Intense	3 mm	Intense
Month	2 mm	Average	2.7 mm	Intense
Two months	5.8 mm	Low	2.3 mm	Average
Three month	Healing	No pain	1.8 mm	Average

Through table (1) showing the size of partial fracture at the extensor carpi radialis brevis muscle (tennis elbow injury), it can be noticed that there is a clear development in the muscle's tendon healing. After fracture length was 3 mm one week after the injury, and as a result of injecting the injured area with blood vesicle-rich plasma, its length became 2mm one month after the date of the first injection process. The rate of feeling pain also was low from very intense to average one, while the size of fracture of the muscle's tendon with the sample not injected with blood vesicle-rich plasma was 2.7 mm one month after initial diagnosis as fracture size was 3 mm with continuous feeling great pain at the injured area. This asserts the effectiveness of blood vesicle-rich plasma and its ability to accelerate healing the muscle's tendon (1).

After re-examination and diagnosis of the injured muscle's tendon two months after the initial examination date, as a result of using rehabilitation training in addition to injecting the injured area with blood vesicle-rich plasma once again, the researcher noticed that muscle tendon's healing rate increased more than previously from 2 to 5.8 mm. He also noticed that the rate of feeling pain was also low from average to lower, while the rate of healing for the muscle's tendon of the sample not injected with blood vesicle-rich plasma and not subject to rehabilitation training mush less. After fracture size was 2.7 mm one month after injury, it became 2.3 mm two months from injury and feeling pain was reduced from very intense to average one. This also asserts the role of rehabilitation training on accelerating healing in addition to blood vesicle-rich plasma (2). Moreover, table (1) also shows that in three months after initial injection of the muscle's tendon of with blood vesicle-rich plasma and continuous rehabilitation training, the injured area of the sample was re-examined and it was found that there is a complete healing of the tendon of the extensor carpi radialis brevis muscle (tennis elbow) and no pain at the injured area, while there was a 1.8 mm fracture at the muscle's tendon with average pain level at the injured area of the sample not injected with blood vesicle-rich plasma and not subject to rehabilitation training.

Thus, it became greatly evident that blood vesicle-rich plasma and rehabilitation training play a role in rehabilitation of sport injuries and great shortening of time in order to restore complete recovery from muscular tendon injuries which agrees with the study of (Bahaa Eldin Salama, 2005: 23). He says that it is necessary to use modern techniques in recovery and prevention from injury repetition such as using local blood plasma injection as it has rapid and good influence in recovery.

3. CONCLUSIONS:

- Blood plasma used as local injection contributed to accelerate recovery for the injured persons with quick return to normal position.
- The study reached a selective treatment to specific muscles or tendons and this, in turn, contributes to guide treatment work to a specific point.

4. RECOMMENDATIONS:

1- Authorizing results of the study in recovery of elbow joint injuries.
2- Applying local plasma injection on other injuries such as the knee joint.
3- Applying the study on a sample of injured females with similar cases with the possibility to compare the effect among males and females.

5. REFERENCES:

1- Bahaa Eldin Salama. (2005): "Blood Lactates", Al Maaref Press.
2- Abo Elela. (2003): "Sport Training Physiology", Cairo, Nasr Press.
3- International Journal of Clinical and Experimental Hypnosis, uk.2001

THE ROLE OF PHYSICAL EDUCATION AND SPORTS IN THE SUPPORT AND DEVELOPMENT OF SKILLS AND SOCIAL ABILITIES OF SECONDARY SCHOOL PUPILS.

Belkebiche Kada[1], Kohli Kamel [1], Mokrani Djamel[1] , Benzidane Houcine [1]

Laboratory of Programs Optimization in APS.
Institute of Sports and Physical Education, University of Mostaganem, Mostaganem, Algeria

belkbiche1@yahoo.fr kamel.76@live.com djameleps@yahoo.fr hocine76ben@yahoo.fr

Abstract:

The research aims to know the role of physical education and sports in the support and development of skills and social abilities of secondary school pupils. Where the descriptive approach was adopted for its suitability in this research on a sample of 544 male and female pupils' on wheelchairs through the 2013-2014 season, at the provinces of Mostaganem in Algeria. The used tool was a measure of skills and social abilities, which includes social mobility, response, conflict, organization, social control, social expression, and social relationship. A research tool was distributed to a sample of secondary school pupils. After statistical treatment of the raw results, the researchers concluded that the role of physical education came and sports in the support and development of these social skills of students.

Keywords: physical education and sports, skills and social abilities, Secondary school, pupils.

1. INTRODUCTION:

Physical education and sports science are considered like all other sciences have evolved, so has become an effective tool to achieve the purpose of the society is no longer as well as the concepts of organic is a set of motor skills, but it is consensual and adaptive to the individual process.

Education as a concept is the individual's interaction with the social environment in order to achieve compliance or adjustment between man and society depending on the degree of physical and spiritual development in it, and that the ultimate goal of education is a personal help for humanity to grow emotionally and socially sound, physical education and sports can develop voluntary qualities when human practice and have the moral habits that are in line with the general spirit of the community. (Badawi, 1987).

The physical education and sports as a means to achieve the purposes of the community and the idea of "sound mind in a sound body" assures us that physical education and sports are a full part of the public education and the field aims to form a decent citizen of physical, mental and emotional, as well as from the social point of view, and next to that, knowing the psychological foundations can give an analysis of the most important aspects of physical and sports activities and contribute to the careful analysis of the psychological processes of the individual.(Ben Kassed ,1998).

Individual also helps to cope with the group what to play, but a manifestation of social harmony and can brotherhood and friendship grow between people has human distinguish inclination to violence in situations of stability as they are able through activities that offer a lot to cover the needs of the individual, which represents cooperation and the sharing of love and intimacy and a sense of security within the frame work of the society in which he lives, and can achieve these needs and behaviors through play and recreation for this, the goal of physical education and sports is psychological, social and economic individual case largely service, contrary to what is thought a lot that the aim of the exercise is limited to time objects and strengthen the muscles automatically and independently In our time this is a sports activity social climate rich in terms of social development, which is one of the important and the main objectives of Physical Education and Sports, Valoncth sports are in abundance processes and social interactions, which would give the practice of sport and physical activity, a large number of social values and experiences unwanted and that develop social principles in character and help in socializing and adapt to the requirements of society and organized by social standards.

Which led educational institutions to take all this into account and make physical education and sports classes in decision-school, like the rest of the materials for deliberately making designed to facilitate the education and benefit from the process of educational curricula when you take a position in the field of school for the development of expertise engaged by students if the practical and

theoretical through their competencies and their share of physical education and sports are integrated with the rest of the material in the student service intent identifier and development to what is best.

Problematic:

The education and growth between the individual and society interaction process and through this interaction the individual benefit from the experience and expertise can or adjust his behavior and changing trends even fit with the community in which they live is the most important theoretical tendencies that are born by the individual, the tendency to play, which is a vital energy and show the latter what we call physical activity and motor sports, physical education and sports (salary, 1998).

Perhaps the consensus that physical education and sports in general are selected a number of physical activities aiming at the formation of the individual from the point of mental and emotional and social terms of activities an individual can learn the system, cooperation and courage and we can say that physical education and sports manifestation of Education and indisputable because this The kind of love for the individual species, we find a profound impact in the formation of social qualities, but in the normal profile of each individual composition because the individual is integrated module is a separate where the mind affects the body and vice versa cannot be separated from each other (Ahmed , 1991).

With this in mind and through all previous concepts proved to us that the share of physical education and sports a large impact on the social side of student service and that we decided in our search to find out the role and function of physical education and sports in highlighting and install basic social skills in the community, so ask the following formats:

* What is the role of physical education and sports in the support and development of social skills?

3. The objectives of the research:

The objectives of this research are as follows:

* highlight and identify social skills during sport practice at the high school students of both sexes male and female.

* Knowledge of the role of sports practice in the support and development of social skills for students of both sexes male and female.

2. RESEARCH METHODOLOGY:

The research methodology varies depending on the topics of research, and through the problem at hand has used the survey method.

Sample: Sample was selected at random and to disseminate the results of this, and included 544 male and female pupils' distributors at different rates and are described in the following schedule:

The number of pupil's levels / secondary school year

Table 01 shows the distribution of students according to how high schools

The number of pupils levels secondary school year	**LEVEL 1**	**LEVEL 2**	**LEVEL 3**	**ALLS**
AIN TEDLESS	35	24	19	78
KHEIR EDDINE	37	33	40	110
5 JUILLET	37	32	31	100
DJEBLI MED	36	33	42	115
MESRA	27	19	22	68
BOUGUIRAT	29	25	23	77
ALL SCHOOLS	201	166	177	544

The time domain: Embarked on a theoretical study of the search starting from November 06th, 2013 where they were gathering news article for research and arranged.

As for the field study was initiated a questionnaire and interview with students in high schools, starting on Sunday, January 21, 2014 to on Tuesday, March 13, 2014, and then we moved to the analysis and discussion to end up setting the conclusion and finish the research in the May 22, 2014.

Display and analysis of the results:

1. **Social mobility:**

Table 02: represents ratios for answers skillfully social mobility

LEVELS	Yes	No	Middle	All
LEVEL 1	66.50	10.61	22.89	%100
LEVEL 2	61.24	21.48	17.28	%100
LEVEL 3	53.11	19.40	27.49	%100

From Table 2 we note that the majority of pupils and their lineage, which was as follows 66.50% the first year, second year, 61.24%, 53.11% the third year, that share of physical education and sports contribute to the strengthening of mobility inside and outside the institution, and this, in their view to see that some of them highlight its capabilities and its importance among his colleagues during this share.

The other category of students, which were accounted for, respectively, according to levels: 22.88%, 17.27%, 27.49% believe that the share of physical education and sports somewhat to strengthen the skill mobility have contributed the remaining category, which accounted for respectively: 10.60%, 21.48%, 19.40%, see the reverse first category where the share physical education and sport do not contribute to the development of mobility skill to have. This is due to the fact that in their opinion the share entertainment no more. Ammar Bouhuth, Mohamed Mahmoud Dnibat (1995).Abdul Rahman (1992). And conclude by the results recorded in Table 02 that the share of physical education and sports contribute to the support and improvement of skill mobility among secondary.

2. **Response:**

Table 03: represents relations for answers skillfully respond

LEVELS	Yes	No	Middle	All
LEVEL 1	71.97	8.62	19.41	%100
LEVEL 2	80.32	7.84	11.84	%100
LEVEL 3	77.03	7.91	15.06	%100

From Table 03 we note that the percentages answers about skill response was as follows: 71.97% for the first year, second year 80.32% and the third year 77.03% proof that students find it easier to respond through share physical education and sports, and they see that this share will contribute to improving the skill to respond to have that in their view it is the only portion in which the professor involved and colleagues to express their opinions.

Another class of pupils and their lineage, respectively: 19.40%, 11.84%, 15.06% believe that the share physical education and sport the ease of response is simple.

The remaining group of students and their lineage was respectively 8.62%, 7.83%, 7.90% to respond in other materials are easily compared with the share of physical education and sports.

By analyzing the results of Table 03 concludes that the share physical education and sport role in improving the skill to respond to the students. Tarif Shawki Mohammed Faraj (2003) and Abbas Mahmoud Awad (995).

3. **Conflict:**

Table 04: represents relations for answers skillfully conflict

LEVELS	Yes	No	Middle	All
LEVEL 1	71.14	11.61	17.25	%100
LEVEL 2	70.28	13.46	16.26	%100
LEVEL 3	72.31	13.38	14.31	%100

Note from Table 04 that the vast majority of students who were parentage as follows: The first year of 71.14%, the second year 70.28%, the third year of 72.31% think that the share of physical education and sports cultivate some sort of ability to overcome obstacles and send them the courage and the will to overcome the others, and this according to them due to the fact that the share of physical education and sports contain exercises and games require them to the spirit of competition with colleagues.

Some students who were parentage respectively by levels: 17.25%, 16.26%, 14.31% believe that the share of physical education and sports contribute to some extent in the win over the courage and the will and the ability to overcome obstacles. Saher Ahmed Kamal (2001), and Saad Jalal (1987). The remaining students and their lineage, respectively: 11.61%, 13.45%, 13.38%, saw sharp contrast with the previous two categories because according to them seeking to share a very small size to achieve these results.

And from it we can deduct from Table 04 analysis that share physical education and sports have an impact in improving and developing the skill of the conflict.

4. Organization:

Table 05: represents relations for answers skillfully organization

LEVELS	Yes	No	Middle	All
LEVEL 1	61.11	16.91	21.90	%100
LEVEL 2	66.47	15.26	18.27	%100
LEVEL 3	65.36	11.67	12.97	%100

Note from Table 05 that most of the students who were parentage as follows: The first year of 61.19%, the second year 66.46%, the third year of 68.35% think that they have learned some of the order of the day through the share of physical education and sports and embody this organization in their interactions in the community and that the fact that the share physical education and sport contain games collectively and individually and mathematics require them to system to the fact that this organization games and other category of students and their lineage, respectively: 21.89%, 18.27%, 12.97% believe that they are sometimes only embody a organization that is in the share physical education and sport in the outside community, and that they did not learn a little something to the system of share physical education and sport the remainder of the pupils and their parentage and category respectively: 16.91%, 15.26%, 11.67%, they did not learn of any share physical education and sport system and this, in their view, the system is acquired from the environment in which they live (family, neighborhood) and not of the share physical education and sport

After analyzing the results of Table 05, we conclude that the share sport have a role in supporting and developing the skill system with high school students. Jabara the gift of a powerful (1996). Hamid Abdul Salam Zahran (1995).

5. Appreciation

Table 06: a special skill ratios answers appreciation

LEVELS	Yes	No	Middle	All
LEVEL 1	26.03	51.41	22.56	%100
LEVEL 2	30.53	56.22	13.25	%100
LEVEL 3	25.61	55.56	18.83	%100

Note from Table 06 that most of the students who were parentage as follows: The first year of 51.41%, the second year 56.22%, the third year of 55.56%, do not have the ability to lead their colleagues and take responsibility if assigned to decide whether, they can not stay calm despite harassment by others and this to the fact that this group of students have appreciated a negative other category of students have the ability to harass others to them, and their lineage, respectively: 26.03%, 30.53%, 25.61%, and this group of students to have a positive estimate.

The third category of pupils and their lineage, respectively: 22.56%, 13.25%, 18.83% only sometimes can lead the friends and share responsibility through physical education and sports.

Through our analysis of the results of Table 06, we conclude that the share of physical education and sports do not contribute to support and develop the skill of appreciation among students in the secondary.

6. Social Control:

Table 07: represents ratios for answers skillfully social control

LEVELS	Yes	No	Middle	All
Level 1	61.52	15.25	23.23	%100
Level 2	59.04	20.88	20.08	%100

Level 3	73.82	13.18	13.00	%100

Note from Table 07 that most of the students who were parentage as follows: The first year of 61.52%, the second year 59.03%, the third year of 73.82%, they can control their behaviors verbal and motor control their emotions toward their colleagues and in control of their behaviors despite provocation or inconvenience their colleagues to them and that the fact that this group has the ability to control his emotions towards others whatever harassment face.

Other class of students do not have the ability to control their behaviors verbal and motor or control their emotions toward their colleagues when harassment and provocation of others to them and their lineage respectively 15.25%, 20.88%, 13.18%, and the third group was their lineage as follows: 23.21%, 20.08%, 13.00 % can only control verbal behavior and motor and even emotions towards their colleagues, despite the provocation which may face them.

7. Social expression:

Table 08: represents relations for answers skillfully social expression

LEVELS	**Yes**	**No**	**Middle**	**All**
Level 1	73.47	13.9	13.44	%100
Level 2	69.48	18.08	12.44	%100
Level 3	68.36	11.30	20.34	%100

Note from Table 09 that most of the students who were attributed their answer is as follows: the first year 73.47%, the second year 69.48%, the third year of 68.36%, they can communicate their ideas to the professor and colleagues in the share of physical education and sports, as well as express verbally about their feelings toward their colleagues and can through share knowledge expressions suggestive of others, and this by saying that they only share other class of students was attributed their answer respectively 13.44% - 12.44% - 20.34% sometimes they can communicate their ideas to the professor and express verbally about their feelings and sometimes only able to see the expressions suggestive of colleagues. Khaireddin Ali Aweys, Essam al-Hilali (1997).Zakaria El-Sherbini, Misseriya honest (2000) and Saher Ahmed Kamal (2001).

The remaining group of students who have the opposite and this according to them to see that their ideas are not taken into account it is difficult for them to see the expressions suggestive of others and hiding their feelings towards their colleagues share during physical education and sports. Youcef harchaoui (1998). And conclude from our analysis of Table 09, the share of physical education and sports have a role in supporting and developing the skill of social expression at various levels.

8. Social relationship:

Table 09: represents relations for answers skillfully social relationship

LEVELS	**Yes**	**No**	**Middle**	**All**
Level 1	85.58	5.97	8.45	%100
Level 2	76.5	11.74	11.71	%100
Level 3	81.35	8.49	10.45	%100

Note from Table 10 that most of the students who were parentage as follows: the first year 85.57%, the second year of 76.5% and the third year of 81.35%, believe that the share of Physical Education and Sports has developed and grown their relationships with colleagues class and they have contributed to improving relations with the community to which they belong This is the fact that this group is able to form a relationship with others and other category of the view that the share of physical education and sports have not developed or develop relationships with colleagues or even improve their relationships with the community to which they belong and their lineage, respectively: 5.97%, 11.74%, 8.47%, and this group of students they do not have the ability to create or improve their relationships with others and their love of isolation and loneliness. Chaalal Abdul Majeed (1998). Saleh Ahmed Mrahab (1989).

The third category of pupils and their lineage, respectively: 8.45% - 11.74% - 10.45% only sometimes or somewhat share physical education and sports in the development and improvement and development of relationships with colleagues and the community to which they belong contributed.

3. CONCLUSIONS:

Through the results obtained by researchers at the prompt for high school students concluded the questionnaire:

* Practice of physical education and sports play an important role in the social aspect of student development.

* Physical education and sports contribute to the support and development of the majority of social skills.

* Courier despite meager share of physical education and sports, but they had great love and tendencies by students as they consider a way out of the theoretical lessons for the rest of pressure-sized materials.

* Educational process to share the good physical education and sports will inevitably lead to learning a very important social attitudes among students.

* Physical education and sport are considered fertile ground for the preparation of young people socially and educationally.

*share of Physical Education and Sports is working to highlight and support positive behaviors compared with other academic subjects for students.

* Love and tendencies of students to practice physical education and sports reflect a realistic picture of the social, especially in the field of sport socialization.

* not check appreciation skills and ability to control the self-social role reflects an important aspect as we look in the preparation of young people in the area of personal (psychological area).

* Roles of the professor and the students show us the educational and social processes nested inside educational institutions.

General Conclusion

The physical education and sports in general an important role in supporting social skills in general and almost two differ in that among the objectives of physical education and sports, social and emotional field, a field which is our intention to search because we see a great importance in highlighting the social image of the sport.

The physical education and sports as a social and as a social systems may appear to be more pronounced in the present age be associated with the cultural aspect and my values and social There is no doubt that they have a direct impact on the psychological and social status of individuals. The sport can also provide fertile ground for the upbringing of individuals socially and mathematically, and this effect may be direct by strengthening social skills or indirectly, through the trends and personal preparations for the students showed through several research and studies the health of the physical education and sports are considered as one of the determinants of socialization In leadership, the effects of the different working groups within the school environment because the sponsor provides adequate support for students to acquire many of the social skills in physical education and sports classes and mention here that physical education and sports are also considered as a factor of dynamic groups of factors.

So through this study we came to know the importance and the role of physical education and sports in the support and development of social skills when pupils class so positively on social development of skills and social abilities in schools particularly affect more than the development of the social processes, or in other words, basic social skills this without forgetting cognitive abilities and Development side kinesthetic.

Given the physical activity that the appearance of the important aspects of public education is physical and athletic and containing movements and group games and individual makes a positive impact on the social situation of the pupil aims also to create a spirit of cooperation and strengthening the relationship between the students and facilitate communication, responsiveness and preparation decent student in aspects social and unique advantage of alleviating internal conflicts particular is on the outskirts of adolescence and demonstrate the student respect and social flexibility and system and empathy trait and also contribute to the consolidation of the positive behaviors among students and works to claim for social mobility inside and outside the institution, and cultivate expression skills and settings and social assertion.

Hence the inevitability of the practice of physical activity, which has become a necessity that should be within the educational institution as a rule imposed itself as the rest of the other academic subjects they are somehow contributing to the composition of the student socially and cognitively and physically has been reached to prove it to highlight and identify social skills during sports practice and to know the role of physical education came and sports in the support and development of these social skills of students.

4. RECOMMENDATIONS:

1. Attention to social and psychological aspect of the students at this stage is important seriously.

2. Instill basic social principles and presented and discussed during physical education and sports classes.

3. Understand the social role of sport in general.

4. Work to educate students by holding lectures and seminars in educational institutions to highlight and demonstrate the role of sport in social terms.

5. Give the true image of the party professors of physical education and sports in the educational institutions that educate students and the extent of their importance and to clarify its objectives in the community.

6. Give great importance of physical education and sports by the educational system and the lifting of this article coefficient and lift the Courier her size because two hours a week is not sufficient to achieve its objectives in the adolescent well.

7. Practice in a scientific way and pedagogical non-random, and the development of physical and theoretical possibilities in the hands of Mr. Hassan and harnessed for the benefit of the student.

8. Development of school sports and this activates sports sessions to achieve more cooperation, love and integration into the community.

9. We recommend future installments students to continue research on the subject of the social role of irrigation

5. REFERENCES:

1. Abbas Mahmoud Awad (1995).socialization and underachievement" - Dar knowledge-Alexandria.

2. Abdul Hamid Sharif (1995).Physical education of the child" - Dar Al Arab renaissance.

3. Abdul Rahman (1992).world of communication" - Dar knowledge Gamaah- Egypt.

4. Ahmed Zaki Badawi (1987) Glossary of Welfare and Social Development of the terms" Dar Ketab- Egyptian and Lebanese.

5. Amin Ahmed Fawzi, Tariq Mohammed Badr al-Din (2001).the psychology of sports team" - Dar-Arab thought the first edition.

6. Ammar Bought, Mohamed Mahmoud Dnibat (1995).Research Methods and Research Methods" - Office of University Publications bin Eknon- Algeria.

7. Anwar Kholi (1990).building the foundations of physical education programs" - House thought the Arab-Cairo.

8. Anwar Kholi (1995).Origins of Physical Education and Sports" - Alawly- Edition House thought the Arab-Cairo.

9. Ben Kased Ali Haji Muhammad (1998).The impact of a proposed program for junior high in the development of some physical attributes and basic skills of players much football" - Magester- Mstganem.

10. Chaalal Abdul Majeed (1998).impediments to the exercise of extra-curricular sports activities and methods of processing. Magester- Mostaganem.

11. Fouad gorgeous, Saad Abdel-Rahman (1999).Social Psychology" - contemporary vision -dar thought-Arab Cairo.

12. Jabara the gift of a powerful (1996). Social and educational problems. House knowledge Gamaah- Alexandria.

13. Hamid Abdul Salam Zahran . (1995).Psychology growth". Ed 5. Aware Ketb- Cairo.

14. Khalil Mikhail Mouawad (1999).Social Psychology".Dar thought Gamaa- Alexandria.

15. Khaireddin Ali Awes, Essam al-Hilali (1997).Sports Meeting" - Alawly- House thought the Arab-Cairo edition.

16. Osama full salary (1998).Sports Psychology. Edition House thought the Arab-Algahrh.

17. Saher Ahmed Kamal (2001).the mental health of children" - Alexandria Center for Ktab.

18. Saad Jalal (1987). Childhood and Adolescence. Edition II-house thought the Arab-Cairo.

19. Saleh Ahmed Mrahab .Psychology of psychological adjustment and the level of ambition" - Edition Alawly- House Alaman-Rabat.

20. Salim and others (1997).The entrance to Sociology" - House Alchroq- Oman.

21. Tarif Shawki Mohammed Faraj (2003).social and communicative skills" - Studies and Research Nevsah- House Grayb- Cairo.

22. youcef Harchaoui (1998).Physical Education and Sports in the ability to focus attention and its relationship mileage driven development .Magister. University of Mostaganem.

23. Zakaria El-Sherbini, Misseriya honest (2000).The upbringing of the child and the parents to be treated in ways and face the problems" - House thought the Arab-Cairo.

The Swedish Journal Of Scientific Research

ISSN:2001-9211

Volume 2 Issue 12, December 2015

The Swedish Journal of Scientific Research (sjsr)

ISSN 2001-9211. Volume 2 . Issue 12. December. 2015

"A COMPARATIVE STUDY OF SPORT ACTIVITY CHILDREN PRACTITIONERS & NON-PRACTITIONERS (12-9 YEARS OLD) DUE TO PROFILE NET OF ANTHROPOMETRIC MEASUREMENTS"

Yasser Maauf Thanon[1], Azad Ali Hasan[1]

[1]*University of Garmiyan for Human & Sport Sciences, School of Sport Education*

yaser.thanon@yahoo.com Az_ad1984@yahoo.com

Abstract

Many scientific research and documentation of medical bodies indicate that the practice of physical activity on a regular basis are associated with many health benefits and is beneficial to the functions of the various organs of the body , people differ among themselves in terms of mental abilities , personality traits , and standards of physical and preparations , tendencies , trends , and the ability to physical performance ,And when we try to explain these differences and we measure and characterize it, we do so we have We put the phenomenon of individual differences for study and research. Individual differences be either in character type, or in the degree of the existence of such, through the views of some schools to some schools high school during the period of supervision of the students of the fourth phase in the material Tabiq researcher noted the existence of individual differences for some physical measurements, especially in the reconstruction following the primary stage, a stage of adolescence which is one of the most important stages of building physical and configured Farad researcher find out the cause of these differences and do physical activity role in the configuration of physical characteristic that leads to such a difference.The purpose of research to identify the individual differences between practitioners and non- practitioners sporting activity through the shape profile measurements of the physical network , the research sample included students study elementary, middle and they are not practitioners of sports activity was selected as the school career of Khanaqin babes practitioners of sports activity, Underwent physical measurements (main experiment) 8-11 / 2/2015 was taken (15) compared to physically between the lengths of the oceans and the thickness of fat and after processing the data statistically researcher concluded that there is excellence in physical measurements and in favor of practitioners of sports activity , the researcher recommends worthwhile lessons Sports primary and secondary schools because of their importance for the proper strength as a researcher recommends further research of other age groups.

Keywords: Practitioners, sport, activity, children, anthropometric measurements

1. INTRODUCTION

A lot of scientific researches and documents of medical authorities show that regular practice of sport activity is related to a lot of healthy benefits and this also benefits various body apparatuses (Williams & Wilkins, 2000, 2-21). Statistics issued in countries worldwide and USA show that 35% of deaths of coronary heart disease, 35% of diabetes and 32% of colon cancer are due to physical inactivity. Estimations in USA also refer that diseases related to lack of movement cause death to numbers of persons that are more in 14 doubles than deaths caused by AIDS. All of this negative effect is due to physical inactivity and the increasing role of the importance of physical activity for human life which led to issue guiding documents and scientific recommendations by many scientific associatios and health organizations asserting the importance of physical activity for health. They also recommend the necessity of practicing the minimum of activity regularly by men, women, the old and the young. People differ in terms of mental capacities, personal features, anthropometric measurements, preparations, tendencies, attitudes and the ability of physical performance. When we attempt to explain and measure these differences, by this way, we are applying individual differences under research. Individual differences are whether in the type of

characteristics or in the degree of the presence of these characteristics. The difference between length and weight is the difference in the characteristic type. Length difference is a difference in degree. Therefore, the difference between length and weight (type difference) does not subject to measurement as there is no common measurement for both of them. Anthropometric measurements are highly related to many vital fields as physical growth is related to health, social and emotional consistency for the child in middle years as well as relation with achievement and intelligence. There is also a relation between healthy children's physical and mental growth anthropometrically. In two of the best studies in this field found that there are positive relations between intelligence and a number of anthropometric measurements in ages between (2) and (17) years. As for sports, it was proven that anthropometric measurements are related to many motor capacities and distinction in different activities. Some researches proved that there is a direct relation between fist strength, length and weight. In addition, Cureton found that athletes in some games are distinguished from others in many anthropometric measurements such as trunks length, shoulder width and narrow pelvic (Hassanin 2003, 22-38).

Problem of the Study

Through viewing some secondary schools during the supervision period on 4th stage students at application stage, the researcher found that there are individual differences of some anthropometric measurements, and especially in ages that came after the primary stage which is the adolescence stage that is considered one of the most important stages of body building and formation. The researcher wanted to know the reason of these differences and the role of physical activity in special anthropometric formation that leads to such differences.

Objective of the Study

The study aims to define individual differences among practitioners and non-practitioners of physical activity for children (9-12 years old) due to profile net of morphological measurements.

Hypothesis of the Study

There are statistically significant differences between morphological measurements due to profile net among practitioners and non-practitioners of physical activity for children (9-12 years old).

2. METHODOLOGY

The researcher used the descriptive method as it is proper with the nature of the study.

Sample of the Study

The sample of the study consists of (40) students collected purposively among them 20 students were selected and the researcher ensured they are non-practitioners of sport activity. The rest of the sample (the other 20 students) selected from the football school at Khaniqin city as practitioners of sport activity.

Field Procedures of the Study

Upon taking anthropometric measurements, the following conditions should be considered:

- Measurement should be made by a similar manner in terms of measurement series.
- Using the same measurement tools.
- Measurements should be taken at the same timing daily.
- Measurements (and members of the sample wearing logn pants) (Khater & Al Bek, 1988, 88)
- Measurements of body lengths and diameters for the approximate half of a cm. In addition, body widths were measured at the approximate ml and the thickness of skin folds at the approximate ml. measurements were performed as follows and according to the series mentioned below:
- Body weight: measured through medical scale at the approximate 1/5 kg as the tested stands at the middle of scale base in a way that body weight is distributed on feet.
- Body length: measured at the standard erect posture as heels are stuck together and arms are hung at body sides. Measurement is taken by a graded wall as the wall is touched by the heels, the bottom, shoulder blades and head back and then measurement is taken at the approximate 1/5 cm.
- Arm length with palm: the distance from the lateral edge of the dorsal bend of shoulder bones till the tip of middle finger while stretched.
- Humerus length: measuring the distance from lateral top of the dorsal bend of blade bones till the elbow bend (ulna bone) which is the distance from shoulder to the elbow.
- Forearm length: measuring the distance from elbow bend of the ulna till the radius bend which is the distance from elbow to the wrist.

- Leg length: measured by counting the average between the following two measurements:
- Measuring the distance from the anterior superior iliac spine till the medial heel of tibia bone.
- Measuring the distance from the pubic symphysis till the medial heel of tibia bone.
- Thigh length: measuring the average distance of the inguinal canal till the top edge of the patella bone.
- Leg length: measuring the distance between the line of knee joint and medial heel of tibia bone putting a leg over the other.
- Chest diameter (normal): fixing a measuring tape from top back and under the axilla at the level of breast nipples. Arms should also be extended downwards noting that measurement is taken at the normal inhale posture. (Radwan, 1997, 73-99).
- Abdomen diameter: measured by putting the measuring tape horizontally at the level of the navel and the measurement is taken after normal exhale period (Khater & Al Bek, 1984, 96).
- Humerus Diameter: measured while both arms are hung from middle of the distance of lateral top of the dorsal bend and the end of lateral edge of humerus bone to make measurement spot while the arm is bent with the palm at an angle of 90 degree and the palm is pointing upwards.
- Thigh Diameter: the tested stands in a way that the distance between feet equals the width of shoulders and then measuring tape is put horizontally right at the end.
- Leg diameter: measured by putting the measuring tape around the maximum diameter of the leg. This can be obtained by moving the tape upwards and downwards till we get the required measurement.
- Thickness of skin bend at the iliac fold: this measurement is taken from the area above the forward relief of the iliac bone (right side) and at the anterior line of the axilla with a diagonal line downwards and inwards 45degrees. This fold is diagonal. The person who measures holds the skin fold from below the spot by the flow master pen and then pulls it outwards. After that, he puts caliper jaws above the vertical axis of the skin fold (Radwan, 1997: 176 – 197).
- Thickness of Skin Fold beneath Shoulder Blade: this measurement is taken from under the angle of right blade bone (from 1 to 2 cm) in a diagonal direction downwards and another one outwards with an angle of 45 degrees. This skin fold is diagonal (Hassanin, 1995: 136). In order to have accurate measurement of skin folds, the tester should follow a number of notes including accurate detection of the measured area, separating skin and adipose tissues from the body's muscular tissues in addition to the area of skin fold by the caliper and not using hand fingers. Moreover, measurement should be made at a time limit (2 – 5 sec) after putting the device at the position and then three repetitions are taken for measurement and the rate is counted. (Kir Knedal, D. et al, 168).

Designing the Profile of Anthropometric Measurements

In order to design the profile for anthropometric measurements, we have to mention the way we used through which we can define the level of measurements whether at middle, higher or less levels as well as comparing its different units.

Profile Net:

At first column, anthropometric measurements forming the profile – the rest of columns are (5). Counted profiles are presented as follows:

Average rate column – column 4 – the main column.

A. The maximum is the arithmetic mean of measurement (2/1+) the standard deviation of the same measurement.
B. The minimum is the arithmetic mean of measurement (2/1-) the standard deviation of the same measurement.
C. The minimum for columns at the right of average rate of measurement (2, 3) as order is the maximum limit of the directly previous column in order added to (0.01).
D. The maximum of columns at the right of average rate of measurement (2, 3) as order is the arithmetic mean of the sample 1h, 2h (*) consecutively.
E. The minimum of columns at the left of average rate of measurement (4, 5) as order is the maximum of each is the minimum limit of the directly previous column in order subtracted from to (0.01).
F. The minimum of the mentioned cells (4, 5) is the arithmetic mean of the sample subtracted from 1h and 2h as order.

Drawing the Individual's Profile:

In order to draw the profile, a special figure with columns should be drawn asymmetric with these established for the profile net. An individual's measurements or group averages may be set (if the needed is knowing levels of as group and not the individual) to indicate measurements at the middle of columns and due to the level position of each of them due to the asymmetric levels at the profile determined previously.

After that, points of individuals or groups are linked to form the profile net for the person or group and we became able to determine proximity of the shown anthropometric measurements units or those separated from each other or separated from the sample level on which levels of the profile were built (Khater & Al Bek, 1996: 120 – 121).

Final Application of Measurements:

Final application of measurements was performed on 8, 9, 10 and 11 of February, 2015 between 9 and 11 am following all conditions of measurement.

3. DISCUSSION AND PRESENTATION OF RESULTS:

Results:

Table (1): Arithmetic Mean and Standard Deviation S.D of anthropometric measurements for practitioners and non-practitioners of sport activity:

Anthropometric Measurements	Arithmetic Mean	Standard Deviation
Weight	37.830	7.140
Length	142.125	7.090
Arm length	58.980	3.960
Humerus length	26.410	2.160
Forearm length	22.360	2.010
Leg length	81.860	4.380
Thigh length	40.770	3.070
Foot length	23.330	1.590
Chest diameter	70.670	5.840
Abdomen diameter	65.250	6.850
Humerus diameter	21.450	2.540
Thigh diameter	40.230	4.360
Leg diameter	30.230	4.130
Thickness of skin bend at the iliac fold	10.225	6.237
Thickness of Skin Fold beneath Shoulder Blade	8.850	6.351

Based on this table, the researcher built nets for the profile levels for anthropometric measurements of practitioners and non-practitioners of sport activity.

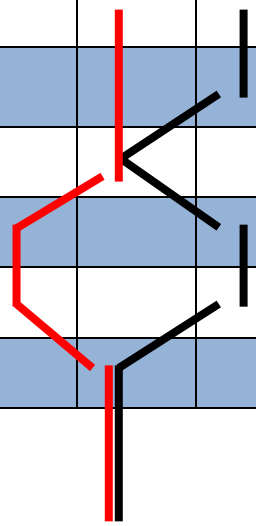
Table (2): the net of the profile of anthropometric measurements of practitioners and non-practitioners of sport activity:

Anthropometric Measurements	Very High Growth	High Growth	Average Growth	Low	Very low
Weight	44.980	41.410	34.260	34.250	30.680
	52.110	44.970	41.400	30.690	23.550
Length	149.225	145.680	138.580	138.570	135.025
	156.305	149.215	145.670	135.035	127.945
Arm length	62.950	60.970	57.000	56.990	55.010
	66.900	62.940	60.960	55.020	51.060
Humerus length	28.580	27.500	25.330	25.320	24.240
	30.730	28.570	27.490	24.250	22.090

Forearm length	24.380	23.375	21.355	21.345	20.340
	26.380	24.370	23.365	20.350	18.340
Leg length	86.250	84.060	79.670	79.660	77.470
	90.620	86.240	84.050	77.480	73.100
Thigh length	43.850	42.315	39.235	39.225	37.690
	46.910	43.840	42.305	37.700	34.630
Foot length	24.930	24.135	22.535	22.525	21.730
	26.510	24.920	24.125	21.740	20.150
Chest diameter	76.520	73.600	67.750	67.740	64.820
	82.350	76.510	73.590	64.830	58.990
Abdomen diameter	72.110	68.685	61.825	61.815	58.390
	78.950	72.100	68.675	58.400	51.550
Humerus diameter	24.000	22.730	20.180	20.170	18.900
	26.530	23.990	22.720	18.910	16.370
Thigh diameter	44.600	42.420	38.050	38.040	35.860
	48.950	44.590	42.410	35.870	31.510
Leg diameter	34.370	32.305	28.165	28.155	26.090
	38.490	34.360	32.295	26.100	21.970
Thickness of skin bend at the iliac fold	16.472	13.353	7.107	7.097	3.978
	22.698	16.462	13.343	3.988	-2.248
Thickness of Skin Fold beneath Shoulder Blade	15.211	12.036	5.674	5.664	2.489
	21.552	15.201	12.026	2.499	-3.852

According to the net of the profile at figure (1), the researcher drew the profile for practitioners and non-practitioners of sport activity:

For non-practitioners	For sport practitioners	Very low	Low	Average growth	High growth	Very high growth	**Anthropometric Measurements**
39.875	41.5						Weight
142.45	145.8						Length
59.25	58.725						Arm length
25.420	27.7						Humerus length
21.275	23.85						Forearm length
81.4	82.325						Leg length



40.55	41						Thigh length
22.8	23.875						Foot length
67.591	72.3						Chest diameter
68.3	61.2						Abdomen diameter
22.675	23.225						Humerus diameter
40.05	42.425						Thigh diameter
31.725	32.75						Leg diameter
15.5	5.95						Thickness of skin bend at the iliac fold
12.7	4.75						Thickness of Skin Fold beneath Shoulder Blade

Figure (1) shows:

Practitioners of sport activity =

Non-practitioners of sport activity =

Figure (1) shows that average measurement for practitioners of sport activity is distinguished from non-practitioners of sport activity at most anthropometric measurements (length, weight, humerus length, forearm length, chest diameter, humerus diameter, thigh diameter, leg diameter, abdomen diameter, Thickness of skin bend at the iliac fold and Thickness of Skin Fold beneath Shoulder Blade). However, practitioners and non-practitioners of sport activity came at the same level due to net profile at the following anthropometric measurements: (arm length, leg length, thigh length and foot length).

Discussing Results:

Through the figure of net profile, results of anthropometric measurements were discussed which practitioners of sport activity were distinct at. Therefore, we find that in results related to body weigh practitioners' weight came at a high level, while non-practitioners came at average growth of the net, so general result refers to an increase in practitioners' mass and weight. Body weight related to strength is one of the most important standards of anthropometric features that a sport practitioner should have (Othman, 1990: 464). As for results of body length, we find that practitioners are distinct with bigger anthropometric measurements than non-practitioners of sport activity at body length and size due to selection process (Hussein, 1979: 180). Concerning body diameters, there is an absolute increase in practitioners at diameters which means as increase in athlete's body mass as well as it is an increase in the horizontal sector that is beneficial as muscular strength is directly related with the anatomic sector of the muscle and with the size of the muscle (Radwan, 1997: 144 – 148). As for skill fold thickness and abdomen diameter, we can find that practitioners lie at the level of the net in low and very low growth as it is known that adipose increase affects the muscle capacity to contract as fats in muscular tissues helps in muscle contraction with internal fracture affecting the efficiency of the operating muscle at movement (Allawi & Radwan, 1994: 222 – 223). Results of multiple studies proved that there is an inverse relation between fat percentages in the body and sport activities. The more fat percentage in the body is, the less athletic performance will be. This is true for all sport activities that require body movement whether vertically or horizontally during playing. (Abdelfatttah & Hassanin, 1997: 380).

4. CONCLUSIONS:

1- The growth in length and weight of sport activity practitioners is higher than in non-practitioners.
2- There is a high growth at most body diameters for the sake of practitioners than non-practitioners of sport activities.
3- There is a lower growth at thickness of skin folds (fats thickness) for practitioners than for non-practitioners of sport activities.
4- There is a higher growth for abdomen diameter for practitioners than for non-practitioners of sport activities.

5. RECOMMENDATIONS:

1- The possibility of make similar research at other age classes and on females.
2- Conducting a comparative study for profile net among practitioners of individual and team sport activities.
3- Good guidance of schools towards anything related to body building of individuals.
4- The possibility to conduct comparative studies between body formation between athletes and non-athletes.

6. REFERENCES:

1- Al Tikrity, Wadia Yassin & Al Abidi & Hassan Mohamed (1999): "Statistical Applications in Sport Education Researches", 2nd Ed, Dar Al Kotob, Al Mawsel University.
2- Hassanin, Mohamed Sobhy, A. (1995): "Measurement & Evaluation in Sport Education", Part 1, 3rd Ed., Dar Al Fikr Al Arabi,Cairo.
3- Hassan, Mahrousa, Ali. (1991): "Determining Model Rates of Profile Net for some Anthropometric Measurements to Achieve High Levels of Fencing Players", Published Research at the Scientific Journal of Physical & Sport Education Researches,Vol. 13, Part 1, Studies & Research, Helwan University.
4- Hussein, Kasem Hassan. (1979): "Theoretical & Practical Basics in Track-and-Field Events for First Stages at Faculties of Sport Education", Baghdad.
5- Khater, Ahmed Mohamed & Al Bek Ali Fahmy. (1984): "Measurement in Sports", Dar Al Maaref, Al Qebla Press, Alexandria.
6- Khater, Ahmed Mohamed & Al Bek Ali Fahmy. (1996): "Measurement in Sports", 4th Ed., Dar Al Fikr Al Arabi, Cairo.
7- Radwan, Mohamed Nasreldin. (1997): "The Reference in Anthropometric Measurements", 1st Ed., Dar Al Fikr Al Arabi, Cairo.
8- Othman, Mohamed. (1990): "Encyclopedia of Athletics", Dar Al Elm for Publishing & Distribution, Kuwait.
9- Allawi, Thilam Younis. (2006): "Profile Net of Anthropometric Measurements for Long Jump Players due to the Effect on Achievement Level", Published Research, Al Rafedin Journal for Sport Sciences, Vol. 12, Issue. 40.
10- Allawi, Mohamed Hassan & Radwan & Mohamed Nasreldin. (1979): "Measurement in Sport Education & Sport Psychology", Dar Al Fikr Al Arabi, Cairo.
11- Allawi, Mohamed Hassan & Radwan & Mohamed Nasreldin. (1994): "Motor; Performance Tests", Dar Al Fikr, Amman.
12- Al Gharib, Ramzia. (1977): "Psychological & Educational Evaluation & Measurement", the Anglo-Egyptian Library, Cairo.
13- Abdelfatttah Aboelela Ahmed & Hassanin, Mohamed Sobhy. (1997): "Sports Physiology & Morphology and Measurement Methods for Evaluation", Dar Al Fikr Al Arabi, Cairo.
14- Mohamed Sobhy Hassanin. (2003): "Measurement & Evaluation in Sport Education", Part 2, 5th Ed., Cairo, Dar Al Fikr Al Arabi Press.
15- American College of Sport Medicine. ACSM s Guidelines for Exercise Testing and Prescription. Baltimore (MD): Williams and Wilkins, 2000, P. 3-21.
16- International Federation of Sport Medicine Position Statement. Physical exercise-an important factor for health. The World of Sport Med 1989, 2: 24-25
17- Kir Knedal , D and others , (1987) : Measurment and Evaluation for Physical Education , 2 ed , Human Kinetics Publisher , Inc . 168
18- Mathews, D.k (1978): Measurment Physical Education, 5 thed, Philadelphia W.B Saunders Co. p73

"DESIGNING & LEGALIZING A TEST TO MEASURE MOTOR EXPECTATION OF VOLLEYBALL PLAYER DUE TO THEIR SPECIALIZATIONS"

Muafaq Sainakh Jafar[1] Rajaa Abdelsamad Ashour[1]

[1]*Collage of Physical Education & Sport Sciences- Al Basrah University*

muafaqjafar@gmail.com dr.raja70@yahoo.com

Abstract:

This study asserted the importance of motor expectation as it is closely related to serve reception skill considering correct reception as the key to gain points. Being late in correct response in ball reception causes failure to reach the ball on time as a result of ball speed in serving skill. The significance of the study is shown in finding a test that helps players who receive the ball to make right expectation for the place of ball landing. The objective was to design and legalize a test of measuring motor expectation of volleyball players. The researchers used the descriptive method, while the sample of the study was from the 1st and premier division players.

Keywords: Test legalization, motor expectation, volleyball

1. INTRODUCTION:

Correct planning based on a scientific basis in learning and training leads to continuous and rapid development in all individual and team sports. Accordingly, trainers are interested in preparing players mentally, physically and skillfully in order to reach the highest levels and expectations that are near to factual playing conditions. Thus, sport practicing is one of the bases of success and progress as it expresses the extent of full consistency between brain and body. The relation between mental element, physical and skill performance became the point of interest for training specialists as the development of athletes depends on right expectation and elapsed time to respond this expectation. This is because any late response for a certain skill performance may cause failure in reaching the ball on time, especially in ball reception skill as a result of ball speed. Hence, the significance of the study is to find a test that helps the player who receives the ball to make right expectation and response to the ball which contributes to overcome the difficulties facing our players in reception forming a great obstacle to our volleyball teams.

Problem of the Study:

The reception skill is the cornerstone of building attack. Therefore, a receiving player has to set his expectation to receive the ball in a correct manner due to his fast response to the ball in addition to skill level that he should adopt in order to complete ball reception. This is the level of world-class teams. From this respect, researchers noticed the contrary for our local teams and even at the level of the national team that there is a clear vacillation at serve reception because of incorrect expectation of the point of ball landing, so this, in turn, leads to late response and losing a lot of points that may end the match. Here, the problem of the study emerges.

Objective of the Study:

The study aims to design and legalize a test to measure motor expectation of volleyball players.

2. METHODOLOGY:

The researchers used the descriptive method using survey as it is proper to solve the problem of the study. Van Dalen refers that: "applied researches aim to determine the nature and characteristics of some phenomena in order to determine, analyze or view the status quo to extract results and set expectations or predictions about the development of these phenomena" (63, 2).

Sample of the Study

The sample of the study is represented in a group of volleyball players (76 players) divided into two parts: design sample and legalizing sample chosen purposively from 1st division clubs including: (Abi El Khasib, Al Madina, Al Qurna, Al Gabayesh, Al Sadek) clubs taking (10) players from each club (43.956% of the studied population) as shown in table No. (1)

Table (1) Numbers and details of the studied sample

Sample of the study	The sample on which scientific basics applied		Technicians Sample		Eliminated Players	Population
	Validity	Reliability	Validity	Reliability		
76	24	12	40	43.956%	15	91

Steps of Designing the Test:

One of the main factors in designing and legalizing tests is to return to references and sources related to tests as a questionnaire was designed and presented to specialist experts.

Field Procedures of the Study:

Muafaq & Raja Test to measure expectation

- **Test Name:** Muafaq & Raja Test to measure ball expectation
- **Purpose of the Test:** measuring ball expectation
- **Tools:** legal volleyball court – 20 volleyballs – measuring tape – various tapes to plan the court – whistle – net to collect balls – a form to measure points.
- **Performance:** the tested player stands inside the court inside square No. (4), the recorder stands outside the court. Next, the recorder asks the player about his expectation of ball landing at which place on the court which is divided into multiple divisions "note that there are a lot of divisions of the court as in figure no. (1)". At the position of each division, there is a pole with a number. The player has to expect ball landing in the square in which the pole number is found and whistles to declare the start of first stage serve and so on till the end of the ten attempts. Next, the tested player says his expectation of the ball landing place at the moment of its release from the hand of the server player.
- **Counting points:** in case of ball landing anywhere, there will be a point for anywhere in which the ball lands based on the following order:

Place of ball landing	Points
- At the correct expectation place inside, outside court or at the net	- 5 points
- Besides the correct expected place	- 2 points
- Far from the correct expected place inside court	- 1 point
- Ball outside the court	- Zero
- Ball falling between two places	- The most point counts

Conditions of Testing:

1- There should be understanding from the tested persons.
2- They should understand a key for the test points.
3- There should be a preparation by the tested persons.

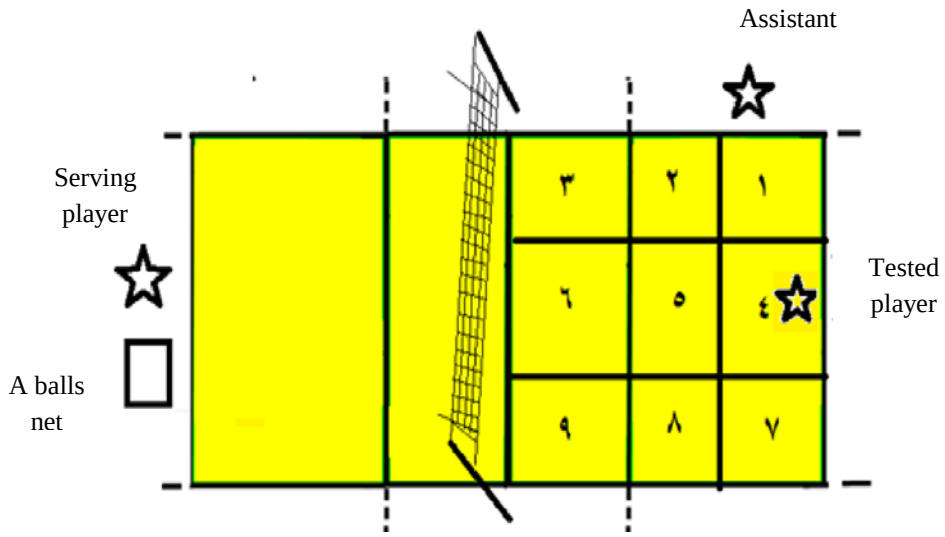


Figure (1): Planning of the volleyball court in expectation test

Exploratory Trial:

The exploratory trial was performed for the purpose of determining difficulties facing the researchers. These were very important as the researchers faced great difficulty in how to explain the test and how to start it which led to repeat the testing till a certain stage and then mastering test performance by some players (outside the sample of the study) to determine the most important difficulties including alerting players to move and stand taking the reception position in the place in which the ball lands during hearing the whistle. This was a very important point.

Coefficients of the Test

Test Reliability:

In order to ensure test reliability in the study, the researchers used retesting method on a sample consisting of 14 players representing Al Basra University volleyball team. The retesting was made after five days and correlation coefficient was counted as in table (2)

Table (2) Arithmetic mean, Standard Deviation S.D, counted and tabulated R value of the test

Statistical treatments / Variables	Measure Unit	Distinct Players		Beginners		Counted T Value	Tabulated T Value	Significance
		Mean -	S.D	Mean	S.D			
Expectation	Point	31.285	6.207	22.857	7.720	3.744	2.68	Significant

- Tabulated (T) value under significance level 0.05 and freedom degree 12 = 0.612 (7, 343).

Test Validity:

"It is the test's ability to distinguish between two logically distinct groups in terms of the measured characteristic" (166, 1), as both researchers performed the test on two even samples in number but different in levels as shown in table (3).

Table (3) Arithmetic mean, Standard Deviation S.D, counted and tabulated T value of the test

Statistical treatments / Variables	Measure Unit	1st Test		2nd Test		Counted R Value	Tabulated R Value	Significance
		Mean -	S.D	Mean	S.D			
Expectation	Point	31.167	4.427	35.917	15.253	0.811	0.612	Significant

- Tabulated (T) value under significance level 0.05 and freedom degree 22 = 2.68 (343, 3).

Objectivity:

It means of disagreement between estimators in judging a certain thing or subject (4, 22). As it is known for us, the test is clear and easy for members of the sample as it only requires a player to hear the whistle and immediately move to the expected position of ball landing which shows easy performance of the test and it is not difficult. In addition, scoring points does not contain any complexities except the place of ball landing and the place of player's expectation when moving towards it. All of these positions have points in the data recording form and there is no other explanation or understanding to the position of ball landing.

The Main Trial

The main trial was performed on 15/02/2015 till 15/03/2015 according to sample position.

Detailed presentation of the sample's members, their arithmetic means and standard deviations

Table (4) Arithmetic mean, standard deviation and number of members of the sample according to their specializations:

	Number	Expectation Test		Percentage
		Mean	S.D	
Preparing player	10	30.9	8.006	25%
High player	10	23.8	4.263	25%
Fast player	10	25.5	2.635	25%
Free player	10	30	3.197	25%
Total	40			100%

Discussion of Results of contrast analysis of the (F) counted and tabulated values of Muafaq & Raja Test to measure volleyball players' expectation

Table (4) shows that the highest expectation level emerges at the preparing player as a result of the experiences that he owns which is asserted by Wagih Mahgoub (106, 5) saying that: "the extent of expectation success is according to previous trials to a far extent and on movement analysis, so we find that motor expectation is week for beginners.

Table (5) Results of contrast analysis of the (F) counted and tabulated values of Muafaq & Raja Test to measure volleyball players' expectation

Contrast sources	Total deviation squares	Freedom degree	Average squares (contrast)	Counted (F) value	Tabulated (F) value	Significance
Inter-groups	482.9	3	160.966	6.474	2.86	Significant
Intra-groups	895	36	24.861			
Total	1377.9	39				

- Tabulated (F) value under significance level 0.05 and freedom degrees 3 and 36 = 2.86 (358, 3).

Table (5) in Muafaq & Raja to measure expectation shows that counted (F) value (6.474) is bigger in value than tabulated (F) value (2.86) at significance level 0.05 and freedom degrees 3 and 36. This means that there are significant differences between different playing groups

in volleyball, so the researchers will resort to the Least Significant Difference (LSD) Test to define which groups are better than the others.

Discussing results of differences between means and the LSD values in Muafaq & Raja Test to measure volleyball players' expectation

Table (6) showing means differences and the LSD values in Muafaq & Raja Test to measure volleyball players' expectation

Means Difference		Difference value	LSD value	Significance
Preparing	Free		1.839	Insignificant
30.9	30	0.9		
Preparing	Fast			Significant
30.9	25.5	5.4		
Preparing	High			Significant
30.9	23.8	7.1		
Free	Fast			Significant
30	25.5	4.5		
Free	High			Significant
30	23.8	6.2		
Fast	High			Insignificant
25.5	23.8	1.7		

Table (6) shows that after taking away means' values due to different playing classifications, the researchers compared results of mean differences with the LSD value (1.839). Since the result of the Least Significant Difference (LSD) and group of free player is 0.9 which is less significant difference, this means that there are no significant differences between them and this is applied on both high and speed player groups.

Table (6) also shows that the value of difference in other groups is shown as we notice the distinction of preparing player over high and speed player groups. We also notice the distinction of free player over high and speed player groups. As a result of table (6), it can be found that there are clear differences in expectation level between players' expectations and the preparing player came first among the other specializations. The researcher attributes this distinction to preparing players as due to being calm and concentrated which was asserted by Wagih Mahgoub (107, 5) saying: "the motor system is related to nervous positions and how a layer explains his expectation of the sent tools of the opponent player as the case in serving despite his speed as a player can receive the ball and expect its arrival".

3. Conclusions:

1- The designed measuring test is effective in measuring expectation.
2- There are statistically significant differences between players according to their specializations at the level of expectation of ball landing position
3- The preparing player achieved the highest correct expectation points followed by free player, fast player and then high player.

4. RECOMMENDATIONS:

1- The designed and legalized test to be authorized for the purpose of player's selection.
2- It is necessary to authorize the designed test during training units for players' training.
3- It is recommended to increase interest with reception skill as it is a key to build effective attack and, in turn, achieve winning.
4- It is recommended to authorize scientific basics (depending on the extent of mental processes acquired by the individual such as attention, expectation and perception in players' selection at different sport games.

5. REFERENCES:

1- Ahmed Salman Awda. (1985): "Measurement and Evaluation in training Process", Jordan, Dar Al Amal.
2- Mohamed Hassan Allawi. (1994): "Sport Psychology", 9th Ed., Cairo, dar Al Maaref.
3- Mohamed Nasreldin Radwan. (2003): "Statistical Inference in Physical Education & Sport Sciences", Cairo, 1st Edition, Dar Al Fikr Al Arabi Press.
4- Mostafa Hussein Bahy: "Scientific Treatments between Theory and Practice: Reliability, Validity, Objectivity and Standards", 1st Ed. Cairo, Book Center Press.
5- Wagih Mahgoub & Ahmed Badry. (2002): "Fundamentals of Motor Learning", Al Dar Al Gamea' Press. Al Mawsel.

EFFECT OF COFFEE CONSUMPTION ON ANAEROBIC PERFORMANCE

Elvin Onarici Gungor

Anadolu University Faculty of Sport Sciences Iki Eylul Campuss Eskisehir, Turkey

eonarici@anadolu.edu.tr

Abstract

The purpose of this study was to determine the effect of coffee ingestion on anaerobic performance of coffee drinkers. Wingate bicycle tests were applied before and after 10 days coffee consumption. In a randomized and double blind design, one group of subjects consumed coffee (3 mg caffeine/kg/day) and other group of subjects consumed decaf coffee for ten days between two Wingate tests. Wilcoxon Signed Ranks Test test were applied between pre and post-tests of the group. Effect size (ES) was calculated using Cohen's delta to evaluate the size of mean differences. Results of this study indicated that peak power increased in just caffeinated coffee group when compared to baseline ($p<0.05$). As a conclusion it can be said that long time coffee with caffeine ingestion has a positive effect on anaerobic performance.

Key Words: wingate, coffee, decaf

1. INTRODUCTİON

People consume caffeine because of many reasons. It is stated that caffeine causes mental alertness increase, a faster and clearer flow of thought and restlessness. Therefore, feeling sleepy is delayed, because fatigue is reduced. The most important determinant for caffeine effect is the amount of taken dose. The dose related effect is underlined that caffeine disruptively effect on sleep latency and quality and objective measure of total sleep time. This situation occurs because caffeine stimulates the heart muscle, the secretion of gastric acid and urine output. It is stated that caffeine increase mental awareness and this causes sustained intellectual effort without significant disruption of coordinated intellectual or motor activity (Harland, 2000; Hindmarch et al., 2000; Spriet, 2014).

Hindmarch et al., (2000) underline the acute effect of caffeine ingestion that caffeinated beverages may maintain aspects of cognitive and psychomotor performance throughout the day and evening if it is taken repeatedly. Harland (2000) summarized the caffeinated drinks as coffee, tea, colas and caffeinated waters and beverages as chocolate products and medications.

Because caffeine is cheap and has no negative effect on health, it is socially accepted amongst sport players and highly used in sport as a perceived ergogenic effect on athletic performance. When the 3 or 6 $mg.kg^{-1}$ body mass caffeine is consumed, it passes the membranes of all the body's tissues in a short time and beneficial to aerobic cycling performance (Desbrow et al., 2012). Furthermore, caffeine as an ergogenic effect has been found to increase speed, power and aerobic endurance (McDaniel et al., 2010). Drinks and beverages containing caffeine and ephedrine have become common substance in the diets of most athletes and popular among sport persons in recent years (Graham, 2001; Magkos and Kavouras, 2004).

Graham (2001) mentioned that caffeine positive effect in intense exercise is controversial, but no negative effect is exist. Therefore, it is suggested that caffeine can be ergogenic in exercise lasting at least 60 seconds. Furthermore, Magkos and Kavouras (2004), underlines the caffeine ingestion effect on exhaustion that caffeine can increase time to exhaustion during submaximal exercise bouts lasting approximately 30–60 minutes. Speed and power output during such activities may also improve.

There are so many effects of caffeine. In this study we concentrate on the caffeine effects on anaerobic performance. Ergogenic effects of caffeine are known. But the ergogenic effect of caffeine and its mechanism of action on short-term, high-intensity exercise are controversial (Greer et al. 2006).

Many of the studies in literature focused on the acute effects of caffeinated coffee or caffeine drug on anaerobic and aerobic performance. Results of many studies show that there are no acute effects of caffeine on anaerobic performance (Hoffman et al., 2007; Greer et al., 2006; Greer et al., 1998).

In addition these studies Roberts et al. (2007), found no JavaFitTM Energy Extreme effects on the results of Wingate test. JavaFitTM Energy Extreme (JEE, Javalution Coffee Co, Fort Lauderdale, FL) is a functional gourmet coffee that contains a proprietary blend of caffeine, garcinia cambogia, chromium polynicotinate, and citrus aurantium, and is marketed to increase energy expenditure.

Some studies are focused on the aerobic effects of caffeine. Coso et al. (2008), investigated the effect of water, carbohydrate, and

caffeine ingestion on fatigue was determined during prolonged exercise in the heat. They stated that caffeine ingestion (6 mg-kg-3 body weight) maintains maximum voluntary contraction and increases maximal cycling power despite dehydration and hyperthermia during prolonged exercise in the heat environment. Furthermore, maximal leg force increases by increasing voluntary activation when caffeine ingestion is combined with water and carbohydrate.

Graham et al. (1998), underlines the endurance and metabolism changes during exercise when caffeine ingestion is applied that other compounds in coffee act to antagonize the responses observed when caffeine is ingested independent of coffee.

Thus, while the exercise effects of caffeine have been studied during submaximal and maximal exercise bouts, it is currently unknown how two weeks coffee ingestion affects anaerobic performance. Therefore, the aim of this study was to investigate the effects of coffee ingestion on maximal anaerobic performance in male and female coffee drinkers. Furthermore, we also examined affects of coffee ingestion on anaerobic exercise performance during a Wingate cycle ergometer test.

The purpose of this study was to determine the effect of caffeine ingestion on anaerobic exercise performance in male and female coffee drinkers.

2. METHODS

Subjects

Ten males (23.1 ± 1.8 years, 176.2± 0.05 cm, 67.9 ± 7.9 kg, BMI 19.3±1.7) and seven females (23.6 ± 9.9 years, 163.2 ± 0.5 cm, 54.5 ± 20.3 kg, BMI 16.6±6.1) volunteered for the current study. After procedure explanation of research, each subject gave his or her written informed consent to participate for the current study. Local Ethic Comity approved research protocol. Subjects also were asked to avoid from taking any other nutritional supplements or ergogenic aids during the 10 days of the research. Female subjects were not menstruation period.

Determination of Hydration Levels

Scientists and clinicians prefer circulatory and urinary indices to identify dehydration (Grandjean et al., 2000). The aim of pre-hydrating is to start the activity normal plasma electrolyte levels. Dehydration increases physiologic strain as measured by core temperature, heart rate and perceived exertion responses during exercise-heat stress (Sawka et al.. 2007)

So hydration level was determined from urine sample of subjects via refractometer. Subjects who have 1000-1020 hydration levels were included in this study.

Experimental Design

Subjects reported to the Human Performance Laboratory on 2 separate occasions. During the first and second visit, subjects performed 30-second Wingate anaerobic power test. Prior to the start of the test, the subjects were instructed to pedal as fast as possible from the beginning and to attempt to maintain maximum pedal speed throughout the test. At the command ‘‘go,’’ the subjects began pedaling as fast as possible against a low resistance that was increased to 7.5% of the subject’s body weight within 2–3 seconds (Beck et al 2006). In a randomized and double blind design, 9 subjects consumed coffee (3 mg caffeine/kg/day) and 8 subjects consumed decaffeinated coffee for ten days between two Wingate test.

Harland., (2000) pointed out that the amount of caffeine in a “cup” of coffee, tea, or hot chocolate is surprisingly change even though it is prepared by the same person and with the same equipment and ingredients every day. So caffeine ratio in caffeinated coffee and decaffeinated coffee was analyzed in pharmacognosy laboratory. Amount of coffee was determined according to caffeine ratio results individually. Eight subjects consumed caffeinated coffee and control group (nine subjects) consumed decaffeinated coffee. Additionally, heart rate (HR), systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured before and after wingate test.
Ten days after the first trial, participants performed the second trial under the same conditions as in the first. Tests were applied before and after coffee consumption.

To analyze anaerobic power performance, all subjects performed the Wingate anaerobic power test (Monark 874 E). After a warm-up period of 5 minutes of pedaling at 60 rev.min^{-1} the subjects pedaled for 30 seconds at maximal speed against a constant force. Peak power, mean power, time to peak power, total works were determined. ‘‘Peak power’’ was defined as the highest mechanical power output elicited during the test. ‘‘Mean power’’ was defined as the average mechanical power during the 30-second test.

Statistical Analyze

Non-Parametric Wilcoxon Signed Ranks Test were applied between pre and post-tests of the groups.

3. RESULTS

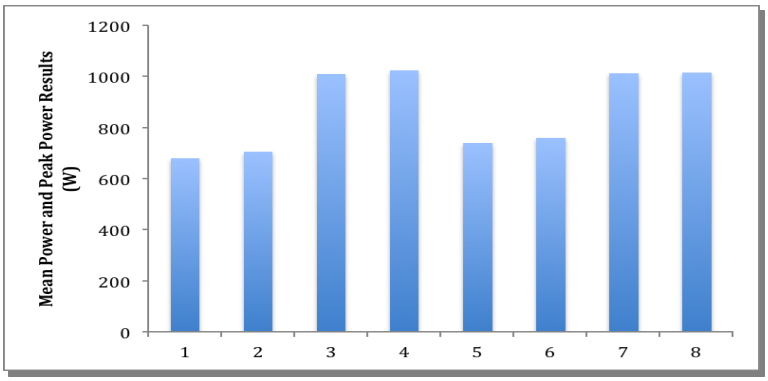
Comparisons of performance results of the wingate test were shown in **Graph 1**. Results of this study indicated that mean power and peak powers both increase in caffeinated coffee group when compared to baseline.

Mean power of coffee consumers groups: pre test, post test responses (679 ±50; 705±57) (p=.028, Z=-2.191[b] (b. Mean power results of post tests are higher than pre test results)).

Mean power of decaffeinated coffee consumers groups: pre test, post test responses (740 ±73; 760±92) (p=.063, Z=--1.859[b]).

Peak power of coffee consumers groups: pre test, post test responses (1010 ±15; 1023±15) (p=.005 Z=-2.812).

Peak power of decaffeinated coffee consumers groups: pre test, post test responses (1012 ±18; 1015±22) (p=.128, Z=-1.521[b]).



Graph 1. Comparison of Performance Results of Wingate Test

1: Mean power of coffee consumers groups (Pre Test)

2: Mean power of coffee consumers groups (Post Test)

3: Peak power of coffee consumers groups (Pre Test)

4: Peak power of coffee consumers groups (Post Test)

5: Mean power of decaffeinated coffee consumers groups (Pre Test)

6: Mean power of decaffeinated coffee consumers groups (Post Test)

7: Peak power of decaffeinated coffee consumers groups (Pre Test)

8: Peak power of decaffeinated coffee consumers groups (Post Test)

4. DISCUSSION

The results of this study indicate that long term coffee with caffeine consumption significantly increase anaerobic performance when compared with decaffeinated coffee. Peak power is more increased than mean power of coffee with caffeine consumers.

Acute caffeine ingestion does not appear to increase one's maximal ability to generate power during short-term cycling exercise (Williams et al., 1988). Results are not supported with this study. The reasons of this situation can be the difference of exercise and coffee consumption protocol. Duration of exercise and whether caffeine ingestion acute or long term can affect the results.

Roberts et al. (2007), investigated the effects of JavaFit Energy extreme functional coffee on aerobic and anaerobic fitness markers in recreationally-active coffee consumers. They found no significant differences between treatments were observed in regards to all of the criterion measures during the Wingate test. Hoffman et al. (2007), also investigated the effects of JavaFit Energy extreme functional coffee on aerobic and anaerobic exercise performance. They also found no significant difference between coffee and placebo ingestion in any of the power performance measures. Greer et al. (1998) searched the caffeine effects during repeated Wingate test. They found that caffeine ingestion did not have any effect on power output (peak or average) in the first two Wingate tests and had a negative effect in the latter two exercise bouts. The performance results are not consistent with this reported by Greer et al. (1998). Bell et al. (2001) investigated the effect of caffeine and ephedrine ingestion on performance of anaerobic exercise. After ephedrine and ephedrine + caffeine ingestion power early in the ride significantly increased compared with the trials when ephedrine was not ingested and caffeine ingested. Greer et al. (2006), found that caffeine increased peak power and mean power. But this effect was not significant. According to the results of Beck et al. (2006), ingestion of the caffeine containing supplement resulted no effect on peak power and mean power.

Literature shows no acute effects of caffeine on anaerobic performance (Roberts et al., 2007; Hoffman et al., 2007; Greer et al., 1998; Bell et al., 2001; Greer et al., 2006; Beck et al. 2006). We sought to examine long time effects of caffeine. It can be the reason of the difference of results of our study and literature.

Doherty et al. (2004), searched the acute effects of caffeine on power output during high intensity cycling. They found that mean

power output increased after caffeine ingestion when compare with placebo. So even though the results of studies are supported each other measurement protocols were different.

As a conclusion it can be said that long time coffee with caffeine ingestion has a positive effect on anaerobic performance.

5. REFERENCES

Bell, D.G., Jacops, I., Ellerington, K. (2001). Effect of caffeine and ephedrine ingestion on anaerobic exercise performance, *Medicine and Science in Sports and Exercise*, 33(8): 1399-1403.

Beck, T.W., Housh, T.J., Schmidt, R.J., Johnson, G.O., Housh, D.J., Coburn, J.W., Malek, M.H. (2006). The acute effects of a caffeine containing supplement on strength, muscular endurance, and anaerobic capabilities, *Journal of Strength and Conditioning Research*, 20(3), 506-510

Cohen J. (1988). *Statistical Power Analysis for the Behavioral Sciences*, 2nd edn. Hillsdale, NJ: Lawrence Erlbaum.

Desbrow, B., Biddulph, C., Devlin, B., Grant, G.D., Anoopkumar-Dukie, S., Leveritt, M.D. (2012). The effects of different doses of caffeine on endurance cycling time trial performance, Journal of Sports Sciences, 30(2), 115–120.

Doherty, M., Smith, P.M., Hughes, M.G., Davison, R.C.R. (2004). Caffeine lowers perceptual response and increases power output during high intensity cycling, *Journal of Sport Sciences*, 22, 637-643.

Graham TE. (2001). Caffeine and exercise: metabolism, endurance and performance. *Sports Med*, 31(11), 785-807.

Graham, T.E., Hibbert, E., Sathasicam, P. (1998). Metabolic and exercise endurance effects of coffee and caffeine ingestion. *Journal of Applied Physiology*, 85, 883-889.

Grandjean, A.C., Reimers, K.J., Bannick, K.E., Haven, M.C. (2000). The Effect of Caffeinated, Non-Caffeinated, Caloric and Non-Caloric Beverages on Hydration. *Journal of the American College of Nutrition*, 19(5), 591–600.

Greer, F., McLean, C., Graham, T.E. (1998). Caffeine, performance, and metabolism during repeated Wingate exercise tests, *Journal of Applied Physiology*, 85, 1502-1508.

Greer F., Morales, J., Coles, M. (2006). Wingate performance and surface EMG frequency variables are not affected by caffeine ingestion, *Applied Physiology of Nutrition and Metabolism*, 31, 597-603.

Harland, B.F. (2000). Caffeine and Nutrition, *Nutrition*, 16(7/8), 522-526.

Hoffman, J.R., Kang, J., Ratamess, N.A., Jennings, P.F., Mangine, G.T., Faigenbaum, A.D. (2007). Effect of nutritionally enriched coffee consumption on aerobic and anaerobic exercise performance. *Journal of Strength and Conditioning Research*, 21(2), 456–459.

Hindmarch, I., Rigney, U., Stanley, N., Quinlan, P., Rycroft J., Lane, J. (2000). A naturalistic investigation of the effects of day-long consumption of tea, coffee and water on alertness, sleep onset and sleep quality. *Psychopharmacology*, 149, 203–216.

Lane, S.C., Hawley, J.A., Desbrow, B., Jones, A.M., Blackwell, J.R., Ross, M.L., Zemski, A.J., Burke, L.M., (2014). Single and combined effects of beetroot juice and caffeine supplementation on cycling time trial performance, Appl. Physiol. Nutr. Metab., 39**,** 1050–1057.

McDaniel, L.W., McIntire, K., Streitz, C., Jackson, A., Gaudet, L., (2010) The effects of caffeine on athletic performance, College Teaching Methods & Styles Journal, 6 (1), 33-38

Magkos, F., Kavouras, S.A. (2004). Caffeine and Ephedrine Physiological, Metabolic and Performance-Enhancing Effects. *Sports Med*, 34(13), 871-889.

Pallares, J.G., Fernandez-Elias, V.E., Ortega, J.F., Munoz, G., Munoz-Guerra J., Mora-Rodriguez, R., (2013) Neuromuscular Responses to Incremental Caffeine Doses: Performance and Side Effects, Med. Sci. Sports Exerc., 45(11), 2184–2192.

Roberts, M.D., Taylor, L.W., Wismann, J.A., Wilborn., C.D., Kreider, R.B., Willoughby, D.S. (2007). Effects of ingesting JavaFit Energy Extreme functional coffee on aerobic and anaerobic fitness markers in recreationally-active coffee consumers. *Journal of the International Society of Sports Nutrition*, 4(25), 1-7.

Sawka, M.N., Burke, L.M., Eichner, E.R., Maughan, R.J., Montain, S.J., Stachenfeld, N.S. (2007). Exercise and fluid replacement, *Medicine and Science in Sport and Exercise*. 39(2), 377-390.

Spriet, L.L. (2014). Exercise and Sport Performance with Low Doses of Caffeine, Sports Med., 44(2), S175–S184

Williams, J.H., Signorile, J.F., Barnes, W.S., Henrich, T.W. (1988). Caffeine, maximal power output and fatigue. *British Journal of Sports Medicine*. 22(4), 132-134.

EFFECTS OF ECCENTRIC TRAINING ON THE MECHANICAL AND GEOMETRICAL PROPERTIES OF THE MUSCLE-TENDON PLANTAR FLEXORS SYSTEM

Ben Jeddou I.[1], Ben Salah F. Z.[1] , Arfa Y.[2] , Dustin c.[1].

[1] Service of physical medicine and rehabilitation functional of the National Orthopaedic Institute "Mohamed KASSAB" (KSAR SAÏD, TUNIS).

[2] Institut supérieur de Sport et Education Physique -Ksar Saïd, University of Manouba-Tunis.

Abstract

Aim: Determine the adjustments to the structures of the musculo-tendinous system of the Plantar flexors of the ankle 10 weeks of eccentric training, as well as the geometry of the triceps surae and muscles of the tendon of Achilles and the mechanical properties of the elastic components of the rheological model of Zajac (1989).

Methods and equipment: Sixty two topics were randomly distributed in a training group (GE, *n* = 31, 5 beginnings, 6 boxers, 5 wrestlers, 7 jumpers in lengths and 8 basketball: 20.9 ± 2.6 years, 178.1 ± 8.3 cm, 68.4 ± 9.2 kg) and a group control (GC, *n* = 31, students of the Military Academy of sports: 23.6 ± 1.8 years, 176.6 ± 11.4 cm 72.0 ± 7.7 kg). All subjects were involved in regular sporting activity (10.5 ± 6.2 hours per week) and have not changed their usual activity during the duration of the study. The 3 experimental sessions were carried out in random order one to two weeks before the start of the training Protocol (pre-test) then a week after the end of the 10 weeks of training (post-test).

Parameters studied: Characterization of the geometry of the muscles of the triceps surae, tendon of Achilles and the stiffness of these and properties mechanical tendon and the stiffness of the PRC.

Results: The results showed that the mechanical properties of the tendon and muscle adapt specific and different way depending on the type of training to optimize the transmission process of skeletal muscle tension and storage-restitution of the elastic potential energy during movement.

Conclusion: The 10 weeks of eccentric training did not alter performance vertical relaxation, flexibility, and strength of the trained subjects. Despite this lack of evolution of functional parameters, eccentric training would induce rather at the level of the intrinsic mechanical properties of muscle tissue (decrease in stiffness of these1) on the mechanical and geometrical properties of the tendon. The nature of the adaptations of the mechanical properties of the muscle and the tendon is associated with a change in intrinsic mechanical properties of muscle and tendon tissue rather than a change to the level of the geometric parameters of the muscle and the tendon.

Keywords: Eccentric training, flexibility, elastic component, musculo-articular stiffness, muscle architecture, dissipated energy.

1. INTRODUCTION

A muscle contraction is eccentric when the mechanical stress imposed on a muscle or muscle group is greater than the force generated by all of the motor units activated involving an increase in the length of the SMT (Enoka, 1996). During this process, the SMT absorbs mechanical energy developed by external work and dissipate this energy as heat with a functioning similar to a shock absorber (Cavagna et al., 1994; Dickinson et al., 2000). Stresses induced by eccentric exercise ranged from strengthening and stretching of the structures of the SMT (Allison and Purdam, 2009). This type of exercise is typically used in the context of training and programs for functional rehabilitation (Figure 1) (Stanish et al. 1986; Alfredson et al., 1998). In addition, changes in the functional behavior of the GTS after eccentric training could be explained by a change in its mechanical and/or geometric properties. The studies presented in this review will concern, insofar as possible, the effects of purely eccentric training (implying that axcentriques shares) on the Plantar flexors of the *vivo*ankle. Studies in animals will be also used to support the assumptions associated with potential physiological mechanisms involved in mechanical and geometrical properties changes observed.

Figure 1: Type of eccentric exercise performed during a rehabilitation program in the context of the treatment of tendinitis of the Achilles (Alfredson et al., 1998).

Data from the literature show that the eccentric training improves performance in force (Duclay et al., 2009). This increase in performance was often associated with an optimization of the nervous mechanisms (modification of muscle activation patterns) and adaptations of mechanical properties of the SMT (stiffness). Similarly to the effects of eccentric on the mechanical properties of the SMT, the assumption of a specific and different from the elastic components of the SMT adaptation was issued in previous work (Pousson et al.., 1990).

Thus, we present in this study the known potential adaptations associated with eccentric training on: *i*) functional performance (strength, flexibility), *ii*) muscle geometry (architecture, Casa, volume) and tendon (CSA, length) and, *iii*) at the level of the elastic components of the model of Zajac (1989) (stiffness of these and the CEP).

1. Effects of eccentric on functional parameters

1.1 The vertical relaxation

Unlike the plyometric training, eccentric exercises promote the power dissipation of the SMT (Cavagna et al., 1994; Dickinson et al., 2000). The performance of relaxation are therefore much less increased after a strength compared to a workout training plyometric (Baker, 1996; Hawkins et al., 2009). Thus, it has been shown that jump squat performance increased from 2 to 3 cm after a workout to eccentric dominant. Whereas the functional role of the eccentric contraction and the need to reuse the elastic potential energy stored by the structures of the SMT to allow a maximum vertical jump performance, eccentric training is very little used in the context of the development of the vertical jump.

1.2 Flexibility

The ankle joint flexibility is not a parameter classically evaluated after eccentric training. It has however been shown that maximum range of motion of the ankle determined dorsal flexion and leg extended increased significantly by about 6 ° after an eccentric Protocol of 6 weeks (Mahieu et al. 2008).

On the other hand, 12 weeks of eccentric training were not sufficient to increase the range of motion of ankle dorsiflexion in patients with tendinopathy (Silbernagel et al., 2001). As previously mentioned, the stresses induced by eccentric exercise ranged from strengthening and stretching of the structures of the SMT (Allison and Purdam, 2009). So similar (to the study of Mahieu et al. (1998)) the flexibility of the ankle after a program of static stretches for 6 weeks was observed (Nelson and Bandy, 2004).

1.3 Isometric force maximum torque

To our knowledge, only two studies have tested the effects of purely eccentric training on the level of CMV in Plantar flexion and showed an increase of this parameter. Duclay and al. (2009) have shown an increase of 13% of the CMV in Plantar flexion in subjects trained in eccentric for 7 weeks confirming the increase of 22% of the CMV in Plantar flexion after 6 weeks of eccentric training (Willems and Stauber, 2002).

However, other studies carried out on other groups muscle *in vivo* or on isolated muscle enhance the effects of eccentric training on maximum force production capacity. If we consider the couple relationship of strength - angle, some authors show that eccentric training improves production force capacity at extreme angles (high muscle lengths) rather than on the entire test range (Blazevich et al. 2007). Also studies in animals show that eccentric training does not necessarily increase the maximum voltage produced by the muscle (Reich et al., 2000).

2. EFFECTS OF TRAINING ON THE GEOMETRY OF SMT

2.1 The triceps surae muscles

Beyond 6 to 8 weeks of training, the improvement of production capacity of force would, regardless of the mode of training (concentric, eccentric and isometric or coupling concentric-eccentric), increased muscle mass (Moritani and deVries, 1979) involving mainly muscle hypertrophy provided that the request is sufficient (Wernbom et al.., 2007).

Muscle hypertrophy in humans is the result of the increase of the muscle fiber CSA. Preferentially affected by muscle hypertrophy fibers are fibers of type II (Hather et al., 1991). The hypertrophic muscle potential is thus linked to the proportion of type II fibres already present within muscle (Hather et al., 1991). The typological changes induced by eccentric training are similar to those caused by other strength training programs, it means increasing the share of intermediate type muscle fibers in muscle (IIa, IIa/IIb) up to 12% of the initial level (Hortobagyi et al., 1996a). Hypertrophy of the muscle fibers can lead to an increase in overall Casa of the muscle but also a change in the muscle architecture.

2.2 Achilles tendon

Although most studies have shown that training in force had no effect on the CSA of the tendon (Kubo et al. 2001a; Kubo et al. 2002b. Hansen et al., 2003; Reeves et al. 2003 a), an increase of the volume of the Achilles tendon has been shown by MRI after 3 months of eccentric training using exercises prescribed by Alfredson et al. (1998) this volume increase was explained by potential hyperemia and/or an increase in the water content of the tendon after training (Shalabi et al.., 2004). In addition, a study on the effects of eccentric training involving heavy loads showed an increase of CSA of the patellar tendon after 12 weeks but only at the level of inserts of the tendon, and not in its central part (Kongsgaard et al.., 2007). Langberg and al. (2007) have also highlighted, after 12 weeks of eccentric exercises, an increase in the synthesis of collagen type I, main component of the tendon tissue, without increase of the degradation processes, within the injured tendon in patients with tendinopathy.

3 Effects of training on the mechanical properties of these

To our knowledge, only one study has evaluated the effects of purely eccentric training on the mechanical properties of the these (Pousson et al. 1990). This study showed an increase in the stiffness of the these, determined by the *quick release*method after 6 weeks of eccentric training of flexor of the elbow for torque strength values relatively low (30 and 45% of CMV) but not to force higher torques (60 and 80% of CMV). However, the authors could not determine if specific adaptations of the fractions active (these1) and passive (these2) of these had occurred.

3.1 Active fraction of these (etuc1)

Characterization of the mechanical properties of these 1 is very difficult *in vivo*, and to our knowledge, no study has evaluated the effects of purely eccentric training on the specific mechanical properties of this component *in vivo*. However, from the data obtained on isolated muscle, it is possible to make some additional hypotheses on the effects associated with eccentric training on the stiffness of the active fraction of these.

3.2 passive fraction of the these (these2) / of the Achilles tendon

Training most often generates an increase in stiffness of Achilles (Magnusson et al., 2003b; Reeves et al. 2003b; Kubo et al. 2006; Burgess et al., 2007). Only two studies have evaluated the effects of eccentric training on the stiffness of Achilles (Mahieu et al., 2008; Duclay et al., 2009). The study of Duclay et al. (2009) showed a significant increase of approximately 20% of the Achilles tendon stiffness after 7 weeks of training. In a less obvious way, a tendency to the insignificant increase in the stiffness of the Achilles tendon was determined by Mahieu et al.. (2008) after 6 weeks of training. Can noted that a study evaluating the effects of ballistic stretching 6 weeks showed a significant decrease in stiffness of the tendon (Mahieu et al., 2007).

The objective of the eccentric contraction to dissipate the elastic energy, no study reported the effects of this type of Protocol on the CD of the Achilles tendon. It may be noted that some authors have reported a decrease in the energy dissipated by the tendon after strength training and stretching chronic (Kubo et al. 2002a protocols; Kubo et al. 2002b. Reeves et al., 2003b).

4 Effects of training on the stiffness of the CEP

Effects of eccentric training on the passive mechanical properties have been evaluated in only one study in humans. Thus, a decrease of 23% of the torque force passive resistive during dorsiflexion of the ankle has been characterized after 6 weeks of eccentric training (Mahieu et al., 2008), showing an adaptation of the overall mechanical properties of the CEP of the ankle Plantar flexors.

1. Materials and methods

1.1 Population

Sixty two subjects have volunteered to participate in this study and were randomly distributed in a training group (GE, n = 31, 5 beginnings, 6 boxers, 5 wrestlers, 7 jumpers in lengths and 8 basketball: 20.9 ± 2.6 years, 178.1 ± 8.3 cm, 68.4 ± 9.2 kg) and a group control (GC, n = 31, students of the Military Academy of sports: 23.6 ± 1.8 years) (, 176.6 ± 11.4 cm 72.0 ± 7.7 kg). All subjects were

involved in regular sporting activity (10.5 ± 6.2 hours per week) and have not changed their usual activity during the duration of the study.

1.2 Eccentric training Protocol

Eccentric training program was based largely on the Protocol of plyometric training, where possible (subjects not realizing that eccentric contraction of the jumps below). More specifically, the subjects of the GE performed: *i)* exercises described by Alfredson et al. ((1998) (figure 1), and *ii)* functions below (i.e., from a platform whose height varies between 40 and 80 cm). For all the eccentric exercises, subjects had to achieve eccentric actions on the right leg or both legs, and then perform the concentric action with left leg only. The progression of training was conducted in terms of volume (number of exercises per session, number of eccentric exercise solicitations) and intensity (height of the functions below, exercises on one or two supports). The Protocol of eccentric training lasted 10 weeks and included 24 hour sessions for a total of approximately 4800 eccentric contractions (from 200 to 600 eccentric contractions by sessions).

1.3 Experimental protocol

The objective was to include the most relevant tests in two experimental sessions of reasonable duration (less than or equal to 1 h 15'). For studies assessing the effects of workouts eccentric and eccentric, the global protocol was thus consists of 2 sessions including various tests: 1) characterization of the geometry of the triceps surae muscles (architecture and Casa: anatomical cross-sectional), of the Achilles tendon (CSA: Surface cross section and length) and these: stiffness of elastic component series (etuc1 and CES2 stiffness dissociation) and 2) the evaluation of the mechanical properties of the tendon (stiffness and dissipative properties) and the stiffness of the CEP: parallel elastic component (dissociation of the stiffness of pec1 and pec2). A third session was then designed to assess performance in vertical jump. These 3 sessions were conducted in random order one to two weeks before the start of the training Protocol (pre-test) then a week after the end of the 10 weeks of training (post-test). The tests were as far as possible at the same time of day in pre-test and post-test.

The experimental protocol was identical to that used in a plyometric training. However, an additional measurement of the surface of section of the tendon (CSAT SO) was realized at the level of the insertion of the Achilles tendon on the SO under the same procedure used for the measurement of CSAT.

2 analysis Statistics

After checking the normality of the distribution data, parametric statistical tests were conducted using Statistica software ® software (Statsoft Inc., Tulsa, OK, had). Analysis of variance for repeated two-factor (group × test) measures was used to evaluate changes in performance in vertical jump as well as all of the listed parameters. A Newman-Keuls post-hoc analysis was performed if necessary. The threshold of significance was set at $P < 0.05$

3. RESULTS

3.1 Functional parameters

Table 1: Performance in vertical jump training and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

GE GC

Pre-test post-test pre-test post-test

	GE		**GC**	
	Prétest	**Posttest**	**Prétest**	**Posttest**
SJ (cm)	32.1 ± 4.4	34.7 ± 6.7	34.6 ± 6.4	35.2 ± 6.9
CMJ (cm)	40.3 ± 6.8	41.6 ± 6.5	40.1 ± 6.5	39.9 ± 5.7
Multibond (cm)	25.6 ± 4.3	25.0 ± 4.1	26.2 ± 3.7	23.0 ± 5.4
DJ (cm)	37.0 ± 8.5	40.7 ± 6.8	35.6 ± 6.3	36.7 ± 5.8

SJ: jump squat, CMY: counter movement jump, multibond, DJ: jump below (50cm), GE:

Group training, GC: control group. Mean ± standard deviation.

There is no interaction between the factors "group" and "test" for SJ, the CMJ and the multibond after 10 weeks of eccentric training ($P > 0.05$). However, it may be noted a trend towards the increase in performance by DJ for GE ($P = 0.10$). Relaxation test results are presented in table 1.

Table 2: Maximal voluntary Contraction and rate of climb in maximum force for training and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		GC	
	Prétest	**Posttest**	**Prétest**	**Posttest**
CMV (N.m)	136 ± 22	132 ± 26	129 ± 18	127 ± 17
RTDmax (N.m.s-1)	1536 ± 297	1515 ± 319	1437 ± 335	1394 ± 316

CMV: maximal voluntary contraction, RTD max: rate of climb in maximum force, GE: Group Training, GC: control group. Mean ± standard deviation.

No significant changes at the level of the CVMP and the RTD Max was found (P > 0.05). The values of CMV and RTDmax are presented in table 2

Table 3: Maximum Amplitudes of the ankle for the training group and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		GC	
	Prétest	**Posttest**	**Prétest**	**Posttest**
RoMT FP (°)	61.4 ± 5.7	63.4 ± 4.2	58.8 ± 9.1	57.6 ± 7.8
RoMT FD (°)	49.1 ± 4.2	52.4 ± 6.0	50.2 ± 8.0	49.4 ± 6.6
RoMF FD (°)	60.0 ± 6.3	62.2 ± 6.5	56.6 ± 10.0	56.4 ± 11.2

RoM T FP: maximum amplitude of the measured ankle leg cocked in plantar flexion, RoM T FD: Maximum amplitude measured ankle leg cocked in dorsiflexion, RoM F FD: amplitude Maximum ankle knee flexed to 80 ° in dorsiflexion, GE: Group training, GC: control group. Mean ± standard deviation.

There is no interaction between factors 'group' and 'test' for RoM T FP and RoM F FD after the 10 weeks of eccentric training (P > 0.05). However, it may be noted a trend towards the increase of RoMT FD for GE (P = 0.07). The results of flexibility are presented in table 3

3.2 Geometry of the muscle-tendon of the triceps surae system

3.2.1 Achilles tendon

Table 4: Lengths, maximum elongation and cross sectional area of the tendon of Achilles for the training group and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		GC	
	Prétest	**Posttest**	**Prétest**	**Posttest**
LT GL (mm)	222 ± 19	219 ± 19 †	220 ± 16	220 ± 16
LT GM (mm)	197 ± 25	194 ± 24 †	194 ± 25	196 ± 24
LT SO (mm)	49 ± 14	48 ± 13	43 ± 15	43 ± 15
△Lmax (mm)	14.4 ± 2.6	15.2 ± 2.9	15.6 ± 2.9	15.7 ± 2.2
CSAT (mm^2)	67.6 ± 7.2	66.6 ± 10.4	59.2 ± 11.6	58.9 ± 9.2
CSAT SO (mm^2)	52.8 ± 8.6	57.0 ± 9.2	59.1 ± 9.4	55.3 ± 6.1

L T GL: length of the lateral gastrocnemius, L Achilles tendon T GM: length of the medial gastrocnemius, L Achilles tendon T SO: the Achilles of the soleus tendon length, ΔL max: maximum elongation of the tendon of the medial gastrocnemius to 90% of contraction maximum voluntary, CSA T: area of cross section of the Achilles tendon, GE: Group training, GC: control group. Mean ± standard deviation. Post-hoc † P < *0.05* analysis

Interaction between factors "group" and "test" has been found for L T GL and L T GM (P < 0.05) (table 4). For GE, significant decreases of 1.3% (i.e., 3 mm) and 1.7% (i.e., 3.5 mm) for LT GL and LT GM respectively were determined after the eccentric

training (P < 0.05) (table 4). On the other hand, no interaction was determined for the other Achilles tendon (P > 0.05) geometrical parameters even though we may note a tendency to the insignificant increase in CSAT SO of around 8.5% (P = 0.09). No significant difference was found for the whole of the geometric parameters of the tendon of Achilles GoC (P > 0.05) (table 4).

3.2.2 The lever arm

No interaction between the factors "group" and "test" found after the eccentric training for GE and the GC on the lever arm of the Plantar flexors of the ankle (P > 0.05) (Figure 2).

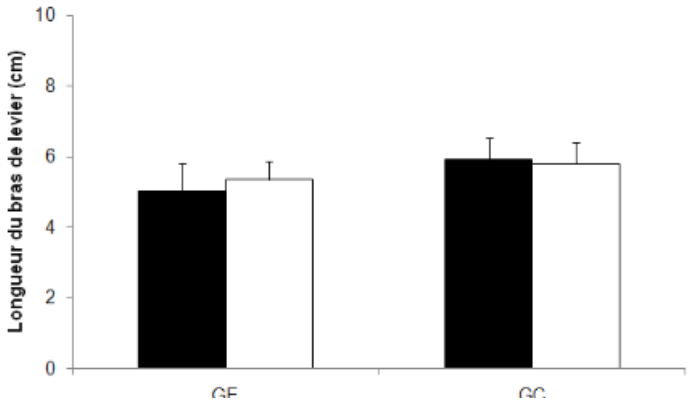


Figure 2: Length of the lever arm of the Plantar flexors for group training (GE) andthe group control (GC) (■) and after (□) 10 weeks of eccentric training.

These results show the absence of effect of eccentric training on the length of the arm of the ankle Plantar flexors.

3.2.3 Stiffness of these

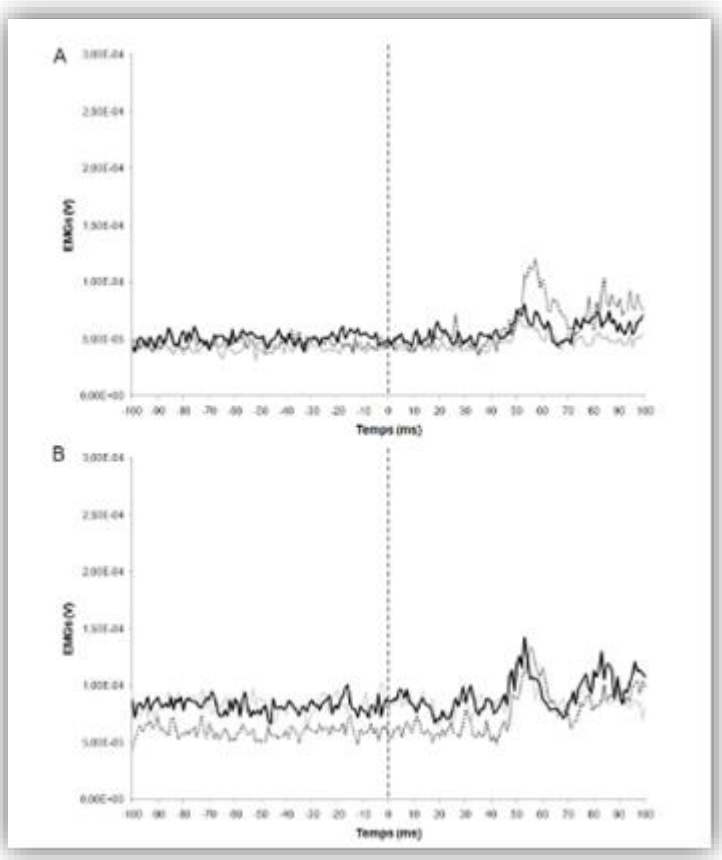


Figure 3: Relations averaged between the lateral gastrocnemius muscle EMG activity ( ), medial gastrocnemius ( ) and soleus ( ) before 100ms and after the start of

(i.e., 0) stretching for valid tests for group training before (A) and after

(B) 10 weeks of eccentric training.

To check the time of appearance of the stretch reflex, relations EMG of the muscles of the TS according to the time when the stretching associated with the SRS method are presented in Figure 3.

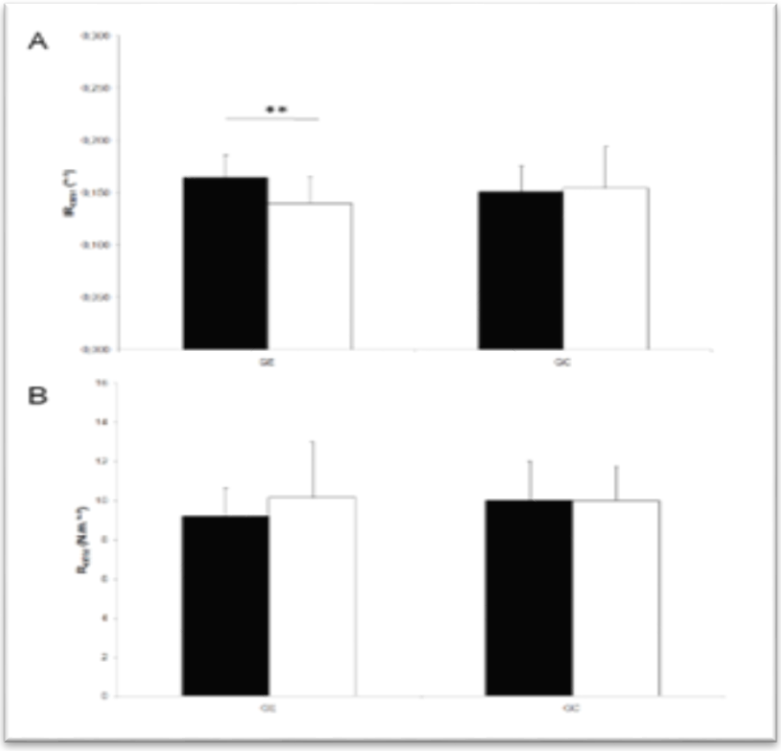


Figure 4: A - average index of stiffness of the active of the elastic component fraction series (IRCES1) and B - stiffness of the passive fraction of the elastic component series (RCES2) for the Group

Training (GE) and the control (GC) Group ( ) and after ( ) 10 weeks of training

Eccentric. * Significant difference between the pre-test and post-test (P < 0.05) values.

It not been observed change of EMG activity during the first 45 milliseconds after the onset of stretch. The activity of the TA does not change during the 100ms after the start of the stretch. Thus, reflex activity did not affect the settings characterized from the SRS method and their potential evolutions with the drive later in this chapter. The interactions between the factors "group" and "test" were found for RminIRetuc1 and Retuc1 90% ($P < 0.05$). The post-hoc analysis shows, for GE, a decrease of Rmin ($P < 0.05$) and a significant decrease of IRetuc1 and Retuc1 90% 14.2% and 11.9% respectively ($P < 0.05$) (Figure 4). No significant differences in the level of Rmax and RCES2 was found after the 10 weeks of training for the GE ($P > 0.05$).

3.2.4 Mechanical properties of the Achilles tendon

Mean relations between force and elongation of Achilles tendon for the two groups are presented in Figure 5. The application of linear regression and the Sten-Knudsen model on the relations of force-elongation of each topic for the two tests show a very good correlation coefficient (R2 way = 0.97 ± 0.02 and 0.99 ± 0.01, respectively), which allows us to identify the tendon stiffness (RTA) estimated at between 50 and 90% of the minimum CMV and Sten-Knudsen stiffness index (IRSK) before and after training.

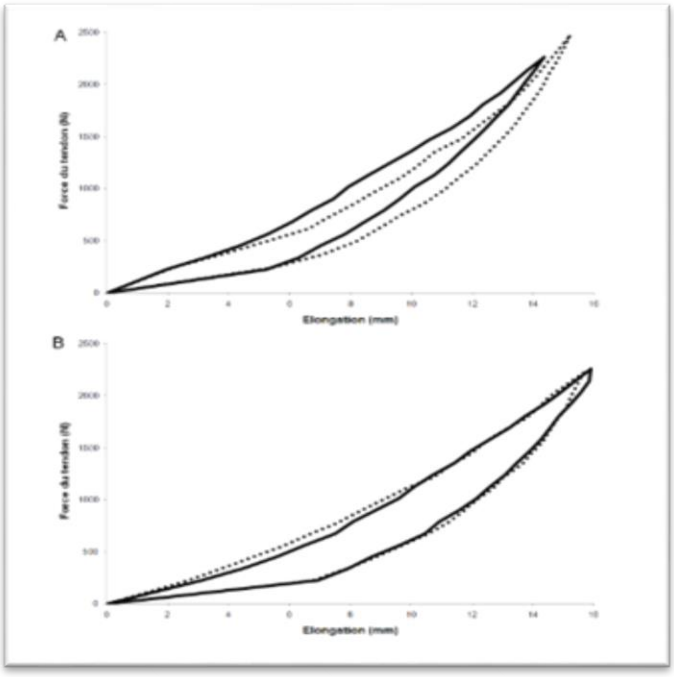


Figure 5: Average relationships between force and elongation of Achilles for the Group gear box (A) and (B) before controlled the Group ( ) and after ( ) 10 weeks of training eccentric.

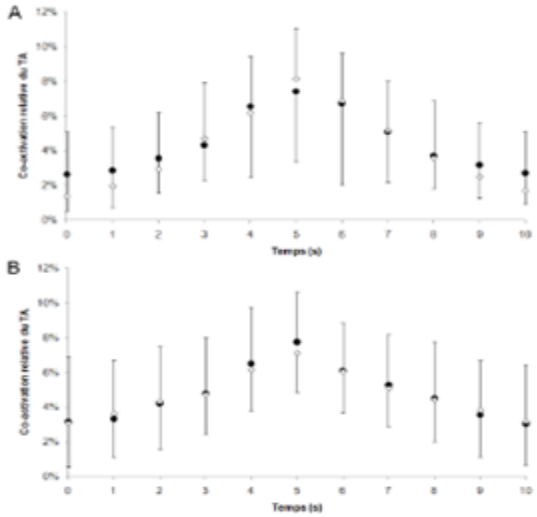


Figure 6: Average relationships between the relative of the Tibialis Anterior (TA) co-stimulation during the ramp Isometric Contraction for training (A) and (B) control group ( ) and After ( ) 10 weeks of eccentric training.

These force-length relationship were not corrected the co-stimulation of the TA during ramp contraction but this co-stimulation has not evolved significantly after 10 weeks for the GE and GC (Figure 6). The co-stimulation has no influence on potentially eccentric training effects on the mechanical properties of the tendon so characterized.

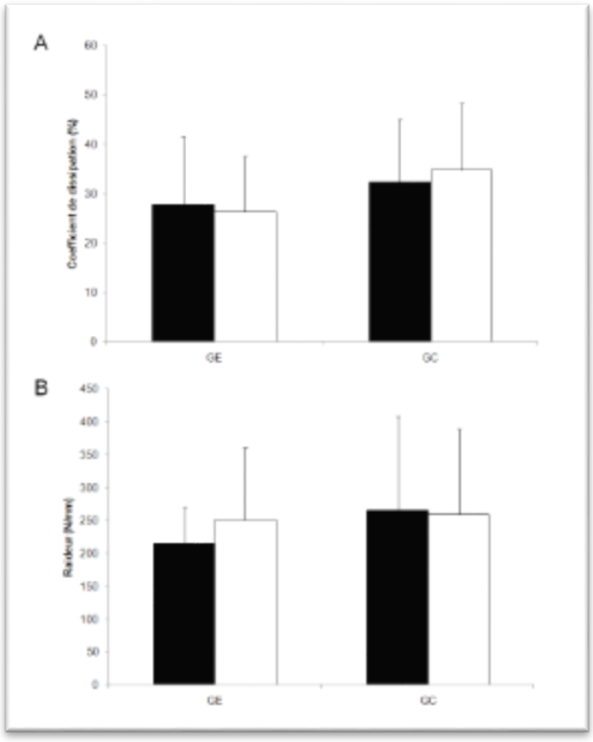


Figure 7: Average values of coefficient of dissipation (A) and (B) tendon stiffness for the Group training (GE) and the control (GC) Group ( ) and after ( ) 10 weeks eccentric training.

No interaction between factors "group" and "test" was found after the eccentric for the GE and GC for IR SK R TA R TA CSA **T** and CD ($P > 0.05$) (table 5 and Figure 7). No significant difference in the stiffness and the dissipative properties of the Achilles tendon was found after the eccentric for the GC ($P > 0.05$).

Table 5: Settings of stiffness of tendon of Achilles for the training group and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		**GC**	
	Prétest	**Posttest**	**Prétest**	**Posttest**
IRSK (mm-1)	0.076 ± 0.049	0.096 ± 0.050	0.114 ± 0.074	0.089 ± 0.065
RTA (N.mm-1)	215.8 ± 55.0	251.1 ± 109.2	265.5 ± 143.2	259.9 ± 129.9
RTA/CSA**T** (N.mm-3)	3.24 ± 0.96	3.83 ± 1.75	4.60 ± 2.39	4.53 ± 2.45

IR SK: StenKnudsen stiffness index, R TA: stiffness of the Achilles tendon, R TA/CSA T: normalized stiffness of the Achilles tendon, GE: Group training, GC: control group. Mean ± standard deviation.

The average stress-strain relations of the tendon of the GE before and after training are presented in Figure 8.

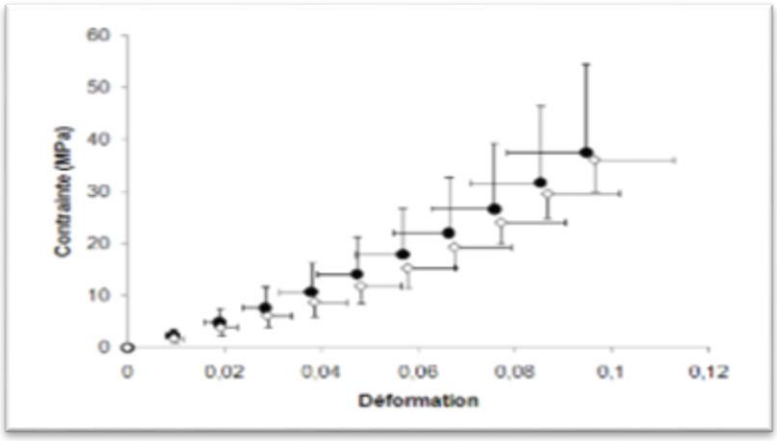


Figure 8: Average relationships between stress and deformation of the Achilles tendon for the Group before training ( ) and after ( ) 10 weeks of eccentric training.

4. STIFFNESS OF THE CEP

4.1 Relationship couple - elongation

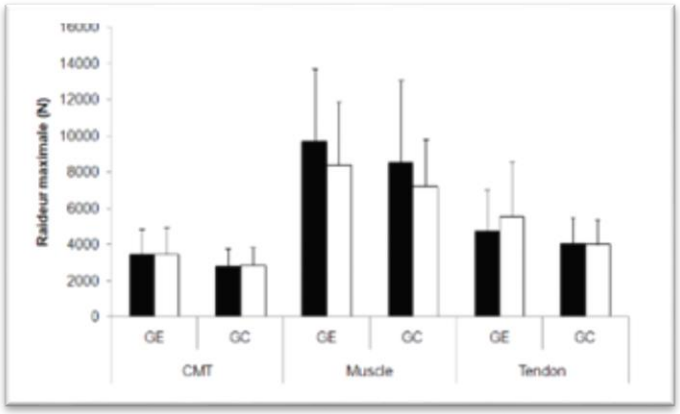


Figure 9: Average values of maximum muscle-tendon (SMT), System stiffness of the muscle and the tendon of the Plantar flexors for group training (GE) and group control (GC) Front ( ) and after ( ) 10 weeks of eccentric training.

No significant difference was found after 10 weeks of eccentric training for maximum passive stiffness of the SMT, muscle and tendon (RSMTmaxRMmax and RTmax respectively) whatever the relevant group (P > 0.05) (Figure 9).

Similarly, no significant change was observed between the pre-test and post-test for IR SMT and IR M for both groups ($P > 0.05$).

4.2 The gastrocnemius SMT force-length relationship

Table 6: Values of different mechanical parameters determined from the relationship forcelongueur of system musculo-tendon of the gastrocnemius for group training and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		GC	
	Prétest	**Posttest**	**Prétest**	**Posttest**
IRG (m-1)	87.46 ± 12.86	89.22 ± 11.22	85.32 ± 10.49	83.79 ± 15.47
RGmax (N.m-1)	62450 ± 25975	66273 ± 15705	46140 ± 16675	48254 ± 19785
L0 G (m)	0.372 ± 0.019	0.373 ± 0.018	0.371 ± 0.026	0.366 ± 0.031
LF=1 SMT (m)	0.423 ± 0.018	0.424 ± 0.017	0.423 ± 0.022	0.421 ± 0.025

IR G: passive stiffness index, R Gmax : maximum passive stiffness, L 0 G : initial length, L F = 1 SMT : length for a passive 1N force developed by the GTS of the gastrocnemius, GE: Group training, GC: control group. Mean ± standard deviation.

No significant difference was found for IR G R Gmax L 0 G and L F = 1 in the two groups considered (P > 0.05) between the pre-test and post-test (table 6).

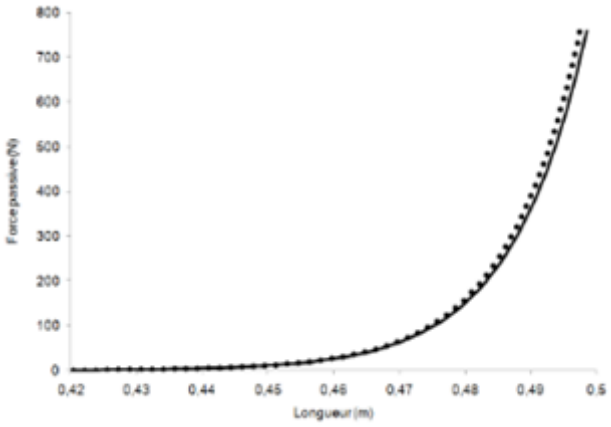


Figure 10: Average relationships between passive strength and the length of the musculo-tendon system of the gastrocnemius for the front drive Group ( ) and after ( ) 10 weeks of eccentric training.

The GE relations between force passive and the length of the GTS of the gastrocnemius for both tests are presented in Figure 10.

4.3 Force-length of the muscle and the tendon of the gastrocnemius relationships

IR G T and L 0 T increased significantly by 21.8% and 6.4% respectively for GE (P < 0.05) (table 7).

Table 7: Values of different mechanical parameters evaluated from the relationship forcelongueur of the muscle and the tendon of the gastrocnemius for group training and group control before (pre-test) and after (post-test) 10 weeks of eccentric training.

	GE		GC	
	Prétest	**Posttest**	**Prétest**	**Posttest**
IRG M (m-1)	168.1 ± 44.0	153.8 ± 27.7	152.7 ± 36.5	144.0 ± 40.2
L0 M (m)	0.216 ± 0.029	0.212 ± 0.029	0.216 ± 0.016	0.212 ± 0.022
LF=1 M (m)	0.247 ± 0.026	0.246 ± 0.027	0.251 ± 0.017	0.248 ± 0.020
IRG T (m-1)	152.9 ± 16.6	185.9 ± 32.6 †	168.0 ± 22.8	170.9 ± 36.6
L0 T (m)	0.137 ± 0.022	0.145 ± 0.024 †	0.137 ± 0.026	0.136 ± 0.032
LF=1 T (m)	0.170 ± 0.023	0.174 ± 0.024 †	0.168 ± 0.025	0.167 ± 0.028

IR G M : index of stiffness of the muscle of the gastrocnemius, L 0 M : initial length of the muscle of the gastrocnemius, L F = 1 M : length of the muscle of the gastrocnemius for a passive force of 1N, IR G T : index of stiffness of the tendon of the gastrocnemius, L 0 T : initial length of the tendon of the gastrocnemius, L F = 1 T : length of the tendon of the gastrocnemius for a passive force of 1N, GE: Group training, GC: control group. Mean ± standard deviation. Post-hoc † P < 0.05 Analysis

No significant changes were observed for IR G M and L 0 M in the two groups (P > 0.05) (table 7). Relations for the GE of the gastrocnemius muscle and Achilles tendon force-length and stress deformation are presented in Figure 11

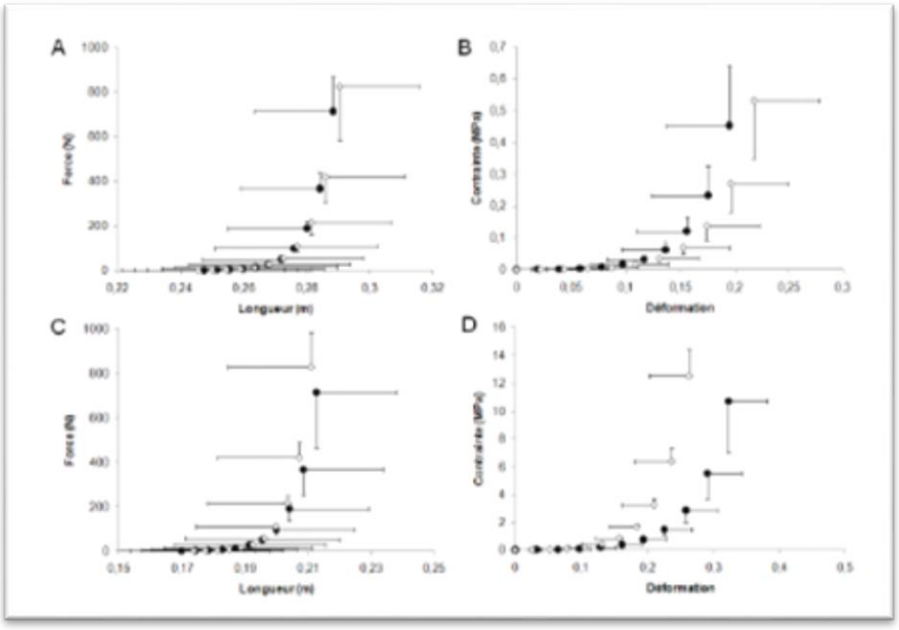


Figure 11: Average relationships between strength and length (A and C) and the stress and strain (B and D) of the gastrocnemius muscle (A and B) and Achilles (C and D) for the Group before workout ( ) and after ( ) 10 weeks of eccentric training.

5. DISCUSSION

The purposes of this study were to determine the effects of 10 weeks of eccentric training on the stiffness of the various components of the geometric model of Zajac (1989) and the properties of dissipative of the Achilles tendon. The results showed a decrease in stiffness of these1 and an increase in the stiffness of the passive of the tendon of the gastrocnemius.

5.1 Functional parameters

No significant changes of functional parameters after the 10 weeks of eccentric training was found. Trends in DJ performance increase and greater joint flexibility of the ankle were observed. These results are consistent with those of the literature that generally show a low performance scales in vertical jump (+ 2.6 cm after eccentric training (Friedmann-Bette et al., In press)). Same way, Mahieu et al. (2008) had found a tendency to the increase of flexibility (non-significant increase of 6 ° in dorsiflexion) after 6 weeks of eccentric training using exercises recommended by Alfredson et al. (1998) performance in CMV have not changed after the training period in our study, which differs from conventionally eccentric training results that show an improvement of the maximum force capacity (Duclay et al., 2009). Earnings strength are more important after eccentric training involving heavy loads and thus inducing a greater constraint (Higbie et al., 1996; Hortobagyi et al., 1996 Farthing and Chilibeck, 2003). Indeed, some studies have shown that the optimal effects of eccentric muscle solicitation on the maximum force mode occur from supramaximal or maximum loads (Johnson, 1972; Hortobagyi and Katch, 1990). Eccentric training carried out in our study mobilised no additional charges and has been done with the body weight (in order to standardize protocols plyometric workouts and eccentric). The exercises made during our eccentric training Protocol did not force maximum levels except perhaps during the receptions below. In addition, the eccentric exercises in our study were not strictly controlled (like on isokinetic cycle Ergometer or on a weight machine) and compensation during the creation of the movement might have occurred in the mobilization of the body segments (the constraint may be distributed on the knee and hip joints during these receptions below). The relatively low stress in our study level probably explains the absence of significant changes in isometric maximum force production capacity. Furthermore, it has been shown that eccentric exercise causes a shift of the relationship between the maximum force torque and joint angle after workout (Blazevich et al. 2007). Thus, the evolution of the torque force may produce significantly more extreme articular amplitudes (Talbot and Morgan, 1998; Bowers et al., 2004). However, we cannot support this hypothesis insofar as the relationship between the maximum force level and the ankle joint angle was not determined in this study.

5.2 Geometry of the muscle-tendon of the triceps surae system

Although a study on isolated muscle showed no change in the size of the muscles in rats after eccentric training (Reich et al., 2000), most of the studies being interested in the effects of eccentric training on muscle geometry, including one on the muscles of the TS (Duclay et al., 2009), showed an increase of pennation angle the length of the fascicles or Casa after this type of training therefore that the solicitation was important (Higbie et al., 1996; Blazevich et al., 2007 Duclay et al., 2009). In our study, no changes of architecture and Casa of the muscles of the TS was shown. However, an increase in the length of the gastrocnemius muscle was indirectly shown

by decreasing length of the tendons of the GL and GM after drive about 1.5% on average. This slight increase in the length of the muscle does not seem to have had an impact on the architecture of the concerned muscles.

On the tendon, structures a decrease in the length of the tendon of the gastrocnemius was characterized in our study unaltered from the CSA T. Adaptations localized CSA of the tendon had yet been shown at the level of the inserts on the bone and muscle of the patellar tendon after a slow but realized eccentric workout with heavy loads (Kongsgaard et al.., 2007). As mentioned, the CSA of the tendon is not homogeneous throughout its length and small variations in the CSA of the Achilles tendon can occur locally. Therefore, we decided to perform an additional step to also measure the CSA of the tendon insertion on the SO level. Only a trend in the increase of this tendon section was observed (P = 0.09). Also, all these results suggest that the intensity of the eccentric load applied during this training Protocol (submaximal contractions) do not constitute sufficient mechanical stress to induce changes in the geometry of muscle and tendon of the TS in subjects with regular physical activity (~ 9 h of activity per week on average). This might also explain the weak evolution of functional parameters characterized in this study (CMV, flexibility).

5.3 Mechanical properties of the these

A significant decrease in stiffness of the these for low values of torque force (30% of the CMV) has been shown in our study no change in stiffness characterized for a high level of CMV. Insofar as the geometric parameters are not changed by the completed training, changes in the behaviour of elastic components seem be explained only by changes in the intrinsic mechanical properties of underlying tissues. Although our results are different from those obtained by Pousson et al. (1990) (increase in stiffness of the these low couples for), the hypothesis issued a specific adaptation of these1 or these2 to explain our results could be tested using the method alpha.

5.4. Active fraction of the these (these1))

A decrease in stiffness of the fraction activates of the these was found in our study. It would allow the muscle more elastic energy stored during the eccentric contraction. Although the modification of stiffness of tendon / these2 was not significant after the 10 weeks of eccentric training, the decrease of stiffness of these1 could be compensated to achieve, to force high torques, non-significant changes in the overall stiffness of the these (Rmax). This decrease in stiffness of these1 and the lack of change in stiffness of these however explain the decrease of Rmin2. Some physiological mechanisms could not be evaluated in our study and already mentioned previously can, however the decrease of stiffness of these1 after training. Indeed, it has been shown that strength training increased the number of fast-twitch fibers and implied a decrease in stiffness of the muscle in the animal (Don and Marini, 1987). More specifically, eccentric training would alter the typological profile of muscle fibers by an increase in selective hypertrophy of the II fibres and increasing the share of intermediate muscle fibres in muscle IIa, IIa/IIb up + 12% of the initial level (Hortobagyi et al., 1996b). This increase in the relative number of fast-twitch fibers in the muscle would influence the mechanical properties of the muscle towards an increase in muscle compliance (Kovanen et al.., 1984 ;) Gregory et al., 2007). However, these assumptions are to be considered carefully insofar as no significant changes of muscle ACSA and CMV were found in our study.

5.5 Passive fraction of these (CES2) / of the Achilles tendon

No modification of the R CES2 and R TA has been shown after the workout in our study. An increase in the stiffness of the tendon had been determined after several protocols (Reeves et al., 2003b strength training; Kubo et al. 2006) or eccentric (Duclay et al., 2009). In effect, Duclay et al. (2009) showed increased the stiffness of the Achilles tendon after 7 weeks of eccentric training carried out in a muscle building apparatus. The authors explained this increase in stiffness by increasing the synthesis of collagen type I (Kim et al., 2002; Yang et al. 2004) based on studies carried out *in vitro*stretch-induced.

However, our results on the evolution of the stiffness of the Achilles tendon after the workout are in agreement with those of Mahieu et al. (2008) which had tested the effects of 6 weeks of eccentric training mobilizing exercises prescribed by Alfredson et al. (1998) the differences between our results, those of Mahieu et al. (2008) and those of Duclay et al. (2009) tend to show the same kind of phenomenon could occur during eccentric contractions and to impose an important to get chronic tendon stiffness changes tendinous stretch. Furthermore, any modification of the elastic potential energy dissipated by the tendon was observed in our study. We mentioned in the review of literature that some authors had obtained a reduction of the energy dissipated by the tendon after a workout in force or chronic stretching (Kubo et al. 2002; Kubo et al. 2002b. Reeves et al., 2003b). However this result seemed inconsistent with the role of the tendon energy absorber during the eccentric contraction. In our study, the CD of the Achilles tendon has not changed with the drive. Thus, the decrease in CD shown after trainings in strength or chronic stretching (Kubo et al. 2002a; Kubo et al. 2002b. Reeves et al., 2003b) could be qualified by the sink role of tendon in the eccentric contraction. On the other hand, muscle could have participated more significantly than the tendon in the dissipation of this energy during eccentric contractions.

5.6 Stiffness of the CEP

No significant change the stiffness of the rated CEP in a comprehensive manner was shown in our study. These results differ from those obtained by Mahieu et al. (2008) after 6 weeks of eccentric training which showed a reduction in the passive torque resistive product by dorsal flexion of the ankle. Yet the training protocols used in our study and that of Mahieu et al. (2008) mobilized eccentric exercises without additional charges. However, the duration of the Protocol was longer in our study (almost twice as long). Thus, changes in mechanical properties evaluated after 6 weeks of eccentric training could be compensated to the scale of the overall

assessment of the CEP by changes in mechanical properties could intervene in the longer term. We will try to explain this difference in results through the specific mechanical properties of CEP1 and CEP2 evaluated in our study.

Only adaptations notable of mechanical properties passive of the SMT after the 10 weeks of eccentric training are the increase in the index of passive stiffness of the tendon of the gastrocnemius (IRG T) and the increase of the initial length (i.e., L0 T, length for which product tendon one force passive significant resistive). The increase in the stiffness of CEP2 diverges from the evolution of the stiffness of these2. This observation also made after the 10 weeks of plyometric training clearly shows that these two parameters do not exactly match the behaviour same structures. The constraints when tested in the laboratory on the tendinous structures do not report the same mechanical properties (according to the experimental condition active or passive). Furthermore, different constraints within the tendon can induce the implementation of specific physiological mechanisms depending on the type of solicitation (contraction or passive mobilization of the joint). These specific constraints on the various parts of the tendon could lead to adaptations different properties geometric (Kongsgaard et al., 2007) or mechanical (Lyman et al., 2004) according to the considered tendon area. The tendon composed, like muscle, hierarchically, preferentially could involve different structures in active and passive conditions. Although the adaptations of the stiffness of CEP2 do not correspond to the evolution of the stiffness of tendon of Achilles and RCES2, a modification of physiological processes associated with the synthesis of collagen at the level of the tendon may be considered. Thus, an increase in the synthesis of collagen type I fibers has highlighted in the peri-tendineuse region after eccentric training (Langberg et al. 2007). This increase of collagen type I could contribute to increasing the stiffness of CEP2. Yet no change to RTmax (parameter from the couple-lengthening of tendon relationship) was found after the workout. This can be explained by the fact that in this relationship, the force overall torque is put in relation to the lengthening of the tendon of the GM. This global data and lengthening of a local association can hide the characterization of specific adaptation of the gastrocnemius mono-articulaires structures of the ankle. Indeed, one can hypothesize that the gastrocnemius and soleus muscles respond differently to the eccentric training.

On the other hand, an increase in the number of sarcomeres in series identified in animals (Proske and Morgan, 2001) and then indirectly in humans (Brockett et al., 2001) after eccentric training could occur in our study without significantly altering the length of muscle fascicle. This increase of sarcomeres in series would contribute to a small but significant increase in the length of the muscle and change the length for which the muscle or by impact, product tendon one force passive during the stretch. This increase in the number of sarcomeres in series may also explain the increase in compliance of these1. However, these assumptions are to be considered with caution because no significant changes CMV was found in our study.

Thus, the eccentric training generates different adaptations of these 1 and CEP 1 to the extent where these two elastic components of the model are not behaviours of the same structures at the muscle level (the bridges between actin and myosin for these1 mainly muscle for CEP envelopes1)).

6. CONCLUSION:

The 10 weeks of eccentric training did not alter performance vertical relaxation, flexibility, and strength of the trained subjects. Despite this lack of evolution of functional parameters, eccentric training would induce rather at the level of the intrinsic mechanical properties of muscle tissue (decrease in stiffness of these1) on the mechanical and geometrical properties of the tendon. The decrease of stiffness of these1 increase the storage of the elastic potential energy by the muscle. If more energy is stored, the muscle may also dissipate further. Thus, the muscle seems participate predominantly to the dissipation of the potential energy elastic stored and the regulation of global stiffness during the production of couples force relatively weak. On the other hand, the mechanical properties of these2 seem very little to adapt to chronic eccentric solicitation. Only increases the stiffness and the length of the tendon of the gastrocnemius index have been highlighted, which would indicate that during a passive joint and ankle muscle contraction movement of the muscles of the TS, different (with specific mechanical properties) structures may be involved and adapt differently to eccentric training.

The decrease of stiffness of these 1 would increase the storage of the elastic potential energy by the muscle. If more energy is stored, the muscle may also dissipate further. Thus, the muscle seems participate predominantly to the dissipation of the potential energy elastic stored and the regulation of global stiffness during the production of couples force relatively weak. On the other hand, the mechanical properties of these2 seem very little to adapt to chronic eccentric solicitation. Only increases the stiffness and the length of the tendon of the gastrocnemius index have been highlighted, which would indicate that during a passive joint and ankle muscle contraction movement of the muscles of the TS, different (with specific mechanical properties) structures may be involved and adapt differently to eccentric training.

7. REFERENCES:

H, Pietilä Alfredson T, Jonsson P and Lorentzon R (1998) Heavy-load eccentric calf muscle training for the treatment of chronic Achilles tendinosis. Am J Sports Med; 26 (3): 360 - 6

Allison GT and Purdam C (2009) Eccentric loading for Achilles tendinopathy-strengthening or stretching? BR J Sports Med; 43 (4): 276 - 9

AJ, Cannavan Blazevich D, Coleman Dr. and Horne S (2007a). Influence of concentric and eccentric resistance training on architectural adaptation in human quadriceps muscles. J Appl Physiol; 103 (5): 1565-75

Bowers EJ, Morgan DL and Proske U (2004) damage to the human quadriceps muscle from eccentric exercise and the training effect. J Sports Sci; 22(11-12):1005 - 14

Brockett CL, Morgan DL and Proske U (2001) Human hamstring muscles adapt to eccentric exercise by changing optimum length. Med Sci Sports Exerc; 33 (5): 783-90

Burgess KE, Connick MJ, Graham-Smith P and Pearson SJ (2007) Plyometric vs. isometric training influences on tendon and muscle output properties. J Strength Cond Res; 21 (3): 986 - 9

Cavagna GA, NC, Harry JD and Mantovani Heglund M (1994) Storage and release of mechanical energy by contracting frog muscle fibers. J Physiol; 481 (Pt 3): 689-708

Dickinson MH, Farley CT, RJ, Kassab Full MA, Kram R and Lehman S (2000) how animals move: an integrative view. Science; 288 (5463): 100-6

Duclay J, Martin A, Duclay, Cometti G and Pousson M (2009) Behavior of fascicles and the myotendinous junction of human medial gastrocnemius following eccentric strength training. Muscle Nerve; 39 (6): 819 - 27

Enoka RM (1996) Eccentric contractions require unique activation strategies by the nervous system. J Appl Physiol; 81 (6): 2339-46

Farthing JP and Chilibeck PD (2003) the effects of eccentric and concentric training at different velocities on muscle hypertrophy. Eur J Appl Physiol; 89 (6): 578 - 86

Forster, Neeson, watching M and Cornu C (2009) Effects of plyometric training on passive stiffness of gastrocnemii and the musculo-articular complex of the ankle joint. Scand J Med Sci Sports; 19 (6): 811-818

Forster A, Neeson and Cornu C (2010A). In vivo assessment of both active and passive parts of the plantarflexors series elastic component stiffness using the alpha method: a reliability study. Int J Sports Med; 31: 51 - 57

Don F and Marini JF (1987) fiber type transition and stiffness change of soleus muscle of rats trained. Pflugers Arch; 410 (3): 321 - 5

Gregory I, Morgan DL, Allen TJ and Proske U (2007) the shift in muscle's length-tension relationship after exercise attributed to increased series compliance. Eur J Appl Physiol; 99 (4): 431 - 41

H Ansen P, Aagaard P, Kjaer M, Larsson B, and Magnusson SP (2003) Effect of habitual running on human Achilles tendon load-deformation properties and cross-sectional area. J Appl Physiol. 95 (6): 2375-80

Hather BM, Tesch PA, Buchanan P and Dudley GA (1991) influence of eccentric actions on skeletal muscle adaptations to resistance training. ACTA Physiol Scand; 143 (2): 177 - 85

Hawkins SB, TL and McGuigan MR Doyle (2009) the effect of different training programs on eccentric energy utilization in college-aged males. J Strength Cond Res; 23 (7): 1996-2002

Higbie EJ, Cureton KJ, Warren GL, 3rd and Prior BM (1996) Effects of concentric and eccentric training on muscle strength, cross sectional area, and neural activation. J Appl Physiol; 81 (5): 2173 -81

Hortobagyi T, Barrier J, Beard D, Braspennincx J, P, Devita Koens P Dempsey L and Lambert J (1996a). Greater initial adaptations submaximal to muscle lengthening than maximum shortening. J Appl Physiol; 81 (4): 1677-82

Johnson BL (1972) Eccentric vs concentric muscle training for strength development. Med Sci Sports Exerc; 4 (2): 111-115

Kim SG, Akaike T, Sasagaw T, Atomi Y and Kurosawa H (2002) Gene expression of type I and type III collagen by mechanical stretch in anterior cruciate ligament cells. Cell Struct Funct; 27 (3): 139 - 44

Kongsgaard M, Reitelseder S, Pedersen TG, Holm L, Aagaard P, Kjaer M and Magnusson SP (2007) Region specific patellar tendon hypertrophy in humans following resistance training. ACTA Physiol (Oxf); 191 (2): 111 - 21

Kovanen V, Suominen H and Heikkinen E (1984) Mechanical properties of fast and slow skeletal muscle with special reference to collagen and endurance training. J Biomech; 17 (10): 725 - 35

Kubo K, Kanehisa H, Ito M, and Fukunaga T (2001a). Effects of isometric training on the elasticity of human tendon structures in vivo. J Appl Physiol; 91 (1): 26-32

Kubo K, Kanehisa H and Fukunaga T (2002a). Effect of stretching training on the viscoelastic properties of human tendon structures in vivo. J Appl Physiol; 92 (2): 595-601

Kubo K, Kanehisa H and Fukunaga T (2002b). Effects of resistance and stretching training programs on the viscoelastic properties of human tendon structures in vivo. J Physiol; 538(Pt_1):219 - 26

Kubo K, Yata H, Kanehisa H and Fukunaga T (2006) Effects of isometric squat training on the tendon stiffness and jump performance. EUR J Appl Physiol; 96 (3): 305 - 14

H, Ellingsgaard Langberg H, Madsen T, Jansson J, Magnusson SP, Aagaard P and Kjaer M (2007) rehabilitation exercise increases peritendinous Eccentric type I collagen synthesis in humans

Lyman J, Weinhold PS and Almekinders LC (2004) Strain behavior of the distal achilles tendon: implications for insertional achilles tendinopathy. Am J Sports Med; 32 (2): 457-61

Magnusson SP, P and Kjaer Hansen M (2003b). Tendon properties in relationship to muscular activity and physical training. SCAND J Med Sci Sports; 13 (4): 211-23

Mahieu NN, McNair P, De Muynck M, Stevens G, Blanckaert I, Smits N and Antony E (2007) Effect of static and ballistic stretching on the muscle-tendon tissue properties. Med Sci Sports Exerc. 39 (3): 494-501

Mabuza NN, McNair P, Cools A, Haen C, Vandermeulen of K and Antony E (2008) Effect of eccentric training on the plantar flexor muscle-tendon tissue properties. Med Sci Sports Exerc; 40 (1): 117 - 23

Moritani T and deVries HA (1979) neural factors versus hypertrophy in the time race of muscle strength gain. Am J Phys Med; 58 (3): 115 - 30

Nelson RT and Bandy WD (2004) Eccentric Training and Static Stretching Improve Hamstring Flexibility of High School Males. J athletes Train; 39 (3): 254-258

M, Van Hoecke J and Goubel Pousson F (1990) changes in elastic characteristics of human muscle induced by eccentric exercise. J Biomech; 23 (4): 343 - 8

M, Perot Pousson C and Don F (1991) Stiffness changes and fiber type transitions in rat soleus muscle produced by jumping training. Pflugers Arch; 419 (2): 127 - 30

Proske U and Morgan DL (2001) muscle damage from eccentric exercise: mechanism, mechanical signs, adaptation and clinical applications. J Physiol; 537(Pt_2):333 - 45

Reeves ND, Narici MV and Maganaris CN (2003b). Strength training alters the viscoelastic properties of tendons in elderly humans. Muscle Nerve; 28 (1): 74-81

Reeves ND, Maganaris CN and Narici MV (2003a). Effect of strength training on human patella tendon mechanical properties of older individuals. J Physiol; 548(Pt_3):971 - 81

Reich TE, Lindstedt SL, LaStayo PC and Pierotti DJ (2000) Is the spring quality of muscle plastic? Am J Physiol Regul Integr Comp Physiol; 278 (6): R1661-6

Shalabi A, Kristoffersen-Wiberg M, Aspelin P and Movin' T (2004) Immediate Achilles tendon response after strength training evaluated by MRI. Med Sci Sports Exerc; 36 (11): 1841-6

Silbernagel KG, Thomee R, P and Karlsson Thomee J (2001) Eccentric overload training for patients with chronic Achilles tendon pain - a randomised controlled study with reliability testing of the assessment methods. SCAND J Med Sci Sports; 11 (4): 197-206

Stanish WD, RM and Curwin Rubinovich S (1986) Eccentric exercise in chronic tendinitis. Clin Orthop Relat Res (208): 65 - 8

Talbot JA and Morgan DL (1998) the effects of stretch parameters on eccentric exercise-induced damage to toad skeletal muscle. J Muscle Res Cell Motil; 19 (3): 237-45

Wernbom M, Augustsson J and Thomee R (2007) the influence of frequency, intensity, volume and mode of strength training on whole muscle cross sectional area in humans. Sports Med; 37 (3): 225-64

Willems ME and Stauber WT (2002) fatigue and recovery at long and short muscle lengths after eccentric training. Med Sci Sports Exerc; 34 (11): 1738-43

Yang G, Crawford RC and Wang JH (2004). Proliferation and collagen production of human patellar tendon fibroblasts in response to cyclic uniaxial stretching in serum-free conditions. J Biomech; 37 (10): 1543-50

Zaja FE (1989) muscle and tendon: properties, models, scaling, and application to biomechanics and motor control. Crit Rev Biomed Eng; 17 (4): 359-411

RELATIONSHIPS OF PHYSICAL ACTIVITY LEVELS AND QUALITY OF LIFE BEHAVIORS OF STUDENTS

Dilek Yalız Solmaz[1], Gülsün Aydın[1]

[1]*Anadolu University, Faculty of Sport Sciences, Eskisehir/ Turkey*

E-mail: dilekyaliz@anadolu.edu.tr , gaydin@anadolu.edu.tr

Abstract

The purpose of the study was to determine the relationships of physical activity levels and quality of life behaviors of students in Anadolu University at Faculty of Sport Science, Department of Coach Training in Sports. 114 students who were educated in Department of Coach Training in Sports participated in this study. Data were collected using a personal information form, short form SF-36 and IPAQ short form. According to our research results most of the students were attending high intensity physical activities and the highest means according to with SF-6 Health Survey are physical functioning and the lowest mean is vitality status. Highest vitality values belong to 21-23 years old students. The highest general health values belong to 1st class students. Nonsmoker students had the highest physical functioning scores. But there is no significant difference between students' scores in all dimensions according to alcohol use status. As a conclusion of this study, there is a positive relationship between general health status and physical activity.

Key Words: Quality of Life, University student, Physical activity, Behavior

1. INTRODUCTION

Regular physical activity remains an important behavior for promoting health, preventing prevalent musculoskeletal disorders such as mechanical low back pain and decreasing the risk of heart diseases, hypertension, diabetes, osteoporosis, obesity … etc (Daskapan et. al., 2006). In addition, physical activity has favorable effects on blood pressure, lipid and lipoprotein profiles, weight control and body fat distribution, as well as on mental health and psychological well-being (Brown et. al., 2003). Adequate physical activity has also a critical bearing on wellbeing and quality of life (Lovell et.al. 2010).

Quality of life is defined as a conscious cognitive judgment of satisfaction with one's life (Rejeski and Mihalko, 2001). The World Health Organization defines quality of life as individuals' perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. The health related quality of life (HRQL) is a relatively new term in literature, receiving more attention in recent year. The HRQL is developed as a narrower term than the comprehensive "quality of life" terms (Latas, 2014). Health-related quality of life has also evolved to include aspects of life that affect perceived physical or mental health (Brown et. al., 2003).

Quality of life is a new research field in the postmodern world (Edvy, 2013). Over the past decades, it was shown that health-related quality of life assessments are very important in educational settings (Pekmezovic et. al, 2011).

The purpose of the present study was to determine and examine the relationships of physical activity levels and quality of life behaviors of university students in Anadolu University at Faculty of Sport Science, Department of Coach Training in Sports.

2. METHODOLOGY

Participants: 114 students who were educated in Anadolu University, Faculty of Sport Sciences and Department of Coach Training in Sports participated in this study.

Data Collection Tools: Data were collected using a personal information form, HRQL from the Medical Outcomes Survey short form-36 (SF-36) and International Physical Activity Questionnaire (IPAQ) short form. The data were gathered during 2014-2015 Academic Year.

HRQL from the Medical Outcomes Survey short form-36 (SF-36): The SF-36 Health Survey is a generic questionnaire consisting of 36 items clustered to measure eight health concepts (Lim et. al., 2008). The SF-36 was first published in 1992, respectively, with the revised version of the questionnaire published in 2000. The revised version is very similar to its original form, with major differences involving changes in item wording, revision of the response scale to incorporate a greater number of response options, and norm-based scoring (Busija et. al., 2011).

It yields an eight-scale profile of scores as well as summary physical and mental measures (Busija et. al., 2011). The Turkish validated version of the SF-36 questionnaire was applied to students. This self-administered questionnaire contains 36 questions measuring eight domains of functioning: physical functioning (PF), role- functioning/physical (RP), pain (P), emotional wellbeing (EW), role-functioning/emotional (RE), social functioning (SF), vitality (VT), and general health (GH) status. PF covers limitations in daily life due to health problems. The RP scale measures role limitations due to physical health problems. The P scale assesses pain frequency and pain interference with usual roles. The GH scale measures individual perceptions of general health. The VT scale assesses energy levels and fatigue. The SF scale measures the extent to which ill health interferes with social activities. The RE scale assesses role limitations due to emotional problems, and the EW scale measures psychological distress (Busija et. al., 2011). Each of the SF-36 subscales is scored from 0 to 100, with a higher score representing better health. The eight SF-36 scales can be summarized into a physical component summary (PCS) and a mental component summary (MCS) scores (Khanna et. al., 2010).

International Physical Activity Questionnaire (IPAQ) short form: The International Physical Activity Questionnaire (IPAQ) was developed in an attempt to standardize assessment of the prevalence of PA in different countries and cultures around the world (Ekelund et. al., 2006; Craig et. al., 2003). IPAQ is designed to assess the levels of habitual physical activity for individuals ranging from young to middle-aged adults. In addition, there are different forms of IPAQ depending on several variations which include length of questionnaire (short or long form), reference period (last 7 day or usual week) and mode of administration (self-report or interviewer-based) (Craig et. al., 2003) suggested that the last 7-day, short form of the International Physical Activity Questionnaire can be used for national and regional researches.

Analysis: In the data analysis, "frequencies, percentage, mean, standard deviation, t-test, ANOVA" were used. Moreover, Product-Moment Correlation coefficients were calculated in order to see the relationship between physical activity levels and quality of life behaviors. The significance level is accepted as .05 and .01 during the statistical analysis.

3. RESULTS

Tables which are showing about opinions of students participating on research's findings are given below.

Table 1: Demographic characteristics of participants

Variable	f	%
Gender		
Male	100	87.7
Female	14	12.3
Grade Levels		
1st class	38	33.3
2nd class	22	19.3
3rd class	36	31.6
4th class	18	15.8
Ages		
18-20 age	31	27.2
21-23 age	65	57.0
24 and over age	18	15.8
Smoking status		
Smokers	34	29.8
Non-smokers	77	67.5
Quit smoking	3	2.6
Alcohol use status		
User	49	43.0
Non-user	61	53.5
Quit using alcohol	4	3.5

According to Table 1, 12.3% of the students in the study population were female, 87.7% are male. According to the grade levels, it is observed that students are 1st class of 33.3%, 2nd class of 19.3%, 3rd class of 31.6% and 4th class of 15.8%. According to the ages, it is observed that students are 18-20 age of 27.2%, 21-23 age of 57.0% and 24 and over age of 15.8%. According to the smoking and alcohol use status %29.8 of students are smokers, % 67.5 nonsmokers, % 43 alcohol users and % 53.5 of students are non-alcohol users.

Table 2: The level of the students' physical activity

	F	%
Low Intensity	9	7.9
Middle Intensity	36	31.6
High Intensity	69	60.5

According to Table 2, when we examined the frequency and percentage distribution of students' physical activity levels who are studying at Department of Coach Training in Sports, it is determined that %7.9 of students were attending low intensity physical activity while %31.6 of them were attending middle intensity physical activity and %60.5 of them were attending high intensity physical activity.

Table 3: The level of the students' quality of life behaviors

	N	Mean	Sd
Physical functioning	114	89.21	15.79
Role functioning/physical	114	81.80	31.60
Role functioning/emotional	114	69.88	39.90
Vitality	114	65.53	14.99
Emotional well-being	114	66.91	14.48
Social functioning	114	69.41	22.00
Pain	114	77.89	20.45
General health	114	71.27	17.25

According to Table 3, when we examined students' quality of life behaviors with SF-6 Health Survey in eight domains of functioning, the highest point means belong to in physical functioning (M=89.21), role functioning/physical (M=81.80) and pain (M=77.89). the lowest point means belong to general health (M=71.27), role functioning/emotional (M=69.88), social functioning (M=69.41), emotional well-being (M=66.91) and vitality (M=65.53).

Table 4. Gender- specific mean T scores of quality of life behaviors

	Male	Female	
	Mean ± SD	Mean ± SD	*P* value*
Physical functioning	88.4 ± 16.6	95.0 ± 5.88	0.01*
Role functioning/physical	82.5 ± 31.3	76.8 ± 34.6	0.53
Role functioning/emotional	70.3 ± 39.0	66.7 ± 47.1	0.75
Vitality	65.3 ± 14.8	67.1 ± 16.8	0.67
Emotional well-being	66.3 ± 14.4	71.1 ± 15.0	0.25
Social functioning	69.3 ± 21.8	70.5 ± 24.3	0.84
Pain	78.4 ± 19.5	74.6 ± 26.9	0.53
General health	71.3 ± 17.6	71.1 ± 15.2	0.96

*Significance of difference between male and female ($P<0.05$)

According to Table 4, when male and female students evaluate quality of life behaviors scores, there is no significant difference between students' role functioning/physical (p=0.53), role functioning/emotional (p=0.75), vitality (p=0.67), emotional well-being (p=0.25),

social functioning (p=0.84), pain (p=0.53) and general health (p=0.96) according to gender. However, physical functioning mean of female students were found to have scored higher than the male ones (M=95.0 and M=88.4 respectively). Also, the difference between these scores was found to be statistically significant (p=0.01).

Table 5. Ages- ANOVA scores of quality of life behaviors

	18-20 ages	21-23 ages	24 and over age	
	Mean ± SD	Mean ± SD	Mean ± SD	*P* value*
Physical functioning	93.5 ± 9.9	87.5 ± 17.5	87.8 ± 16.7	0.20
Role functioning/physical	91.9 ± 26.1	79.2 ± 30.8	73.6 ± 39.7	0.08
Role functioning/emotional	67.7 ± 41.7	67.7 ± 40.4	81.5 ± 34.7	0.41
Vitality	64.7 ± 14.4	68.4 ± 15.2	56.7 ± 11.8	0.01*
Emotional well-being	70.3 ± 15.8	66.9 ± 14.2	61.1 ± 11.5	0.09
Social functioning	73.8 ± 26.1	67.1 ± 19.3	70.1 ± 23.5	0.38
Pain	75.4 ± 25.3	78.4 ± 18.5	80.3 ± 18.3	0.69
General health	75.5 ± 18.6	69.8 ± 16.9	69.4 ± 15.7	0.28

*Significance of difference between male and female (*P*<0.05)

According to Table 5, there is no significant difference between students' physical functioning (p=0.20), role functioning/physical (p=0.08), role functioning/emotional (p=0.41), emotional well-being (p=0.09), social functioning (p=0.38), pain (p=0.69) and general health (p=0.28) according to ages. However, there is a statistically significant difference in vitality of students according to ages (p=0.01).

Table 6. Grade Levels- ANOVA scores of quality of life behaviors

	1st class	2nd class	3rd class	4th class	
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	*P* value*
Physical functioning	94.1 ± 10.3	84.1 ± 21.7	87.2 ± 17.5	89.2 ± 10.7	0.08
Role functioning/physical	88.8 ± 29.5	71.6 ± 37.2	82.6 ± 29.8	77.8 ± 30.8	0.21
Role functioning/emotional	71.9 ± 39.9	68.2 ± 40.5	74.1 ± 39.9	59.2 ± 40.5	0.61
Vitality	66.1 ± 14.2	62.5 ± 11.4	64.7 ± 18.2	69.7 ± 13.3	0.49
Emotional well-being	70.7 ± 14.8	63.6 ± 12.6	65.1 ± 15.3	66.4 ± 13.6	0.22
Social functioning	73.0 ± 24.6	61.4 ± 12.1	70.5 ± 23.6	79.4 ± 21.5	0.25
Pain	76.0 ± 24.1	75.9 ± 18.3	81.0 ± 17.8	78.1 ± 20.2	0.71
General health	75.7 ± 18.5	63.2 ± 16.4	71.9 ± 16.7	70.6 ± 14.0	0.05*

*Significance of difference between male and female (*P*<0.05)

According to Table 6, there is no significant difference between students' physical functioning (p=0.08), role functioning/physical (p=0.21), role functioning/emotional (p=0.61), vitality (p=0.49), emotional well-being (p=0.22), social functioning (p=0.25) and pain (p=0.71) according to grade levels. However, there is a statistically significant difference in and general health of students according to grade levels (p=0.05).

Table 7. Smoking use status- ANOVA scores of quality of life behaviors

	Smoker	Non-smoker	Quit Smoking	
	Mean ± SD	Mean ± SD	Mean ± SD	*P* value*

Physical functioning	82.1 ± 18.3	92.5 ± 13.3	86.7 ± 23.1	0.00*
Role functioning/physical	78.7 ± 35.4	82.8 ± 30.4	91.7 ± 14.4	0.70
Role functioning/emotional	64.7 ± 38.4	72.3 ± 40.2	66.7 ± 57.7	0.65
Vitality	62.9 ± 15.7	66.4 ± 14.9	73.3 ± 5.8	0.36
Emotional well-being	62.5 ± 14.2	68.6 ± 14.4	74.7 ± 12.2	0.07
Social functioning	64.7 ± 22.5	71.8 ± 21.8	62.5 ± 12.5	0.25
Pain	76.4 ± 20.7	78.8 ± 20.4	71.7 ± 23.6	0.74
General health	62.6 ± 15.1	74.5 ± 16.8	85.0 ± 17.3	0.00*

*Significance of difference between male and female (P<0.05)

According to Table 7, there is no significant difference between students' role functioning/physical (p=0.70), role functioning/emotional (p=0.65), vitality (p=0.36), emotional well-being (p=0.07), social functioning (p=0.25) and pain (p=0.74) according to smoking use status. However, there is a statistically significant difference in physical functioning (p=0.00) and general health (p=0.00) of students according to smoking use status.

Table 8. Alcohol use status- ANOVA scores of quality of life behaviors

	User	Non-user	Quit using alcohol	*P* value*
	Mean ± SD	Mean ± SD	Mean ± SD	
Physical functioning	88.2 ± 15.5	90.6 ± 14.9	80.0 ± 30.3	0.35
Role functioning/physical	86.2 ± 30.6	78.7 ± 32.2	75.0 ± 35.4	0.42
Role functioning/emotional	71.4 ± 41.4	69.4 ± 38.6	58.3 ± 50.0	0.81
Vitality	63.5 ± 15.7	66.8 ± 14.8	71.3 ± 4.8	0.38
Emotional well-being	66.2 ± 15.6	67.5 ± 13.9	67.0 ± 10.0	0.90
Social functioning	74.2 ± 18.5	65.2 ± 23.6	75.0 ± 28.9	0.08
Pain	78.9 ± 17.2	77.2 ± 22.8	76.3 ± 24.3	0.90
General health	67.7 ± 15.4	74.7 ± 17.5	63.6 ± 22.9	0.07

*Significance of difference between male and female (P<0.05)

According to Table 8, there is no significant difference between students' physical functioning (p=0.35), role functioning/physical (p=0.70), role functioning/emotional (p=0.65), vitality (p=0.36), emotional well-being (p=0.07), social functioning (p=0.25), pain (p=0.74) and general health (p=0.07) according to alcohol use status.

Table 9: Correlations between sub-dimensions of quality of life behaviors and physical activity

	*r**	*P* value
Physical functioning	0.133	0.158
Role functioning/physical	0.073	0.440
Role functioning/emotional	-0.009	0.923
Vitality	-0.029	0.759
Emotional well-being	0.043	0.648
Social functioning	0.093	0.326
Pain	0.045	0.636
General health	0.199*	0.034*

*Pearson correlation coefficient

Correlation is significant at the 0.01 level.

Correlation is significant at the 0.05 level.

According to Pearson Correlation analysis, it is observed that the highest correlation is between general health perceptions (r=.199; p<0.05) and physical activity. Moreover, it has been found out that there is a positive and significant relationship between general health status (r=.199; p<0.05) and physical activity. It has also been found out that there is a positive yet no significant relationship between physical activity and physical functioning (r= .133, p>.01), role functioning/physical (r=.073, p>.01), emotional well-being (r= .043, p>.01), social functioning (r= .093, p>.01) and pain (r=.045, p>.01). It has also been found out that there is a negative yet no significant relationship between physical activity and role functioning/emotional (r= -.009, p>.01) and energy/fatigue (r= -.029, p>.01).

4. DISCUSSION AND CONCLUSION

In a summary, when we examined the physical activity levels most of the students were attending high intensity physical activities and then middle and low intensity physical activities.

According to our research results the highest means according to with SF-6 Health Survey are physical functioning and role functioning/physical status and the lowest mean is vitality status. These results are similar with the research results determined by Pekmezovic et. al (2011).

Physical functioning values of female students were found higher than the male ones. In contrast to our research results, Pekmezovic et. al (2011) mentioned that male students scored better compared to female students, in any of the eight dimensions except for the role functioning physical status and Paro et. al. (2010) determined that female students had lower physical functioning, pain, vitality, social functioning, and role emotional values than male students. According to age differences highest vitality value belongs to 21-23 years old students and then 28-20 years old, the lowest vitality value belongs to 24 years and more. The highest to lowest general health values in turn belong to 1^{st,} 3rd, 4th and 2nd class students. According to smoking status nonsmoker students had the highest physical functioning scores. But there is no significant difference between students' scores in all dimensions of SF-6 Health Survey according to alcohol use status.

According to our research results, scores of students for all SF-36 subscales are with a higher score representing better health (Khanna et. al., 2010). In contrast to our study Henning et. al. (2012) determined that all student groups examined in their study appeared to be experiencing lower levels of quality of life when compared to the general population. The same results were found in another research too. In this research the medical students showed poor HRQOL, mainly because of the mental component. Lower HRQOL was associated with FIES support, females, sleepiness, headaches and lack of regular physical activity (Lins et. al., 2015). Regular physical activity improves physical and mental health in students and regular physical activity as a part of strategies to improve the quality of life in students (Pekmezovic et. al., 2011). As a conclusion of this study, there is a positive relationship between general health status and physical activity but no significant relationship between physical activity and the other status.

5. LIMITATIONS AND FUTURE RESEARCH

The sample population of this study limited to University students in Department of Coach Training in Sports. A bigger sample that is able to represent the other universities, faculties and departments would enable the research to reach yield even more meaningful clearer and more generalized results about university students' health related quality of life (HRQL) and physical activity levels which is one of the factor effecting HRQL.

6. REFERENCES

- Brown, D.W., Balluz, L.S., Heath, G.W., Moriarty, D.G., Ford, E.S., Giles, W.H., Mokdada, A.H. (2003). Associations between recommended levels of physical activity and health-related quality of life: Findings from the 2001 Behavioral Risk Factor Surveillance System (BRFSS) survey. Preventive Medicine, 37, 520-528.
- Busija, L., Pausenberger, E., Haines, T.P., Haymes, S., Buchbinder, R., Osborne, R.H. (2011). Adult measures of general health and health-related quality of life. Arthritis Care & Research, 63(11), 383-S412.
- Craig, C.L., Marshall, A.L., Sjo¨stro¨m, M., Bauman, A.E., Booth, M.L., Ainsworth, B.E., Pratt, M., Ekelund, U,, Yngve, A., Sallis, J.F., Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. Medicine and Science in Sports and Exercise, 35, 1381-95.
- Daskapan, A., Tuzun, E.H., Eker, L. (2006). Perceived barriers to physical activity in university students. Journal of Sports Science and Medicine, 5, 615-620.
- Edvy, L. (2013). Quality of life indicators of university students in Hungary. Physical Culture and Sport Studies and Research, 58(1), 53-60.
- Ekelund U., Sepp, H., Brage, S., Becker, W., Jakes, R., Hennings, M., Wareham, N.J. (2006). Criterion-related validity of the last 7-day, short form of the international physical activity questionnaire in Swedish adults. Public Health Nutrition, 9(2), 258-265.

- Henning MA, Krägeloh CU, Hawken SJ, Zhao Y, Doherty I. (2012). The quality of life of medical students studying in New Zealand: a comparison with nonmedical students and a general population reference group. Teach Learn Med., 24(4), 334-40.
- Khanna, P.P., Perez-Ruiz, F., Maranian, P., Khanna, D. (2010). Long-term therapy for chronic gout results in clinically important improvements in the health-related quality of life: short form-36 is responsive to change in chronic gout. Rheumatology, 50(4), 740-745.
- Latas, M., Stojkoviü, T., Raliü, T., Jovanoviü, S., Špiriü, Z., Milovanoviü, S. (2014). Medical students` health-related quality of life – A comparative study. Vojnosanit Pregl, 71(8), 751-56.
- Lim, L-Y, Seubsman, S., Sleigh, A. (2008). Thai SF-36 health survey: tests of data quality, scaling assumptions, reliability and validity in healthy men and women. Health and Quality of Life Outcomes, 6(52)1-9.
- Lins, L., Carvalho, F.M., Menezes, M.S., Silva, L.P. Damasceno, H. (2015). Health-related quality of life of students from a private medical school in Brazil. Int J Med Educ., 6,149-154.
- Lovell, G.P., Ansari, W.E., Parker, J.K. (2010). Perceived exercise benefits and barriers of non-exercising female university students in the United Kingdom. Int. J. Environ. Res. Public Health, 7(3), 784-798.
- Paro, H.B.M.S., Morales, N.M.O., Silva, C.H.M., Rezende, C.H.A., Pinto, R.M.C., Morales, R.R., et al. (2010). Health-related quality of life of medical students. Medical Education, 44, 227-235.
- Pekmezovic, T., Popovic, A., Tepavcevic, D.K., Gazibara, T., Paunic, M. (2011). Factors associated with health-related quality of life among Belgrade University students. Qual Life Res., 20, 391-397.
- Rejeski, W.J., Mihalko, S.L. (2001). Physical activity and quality of life in older adults. Journals of Gerontology, 56A (Special Issue II), 23-3523.

"THE EFFECT OF USING BLOOD VESICLE-RICH PLASMA & SPECIAL REHABILITATION TRAINING ON ACCELERATING RECOVERY FROM TENNIS ELBOW INJURIES"

Mohamed Fadel Elwan

College of Physical Education & Sport Sciences. Diyala University

Abstract:

The tennis elbow injury was the center of the researcher's interest as he decided to exert his utmost effort in order to find modern therapeutic means (medical and rehabilitation training) to reach complete recovery stage from this injury. In his study, the researcher aims to define the effect of using blood vesicle-rich plasma on accelerating recovery from tennis elbow injury. In addition, the study aims to define the effect of special rehabilitation training after using blood vesicle-rich plasma on accelerating recovery from tennis elbow injury. To apply this study, the researcher selected two athletes injured with partial fracture in the tennis elbow (musculus extensor carpi radialis) who have similar injuries to overcome differences and to ensure homogeneity among sample members. The researcher used blood plasma and training as a basis for treatment and he found that blood plasma used in the form of local injection contributed to accelerate recovery of injured players and quick return to normal posture. In addition, the study found selective treatment of certain muscles or tendons to contribute to guide therapeutic work to specific points.

Keywords: blood plasma, blood vesicles, rehabilitation training, tennis elbow injuries.

1. INTRODUCTION:

With the development of science, diagnostic and therapeutic techniques at present, more awareness was created to use these techniques to their maximum limits in order to get maximum benefits. Each student utilized these techniques in his/her work field according to their specialization till maximum limits in order to benefit from scientific development and support development cycle towards advancing consistently. This depends on scientific studied method combined with researchers' creativity and passion to solve problems and shorten time in order to reach their goals and achieve their research and scientific objectives as quick as possible. These scientific researches resulted in development in all aspects of life. Therefore, the significance of the study lies in defining the effect of using modern medical techniques combined with special rehabilitation training in order to accelerate time reaching recovery from tennis elbow injury.

Problem of the Study

Sport injuries are among the worst fears of athletes and they are always described as the ghost which chases the athletes along their sport careers, especially some common injuries for a lot of athletes that stand as a stumbling block in their sport development. It is not necessary to mention many of prominent names in sport whose sporting careers ended with injuries

From previous illustration and many others, the researcher became motivated to highlight one of the common injuries and find solutions to mitigate the severity of this injury, shorten recovery time and then rehabilitate the injured area to return to sport activity with prevention from repeating this injury as a result of incomplete recovery. The tennis elbow injury was the main center of the researcher's attention and he decided to exert his utmost effort in order to find modern therapeutic means (medical and rehabilitation training) to reach complete recovery stage from this injury.

Objectives of the Study:

1- Define the effect of using blood vesicle-rich plasma on accelerating recovery from tennis elbow injury.
2- Define the effect of special rehabilitation training after using blood vesicle-rich plasma on accelerating recovery from tennis elbow injury.

Hypotheses of the Study:

1- There are statistically significant hypotheses towards accelerating recovery from tennis elbow injury after injection of blood vesicle-rich plasma at the injured place.
2- Physical training has a statistically significant effect towards accelerating recovery from tennis elbow injury after injection of blood vesicle-rich plasma at the injured place.

2. METHODOLOGY:

The researcher used the empirical method to solve problem of the study.

Sample of the Study:

The researcher selected two athletes injured with partial fracture in the tennis elbow (musculus extensor carpi radialis) who have similar injuries to overcome differences and to ensure homogeneity among sample members.

Procedures of the Study:

Procedures of the study depended on two main factors and one secondary factor:

1- Diagnosis & Medical Treatment:

With the help of a specialized medical crew, the researcher performed examination using ultrasound waves (Sonar). After a week, the researcher performed it after ensuring that there is no swelling, side effects or accompanying injuries such as skin injuries, a fracture of a part of elbow bones or bone fragments at the injured area.

10 cc were extracted from the blood of the injured person himself and then put them in a special tube. Blood was put in the centrifugal device for (5) minutes to separate blood plasma from red blood cells and then blood plasma was extracted and red blood cells were left in the tube. Next, the injured person stands on a seat and the arm is put bended on a table in a convenient way for the injured person. After that, the injured area should be sterilized with accurate detection of the injured place using the sonar device (examination device using ultrasound waves) and blood vesicle-rich plasma at the injured area using a syringe. After injection, the injured area was sterilized again to avoid any pollution that may lead to future side effects.

It was asserted to make the injured person at the sitting position and its arm by the bend posture on the table for (15) minutes. This process is repeated after one or two months since the date of performing the first injection process.

2- Prevention (Secondary) Part

The tester uses a special slap and puts it at the wrist. This slap contains a hard part at the back part of the wrist. This hard part prevents wrist movement backwards as the extensor carpi radialis brevis muscle related to the tennis elbow is the muscle responsible for wrist joint backward movement. This slap prevents any movement that may lead to late healing and allows the injured to perform the rest of moves that are not related to this muscle or the injured tendon. This slap is used at the first month of the injury in a continuous manner for 24 hours and partly at th second month not less than 12 hours daily.

3- Rehabilitation Training

Rehabilitation training starts four weeks after the date of performing injection of blood vesicle-rich plasma. This training should be very low in intensity, repetition and they aim to reduce pain. After that, average intensity training begins and according to the injured person's ability to perform them considering gradual loads (intensity and repetition) and they are divided into:

1- Flexibility Training: training of the motor rate of the elbow and wrist.
2- Strength Training:
A. Isometric Training for extending and bending muscles of the elbow and wrist.
B. Isotonic Training for extending and bending muscles of the elbow joint.
C. Muscle Strengthening Training at palm extension and contraction.

Table (1): the size of partial fracture of the extensor carpi radialis brevis muscle measured in (mm) and the amount of feeling pain during gradual loads:

	Using Blood Vesicle-Rich Plasma & Rehabilitation Training		Un-using Blood Vesicle-Rich Plasma & Rehabilitation Training	
	Tendon fracture size (mm)	Feeling pain	Tendon fracture size (mm)	Feeling pain

Week	3 mm	Intense	3 mm	Intense
Month	2 mm	Average	2.7 mm	Intense
Two months	5.8 mm	Low	2.3 mm	Average
Three month	Healing	No pain	1.8 mm	Average

Through table (1) showing the size of partial fracture at the extensor carpi radialis brevis muscle (tennis elbow injury), it can be noticed that there is a clear development in the muscle's tendon healing. After fracture length was 3 mm one week after the injury, and as a result of injecting the injured area with blood vesicle-rich plasma, its length became 2mm one month after the date of the first injection process. The rate of feeling pain also was low from very intense to average one, while the size of fracture of the muscle's tendon with the sample not injected with blood vesicle-rich plasma was 2.7 mm one month after initial diagnosis as fracture size was 3 mm with continuous feeling great pain at the injured area. This asserts the effectiveness of blood vesicle-rich plasma and its ability to accelerate healing the muscle's tendon (1).

After re-examination and diagnosis of the injured muscle's tendon two months after the initial examination date, as a result of using rehabilitation training in addition to injecting the injured area with blood vesicle-rich plasma once again, the researcher noticed that muscle tendon's healing rate increased more than previously from 2 to 5.8 mm. He also noticed that the rate of feeling pain was also low from average to lower, while the rate of healing for the muscle's tendon of the sample not injected with blood vesicle-rich plasma and not subject to rehabilitation training mush less. After fracture size was 2.7 mm one month after injury, it became 2.3 mm two months from injury and feeling pain was reduced from very intense to average one. This also asserts the role of rehabilitation training on accelerating healing in addition to blood vesicle-rich plasma (2). Moreover, table (1) also shows that in three months after initial injection of the muscle's tendon of with blood vesicle-rich plasma and continuous rehabilitation training, the injured area of the sample was re-examined and it was found that there is a complete healing of the tendon of the extensor carpi radialis brevis muscle (tennis elbow) and no pain at the injured area, while there was a 1.8 mm fracture at the muscle's tendon with average pain level at the injured area of the sample not injected with blood vesicle-rich plasma and not subject to rehabilitation training.

Thus, it became greatly evident that blood vesicle-rich plasma and rehabilitation training play a role in rehabilitation of sport injuries and great shortening of time in order to restore complete recovery from muscular tendon injuries which agrees with the study of (Bahaa Eldin Salama, 2005: 23). He says that it is necessary to use modern techniques in recovery and prevention from injury repetition such as using local blood plasma injection as it has rapid and good influence in recovery.

3. CONCLUSIONS:

- Blood plasma used as local injection contributed to accelerate recovery for the injured persons with quick return to normal position.
- The study reached a selective treatment to specific muscles or tendons and this, in turn, contributes to guide treatment work to a specific point.

4. RECOMMENDATIONS:

1- Authorizing results of the study in recovery of elbow joint injuries.
2- Applying local plasma injection on other injuries such as the knee joint.
3- Applying the study on a sample of injured females with similar cases with the possibility to compare the effect among males and females.

5. REFERENCES:

1- Bahaa Eldin Salama. (2005): "Blood Lactates", Al Maaref Press.
2- Abo Elela. (2003): "Sport Training Physiology", Cairo, Nasr Press.
3- International Journal of Clinical and Experimental Hypnosis, uk.2001

THE ROLE OF PHYSICAL EDUCATION AND SPORTS IN THE SUPPORT AND DEVELOPMENT OF SKILLS AND SOCIAL ABILITIES OF SECONDARY SCHOOL PUPILS.

Belkebiche Kada[1], Kohli Kamel [1], Mokrani Djamel[1] , Benzidane Houcine [1]

Laboratory of Programs Optimization in APS.
Institute of Sports and Physical Education, University of Mostaganem, Mostaganem, Algeria

belkbiche1@yahoo.fr kamel.76@live.com djameleps@yahoo.fr hocine76ben@yahoo.fr

Abstract:

The research aims to know the role of physical education and sports in the support and development of skills and social abilities of secondary school pupils. Where the descriptive approach was adopted for its suitability in this research on a sample of 544 male and female pupils' on wheelchairs through the 2013-2014 season, at the provinces of Mostaganem in Algeria. The used tool was a measure of skills and social abilities, which includes social mobility, response, conflict, organization, social control, social expression, and social relationship. A research tool was distributed to a sample of secondary school pupils. After statistical treatment of the raw results, the researchers concluded that the role of physical education came and sports in the support and development of these social skills of students.

Keywords: physical education and sports, skills and social abilities, Secondary school, pupils.

1. INTRODUCTION:

Physical education and sports science are considered like all other sciences have evolved, so has become an effective tool to achieve the purpose of the society is no longer as well as the concepts of organic is a set of motor skills, but it is consensual and adaptive to the individual process.

Education as a concept is the individual's interaction with the social environment in order to achieve compliance or adjustment between man and society depending on the degree of physical and spiritual development in it, and that the ultimate goal of education is a personal help for humanity to grow emotionally and socially sound, physical education and sports can develop voluntary qualities when human practice and have the moral habits that are in line with the general spirit of the community. (Badawi, 1987).

The physical education and sports as a means to achieve the purposes of the community and the idea of "sound mind in a sound body" assures us that physical education and sports are a full part of the public education and the field aims to form a decent citizen of physical, mental and emotional, as well as from the social point of view, and next to that, knowing the psychological foundations can give an analysis of the most important aspects of physical and sports activities and contribute to the careful analysis of the psychological processes of the individual.(Ben Kassed ,1998).

Individual also helps to cope with the group what to play, but a manifestation of social harmony and can brotherhood and friendship grow between people has human distinguish inclination to violence in situations of stability as they are able through activities that offer a lot to cover the needs of the individual, which represents cooperation and the sharing of love and intimacy and a sense of security within the frame work of the society in which he lives, and can achieve these needs and behaviors through play and recreation for this, the goal of physical education and sports is psychological, social and economic individual case largely service, contrary to what is thought a lot that the aim of the exercise is limited to time objects and strengthen the muscles automatically and independently In our time this is a sports activity social climate rich in terms of social development, which is one of the important and the main objectives of Physical Education and Sports, Valoncth sports are in abundance processes and social interactions, which would give the practice of sport and physical activity, a large number of social values and experiences unwanted and that develop social principles in character and help in socializing and adapt to the requirements of society and organized by social standards.

Which led educational institutions to take all this into account and make physical education and sports classes in decision-school, like the rest of the materials for deliberately making designed to facilitate the education and benefit from the process of educational curricula when you take a position in the field of school for the development of expertise engaged by students if the practical and

theoretical through their competencies and their share of physical education and sports are integrated with the rest of the material in the student service intent identifier and development to what is best.

Problematic:

The education and growth between the individual and society interaction process and through this interaction the individual benefit from the experience and expertise can or adjust his behavior and changing trends even fit with the community in which they live is the most important theoretical tendencies that are born by the individual, the tendency to play, which is a vital energy and show the latter what we call physical activity and motor sports, physical education and sports (salary, 1998).

Perhaps the consensus that physical education and sports in general are selected a number of physical activities aiming at the formation of the individual from the point of mental and emotional and social terms of activities an individual can learn the system, cooperation and courage and we can say that physical education and sports manifestation of Education and indisputable because this The kind of love for the individual species, we find a profound impact in the formation of social qualities, but in the normal profile of each individual composition because the individual is integrated module is a separate where the mind affects the body and vice versa cannot be separated from each other (Ahmed , 1991).

With this in mind and through all previous concepts proved to us that the share of physical education and sports a large impact on the social side of student service and that we decided in our search to find out the role and function of physical education and sports in highlighting and install basic social skills in the community, so ask the following formats:

* What is the role of physical education and sports in the support and development of social skills?

3. The objectives of the research:

The objectives of this research are as follows:

* highlight and identify social skills during sport practice at the high school students of both sexes male and female.

* Knowledge of the role of sports practice in the support and development of social skills for students of both sexes male and female.

2. RESEARCH METHODOLOGY:

The research methodology varies depending on the topics of research, and through the problem at hand has used the survey method.

Sample: Sample was selected at random and to disseminate the results of this, and included 544 male and female pupils' distributors at different rates and are described in the following schedule:

The number of pupil's levels / secondary school year

Table 01 shows the distribution of students according to how high schools

The number of pupils levels secondary school year	**LEVEL 1**	**LEVEL 2**	**LEVEL 3**	**ALLS**
AIN TEDLESS	35	24	19	78
KHEIR EDDINE	37	33	40	110
5 JUILLET	37	32	31	100
DJEBLI MED	36	33	42	115
MESRA	27	19	22	68
BOUGUIRAT	29	25	23	77
ALL SCHOOLS	201	166	177	544

The time domain: Embarked on a theoretical study of the search starting from November 06th, 2013 where they were gathering news article for research and arranged.

As for the field study was initiated a questionnaire and interview with students in high schools, starting on Sunday, January 21, 2014 to on Tuesday, March 13, 2014, and then we moved to the analysis and discussion to end up setting the conclusion and finish the research in the May 22, 2014.

Display and analysis of the results:

1. **Social mobility:**

Table 02: represents ratios for answers skillfully social mobility

LEVELS	Yes	No	Middle	All
LEVEL 1	66.50	10.61	22.89	%100
LEVEL 2	61.24	21.48	17.28	%100
LEVEL 3	53.11	19.40	27.49	%100

From Table 2 we note that the majority of pupils and their lineage, which was as follows 66.50% the first year, second year, 61.24%, 53.11% the third year, that share of physical education and sports contribute to the strengthening of mobility inside and outside the institution, and this, in their view to see that some of them highlight its capabilities and its importance among his colleagues during this share.

The other category of students, which were accounted for, respectively, according to levels: 22.88%, 17.27%, 27.49% believe that the share of physical education and sports somewhat to strengthen the skill mobility have contributed the remaining category, which accounted for respectively: 10.60%, 21.48%, 19.40%, see the reverse first category where the share physical education and sport do not contribute to the development of mobility skill to have. This is due to the fact that in their opinion the share entertainment no more. Ammar Bouhuth, Mohamed Mahmoud Dnibat (1995).Abdul Rahman (1992). And conclude by the results recorded in Table 02 that the share of physical education and sports contribute to the support and improvement of skill mobility among secondary.

2. **Response:**

Table 03: represents relations for answers skillfully respond

LEVELS	Yes	No	Middle	All
LEVEL 1	71.97	8.62	19.41	%100
LEVEL 2	80.32	7.84	11.84	%100
LEVEL 3	77.03	7.91	15.06	%100

From Table 03 we note that the percentages answers about skill response was as follows: 71.97% for the first year, second year 80.32% and the third year 77.03% proof that students find it easier to respond through share physical education and sports, and they see that this share will contribute to improving the skill to respond to have that in their view it is the only portion in which the professor involved and colleagues to express their opinions.

Another class of pupils and their lineage, respectively: 19.40%, 11.84%, 15.06% believe that the share physical education and sport the ease of response is simple.

The remaining group of students and their lineage was respectively 8.62%, 7.83%, 7.90% to respond in other materials are easily compared with the share of physical education and sports.

By analyzing the results of Table 03 concludes that the share physical education and sport role in improving the skill to respond to the students. Tarif Shawki Mohammed Faraj (2003) and Abbas Mahmoud Awad (995).

3. **Conflict:**

Table 04: represents relations for answers skillfully conflict

LEVELS	Yes	No	Middle	All
LEVEL 1	71.14	11.61	17.25	%100
LEVEL 2	70.28	13.46	16.26	%100
LEVEL 3	72.31	13.38	14.31	%100

Note from Table 04 that the vast majority of students who were parentage as follows: The first year of 71.14%, the second year 70.28%, the third year of 72.31% think that the share of physical education and sports cultivate some sort of ability to overcome obstacles and send them the courage and the will to overcome the others, and this according to them due to the fact that the share of physical education and sports contain exercises and games require them to the spirit of competition with colleagues.

Some students who were parentage respectively by levels: 17.25%, 16.26%, 14.31% believe that the share of physical education and sports contribute to some extent in the win over the courage and the will and the ability to overcome obstacles. Saher Ahmed Kamal (2001), and Saad Jalal (1987). The remaining students and their lineage, respectively: 11.61%, 13.45%, 13.38%, saw sharp contrast with the previous two categories because according to them seeking to share a very small size to achieve these results.

And from it we can deduct from Table 04 analysis that share physical education and sports have an impact in improving and developing the skill of the conflict.

4. Organization:

Table 05: represents relations for answers skillfully organization

LEVELS	Yes	No	Middle	All
LEVEL 1	61.11	16.91	21.90	%100
LEVEL 2	66.47	15.26	18.27	%100
LEVEL 3	65.36	11.67	12.97	%100

Note from Table 05 that most of the students who were parentage as follows: The first year of 61.19%, the second year 66.46%, the third year of 68.35% think that they have learned some of the order of the day through the share of physical education and sports and embody this organization in their interactions in the community and that the fact that the share physical education and sport contain games collectively and individually and mathematics require them to system to the fact that this organization games and other category of students and their lineage, respectively: 21.89%, 18.27%, 12.97% believe that they are sometimes only embody a organization that is in the share physical education and sport in the outside community, and that they did not learn a little something to the system of share physical education and sport the remainder of the pupils and their parentage and category respectively: 16.91%, 15.26%, 11.67%, they did not learn of any share physical education and sport system and this, in their view, the system is acquired from the environment in which they live (family, neighborhood) and not of the share physical education and sport

After analyzing the results of Table 05, we conclude that the share sport have a role in supporting and developing the skill system with high school students. Jabara the gift of a powerful (1996). Hamid Abdul Salam Zahran (1995).

5. Appreciation

Table 06: a special skill ratios answers appreciation

LEVELS	Yes	No	Middle	All
LEVEL 1	26.03	51.41	22.56	%100
LEVEL 2	30.53	56.22	13.25	%100
LEVEL 3	25.61	55.56	18.83	%100

Note from Table 06 that most of the students who were parentage as follows: The first year of 51.41%, the second year 56.22%, the third year of 55.56%, do not have the ability to lead their colleagues and take responsibility if assigned to decide whether, they can not stay calm despite harassment by others and this to the fact that this group of students have appreciated a negative other category of students have the ability to harass others to them, and their lineage, respectively: 26.03%, 30.53%, 25.61%, and this group of students to have a positive estimate.

The third category of pupils and their lineage, respectively: 22.56%, 13.25%, 18.83% only sometimes can lead the friends and share responsibility through physical education and sports.

Through our analysis of the results of Table 06, we conclude that the share of physical education and sports do not contribute to support and develop the skill of appreciation among students in the secondary.

6. Social Control:

Table 07: represents ratios for answers skillfully social control

LEVELS	Yes	No	Middle	All
Level 1	61.52	15.25	23.23	%100
Level 2	59.04	20.88	20.08	%100

Level 3	73.82	13.18	13.00	%100

Note from Table 07 that most of the students who were parentage as follows: The first year of 61.52%, the second year 59.03%, the third year of 73.82%, they can control their behaviors verbal and motor control their emotions toward their colleagues and in control of their behaviors despite provocation or inconvenience their colleagues to them and that the fact that this group has the ability to control his emotions towards others whatever harassment face.

Other class of students do not have the ability to control their behaviors verbal and motor or control their emotions toward their colleagues when harassment and provocation of others to them and their lineage respectively 15.25%, 20.88%, 13.18%, and the third group was their lineage as follows: 23.21%, 20.08%, 13.00 % can only control verbal behavior and motor and even emotions towards their colleagues, despite the provocation which may face them.

7. Social expression:

Table 08: represents relations for answers skillfully social expression

LEVELS	**Yes**	**No**	**Middle**	**All**
Level 1	73.47	13.9	13.44	%100
Level 2	69.48	18.08	12.44	%100
Level 3	68.36	11.30	20.34	%100

Note from Table 09 that most of the students who were attributed their answer is as follows: the first year 73.47%, the second year 69.48%, the third year of 68.36%, they can communicate their ideas to the professor and colleagues in the share of physical education and sports, as well as express verbally about their feelings toward their colleagues and can through share knowledge expressions suggestive of others, and this by saying that they only share other class of students was attributed their answer respectively 13.44% - 12.44% - 20.34% sometimes they can communicate their ideas to the professor and express verbally about their feelings and sometimes only able to see the expressions suggestive of colleagues. Khaireddin Ali Aweys, Essam al-Hilali (1997).Zakaria El-Sherbini, Misseriya honest (2000) and Saher Ahmed Kamal (2001).

The remaining group of students who have the opposite and this according to them to see that their ideas are not taken into account it is difficult for them to see the expressions suggestive of others and hiding their feelings towards their colleagues share during physical education and sports. Youcef harchaoui (1998). And conclude from our analysis of Table 09, the share of physical education and sports have a role in supporting and developing the skill of social expression at various levels.

8. Social relationship:

Table 09: represents relations for answers skillfully social relationship

LEVELS	**Yes**	**No**	**Middle**	**All**
Level 1	85.58	5.97	8.45	%100
Level 2	76.5	11.74	11.71	%100
Level 3	81.35	8.49	10.45	%100

Note from Table 10 that most of the students who were parentage as follows: the first year 85.57%, the second year of 76.5% and the third year of 81.35%, believe that the share of Physical Education and Sports has developed and grown their relationships with colleagues class and they have contributed to improving relations with the community to which they belong This is the fact that this group is able to form a relationship with others and other category of the view that the share of physical education and sports have not developed or develop relationships with colleagues or even improve their relationships with the community to which they belong and their lineage, respectively: 5.97%, 11.74%, 8.47%, and this group of students they do not have the ability to create or improve their relationships with others and their love of isolation and loneliness. Chaalal Abdul Majeed (1998). Saleh Ahmed Mrahab (1989).

The third category of pupils and their lineage, respectively: 8.45% - 11.74% - 10.45% only sometimes or somewhat share physical education and sports in the development and improvement and development of relationships with colleagues and the community to which they belong contributed.

3. CONCLUSIONS:

Through the results obtained by researchers at the prompt for high school students concluded the questionnaire:

* Practice of physical education and sports play an important role in the social aspect of student development.

* Physical education and sports contribute to the support and development of the majority of social skills.

* Courier despite meager share of physical education and sports, but they had great love and tendencies by students as they consider a way out of the theoretical lessons for the rest of pressure-sized materials.

* Educational process to share the good physical education and sports will inevitably lead to learning a very important social attitudes among students.

* Physical education and sport are considered fertile ground for the preparation of young people socially and educationally.

*share of Physical Education and Sports is working to highlight and support positive behaviors compared with other academic subjects for students.

* Love and tendencies of students to practice physical education and sports reflect a realistic picture of the social, especially in the field of sport socialization.

* not check appreciation skills and ability to control the self-social role reflects an important aspect as we look in the preparation of young people in the area of personal (psychological area).

* Roles of the professor and the students show us the educational and social processes nested inside educational institutions.

General Conclusion

The physical education and sports in general an important role in supporting social skills in general and almost two differ in that among the objectives of physical education and sports, social and emotional field, a field which is our intention to search because we see a great importance in highlighting the social image of the sport.

The physical education and sports as a social and as a social systems may appear to be more pronounced in the present age be associated with the cultural aspect and my values and social There is no doubt that they have a direct impact on the psychological and social status of individuals. The sport can also provide fertile ground for the upbringing of individuals socially and mathematically, and this effect may be direct by strengthening social skills or indirectly, through the trends and personal preparations for the students showed through several research and studies the health of the physical education and sports are considered as one of the determinants of socialization In leadership, the effects of the different working groups within the school environment because the sponsor provides adequate support for students to acquire many of the social skills in physical education and sports classes and mention here that physical education and sports are also considered as a factor of dynamic groups of factors.

So through this study we came to know the importance and the role of physical education and sports in the support and development of social skills when pupils class so positively on social development of skills and social abilities in schools particularly affect more than the development of the social processes, or in other words, basic social skills this without forgetting cognitive abilities and Development side kinesthetic.

Given the physical activity that the appearance of the important aspects of public education is physical and athletic and containing movements and group games and individual makes a positive impact on the social situation of the pupil aims also to create a spirit of cooperation and strengthening the relationship between the students and facilitate communication, responsiveness and preparation decent student in aspects social and unique advantage of alleviating internal conflicts particular is on the outskirts of adolescence and demonstrate the student respect and social flexibility and system and empathy trait and also contribute to the consolidation of the positive behaviors among students and works to claim for social mobility inside and outside the institution, and cultivate expression skills and settings and social assertion.

Hence the inevitability of the practice of physical activity, which has become a necessity that should be within the educational institution as a rule imposed itself as the rest of the other academic subjects they are somehow contributing to the composition of the student socially and cognitively and physically has been reached to prove it to highlight and identify social skills during sports practice and to know the role of physical education came and sports in the support and development of these social skills of students.

4. RECOMMENDATIONS:

1. Attention to social and psychological aspect of the students at this stage is important seriously.

2. Instill basic social principles and presented and discussed during physical education and sports classes.

3. Understand the social role of sport in general.

4. Work to educate students by holding lectures and seminars in educational institutions to highlight and demonstrate the role of sport in social terms.

5. Give the true image of the party professors of physical education and sports in the educational institutions that educate students and the extent of their importance and to clarify its objectives in the community.

6. Give great importance of physical education and sports by the educational system and the lifting of this article coefficient and lift the Courier her size because two hours a week is not sufficient to achieve its objectives in the adolescent well.

7. Practice in a scientific way and pedagogical non-random, and the development of physical and theoretical possibilities in the hands of Mr. Hassan and harnessed for the benefit of the student.

8. Development of school sports and this activates sports sessions to achieve more cooperation, love and integration into the community.

9. We recommend future installments students to continue research on the subject of the social role of irrigation

5. REFERENCES:

1. Abbas Mahmoud Awad (1995).socialization and underachievement" - Dar knowledge-Alexandria.

2. Abdul Hamid Sharif (1995).Physical education of the child" - Dar Al Arab renaissance.

3. Abdul Rahman (1992).world of communication" - Dar knowledge Gamaah- Egypt.

4. Ahmed Zaki Badawi (1987) Glossary of Welfare and Social Development of the terms" Dar Ketab- Egyptian and Lebanese.

5. Amin Ahmed Fawzi, Tariq Mohammed Badr al-Din (2001).the psychology of sports team" - Dar-Arab thought the first edition.

6. Ammar Bought, Mohamed Mahmoud Dnibat (1995).Research Methods and Research Methods" - Office of University Publications bin Eknon- Algeria.

7. Anwar Kholi (1990).building the foundations of physical education programs" - House thought the Arab-Cairo.

8. Anwar Kholi (1995).Origins of Physical Education and Sports" - Alawly- Edition House thought the Arab-Cairo.

9. Ben Kased Ali Haji Muhammad (1998).The impact of a proposed program for junior high in the development of some physical attributes and basic skills of players much football" - Magester- Mstganem.

10. Chaalal Abdul Majeed (1998).impediments to the exercise of extra-curricular sports activities and methods of processing. Magester- Mostaganem.

11. Fouad gorgeous, Saad Abdel-Rahman (1999).Social Psychology" - contemporary vision -dar thought-Arab Cairo.

12. Jabara the gift of a powerful (1996). Social and educational problems. House knowledge Gamaah- Alexandria.

13. Hamid Abdul Salam Zahran . (1995).Psychology growth". Ed 5. Aware Ketb- Cairo.

14. Khalil Mikhail Mouawad (1999).Social Psychology".Dar thought Gamaa- Alexandria.

15. Khaireddin Ali Awes, Essam al-Hilali (1997).Sports Meeting" - Alawly- House thought the Arab-Cairo edition.

16. Osama full salary (1998).Sports Psychology. Edition House thought the Arab-Algahrh.

17. Saher Ahmed Kamal (2001).the mental health of children" - Alexandria Center for Ktab.

18. Saad Jalal (1987). Childhood and Adolescence. Edition II-house thought the Arab-Cairo.

19. Saleh Ahmed Mrahab .Psychology of psychological adjustment and the level of ambition" - Edition Alawly- House Alaman-Rabat.

20. Salim and others (1997).The entrance to Sociology" - House Alchroq- Oman.

21. Tarif Shawki Mohammed Faraj (2003).social and communicative skills" - Studies and Research Nevsah- House Grayb- Cairo.

22. youcef Harchaoui (1998).Physical Education and Sports in the ability to focus attention and its relationship mileage driven development .Magister. University of Mostaganem.

23. Zakaria El-Sherbini, Misseriya honest (2000).The upbringing of the child and the parents to be treated in ways and face the problems" - House thought the Arab-Cairo.