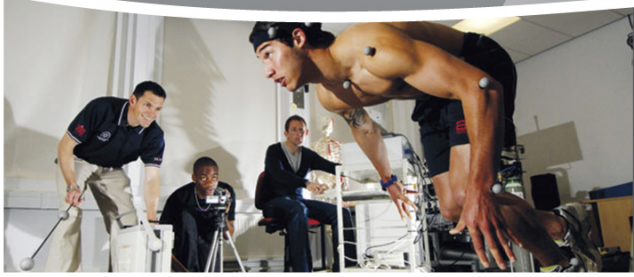
SWEDISH JOURNAL™ OF SCIENTIFIC RESEARCH

ISSN 2001- 9211

Issue 3 March

Volume 4 - 2017



SWEDISH JOURNAL™
OF SCIENTIFIC RESEARCH
ISSN. 2001-9211

The Swedish Journal of Scientific Research (SJSR)
ISSN 2001-9211. Volume 4 . Issue 3 . March 2017

The Swedish Journal of Scientific Research

Original Article

The Effect of a Wrist Worn Accelerometer on Children's In-School And Out-of-School Physical Activity Levels

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ABSTRACT

Background: Children's physical activity levels continue to decline with age. Wrist worn accelerometers are accessible and worn by many children; however, research examining the effects of wrist worn accelerometers on children's physical activity levels has not been conclusive. **Methods:** 25 children were given a wrist worn accelerometer for 4 weeks (1 week sealed; 3 weeks unsealed) and information about physical activity and fitness to increase their in- and out-of school physical activity. **Results:** Multivariate analysis revealed a significant difference for in-school (p=.021) and out-of-school (p=.012) activity between weeks 2 and 3, suggesting reactivity to the wrist worn accelerometer. Males were significantly more active out of school (p=.017). Additionally, our results indicated that Asian students [M=7879.6(±481.1)] were getting significantly fewer *moves* than African American students [M=9439(±367.5)]. **Conclusions:** This study demonstrated that the use of activity trackers and information alone could not be sufficient in improving physical activity levels among 5th graders.

Keywords: Out-of-school physical activity, activity trackers, self-regulation

INTRODUCTION

Health benefits from engaging in regular physical activity have been well documented (Centers for Disease Control and Prevention, 2015). Regular physical activity (i.e. 60 minutes on most days of the week) aids in the growth and development of children and is associated with psychological benefits for youth regardless of weight status (Calfas & Taylor, 1994; Haugen, Säfvenbom, & Ommundsen, 2011; Digelidis, Papaioannou, Laparidis, & Christodoulidis, 2003). Although the benefits of physical activity are well known, reports suggest that only 58% of children are meeting physical activity recommendations and levels of physical activity continue to decline as children age (Troiano et al., 2008; Baranowski, Thompson, DuRant, Baranowski, & Puhl, 1993). Establishing physical activity behavior early in life is key, because regular physical activity behavior and skills developed in childhood and early adolescence are likely to translate into adulthood (Institute of Medicine, 2012).

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ISSN: 2001-9211

On average, children in the United States spend 6.64 hours per day in school (U.S. Department of Education, 2008); therefore, schools should be targeted for physical activity promotion programs. Public health efforts have increased physical activity during physical education, but 60 minutes of physical activity cannot be met in physical education alone (Palmer & Bycura, 2014). Furthermore, it has been reported that only 35.3% (19) of states are requiring elementary students to participate in a specific number of physical education minutes per week, and only 6 states are requiring 150 minutes or more per week (SHAPE

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America, 2016). This data and the lack of children meeting physical activity guidelines highlights the need for quality physical education classes to provide learning opportunities on how children can be more physically active outside-of-school (Chen, Kim, & Gao, 2014; Institute of Medicine, 2012). This objective has been highlighted by national physical education teaching standards and public health (SHAPE America, 2016).

Previous literature suggests the establishment of self-regulation skills may impact out-of-school physical activity (Butcher, Fairclough, Stratton, & Richardson, 2007). Within the context of Bandura's social cognitive theory, self-regulation involves three principles including: self-monitoring of one's behavior, judgment of one's behavior in relation to personal and environmental standards and expectations, and self-reaction to one's behaviors (Bandura, 1991). The utilization of an activity tracker can provide all three aspects of self-regulation. First, the activity tracker can monitor a child's physical activity patterns. Second, the tracker can provide feedback by providing children with immediate information about their physical activity and can act as an environmental cue or reminder to engage in more physical activity (Tudor-Locke, 2002). Finally, the tracker may encourage self-reaction to enhance children's ability to self-regulate their own physical activity. The majority of physical activity tracker literature is being conducted to estimate energy expenditure (Puyau, Adolph, Vohra, Zakeri, & Butte, 2004; Stookey, Mealey, & Shaughnessy, 2011) and to estimate the validity and reliability of the tracker themselves (Rowe, Mahar, Raedeke, &Lore, 2004; Clemes & Biddle, 2013). A study examining the feasibility of wearing activity trackers, suggested that children preferred the wrist-worn activity trackers (23 out of 24 children) with the two most prominent reasons being comfort and the feedback feature (Shaefer & Marta Van Loan, 2014). When examining the use of activity trackers in physical activity interventions with adults, it has been suggested that activity monitoring can increase awareness and support physical activity behavior within the intervention (de Vries, Kooiman, van Ittersum, van Brussel, & de Groot, 2016).

In addition to a fitness tracker, adequate health-related fitness knowledge would be necessary for a child to determine environmental and personal standards, the second aspect of self-regulation. Keating et al., 2009 reported deficiencies in health-related fitness knowledge among students at all educational levels. Therefore, the purpose of this study was to determine the effects of providing elementary students with wrist worn accelerometer and information about physical activity and fitness on increasing their in- and out-of school physical activity.

METHODS

Participants and Setting

Students were recruited from a local elementary school in the Southeast United States. All students in one 5th grade physical education class (ages 10-12 years) were invited to participate. This class consisted of three homeroom classrooms for a total of 40 children. Forty children provided parental consents and assented to be in the study. Ethical approval was obtained from the university's Human Research Ethics Committee prior to recruitment. The physical education class was five days per week and 30 minutes in duration.

Physical Activity Tracker

Each student was asked to wear the *MOVABLE* MOVband3, wrist-worn, activity tracker (*Dynamic Health Solutions, LLC*, Houston, Texas). The MOVband3 utilizes tri-axial accelerometry and demographic information to estimate "moves" or physical activity during a 24-hour period. Approximately 12,000 *moves* is the equivalent of 10,000 steps (*DHS Group*, Houston, Texas). The MOVband3 has companion software that can estimate physical activity in 1-hour intervals. Each participant's demographic information (height, weight, birth date, and sex) was used to calibrate the activity tracker. Activity trackers were downloaded each week. Physical activity data from Tuesday, Wednesday, and Thursday each week were analyzed.

Health-Related Fitness Knowledge

Prior to instruction, all students completed a validated, grade appropriate test of health-related fitness knowledge (Chen, Chen, Sun, & Zhu, 2013; Zhu, Safrit, & Cohen, 1999). This test has 11 multiple choice questions sought to determine students' knowledge of four areas of fitness: (i) FITT (frequency, intensity, type, and time) principles, (ii) training principles of overload, progression, and specificity, (iii) health-related fitness components, and (iv) parts of a workout (e.g., warm-up, cool down). The test has two equivalent forms (form A vs. form B). Students completed version A at pretest and version B at posttest.

Physical Activity Opportunities at School

For this elementary school there were two blocks per day scheduled for physical activity: a 30-minute physical education block and a 15-minute afternoon recess block. In physical education the students participated in a fitness unit led by the certified physical education teacher. The unit included daily instruction on key components of fitness (e.g., progression, overload, FITT principle) in a participatory format. Specifically, a typical day consisted of a brief teacher introduction and demonstration of how a fitness component could be incorporated with an exercise, followed by students creating their own exercises applying the fitness component in groups, and finally all students participating in each group's exercise in station rotations. The 15-minute recess block consisted of outdoor free play on a playground area. The children had access to balls, climbing structures and green space. Over the course of the three weeks, recess was conducted outside except for three days. Two days recess was conducted inside due to weather and consisted of social based activities, with minimal movement. One day of recess did not occur due to a school wide activity.

Procedures

Height and weight was assessed with a calibrated electronic scale (Michelli Scales, Harahan, LA) to the nearest 0.1 kg and height measured to the nearest 0.25 on a calibrated scale and standiometer. Students were given the activity trackers on Monday morning at 7:45am and were asked to return them Friday morning at 7:45am. Students were instructed to wear the activity tracker at all times throughout the day, with exceptions being during any water-based activities. Students were given sealed activity trackers so they were unable to see their "moves" for baseline measurement for 1 week. For the following 3 weeks, students were given unsealed activity trackers and instructed on how to monitor and interpret their "moves" on the screens.

Statistical Analysis

School days began at 7:30am and ended at 2:45pm. For data analysis purposes, "in-school" time was defined as 7:00am-2:00pm and "out-of-school" time was from 3:00pm-10:00pm. Physical activity data was broken down into hourly segments, with 2:00pm activity representing physical activity taking place between hours 2:00-2:59pm. If a participant had more than 1 day per week of zero wear-time, their data was treated as missing.

Initial analysis were conducted using a one-way repeated measures analysis of variance (RMANOVA) to examine the overall differences between the physical activity weekly means of each group: average daily *moves*, in-school *moves*, and out-of-school *moves*. Additional analyses were conducted using multivariate analysis of variance (MANOVA) to investigate whether the weekly means of each group differed across participant gender and ethnicity. A RMANOVA was utilized to determine changes in health-related fitness knowledge. All statistical significance was set to $p < 0.05$, and analyses were performed using IBM SPSS Statistics 23 for Windows®.

Out of the 40 students that returned their informed consent, 25 students (52% female, 48% male) had complete data for every week of the intervention and were used for data analysis. Average daily physical activity was their average number of *moves* across the three days. Average daily in-school physical activity was the participants *moves* between the hours of 7:00am-2:00pm averaged across the three days, and average daily out-of-school physical activity was the participants *moves* between the hours of 3:00pm-10:00pm averaged across the three days.

RESULTS

All data were normally distributed. The mean body mass index (BMI) was 19.8 kg/m^2 and the average BMI percentile was 55.5, suggesting the participating students on average were considered of normal or healthy weight (BMI < 84th percentile). Only 6 of the participating 25 children were considered overweight or obese (BMI > 85th percentile) (Centers for Disease Control and Prevention, 2015). The majority of participating children were White (56%), participant demographic information is provided in Table 1. It is also important to note that during baseline testing (Week 1) the average daily *moves* across all participants were 14,738.86(±2857.17), with 84% of participants accumulating over 12,000 *moves* per day.

The initial ANOVA examining average daily moves revealed a time main effect that was not significant (Wilks L=.718, $F_{(3,22)}$=2.86, p=.059, h^2=.282), despite a significant increase (p=.011) in health related fitness knowledge from pretest [M=62.2(±17.3)] to posttest [M=71.3(±16.1)]. The results suggested a significant difference (p=.007) in average daily *moves* between weeks 2 [(M=15868.8(±744.1)] and

Table 1: Demographic characteristics of participating children (n=25)

	n (%)
Sex	
Male	12 (48)
Female	13 (52)
Race	
Asian	4 (16)
African american	7 (28)
White (or non-Hispanic)	14 (56)
*Weight Status**	
Normal weight	19 (76)
Overweight	1 (04)
Obese	5 (20)

**Weight status was determined by BMI percentiles, which were classified according to the Centers for Disease Control (1) classification's age- and sex-specific BMI cutoff points for 'normal weight' (84th percentile and below), 'overweight' (85th to 94th percentile) and 'obese' (95th and above).*

3 [*M*=14073.8(±495.2)]. The ANOVAs conducted for in-school *moves* and out-of-school *moves* both suggested a time main effect of no significance (p=.119, p=.111, respectively). However, the results revealed a significant difference (p=.021) for in-school activity between weeks 2 [*M*= 9172.66(±376.5)] and 3 [*M*=8328.8(±250.8)], and a significant difference (p=.012) in out-of-school activity between weeks 2 [*M*=6802.8(±490.6)] and 3 [*M*=5819.3(±384.4)] (Figure 1).

Multivariate analysis revealed sex differences in average daily moves (p=.017), with males [*M*=16372.9(±733.3)] achieving significantly more *moves* than females [*M*=13724.2(±701.4)]. Similarly, sex differences were also found in out-of-school activity (p=.007), with males [*M*=7560.5(±519.2]) accumulating significantly more *moves* than females [*M*=5384.8(±496.5)]. There were no significant differences found in sex for in-school activity (p=.27).

When examining ethnic differences, there were no significant differences found across ethnicities for average daily moves or out-of-school activity. However in examining ethnic differences for in-school activity, our results indicated a significant difference (p=.019) between African American and Asian students, with Asian students [*M*=7879.6(±481.1)] getting significantly fewer *moves* than African American students [*M*=9439(±367.5)].

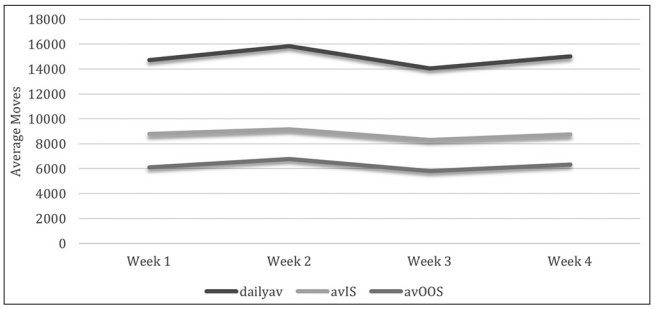

Figure 1: Average daily, in-school, and out-of-school moves

DISCUSSION

This study examined the effects of providing elementary students with a self-regulatory tool and information about physical activity and fitness on increasing their in- and out-of-school physical activity. Our results indicate that a wrist worn physical activity tracker, paired with a physical education unit targeting health-related fitness knowledge did not increase out-of-school physical activity. This could suggest that the implementation of a self-regulatory tool, such as an activity tracker, combined with physical activity information is not sufficient to motivate students to be more physically active throughout their day. Our findings are similar to a recent study examining 11-12 year olds that suggested an overall low engagement with the activity tracker, and engagement was dependent upon the support and encouragement of the research staff. Researchers found that during the few weeks that the research team visited infrequently or when the students were on spring break, the student's syncing of their devices dropped significantly. Their findings suggested that researcher presence and encouragement seemed to be a motivating factor for engagement in physical activity (Schaefer, Ching, Breen, & German, 2016). It is important to note that 84% of the participants were already meeting the 12,000 step/day recommendation at the onset of the intervention.

During week 1 (baseline), the activity trackers were sealed so that students were unable to monitor their physical activity. Beginning in week 2, the activity trackers were uncovered in order for the students to be able to self-monitor. Our analyses did reveal a significant difference between weeks 2 and 3 for average daily *moves* and in- and out-of-school *moves*. This finding could be indicative of reactivity to being able to monitor their physical activity. Reactivity is defined as a change in normal activity patterns when participants are aware of being monitored and could be a threat to the ability

to accurately measure physical activity (Vincent & Pangrazi, 2002). Research studies examining reactivity among children and adults have been mixed (Scott, Morgan, Plotnikoff, Trost, & Lubans, 2014). Some research has suggested that reactivity seems to have larger effects on preschool-aged children compared to elementary-aged children and adolescents (Dössegger et al., 2014). Contrary to these findings, our results suggested that for this particular cohort of 10-12 year olds they did experience a reactive response to being monitored with the activity trackers that was not indicative of their habitual physical activity.

Our results also suggested gender differences for average daily *moves* and out-of-school *moves*. Males were getting significantly more activity outside of school, as well as overall physical activity. This finding coincides with existing literature suggesting that females engage in less physical activity and more sedentary time compared to their male counterparts (Troiano et al., 2008; Ridgers, Timperio, Crawford, & Salmon, 2013). When examining in-school activity, there were no gender differences suggesting that for this particular cohort there were equal opportunities to engage in physical activity throughout their school day. When investigating whether there were any ethnic differences, no differences were found for average daily *moves* or out-of-school activity. However, there were significant ethnic differences found for in-school activity. Our results suggested that Asian students were getting significantly less physical activity during the school day compared to African American children. A 5-year longitudinal study suggested that Asian females (ages 12-16) showed a faster increase in sedentary behavior compared to White females the same age, and African American females engaged in significantly less physical activity compared to White females. However, there was no significant differences reported between Asian and African American children's physical activity or sedentary behavior (Brodersen, Steptoe, Boniface, & Wardle, 2007). The findings from our study and other's underline the importance of ensuring that there are culturally relevant opportunities for physical activity within schools.

Over the course of the intervention, students health-related fitness knowledge did increase significantly. This increase in knowledge did not seem to have an effect on the participant's total daily, in school, or out-of-school physical activity levels. Although contrary to other studies suggesting that increasing physical activity knowledge through in-school instruction could increase out-of-school physical activity levels (Chen, Kim, & Gao, 2014; Sirota et al., 2014), our findings suggested no change in their physical activity levels. It is important to note, that the majority of participants were already meeting step count recommendations prior to the intervention. This could have an effect on their ability to significantly increase their physical activity, despite their increase in health-related fitness knowledge.

CONCLUSIONS

This study demonstrated that the use of activity trackers and information alone could not be sufficient in improving physical activity levels among 5th graders. Although the student's health-related fitness knowledge increased, this was not found to have an effect on their physical activity levels. Our results also indicated an initial rise in physical activity during the first week of the intervention; this is thought to be a reactive response to being monitored and not indicative of an increase in the student's habitual physical activity levels. With the increasing availability of activity trackers, it is becoming easier to use and implement these monitors into physical activity interventions as a means of self-monitoring. However, it is important to remember that within Bandura's social cognitive theory, self-regulation involves three principles including: self-monitoring of one's behavior, judgment of one's behavior in relation to personal and environmental standards and expectations, and self-reaction to one's behaviors (Bandura, 1991). Activity trackers offer the ability to self-monitor, but cannot offer internal psychological processes such as judgment in comparison to personal and environmental standards and self-reaction. Similarly, activity trackers are offering a means of external motivation for physical activity. Research has suggested that for a change in habitual physical activity one must achieve intrinsic motivation for a behavior (Teixeira, Carraca, Markland, Silva, & Ryan, 2012). In future interventions incorporating the use of an activity tracker as a self-regulatory tool, it may be advantageous to include psychological components to help improve habitual physical activity.

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The Swedish Journal of Scientific Research

Original Article

The Impact of Training According to Six-intensity Zones and Aerobic and Anaerobic Training in Some Physical and Motor Capabilities for Athletes

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ABSTRACT

The training according to the six intensity zones the modern training and sports which exceeds the variables and conditions that occur in in contests, sports competitions as well as its importance in preparing sports, Training intensity zones include (Lactic acid, The maximum oxygen consumption, Anaerobic threshold, Phosphagen system, Oxygenic threshold, Oxygen compensatio). The research aims to build a training curriculum for the six intensity zones that suits the capacities the research sample and identify the rates of evolution and the impact of the training curriculum in physical and motor capacities of the the research sample. The researcher used the experimental method designed control and experimental groups, so as to suitability and the nature of the research problem. The research sample selected by the way to improbability manner of the Accidental Sampling and sometimes called (CONVENINCE SAMPLING), For ages (16-18) years representing sports games (Taekwondo, Weight lifting, Futsal, Swimming, Handball). The duration from (21/2/2016) to (18/4/2016), It has been identified physical capacities tests which included vertical jump from steadiness to measure the explosive power of legs, and test of knees bent in a (20) seconds to measure the characteristic speed and strength, and run switchback (25 m × 8) test to measure the assume (tolerance) speed, and determine the tests of motor capacities w hich included the the core flexion from standing for measuring the core flexibility and barrow test to measure fitness. The training curriculum was applied for (8) weeks of (5) training units per week, The researcher concluded outweigh the experimental group that worked on according to the intensity zones in most of the physical and motor capacities tests, but the flexibility Capability did not appear any significant difference between the experimental and control groups, and there was also a clear outweigh in the experimental group in the rates of development for physical and motor capacities except flexibility, it was almost equal proportions in which evolution, The effect was tilted in favor of the collective Games, At the expense of individual Games. The researcher recommended the adoption of the training according to the intensity zones rather than relying on training in according to aerobic and anaerobic energy systems, Without ignoring the nature of the prevailing energy system at sports activities, and avoid the training according to six intensity zones for ages under 16 years.

Keywords: Six-intensity zones, Aerobic, anaerobic, physical, motor capabilities, athletes

INTRODUCTION AND THE IMPORTANCE OF RESEARCH

The conventional intensity zones are training intensity zones that include (lactic acid, the maximum limit of oxygen consumption, anoxygenic threshold, Phosphagenic system and oxygenic threshold). Bomba added a sixth zone which is oxygen compensation zone. The intensity zones are(Mohammed Reda Ibrahim 2008, 468-493).

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ISSN: 2001-9211

First: Endurance Ability of Lactic Acid

The system that provides energy after the depletion of the Phosphagens and rebuilds the ATP inside the muscle is the anaoxygenic decomposition of the Glycogen. This system enables the athletes whose bodies can endure the pains of the increase of acidity

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in blood due to the hard training to perform physical efforts better and longer than the efforts of those who cannot endure the increase in blood acidity. Therefore, the purpose of the training of lactic acid system is to adapt the athletes' bodies to the acidic impact of the lactic acid and to show larger resistance to the impact of lactic acid.

Second: Training of Maximum Oxygen consumption

The consumption of oxygen, for which the symbol vo2 is assigned, represents the volume of the oxygen absorbed by the body's tissues from the inhaled air at standard temperature and pressure (stpd). We can get the maximum oxygen consumption (vo2max)by measuring the individual's oxygen consumption while exercising the maximum physical effort he can do which sometimes called the maximum aerobic ability. The maximum consumption of oxygen is the best physiological indicator for the functional capability of the individual and a good evidence of the extent of his physical fitness. It represents indeed the utmost ability of the body to take and transfer the oxygen and then extract it in the acting cells(the muscles). The maximum oxygen consumption is equal to the output of multiplying the maximum output of the heart(the quantity of blood pumped by the heart per minutes) by the utmost arteriovenous oxygen difference(Mcgraw, 1987, p121).

Third: Anaerobic Threshold Training

It is the level of physical endurance that the transmission of lactic acid from the muscles to the blood increases much more than waste average rate. (Kighton & Hole:, 1997, 53)

This type of training Attributed to the physical effort (exercise), in which the level of prevalence rate of lactic acid reaches (4-6) m mol in the bloodstream, which exceeds the waste or remove rate.

Fourth: Phosphagene Energy System Training

Phosphocreatine (PC) is energy-rich phosphatic combination, it is found in muscle cells and when cut, it produces a large amount of energy, which helps to rebuild ATP. Mohammad Reda Ibrahim said, according to Mac Farlin, that improving the training level of phosphagene system is done by performing repeated physical efforts several times individually or in groups that contain certain occurrences. Effort duration shall not be more than (10) seconds for (10-20) times, in the case of groups, there shall be (4) groups repeat (3-4) times for each group - with break between each repetition and another (3-4) minutes (8-10) minutes between groups in order to have suitable break to get creatine phosphate back to muscle.

Fifth: Oxygenic Threshold Training

Oxygenic threshold is known as the threshold beyond which oxygen system improvement begins and equal to 60% of HR - max.

High oxygenic threshold training is a critical factor in improving the delivery of all sports events of medium and long duration as well as a major role in oxygen supply in order to provide the necessary energy as it becomes within the anaerobic energy systems and mixed system.

Sixth: Oxygen Indemnity: (Tudor Bompa, Carlo A.Buzzichelli:, U.S.A, 2O15, P32-35)

The area effectively contributes to the restore recovery for athletes following high training loads or competitions. Training loads are determined in light intensity, ranging between 40% - 50% of the maximum intensity. It is preferable to be replicated in the competition stage to get rid of metabolites resulting from metabolism and speed recovery restoration for athletes to accept the new loads.

The importance of research is to show the importance of training in accordance with the intensity areas as they represent inclusiveness in training load aimed at creating and preparing athletes for competition and leave the reliance on rating according to the prevailing energy system being not dealing with the conditions and variables happening during or after competitions.

Research Problem

The progress achieved by sport achievement and performance may not happened unless taking advantage of various sciences, These sciences together aim at the interest of science of sports training through which a good coach tries to take advantage of them in the sports training process and show their clear implications to athletes.

As being workers and specialists in the field of athletic training for a long time, we are constantly striving to take advantage of the results of research and apply

them in the field and to serve the achievement and development of performance through field follow-up, we found that there are some defects that appear in the performance of players during the time of competition, although sufficient duration of prepare. the majority of coaches are depending on the accumulation of experience and exercise repeat according to the actual need for energy system approved for the effectiveness without taking into account the developments variables in competitions and the surrounding circumstances and the nature of the competition generates requirements and additives loads, as well as loads that correspond to the nature of the performance and the skills required to compete. These large loads may reach the degree beyond what athlete can do.

For the purpose of taking into account the performance requirements for sports events and variables that surround the effective and playing variables, trainers shall adopt their athletes creation and prepare them for varying variables and exceeded style distribution of loads on according to the prevailing power system with non-negligent acts or omissions and to rely on the modern style in distribution of loads according to intensity areas, these areas are distributed according to essential needs for training the high levels and the majority of sporting events and to prove the importance of this technique, we made several experiences previous to sports activities of athletes included (weightlifting, tennis, wrestling, handball) had very good results. For comparison between the two ways of training and athletic events and get variety of comprehensive sport results, we have this research.

Research Goals

1. Prepare a training curriculum manner consistent with intensity areas and the capabilities of the research sample of athletes.
2. Understand the impact of the training program in accordance with the style of intensity areas in some physical and kinetic abilities of athletes from the research sample.
3. Understand the development of physical and kinetic abilities of athletes according to training nature and in accordance with the sporting effectiveness.

Research Hypotheses

1. There are significant differences between the results of previous, post, experimental and control tests groups in physical and kinetic abilities of athletes from the research sample.
2. There are significant differences between the results of, post, experimental and control tests groups in physical and kinetic abilities of athletes from the research sample.
3. There is variation in the development of physical and kinetic abilities according to training curriculum and sporting effectiveness privacy.

Research Methodology

The researcher used the experimental curriculum by control and experimental group design, as it is suitable for the nature of the research problem.

The research sample was chosen by improbability way of occasional sample Accidental Sampling that sometimes called (convenince sampling).

It depends on the researcher choice of sample that is easily obtained (Mohammad Hassan Allawi, Osama Kamel Rateb: 1999.147). Of young athletes of 16-18 years old who attend fitness gem, by (18) players representing a variety of sports (taekwondo, weightlifting, futsal, swimming, handball), then a sample of their peers engage in regular exercise was selected and by (20) player of the same sports to serve as a control group, as shown in Table 1.

The harmonies in the variables that affect the outcome of the experiment was observed, before starting to implement the training program, sample homogeneity parity between the two sets was calculated by measurements and tests. As shown in Table 2.

Researcher had to verify the equality of the two sets of tests search to ensure the only project line between the two groups, as shown in Table 3.

The researcher adopted the following tests:
First, tests for physical abilities: -

1. Vertical jump of fortitude to measure the explosive power of the two legs in the highest vertical jump (Mohammad Hassan Allawi, Mohamed Nasr Addin Radwan: 1994.84).
2. Test of bending and stretching knees in (20) seconds to measure the fast strengths of leg muscle (Qais Naji Abdul-Jabbar, Bastawisi Ahmed: 1987.344).
3. Shuttle running test (25 m × 8) higher start: -speed endurance measurement (Kamal

Table 1: Distributing research sample in both search groups

Group	Training according to power systems (20)					Training according to intensity areas (18)				
Effectiveness type	Taekwondo	Weight lifting	Futsal	Swimming	handball	Taekwondo	Weight lifting	Futsal	Swimming	handball
Sample number	4	4	4	4	4	3	4	4	3	4

Table 2: Sample homogeneity in (length, weight, age and training age)

Statistical processes variables	Measuring unit	Arithmetic mean	Mediator	Standard deviation	Torsion modulus
Length	cm	0.18181	182	5.35	0.530
Weight	kg	78.89	79.50	4.81	–0.403
Age	Monthly	200.92	199	22.49	–0.307
Training age	Monthly	24.31	24	3.13	0.284

Table 3: Shows the equality of sample in the previous tests for the control and experimental groups

Variables	Measurement unit	Experimental group		Control group		The calculated value	Sig	Differences significance
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
Explosive leg ability test	m/cm	28.850	2.996	28.944	3.038	–0.096	0.746	No significance
Distinctive ability of the two legs test	Repeat	18.900	1.832	18.833	1.977	0.108	0.539	No significance
Speed endurance	Second	44.149	1.80	43.617	1.912	0.883	0.976	No significance
Flexibility	m/cm	24.800	3.548	25.611	3.867	–0.674	0.842	No significance
Fitness	Second	33.520	2.159	33.433	2.752	0.109	0.670	No significance

Abdel-Hamid, Mohammed Subhi Hassanein: 1987.286).

Second, tests of kinetic abilities:

1. Trunk bend test by standing on a box with (50 cm) oh height: - measuring the flexibility of the trunk and rear thigh in the front bend of movements from a standing position (Muhammad Subhi Hassanein, Hamdi Abdel-Moneim: 1997.131 to 132)
2. Barow fitness test (Mohammed Nasr Addin Radwan: 1994.265)

Scientific weight of the tests has been verified for validity, reliability and objectivity.

Research procedures were identified to hold previous tests and over on Sunday and Monday 21 -22/2/2016, and then the training program applied for the period from 25/02/2016 until 14/04/2016, as included five training units per week and by five days per a week for a period of 8 weeks, and in the setting stage, intensity areas were distributed in the training program in accordance with the training modules and to ensure that there is sufficient recovery stage between training area and another and between the training module and another. Interim method of training was adopted (interval) (Appendix Tables 1 and 2).

Post tests for the two experimental and control group was conducted, in almost the same conditions, as they were previous tests. Post tests were conducted on Sunday and Monday of 17-18/4/2016.

Display, Analyze and Discuss the Results

After completion of the trial proceedings, results have been statistically processed by mediated Statistical bag system, which is shown in Tables 4-6, as follows:

It is clear from Table 4 that the results of the physical and kinetic tests were significant and in favor of later tests. This is due to the efficiency of training by the trainer and the commitment of the players accordance to power systems, whereas training for five days a week, in line with the experimental group had developed physical and kinetic abilities of the control group, we may also note that the development rates of physical and kinetic abilities ranged from 5% - 23%, which is a new development evolution confirms the safety of the

Table 4: Significant differences between previous and past test for control group and evolution ratios

Variables	Measurement unit	Experimental group		Control group		The calculated value	Sig	Differences significance	Evaluation ratios (%)
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation				
Explosive leg power test	m/cm	28.850	2.996	34.350	2.852	–5.422	0.000	Moral significance	17
Distinctive ability of the two legs test	Repeat	18.900	1.832	22.300	1.949	–5.362	0.000	Moral significance	18
Speed endurance	Second	44.149	1.800	42.900	1.804	2.217	0.039	Moral significance	5
Flexibility	m/cm	24.800	3.548	31.100	2.673	–6.950	0.000	Moral significance	23
Fitness	Second	33.520	2.154	30.149	0.984	6.037	0.000	Moral significance	9

Table 5: Significant differences between previous and past test for experimental group and evolution ratios

Variables	Measurement unit	Experimental group		Control group		The calculated value	Sig	Differences significance	Evaluation ratios (%)
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation				
Explosive leg power test	m/cm	28.944	3.038	39.000	3.307	–9.060	0.000	Moral significance	18
Distinctive ability of the two legs test	Repeat	18.833	1.977	25.944	1.984	10.233	0.000	Moral significance	28
Speed endurance	Second	43.617	1.912	38.847	1.437	10.246	0.000	Moral significance	11
Flexibility	m/cm	25.611	3.867	31.277	3.374	–4.047	0.001	Moral significance	19
Fitness	Second	33.433	2.752	28.923	1.595	5.124	0.000	Moral significance	20

Table 6: Difference significance between the post tests for the two sets of search

Variables	Measurement unit	Experimental group		Control group		The calculated value	Sig	Differences significance
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
Explosive leg power test	m/cm	34.350	2.852	39.000	3.307	–4.653	0.000	Moral significance
Distinctive ability of the two legs test	Repeat	22.300	1.949	25.944	1.984	–5.706	0.000	Moral significance
Speed endurance	Second	42.900	1.804	38.847	1.437	7.599	0.000	Moral significance
Flexibility	m/cm	31.100	2.673	31.277	3.374	0.181	0.857	No significance
Fitness	Second	30.149	0.984	28.923	1.595	2.882	0.007	Moral significance

followed training curriculum according to the energy Systems.

Table 5 shows that all-physical and kinetic tests had achieved a moral distinctions for dimensional test results, and development rates ranged between (11%-28%). These ratios is very excellent if compared and the duration of the training program. Reacher attributes this development in training group according to the training intensity areas to the nature and privacy of these areas and employed in training methodology, which caused a significant difference as well as advanced development ratios.

Table 6 shows that all the results of physical and skill tests have achieved significant differences for the benefit of experimental group results except flexibility scalability. The results were not statistically significant, this is due to the nature of the experimental factor (training according to the

intensity areas), which has affected positively in physical and kinetic abilities taking into account the specificities of the prevailing energy system and support physical capabilities. "The legalization of the training load properly process accompanied by progress in the level of body organs and then develop the physical attributes to achieve the best athlete level (Joseph Lazim Kemash: 1999.31)." If the nature of these exercises work in the development of muscle efficiency because of the implementation of these exercises shortly. This is what contributed in the development of the explosive power of the members of the experimental group. The rapid increase in the length of the muscle just before the crunch resulting in fast and powerful muscle contraction (Muhammad Yunus Thanon: 2000.57).

Power distinguished by speed is a physical element closely related to a factor of training. That comes through focus and good training exercises of power and speed significantly in training approaches by trainers, which have the effect on the muscle groups by re-iterations on exercises for many times and that affected positively in the level of the players. (Link between muscle strength and speed muscle is one of the sports performance requirements at high levels, and that this factor is the most important characteristic of athletes, as they have a great deal of strength and speed and have the ability to link them in an integrated form of strong and rapid movement in order to achieve optimal performance) (Raad Baqer Jaber: 1995.13)

As for the development that took place in speed afford is attributed by the researcher to the nature of the numbers according to the intensity areas, that its physiological effects is the foundation on which the training programs should be taken into consideration so that the player gat the ability to increase endurance rates and short and long distances during the exercise. This requires an increase in aerobic capacity of increasing the amount of oxygen consumed during athletic performance, and confirms (Aweys Al-Jabali) the muscles supply of oxygen will be the limiting factor of performance when the player has a high ability of oxygen (Aweys Al-Jabali: 2000.421), and highlights the importance of this ability in the performance of endurance sports and improve the level of the amount of oxygen. They help to improve the league respiratory efficiency in sport work (Wilmor: 1994. 181). As well as the aerobic exercises contribute physiologically to increase the possibility of susceptibility of mitochondria (energy houses) in muscles by increasing the amount of reserves of carbohydrates in the muscle, making the muscle less dependent on blood to get glucose causing to delay limits the phenomena of fatigue.

As for there is no moral difference in the viability of flexibility between the control and experimental groups, it confirms the importance of the athletes ability, which is not set aside by the trainers in their units, and the size of the development of two groups is parallel. "kinetic flexibility is essential to master the kinetic physical performance. Without the adequate range of motion, movement becomes limited (Mufti Ibrahim Hammad: 2001.194). Researcher agree with what he referred to (Ibrahim Ahmed Salama, 2000) as (flexibility is a way to determine the extent of progress in skill performance, especially when achieving especially flexible levels becomes within targets module)

As for fitness viability, the application of the training curriculum according to the intensity areas and diversity in the exercise requirements systematically and continuously, and their adaptation to perform athletic movements according to requirements phase developed their kinetic abilities, as the (the ability to perform movements, absorb and to quickly adapt to the kinetic activity with the requirements of the changing circumstances is of great importance in the development of fitness) (Qassim Hassan Hussein, Qais Naji Abdul-Jabbar: 1984.219) "fitness is the ability to take swift action, stop and change direction quickly. (Robert, V. Hochey:1981.p210)

It is clear from Table 7 that the explosive force evolution rates were comparable between the total samples in training group of energy regulations with training group according to intensity areas. Researcher attributes importance of this ability for most sports, but there was a difference between the sporting activities as Taekwondo, futsal and handball exceeded training according to intensity areas, but in weightlifting and swimming games in training group on energy system. Researcher attributes the priorities of this ability in sports and the absence of tactical side.

It is also clear that training group according to intensity areas contributed to develop distinctive force speed in the total sample and in taekwondo, weightlifting, football, handball Activities. Researcher attributed to the great importance attached by this style of training for this ability in more than three areas.

Table 7: Development percentage of training group according to the proportions of the energy systems and intensity areas training group combined and according to sporting activities

Groups abilities	Training according to the Energy Systems (%)						Training according to intensity areas (%)					
	mg	Taekwondo	Weight lifting	Swimming	Futsal	Handball	mg	Taekwondo	Weight lifting	Swimming	Futsal	Handball
Explosive power	17	6	17	24	23	9	18	31	13	33	21	33
Distinctive strengths speed	18	14	18	17	18	14	28	35	19	35	13	35
Speed endure	5	5	2	2	2	5	16	16	12	7	9	14
Flexibility	23	13	19	22	14	25	19	31	7	3	26	17
Fitness	9	6	6	15	6	12	20	17	15	15	12	13

Training group according to the energy system has exceeded within swimming activities. Researcher attributed it to the privacy of this capability for swimming activities and the privacy of this style of training in giving adequate space.

The clear superiority of the training group according to the intensity areas in the evolution rates for speed in total and all sporting activities on the total training according to energy systems. Researcher attributes this to the adaptations occurring in functional systems, which had a great effect on speed endurance.

The training group according to the energy systems exceeded in the development of the flexibility in the total sample and the activities of weightlifting, futsal, handball ratios, as a group of intensity areas have exceeded within the activities of taekwondo and swimming. Researcher attributes this discrepancy to the individual characteristics and the nature of this ability as we noticed a marked evolution of both groups in this capacity.

It is clear that training group according to the intensity areas has exceeded in the proportions of fitness in the total sample, taekwondo, weightlifting, swimming and handball. The results between the two groups narrowed in futsal. The researcher attributes this to the adaptation happening in the body's control adjustment because of the evolution of the physical abilities and kinetic capabilities, which reflected positively on the status of fitness, which is a recipe of kinetic capabilities.

CONCLUSIONS

1. Statistically significant differences in the results of the early and later tests in kinetic physical abilities for control and experimental groups and for later tests.
2. Statistically significant differences between the results of later tests of control and experimental groups in kinetic physical abilities for the experimental group, except for flexibility that did not show statistical difference.
3. Training group exceeded the intensity areas in the proportions of the total sample in most physical and kinetic abilities except for flexible evolution rates that were according to power systems training.
4. Proportions of evolution in physical and kinetic abilities of sports activities have varied between the two groups depending on the privacy of potential and its importance for efficiency.
5. The six intensity areas included in training methodology have contributed in developing physical abilities of research sample.

RECOMMENDATIONS

1. Adoption of the training curriculum in accordance with the intensity areas to develop of physical and kinetic abilities.
2. Using training according to intensity areas for all spots games and especially to team games.
3. Taking care of the prevailing energy system privacy when developing training programs in accordance with intensity areas.
4. The importance of training in according to intensity areas shown with sports that have skilled and planned privacy that is better activities that feature one side of physical skills.
5. It is not recommended to use training according to intensity areas with six years old groups (16) and with sport for health foe ages over 40 years.
6. It is preferable to use training according to intensity areas in special prepare and pre setup phases.

7. It is possible to make further studies to know the impact of the training according to intensity areas on functional variables and to other sports.

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APPENDICES

AppendiX Tables

Appendix 1: Training according to intensity areas

Intensity number	Training type	Performance duration	Iterations number	Rest period	Effort to comfort percentage	Accumulation of lactic acid (mmol)	Heart beat rate b/d	% Maximum intensity	
								Early (%)	Late (%)
1	Lactic acid training	(30-60) s (2,30-2) m	2 x 2-4 4-6 (8)	10-15 m more than (5) m	(1:1) (1:15)	(12-18) (20) maximum	Maximum or near maximum	More than 85	More than 90
2	Maximum oxygen consumption training	(3-5)	(2-4) 12	(2-3) m	(2:1)	(6-12)	(180) b/d	(80-85)	(85-95)
3	Non-oxygen threshold training	(1,30-7) d (8) m-1 hour	3-5 2-6	(5) m (5-15) m	(1:1) (1:0.6) (1:1.5)	(4-6)	(150-180) b/d	(75-85)	(85-90)
4	Phosphagin training system	(4-15) s	(10-30)	(1-3) m	(1:4) (1:25)	-----	-----	-----	(95)
5	Oxygen threshold training	(10) m–2 hours	(1-6)	(1-2) m	(1:1) (1:25)	(2-3)	(130-150) b/d	More than 60	More than 60
6	Oxygen reimbursement	45 m-2 hrs.	1-2	2.5 m	1:3	2-3	Less than 140 b/d	40	50

Appendix 2: Training program

Weeks	Units	Intensity areas	Training intensity (%)	Time within major section
1st week	1	5-3	67.5	65 m
	2	5-2	70	60 m
	3	5-1	72.5	60 m
	4	5-2	70	60 m
	5	3-5-6	58.3	65 m
2nd week	6	5-3	67.5	65 m
	7	2-3	77.5	55 m
	8	1-2	82.5	50 m
	9	2-3	77.5	55 m
	10	5-3-6	58.3	65 m
3rd week	11	3-2	77.5	55 m
	12	2-5	70	60 m
	13	2-4	85	45 m
	14	2-5	70	60 m
	15	3-2	77.5	55 m
4th week	16	3-2	77.5	55 m
	17	1-2	82.5	50 m
	18	4-1	87.5	45 m
	19	3-2	77.5	55 m
	20	5-6	50	65 m
5th week	21	3-2	77.5	55 m
	22	2-5	70	60 m
	23	2-4	85	45 m
	24	2-5	70	60 m
	25	3-2	77.5	55 m
6th week	26	3-2	77.5	55 m
	27	2-4	85%	45 m
	28	4-1	87.5	45 m
	29	2-4	85	45 m
	30	3-2	77.5	55 m
7th week	31	4-1	87.5	45 m
	32	1	90	40 m
	33	4-1	87.5	45 m
	34	2-4	85	45 m
	35	3-2	77.5	55 m
8th week	36	5-3	67.5	65 m
	37	2-3	77.5	55 m
	38	1-2	82.5	50 m
	39	2-3	77.5	55 m
	40	5-3-6	58.3	65 m

The Swedish Journal of Scientific Research

Original Article

Proposed Approach to Develop the Feature of Strength Along with Speed of the Upper and Lower Limbs and its Influence on the Performance of Clean and Jerk Skills

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ABSTRACT

The technological revolution occurred in the world open the door widely in front of researchers and specialists to keep pace with this evolution. In the field of sport, technology achieved a great leap in the process of qualifying the athletes to deliver them to the highest levels. The great evolution including the sport training science like other sport sciences comes to fruition through the sport achievements we witness in our world today which of course are the result of the great efforts by the side of the researchers and specialists in this field. This research seeks to prepare a proposed training approach to develop the feature of strength marked with speed of the upper and lower limbs for the power lifters. The research uses the experimental methodology including the attempt to set forth the whole basic factors influencing the experiment except a single factor to be controlled by the researcher to change it in a specific manner to determine and measure its influence on the other factors. The study concludes the emergence of evolution with static significant on the level of the feature of strength marked with speed of the sample.

Keywords: Strength, speed, muscles of the upper limbs, muscles of the lower limbs, performance, clean and jerk skills

INTRODUCTION

The technological revolution occurred in the world open the door widely in front of researchers and specialists to keep pace with this evolution. In the field of sport, technology achieved a great leap in the process of qualifying the athletes to deliver them to the highest levels.

The great evolution including the sport training science like other sport sciences comes to fruition through the sport achievements we witness in our world today which of course are the result of the great efforts by the side of the researchers and specialists in this field.

The training process in the current time is the main concern of the specialists and the researches in the field of sport. It is considered the basic step to achieve the prospective objectives; its objectives may be achieved through the proper planning through designing the training programs to raise the sport level and then the level of the game. Powerlifting is one of the games which occupy a great space of achievements through the great lifts made by the powerlifters which reach to weights equal to three times of the weight powerlifter. The sport of powerlifting gained a wide popularity and many countries care about it due to the large number of medals that can be obtained through the competition.

Access this article online

Website: http://sjsr.se/

ISSN: 2001-9211

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The interest in the development of physical characteristics is one of the basic tasks of the training as it provides the athlete with the basic base of integration and preparation of the remaining features including the skillful, psychological and kinetic features whereas as the physical building of the powerlifter is one of the conclusive matters in his abilities to perform clean and jerk skill to be executed during the competition. Prequalifying the powerlifter is crucial as it is very important to work on the proper physical preparation of the powerlifter through the training programs which aims at developing the physical features to serve the powerlifter. The most significant need of the powerlifter is the feature of strength marked with speed. This feature is the common denominator in all sport events which plays an important role in performing the required skills in the competitions, thus designing a training program to develop this feature in a good manner provides an important element in the integrative building of the powerlifter which also works on increasing the feature of strength marked with speed of the powerlifter to develop the kinetic course of performance and weight lifting quickly and that is what the weightlifter needs. From this perspective, the importance of the research and the needy for it becomes clear to contribute to raise level of the training process through the proposed methodology by the researcher.

The Problem of the Research

The training program consists of regular recurrences of the performance of the kinetic course to raise the physical level of the powerlifter and to reach the level which enables the powerlifter to perform the required effort to distribute the power in a proper way suitable for the level of the competitions. From the experience of the researcher, following up the game and the interviews with a number of experts and specialists in the field of game, the researcher finds that there is a great failure by the side of the players to do the clean and jerk. The researcher attributes that to the feature of strength along with speed which is responsible for this performance and that the slow speed in performing the lifts using the upper and lower limbs during the lift and drop process and standing leads of course to the failure in performance. Designing the training programs and raising the level of strength along with speed may contribute to the successful of the performance and from here the problem of the research appears in order to develop the strength marked with speed of the weightlifters to increase the speed of the performance.

Objectives of the Research

1. Preparing the proposed training program to develop the strength marked with speed of the muscles of the upper and lower limbs of the weightlifters.
2. Knowing the influence of the proposed training program on the development of the clean and jerk skills.

Methodology of the Research

The nature of the problem, objectives and assumptions of the research oblige the researcher to choose the suitable approach and then the researcher selected the experimental approach including "an attempt to design the whole basic factors influencing the experiment except a single factor to be controlled by the researcher to change it in a specific manner to determine and measure its influence on the other factors".

Sample of the Research

A sample was selected intentionally including the powerlifters of the training centers of powerlifters in the city of Shoola in Baghdad of (20) powerlifters representing the total community of the sample of the research; (4) powerlifters were excluded due to their lack of discipline and their repeated absence from the training and then the number of the sample's individuals is (16) powerlifters divided into two equal categories using poll. One of the two categories was under control while the other one was experiential; (8) powerlifters for each category. Table 1 shows the extent of harmony of the sample is certain tests where it has random significance in whole.

The Practical Foundations of Tests

After identifying the main goals of the tests and the content and quality of items and preparing special instructions for implementation, the test should be codified because it contributes to the good change of the mark the examinee gets (9:67) the researcher hereof not only did the subject matter tests because it is being globally codified and used by more than one researcher even he sets its number of speed and stability using an exploratory experiment and by simple correlation coefficient (Pearson), as shown in the Table 2.

Tests of the Research

After reviewing some scientific sources in the field of testing and measurement, the researcher used the

Table 1: Where value (T) at the level of the significance is 0.50 at liberty degree of (14)

Static methods/test	Measurement	Control		Experimental		Value T		Significance of the difference
		S	P	S	P	Calculated	Table	
Push while relying on the front for 10 seconds	Number	4.63	1.60	4.88	0.95	0521	2.145	Random
Bend knees and extend them from standing (Rear Debny) 10 seconds	Number	40.12	7.22	42.15	6.33	0.243		Random
Clean lift	Degree	18.5	2.27	19.17	3.60	0.173		Random
Jerk lift	Degree	5.5	102	5.8	1.8	0.211		Random

Table 2: The coefficient of speed and stability for tests used in the research

Tests	Stability	Speed
Push while relying on the front for 10 seconds	93.0	96.0
Bend knees and extend them from standing (Rear Debny) 10 seconds	88.0	94.0
Clean lift	81.0	90.0
Jerk lift	90.0	95.0

following codified checksum which are physical and skill tests.

Physical Tests

The test of pushing while relying on the front for 10 seconds (6: 156) to measure the speed strength of the arms muscles.

The test of bending knees and extending them from standing (Rear Debny) 10 seconds (6:84) to measure the speed strength of the legs muscles.

Skill Tests (Judged here by the Referees)

Test of clean lift skill

It is one of the competitive skills of weightlifting and is harder than the other skill, and judged by (3-5) points.

Test of jerk lift skill

It is the second skill of weightlifting and consists of two stages and is rated (3-5).

Training Curriculum (Appendix 1)

Researcher prepared a training curriculum based on scientific sources studied in the science of sports training, in addition to showing it to some specialists in the field of the weightlifting game and training science.

Training curriculum took a period of eight (8) weeks, started on 03/11/2015 and ended on 02/03/2016 and by (2) training units per week and a period of 25 minutes from the main section time, leaving the remaining time of the program for trainers excluding Fridays and official holidays from the days of training.

Rest has been calculated on the basis of the pulse as the weightlifter begins to repeat until his pulse reaches (100 p/m) (2: 128) Pulse is counted for (6 seconds) and output is multiplied by × 10 which is the best way of measuring (8:34).

The researcher used a method of controlling degrees of endurance in terms of hardness and volume as well as in rest periods depending on the principle of gradual ascent and descent to avoid overload.

The researcher supervised the implementation of the training curriculum through the experience group, leaving the control group working under the supervision of the main trainer 0.

PRESENTATION AND DISCUSSION OF THE RESULTS

Presentation and Discussion of the Results of Control Group

It is clear from Table 3 that there is a lack of a clear and important development in the level of the speed strength of upper and lower limbs in the control sample of the research in spite of the emergence of significant differences which the researcher ascribes to the state of competition that took place between the two groups especially in the physical tests despite not appearing in skill tests, not to mention that the standard of development was not good in general, so there has been no test at a higher percentage than the proportion (10%), which is a percentage that points to any real development in the desired level.

Presentation and Discussion of the Results of the Experimental Group

It's clear to us through analyzing Table 4 that the experimental group of the research sample had responded to the items of the training curriculum because (training curriculum is measured by its success in terms of the progress that is achieved by the individual sportsman in the kind of sports activity which he practices through the skill, physical and functional level, and that depends on the adaptation achieved by the individual to the training curriculum which he applies. The above table shows that the training curriculum has achieved rates of tangible development both in the physical or skill side. At the physical level, this group has achieved a good percentage which indicates the effectiveness of the training curriculum. In choosing pushing in front standing position, the proportion of development was (14.37%) which is equivalent to three times the rate achieved by the control group.

This is due to the contribution of professional training in the development of the speed strength as they rely on muscle strength and ability to respond efficiently and quickly (10:25) as well as we see this development through exercises that were given to this group within the curriculum where they stressed on the development of strength and the development of speed and tried to integrate them because (speed strength can be quickly developed through strength, speed, or both) (3:90).

Bending knees and extending them from standing position (rear Debny) has great development indicated through the development rate and by (33.5), which increased by four times than the rate in the control group, if the focus of the exercises on the development of the force on the upper and lower limbs led off as for the development of speed strength quickly had an impact on other types of strength development (as the recent occurrences that lead to fatigue in the neuromuscular system will become an exciting physiological stimulus that leads to the development of maximum strength) (12:57) as well as the training of maximum strength is to ensure the ideal speed strength and this is what achieved the first purpose of the research hypotheses.

Table 3: The significances of differences and the proportion of the development of the control group in pre-tests and post tests in skill and physical tests

Statistical media physical and skill tests	Measurement unit	Pre-test		Post test		Development ratio (%)	T scheduling	T	Denote differences
Push while relying on the front for 10 seconds	Number	144.9	6.22	152.5	13.5	523	2.20	145.z	Abstract
Bend knees and extend them from standing (Rear Debny) 10 seconds	Number	236.4	4.13	265.9	3.8	8.67	3.13		Abstract
Clean lift	Degree	4.2	3.12	4.4	1.9	.4.62	2.5		Random
Jerk lift	Degree	3.4	2.10	3.5	2.82	2.94	1.954		Random

Table 4: The signs of differences and the proportion of the development of the experimental group in the pre and post tests of the physical and skill

Statistical methods physical and skill tests	Measurement unit	Pre-test		Post test		T calculated	T schedule	Denote differences	Rate development (%)
Push while relying on the front for 10 seconds	Number	144.7	4.23	5.165	3.16	4.921	2.145	Abstract	14.37
Bend knees and extend them from standing (Rear Debny) 10 seconds	Number	237.2	3.95	6.315	4.12	4.412		Abstract	33.50
Clean lift	Degree	4.3	2.17	6.13	5.19	3.209		Abstract	42.55
Jerk lift	Degree	4.87	4.29	5.90	4.16	3.165		Abstract	21.14

in the skill side, the curriculum has done a good and clear standard of development as the development standard of speed strength reflected quickly on the performance of the skills under examination as the ratio was of the skill (clean lift) by (42.55%) and skill (jerk lift) (21.14), which are high ratios and that indicates that the group benefited from the exercises given in the training curriculum, where the relationship between the (liability speed strength to the Sports technique) (8:92), and also (strengthening the muscles of the limbs of players leads to the development of their strength and thus gives them strength, agility and technical performance to the players) (11: 198).

CONCLUSIONS

1. The emergence of the development of a statistically significance in the speed strength in a sample of the research (the experimental group).
2. The emergence of the development of a statistically significance in the technical performance of skills under examination in the favor of the experimental group in the pre and post tests.
3. The emergence of statistically significant correlation the performance of the speed strength and doing the skills under examination.

RECOMMENDATIONS

1. The Application of the suggested curriculum concerning physical (the quality of the speed strength especially among weightlifters who suffer from shortage in this aspect.
2. The application of the suggested curriculum, in the skill as well as the physical sides.
3. Exercises of (speed strength) and employing them in the technical performance of the skills under examination and the need for curriculums in terms of focused units that treat the shortage of skills and physical aspects in addition to the usual training curriculums.
3. The need to prepare a curriculum similar to this one develops the other physical qualities in accordance with performing other technical skills.

ATTACHMENT 1

Items of Training Curriculum

The items of training curriculum which is about physical and skill exercises have been applied.

1. From a standing position pulling the weight to the level of the shoulders for (10 seconds)
2. From a lying position on the bench pulling the weight to the chest for (10 seconds)
3. From a standing position bend your knees and Stretch "front Debny for "(10 seconds)
4. From a standing position bend your knees and jump to the maximum distance for (10 seconds).
5. From a standing position bend the knees and stretch them to carry the weight for (10 seconds).
6. From a standing position jump forwards to the marks on the ground for the (10 seconds)
7. Handling the medical ball over the head, with the arms outstretched forward and backwards for (10 seconds)
8. The anterior position, bend and extend the two arms for (10 seconds)
9. from a squatting position, jump high holding the medical ball.
10. From a standing position, jump high touching the chest with both knees, with maximum speed for (10 seconds)
11. From a standing position put one of the two legs on the front bench, jumping interchangeably.
12. performing the skill of clean lift (10 seconds).
13. performing the skill of jerk lift (10 seconds).
14. performing two skills (10 seconds).

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The Swedish Journal of Scientific Research

Original Article

The Relationship between Some Physical Measurements and the Force Distinctive with Speed of the Broad Jumpers

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ABSTRACT

The scientific progression in the field of sports has seen a remarkable development in various levels and for most sports, achieving a quantum leap in establishing great achievements in some sport games. Today we are in dire need for more effort to achieve a bright future that ensures the sports movement scientific advancement and progression at various levels. Through the revision done by the researcher of a number of studies and researches which included physical measurements, he noted that each physical activity owned specific physical measurements qualifying to reach high levels of competition for this activity. The researcher intended to identify the relationship between the height and the force distinctive with speed among the athletic students, in the fourth grade in the faculty of physical education and Sport Sciences/University of Baghdad. The study included a sample of the fourth grade students. They were 26 students. The sample was divided into two groups, the first group included students whose heights exceeded (177 cm). The second group included students whose heights were below (165 cm). For the period from 01/01/2016 to 05/01/2016. The force distinctive with speed was measured for both legs in the two groups. The results showed no significant correlation (P≥ 0.05) between age and choosing the vertical jump of fortitude, and between age and choosing medical ball pushing. Results also recorded the existence of a significant correlation (P≤ 0.05) between the (weight - thigh circumference) and choosing the medical ball pushing. As well as a significant correlation (P≤ 0.05) between the length of the hummers and choosing broad jump of stability, vertical jump of stability and pushing the medical ball. The results also recorded the existence of a significant correlation (P≥ 0.05) between the length of the forearm and the broad jump of stability test and pushing the medical ball. The most important conclusions that have been reached that there was a significant correlation between height and force distinctive with speed among the jumpers of the broad jump of stability.

Keywords: Physical measurements, force distinctive, speed, jumpers

INTRODUCTION

The force distinctive with speed is defined according to "Monterey" as muscular and nervous system's ability to overcome the resistances by the speed of muscle contraction. It is defined by (Clark) as the individual's ability to launch the maximum muscular strength in the shortest possible time. "Larsson and Herman" (1) also agrees with that. It is defined as the ability to release the maximum force in the maximum time. In the triple movements, the height or the distance value is considered as a measure to develop the force distinctive with speed. There is a used choice to measure the strength of the jump, which is jumping over it. As we measure the difference between the height while standing and in case of jumping. While the ability to jump for a broad could be recognized by choosing the familiar three jumps there are many terms in the foreign language refer to the concept of physical and kinetic or physical or kinetic. Which resulted from

Access this article online

Website: http://sjsr.se/

ISSN: 2001-9211

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the link between muscle strength and speed. Some of the pioneer researchers who worked in the field of measurements in physical education English used the English term. These terminologies were translated into Arabic, they mean the ability on the mechanical concept of the word as it refers to the work done for time that it is equal to (2):

Force= power× distance\time

Recent research in the field of measurement in physical education in the field of sports training has taken up the analysis of the complex motor component, that links between power and speed. Some researchers suggested using the term exploitive and explosive power, given that the speed used in the performance serve as the maximum kinetic speed. The power distinctive with speed (muscle force or explosive power) of the most important components for the motor performance in many sporting activities (3).

The muscle strength is known to be the maximum amount of power that can be released by a muscle or a set of muscles involved in work together, because there is a group of researchers identifies muscle strength as the ability of a muscle or muscle to overcome the external resistors or face them on the basis of physical and motor performance requires trial to overcome the resistances and called facing of this resistance. Of course these resistors differ in terms of the intensity in the other physical activity, and that the muscle performance of the other performance in this sense the muscle acquires its significance by being an important factor in the performance and motor performance in most sports activities, and considered to be the most important factor for the performance in certain sports activities. (4.5). the muscle strength can be defined as the force that can and individual exerts and making the utmost effort only once. While the other definition of muscle strength is the ability of the muscle and the muscles to overcome the maximum possible resistances or facing these resistors during a scheduled performance (7.6).

One study (8) pointed to the presence of attractive correlation between physical measurements and the force distinctive with speed among as the football goalkeepers; the problem has forced the researcher to adopt the descriptive manner in the survey because it was the closest approach to solve the problem by a scientific method.

Research Procedure

Research methodology

The research problem has forced the researcher to adopt the descriptive manner in the survey because it was the closest approach to solve the problem by a scientific method. This approach is considered one of the main and basic approaches in the research.

The research sample

The research sample included Phase IV students in the Faculty of Physical Education/University of Baghdad. They were 26 students. The researcher has divided the sample into two groups:

First: He tested the students whose heights exceeded (177 cm).

Second: He tested the students whose heights were below (165 cm).

Tools used

Arabic resources - A playground field - measuring tape - colored chalks.

Specification of test terms used

The purpose of the test: measuring the force distinctive with speed for both legs.

Test description

The student begins with forearms swinging, with knees slightly bent, and then forward swinging of the arms with rapid stretching of the knees, and jumping forward for the furthest distance.

Test rules

Each student is allowed to get three attempts to record the best result.

Statistical methods

The use of statistical program SPSS, for preset calculations. The arithmetic mean, standard deviation and test t value have been calculated for samples to extract the differences.

RESULTS AND DISCUSSION

Table 1 represents the means and standard deviations for students of standard height of 177 cm and above, and students whose heights are below of 165 cm. Also it illustrates the calculated T value (3.385) and the tabular T value (2.228). Upon comparing the calculated value with the tabular value we note a correlation between height and jumping off stability.

Table 1: Illustrates the medians, calculated values and tabular values for the fourth grade students

Physical variable	Median	Standard deviation	Calculated T value	Tabular T value	0.01
Height of 177 and above	83-233	4.63	3.385	2.228	3.169
Height of below 165	222.91	8.56			

As the students whose heights are more than 177 cm were able to achieve greater distance. This proved the research hypothesis, which was the presence of a significant correlation between height and jump out of the stability. The researcher explained that the nature of the test that he performs through which swinging of the arms and bending of the knee joint with pushing the ground and throwing the legs forward up gives a positive aspect to the sample that is characterized by the length of the body especially the legs. As with the increased leg length, the longer the distance passed by the student.

The taller the student, the higher gravity center of the body or the center of the weight of his body. Which in turn makes the fly arc better than the short stature ones. This is what we observe in the jump activities of jump as the broad jump. Where the tall athlete is better than the short one due to the difference in the center of the body gravity. Mahdy Shalsh's success has confirmed that the increase in the length of the muscle fibers is directly proportional to the strength of the muscle. As the muscle with short fibers produces less force than the muscle with long fibers. The muscle strength is directly proportional to the degree of fibers stretch to a certain extent. The less stretch produced less force and vise versa (9).

In light of the results that the researcher found we concluded the following: The existence of a strong relationship between total body length and strength of the jump off stability, or this is what confirms the mechanical orbit in the events in and jump off stability in particular. Based on the above, the researcher recommends the following:

1. Preferential selection of students with longer body length, especially the lower limbs for many sporting events and activities, including jumping.
2. The power distinctive with force Is a motion feature of effective influence on the impact of movements by combining two basic traits, and playing an important role in achieving the levels of sports and in the compilation of sporting events and games, including the event of the track and the field. Therefore, we recommend its use in the events of track and field in general.

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The Swedish Journal of Scientific Research

Original Article

The Relation between Achievement Motivation and Performance of Forehand and Backhand Shooting Skills in Badminton for First Stage Female Students

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ABSTRACT

The game of badminton is one of the individual games that got quick leaps in skill, physical and tactical development, so it became constantly evolving in line with the progress that has occurred in all various sports. However, the game faced obstacles in preparation and conditioning of players to get to a higher level and to achieve the desired goals of sports in each game. There is no doubt that the psychological factor is one of the many and important developmental requirements as this factor has a profound impact on sport achievements like other (physical, skill and tactical) factors. Sports psychology is one of the important rules in the training process without which it is difficult to reach the level of integrated achievement because this factor is the content of training and effective on what is owned by athletes in terms of high capabilities and potential. In addition, achievement motivation is one of the drivers of conduct, performance, and even a key for sports practice. When it reaches a certain level, it leads to satisfactory results as it works to reduce space and bring distances to upgrade the performance of students and their better advancement. Thus achievement motivation is one of the early works that teachers should develop. The research problem is to know achievement motivation and its relationship to accurate performance of forehand and backhand skills in badminton. The present study aims to identify the achievement motivation for female students of the first stage in Faculty of Physical Education and Sport Sciences/Baghdad University as well as identification of measuring performance accuracy of backhand and forehand shooting skills by female students of the first stage in Faculty of Physical Education and Sport Sciences/Baghdad University. The study sample has been selected of students in the first stage at Faculty of Physical Education and Sports Science and the number of respondents was (23 female students) for the academic year 2015-2016 and for the period from 06/12/2015 until 28/04/2016. The study used the descriptive method and statistical method including the arithmetic mean, standard deviation and Pearson correlation coefficient to analyze the results. The results showed that there was no significant correlation between achievement motivation and measurement of performance accuracy of forehand and backhand shooting skills in badminton for students of the first stage in Faculty of Physical Education and Sport Sciences/Baghdad University. Findings of the study conclude that female students do not have the motivation of achievement in forehand shot of badminton while they have the motivation to achieve the backhand shot in badminton. Hence, the importance of the psychological aspect must be stressed through psychological and mental tests to see the performance of student through encouragement, rewards and foreign motivations and develop their motor performance in the field of badminton as well as emphasis on the development of footwork and physical capabilities in the performance of skill tests for female students and conduct studies of the relationship between achievement motivation and various other sports.

Keywords: Achievement motivation, performance, shooting, skills, badminton

Access this article online

Website: http://sjsr.se/

ISSN: 2001-9211

INTRODUCTION

Achievement motivation is one of the key variables that determine the activity carried out by the individual to perform. It is supposed that when an individual starts any activity, it is intended to reach a degree of achievement. Absence of the sense of achievement

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and the goal can develop negative feelings such as frustration and withdrawal([1]Thaer Ghobari:, 2008, 187). Moreover, motivation is a state of internal tension works to provoke and guide behavior, as an internal case or strength that contributes to move behavior to direct it to achieve a particular goal (Mohammad Hassan Allawi: 1998,211.) Most specialists of psychological studies agree that the cause of multiplicity and diversity of human activity is primarily due to the large number of motivations and concerns of the human as multiplicity of such needs, motivations and desires and diversity for the individuals work to diversify behavioral attitudes and choices they make in order to achieve goals or to satisfy certain motives involved. Such cases and others can be explained on the basis of the existence of motives, needs and concerns of the individuals. The research into the subject of (motivation) means detection of the main reasons behind human behaviors in terms of diversity and change that occurs(Imad Abdul Rahman Zglul: 2007, 215.)

The study of motivations of human behavior increases the understanding of man of himself and of other people because our knowledge is far greater if we know the different motivations that drive or cause us to perform kinds of various behaviors in all situations and circumstances. In addition, our knowledge of motivations that drive others to do their behavior makes us able to understand their behavior and its interpretation. The study of motivation helps us predict human conduct in the future. If we know the motivations of someone, we can predict his behavior in certain conditions and we can use our knowledge of people's motivations to control and direct their behavior to certain destinations and certain objectives through creation of some of situations that will excite their certain motivations that urge them to do the work that we want them to perform and stop them from doing some other works that we do not want them to perform (Thaer Ghobari, Op. Cit, 197.). Since the aim of sports psychology is to understand the athlete's behavior, control it and predictability in order to develop it, the study of the motivations of this behavior helps to identify its magnitude, shape and direction in order to be explicable, From this point, the subject of motivation has become one of the leading topics of interest in sports psychology concerned by sport trainers and one of the most exciting and interesting as to know why do some students practice physical activity, while some others only watch and see sport activities without exercise or why do some individuals exercise games or certain sports activities exclusively from other sport activities. In addition, a sport trainer is interested in understanding why do some people continue the practice a physical activity and attend training trying to reach the highest levels of sports while others going out of practice (Ahmad Amin Fawzi: 2003, 81.).

Forehand shot is one of the core skills and of the most widely used in playing and training in any racket games performed in many ways (straight, intersecting, low, high) (Ann Batman: 1991, 47). In addition, forehand shot is performed by the front face of the racket in response to badminton coming in the direction of the right of player's body most likely (not the left). Its goal depends on the form of forehand shot. When the rise is lower, it will be in response to shots returning to the backyard of the court and is done from the highest possible point away from the body. It is directed to sides with enough height in a way that moves away from the net to the backyard of the court (Amin Al Khouli, Op. Cit, 1994, 73.). As for the backhand shot, it is one of the basic skills of any game from the different racket games. As in the forehand shot, it is performed in many ways and forms by playing positions required (straight, intersecting, low, high) and the training should be on both shots together due to their equal importance (Ann Batman, Op. Cit, 1991, 47).

Backhand shot is performed by the back face of the racket in response to badminton coming in the direction of the left from the player's body most likely (not the left) and its goal is exactly like in forehand shot (Amin Al Khouli, Op. Cit, 1994,73). The researcher, Haidar Abdul Reda Tarad (Haider Abdul Redha Tarrad: Babylon University, 2005) in his study entitled: "building and legalizing achievement motivation measurements for advanced volleyball players in Iraq" discussed building achievement motivation measurements for first and premier degree volleyball players in the 2004 season, legalizing achievement motivation measurements for first and premier degree volleyball players in the 2005 season and setting standard levels for achievement motivation measurements for first and premier degree volleyball players in the 2005. He used the descriptive method with surveys and standard studies while the study population included first and premier degree volleyball players in Iraq for the season (2005/2004). The most important finding of this study is to build and legalize an achievement motivation scale for first and premier degree volleyball club players besides derivation of standards and second-degree grade.

The researcher also noted the absence of significant differences in achievement motivation among first and premier degree volleyball club players. The similarity between the two studies is the use of achievement motivation scale for both studies. In addition, the descriptive method using surveys and correlations for both studies is similar. There are also significant differences in both studies. As for the differences between the two studies, the current study sample of students of the first stage - Faculty of Physical Education and Sport Sciences Baghdad University, while the previous study was on advanced volleyball players for first and second degrees.

Methodology

The scientific research set and created many approaches that fit the solution to any of the scientific problems that require study and investigation. After choosing the appropriate method for research and problem to achieve the objective, these are of the most important steps upon which the success of the search or failure is based. A method is "the manner produced by the individual to reach a particular goal"(Akram Khattabyah: 1970, 19). Since the survey is one of the basic descriptive research methods, the researcher in the methodology of her study adopted the descriptive method with correlation (surveys) in overall steps.

Population and Sample of the Study

The study population included female students of the first stage, Faculty of Physical Education and Sport Sciences - Baghdad University for the academic year 2016 - 2015 (88 students). The study sample included (23 female students) of the first stage, Division (j) selected by poll forming (26.13%) of the total population.

Means, Tools and Appliances used in the Study

Sources and scientific references/a form to measure achievement motivation (Hassan Ali Hussein, 2011)/ annex1/survey of experts and specialists in the field of sports psychology and badminton/Badminton Stadium/ measuring tape, adhesive tape/additional posts with height of 244 cm/2 badminton rackets 6 badmintons.

Field Procedures of the Study

Specifications of achievement motivation scale (Hassan Ali Hussein, 2011)

The Achievement Motivation Scale (Hassan Ali Hussein, 2011) was adopted. It consists of (34) items and alternative answers are (applies on me to a large extent, applies on me, does not apply at all) as the highest grade in the scale is (102) and the lowest one is (34).

Identifying skills of the study

The researcher agreed with experts of badminton on selecting two skills from the curriculum of the first stage including forehand and backhand shots for badminton (Nadahan, Loai Hassan Al Bakr, Badminton, Baghdad University, Faculty of Physical Education and Sport Sciences).

Identifying Tests of the Main Trial

The researcher agreed with the supervisor and experts of badminton in selecting one test for each skill.

Test of Forehand Shot (Main Mohammad Taha 2001, 64.)

Test name: Forehand finishing (dimensional) shot.

The purpose of the test: Measuring the performance of forehand (dimensional) shot's finishing accuracy. Tools required: Badminton rackets, rope, extra posts with a height of (244 cm), information form and a planned court with test design.

Performance Description

After explaining the test to respondents, they are given a good time to warm up and then each respondent is given (5) experimental trials/the respondent stands in the designated area (X)/at the moment that the coach serves the badminton to move if it is necessary for the success of the attempt and he should hit the badminton with the forehand shot (over the head), over the net and then the cord toward an area specific with degrees.

1. A respondent is given (12) attempts to calculate only his best (10) attempts.

Performance Evaluation

The respondent is given (3) points in case of the fallen badminton in the area specified with a distance of (50 cm) after the back line of the court./the respondent is given (5) points in case of fallen badminton in the specified area approximately 76 cm between the back line of the court and the beginning of far-double serving line/the respondent is given (4) points in case of the fall of badminton in the area specified with a distance of (70 cm) long after the double serving line/the respondent is given two points in case of fallen badminton in the

specified area of approximately 124 cm, which starts from the end point (4) and ends at the imaginary line that extends down the rope. The higher grade is given in case of fallen of badminton in the line between two points and no points are given for the badminton that falls outside the boundaries of the pitch or attached to the net. The maximum limit of the points recorded by the respondent in the best (10) attempts is 50 points.

Test of backhand Shot (Mazen Hadi Kzar: 2003, 50-51)

The purpose of the test: Measuring the performance of backhand (dimensional) shot's finishing accuracy. Tools required: Badminton court as in figure 2, badminton rackets and adhesive tape, measuring tapes, information form and badmintons.

Performance Description

After explaining the test to respondents, they are given an appropriate time to warm up and then each respondent is given (5) experimental trials/the respondent stands in the designated area (X)/the coach serves the badminton to reach at the left of the respondent (if holding the racket with the right arm/ the respondent is given 12 attempts and the best 10 attempts are count for him/a respondent can move for the success of the attempt and he can let any badminton that is thought to have failed attempt if returned. If the coach thinks that his serve is incorrect, he calls (repeat) and this attempt will not count. Maximum points that can be recorded by a respondent in the best (10) attempts is (40) points.

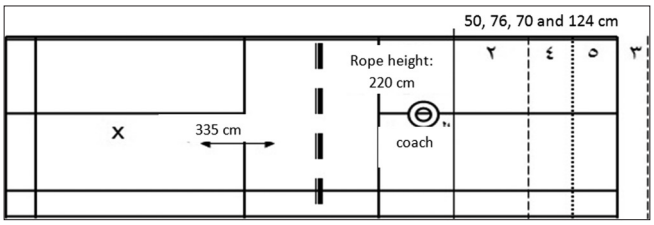

Figure 1: Plan of badminton court to examine the forehand finishing shot

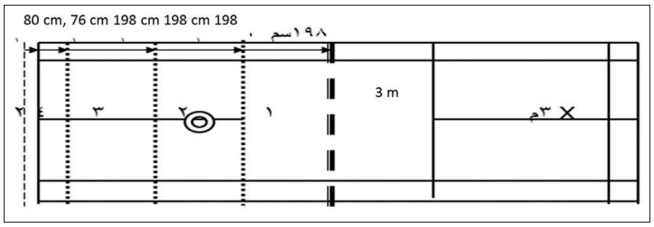

Figure 2: Plan of badminton court to examine the backhand finishing shot

Performance Evaluation

The respondent is given (1) point in case of the fallen badminton in the area specified with a distance of (198 cm) from the mid court line below the net till the near serving line/the respondent is given (2) and (3) points in case of fallen badminton in the specified area approximately 198 cm starting from the near serving line and ends at the far double serve line/the respondent is given (4) points in case of the fall of badminton in the area specified distance (76 cm) long after the court end line/the respondent is given two points in case of fallen badminton in the specified area of approximately 80 cm, which separates the far double serve line and the far single serve line. The badminton that hangs in the net or gets outside the limits of the court (except for the specified area) will not record any points.

Exploratory Trial

For the purpose of identifying all obstacles and negatives that may face the researchers during implementation of the main trial, the researcher performed the exploratory trial on a group from outside the main sample of the study (5 female students). They were tested randomly using the poll method among female students of the first year in Faculty of Physical Education and Sports Science, Baghdad University.

The exploratory trial was as follows: The researcher conducted the exploratory trial (for achievement motivation scale) on the trial sample (4 female students) on 24/02/2016 in Faculty of Physical Education and Sports Science, Baghdad University. The researcher did not calculate the scientific coefficients of the scale because the scale is applied on the Iraqi environment, legalized and characterized by validity, reliability and objectivity. On the following day, the researcher conducted an exploratory trial for both skill tests on the same sample of the trial by previous agreement with them (4 female students) on 25/02/2016 in Faculty of Physical Education and Sports Science, Baghdad University. In addition, the researcher did not calculate the scientific coefficients of the scale because the scale is applied on the Iraqi environment, legalized and characterized by validity, reliability and objectivity.

Main Trial

The researcher conducted the main trial (for achievement motivation scale) on the main trial sample

(23 female students) on 02/03/2016 corresponding Wednesday in Faculty of Physical Education and Sports Science, Baghdad University. On the following day, the researcher conducted the main trial for both skill tests on the same sample of the main trial by previous agreement with them (23 female students) on 03/03/2016 corresponding Thursday in Faculty of Physical Education and Sports Science, Baghdad University.

Statistical Means

The researcher used the SPSS statistical package for data treatment in the study and calculated the arithmetic mean, standard deviation SD and tests for dependent and independent samples.

ANALYZING FINDINGS AND DISCUSSION

Table 1 shows values of arithmetic mean and standard deviation SD for the forehand shot (31.391 – 7.234 respectively), arithmetic mean and standard deviation SD for the backhand shot were (25.173 – 4.628 respectively), while arithmetic mean and standard deviation SD for achievement motivation was (7.593 – 70.739 respectively) on the sample of 23 items.

Table 2 shows Pearson correlation coefficient of achievement motivation for the forehand shot (0.133) when compared with significance degree (0.273) showing an insignificant difference at freedom degree (22).

Table 3 shows Pearson correlation coefficient of achievement motivation for the backhand shot (0.422) when compared with significance degree (0.22) showing an insignificant difference at freedom degree (22).

Table 2 shows no significant correlation between achievement motivation and measuring accuracy of performing the forehand shot. The researcher attributes the reason for this to the fact that female students of first stage did not have information and skill in badminton, weak skill ability and performance during playing or training for this skill leads to multiple errors accompanying performance. All of these reflect and lead to achievement motivation for the students although the skill that is easy to learn and perform. In addition, table (1) shows this idea as the arithmetic mean for the forehand shot is (31.391) which is bigger than the mean for backhand shot (25.173. This asserts

Table 1: Arithmetic means and standard deviations for achievement motivation, forehand and backhand shots

Statistical variables	Sample	Arithmetic mean	Standard deviation
Forehand shot	23	31,391	7,234
Backhand shot	23	25,173	4,628
Achievement motivation	23	70,739	7,539

Table 2: Results of correlation coefficient for achievement motivation and forehand shot

Statistical variables	Pearson coefficient	Real significance	Type of difference
Achievement motivation forehand shot	0.133	0.273	Insignificant

Table 3: Results of correlation coefficient for achievement motivation and backhand shot

Statistical variables	Pearson coefficient	Real significance	Type of difference
Achievement motivation backhand shot	0.244*	0.22	Significant

* Significant ≤ (0.05) at freedom degree (22)

that the forehand shot is easier in performance. By looking at the standard deviation SD of the forehand, it was (7.234), which is bigger than the SD for the backhand shot (4.628). This asserts that the level of the female students in performing the forehand shot varies and not close to each other, but the level of achievement motivation was weak, which led to the insignificant correlation.

Table 3 shows a significant correlation between achievement motivation and measuring accuracy of performing the backhand shot. The researcher attributes the reason for this to the fact that female students of first stage learned performance of backhand shot after learning the forehand shot. This is the process of transferring the effect of learning in the individual event and as a result of previous information for the students about how to perform badminton skills. Thus, backhand shot performance became enjoyable and this led to increase motivation by students more than in the forehand shot. In addition, the researcher thinks that whereas the backhand shot is more difficult than performing the forehand shot skill, this will generate a strong motivation for the students or a bigger challenge to perform the most difficult skill and not to fail in

it. On the other hand, achievement situations often include fear from failure for the individuals. Thus, in such situations, there is a trend to avoid failure, which is also the outcome of three factors: (motivation to avoid failure, possibility of failure and the motivational value of failure) (Ahmed Yahya Alzak, Op. Cit, 237).

From results of the study, we can conclude the following; the female students do not own the achievement motivation for the forehand shot in badminton. In addition, achievement motivation was found for female students in backhand shots in badminton.

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The Swedish Journal of Scientific Research

Original Article

Sports Woman Triad Syndrome: Evaluation, Frequencies and Causes in Algerian Footballers

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ABSTRACT

Introduction: Le niveau des compétitions sportives féminines a connu une croissance tellement marquée que la pression est devenue plus palpable poussant certaines athlètes à se lancer dans des régimes alimentaires déséquilibrés pouvant perturber leurs cycles menstruels. L'association entre troubles de l'alimentation et cycles menstruels irréguliers finirait par engendrer " la triade de l'athlète féminine". **Objectif:** l'objectif est d'évaluer la fréquence des troubles du cycle menstruel et de mettre en évidence ses causes chez la footballeuse algérienne. **Methodologie:** 44 footballeuses ont renseigné le questionnaire sur leur cycle ovarien pour l'analyse de la fréquence des troubles du cycle menstruel. Les sujets ont aussi réalisé des mesures anthropométriques et une enquête alimentaire. Les blessures subies par les footballeuses ont été recensées. **Resultats:**12 footballeuses (27,27%) ont présenté des troubles du cycle dont 5 avec des antécédent d'aménorrhée, 5 avec des cycles irréguliers longs (≥ 35jours) ou courts (≤ 24 jours) et 2 présentant à la fois des antécédents d'aménorrhée et des cycles irréguliers. Nos résultats ont apporté des valeurs du poids et de taille compatibles aux normes du football féminin. En comparaison avec les footballeuses normalement réglé (NR), les footballeuses présentant des troubles de cycles menstruels (TC) présentent un déficit énergétique associé à un IMC plus bas et un taux d'œstradiol réduit. Les athlètes (TC) présentent une fréquence de blessures plus élevé comparées aux athlètes (NR). **Conclusion:** La pratique du football a tendance à perturber le cycle menstruel des footballeuses (27,27%) pouvant suspecter le syndrome de la triade de l'athlète causée essentiellement par la baisse des apports énergétiques journaliers et confirmée par le pourcentage élevé des blessures subies.

Keywords: Menstrual cycle disorders, footballers, energy deficit, oestradiol, injuries

INTRODUCTION

The characterization of a player with a high level constitutes the best approach that allows the best guidelines for the preparation of the future footballer. Among the women footballers, the diversity and regular fluctuation of the sexual hormones associated with the constraints of the requirements of modern football make the process of training more complex. The number of women who practice sport is increasing (Europe: <10% 1968,>60 %). However, the growing participation of women in sports activities has given rise to health problems (Hoch AZ and al 2009).

According to the medical commission of the I.O.C, the level of the competitions has known such a remarkable growth that the performer receives pressure. Looking for an ideal weight, some athletes have started draconian and unbalanced diets, taking the risk of serious food trouble such as anorexia or bulimia. These food disorders may result into a low availability in energy (even insufficient – unable to respond to the energy

Access this article online

Website: http://sjsr.se/

ISSN: 2001-9211

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expenditure) which can disturb the reproductive cycle then leads to amenorrhea. (Boisseau, N and al 2009) The association between food disorders and the irregular menstrual cycle causes a decrease in the estrogen, endogenous and other hormones, which gives birth to bone mineral density hence the expression" Female athlete triad."When the three components of the triad come to exist simultaneously, they have serious consequences on the athlete's health and can even threaten her life " adoption of a declaration of consensus on the triad of the woman athlete - News Olympic " 2016).Female athlete triad is a pathology that has many factors: Environmental, like nutrition, an intense exercise, or stress. (Otis CL and al 1997).

The disorders of the menstrual cycle constitute the most recognizable symptoms of the triad. Yet, they are rarely declared by sportswomen spontaneously because on one hand, they would live with it normally, and on the other hand, the medical corps considers it as normal since it is associated to the constraints of modern football. These disorders may make training more complex and detrimental (Adam 2013). The idea that the presence of a component of the triad induces that the presence of the other components is obvious (Golden NH and al 2002).

In literature, we find various denominations: FAT= female athlete triad, syndrome of female athlete triad (Nattiv A and all 2007).

The problem was defined for the first time in 1993 by the College of Sport Medicine. According to sports, between 16& 52 % of young women are highly threatened by the triad (Hoch AZ et coll 2009) (Amanda K and al 2016) (Tara Tietjen-Smith 2008).

OBJECTIVE

The objective of this work is to evaluate the frequency of the disorders of the menstrual cycle and highlights their causes for the Algerian woman footballer.

SUBJECTS & METHODS

44 women footballers evolving in division I, and are between 20 & 28 of an average weight of 55.79 kg, an average height of 163.14 cm, with a weekly training between 9 and 11 in addition to the competition & the study criteria have accepted to take part in the study. The subjects have accepted to fill in the questionnaire with information about their ovarian cycle for the analysis of the disorders of the menstrual cycle (Female Athlete Triad Coalition…2014). The subjects have also, actualized anthropometric measures for the estimation of the fat mass and the meager one (Frederic, M 2007) & food survey (BILNUT & the table of food components) a census of injuries sustained by the women footballers was fulfilled along the sports season.

Statistical Analysis

Statistical analyses were carried out using the SPSS 20 program for windows.Descriptive statics and Pearson correlation coefficients were calculated. The confidence level for statistical significance was set at $p<0.05$.

RESULTS

Anthropometric Settings

The results show a corporal weight, body mass index for the women footballers (TC) significantly weaker ($p<0.001$) than women footballers (NR) in contract, there is no significant difference in the lean body mass and fat mass between the two groups.

4 women footballers have presented an IMC $\leq 18 kg/m^2$ corresponding to a stage of thinness. One woman footballer among these four has presented an IMC $\leq 16.5 KG/m^2$ (16.35) corresponding to a criterion of undernutrition.

Frequency and Nature of the Menstrual Cycle Disorders

Among the 44 women footballers, 15 of them have presented regular cycles, 12 (27.27 %) Have presented cycle disorders 5 among them with amenorrhea antecedents, 5 with long irregular cycles (≥ 35 days) or short (≤ 24 days) and 2 presenting amenorrhea antecedents and irregular cycles at the same time.

Table 1: The anthropometric characteristics of sportswomen with a normal menstrual cycle (NR) and the sportswomen with disordered cycle (TC)

Paramètres	Footballers (NR)	Footballers (TC)
Corporal weight (kg)	61.3±6.64	57.54±7.45
BMI (kg/m^2)	21.58±1.74	19.36±1.29
Fat mass (%)	31.60±2.75	20.06±5.38
Lean body mass (kg)	25.41±3.36	30.35±5.26

NR: Athletes with a normal menstrual cycle TR: Athletes with disordered menstrual cycle BMI: Body mass index

Results of Hormonal Parameters

The realized amount of the oestradiol rate shows the weaker values for women footballers presenting disorders of the menstrual cycles(29.76)compared to the sports women having a normal menstrual cycle. (table n°3).

Results of Food Survey

The food survey has shown the following results

In comparison with women footballers having a normal cycle, the G.E.C is lower than the women footballers presenting menstrual cycle disorders accompanied with the decrease in the contributions of the lipids and the proteins against an increase in the carbohydrate contribution.

Correlation between the Energetic Results and the Regularity of the Women Footballers' Cycle

The results of the analytic study shows a strong correlation that is inversely proportional between the energetic results and the regularity of the menstrual cycles (r= - 0.522, p= 0. 01) as shown in table5. The results plead for the existence of triad of the sports woman.

Frequency of Injuries Undergone by Women Footballers

On the occasion of their trainings like in the competitions, women footballers with disordered menstrual cycle have picked up more injuries (58,33%) compared to women having a normal cycle (33,33%).

DISCUSSION

Our results have brought weight and height values consistent with the standards of women's football as highlighted by (Dvorak and al 2011). In fact, it is a matter of having a typical body optimal, adapted to the energy and motor requirements of the discipline concerned. Which corroborates the results of Toumanion when it ensures that to achieve the sporting success, Have the constitution of a typical body.

The Results of BMI and% MG showed good physical fitness and reported specific literature. However, the differences between the soccer players and the control group remained insignificant. Our results are consistent with those of Dvorak and al 2011. Similarly, the lean mass of our subjects is relatively high and this is probably due to the increase in the intensity of the training allowing a degreasing of the body of the soccer players, An increase in muscle mass and osseous thanks to repeated and varied mechanical stresses (Duclos and al 2010).

Compared to normally regulated (NR) soccer players, women with troubled menstrual cycles (TC) represent an energy deficit associated with a lower BMI and reduced oestradiol. Indeed, a restrictive food behavior leads to an energy deficit and leads to menstrual cycle disorders (Gottschlich and Young, 2006). The main cause of these disorders seems to be the endocrine adaptation of the body to restore energy homeostasis as evidenced by the association of the energy deficit with the low plasma estrogen content(Lefebvre and Jacques B. 2005) reported by our results Athletes (CTs) represent a frequency of injury especially stress fractures higher compared to athletes (NR). Athletes with functional hypothalamic amenorrhea characterized by hypoestrogenia present a risk factor for stress fractures.

In particular, the present invention is an augmentation of the osseous resorption, and a diminution of the reparation of micro fractures caused by the intensive exercise and repeat (Masson 2017). It is important to note that the adaptive adaptation of the tissues to the physical activity is more important than that of an economic deficit associated with the problems of menstrual cycles and that the equilibrium in the health of the population is stable. (Thissen and al 1994). Remind that the triad does not involve the coexistence of these three composers. 'In addition, the problems of the triad may diminish the physical performances and bring morality and mortality (Nattiv,A and al 2007).

CONCLUSION

The practice of football tends to disrupt the menstrual cycle of female footballers (27.27%) who may suspect the athlete's triad syndrome caused mainly by the decrease in daily energy intakes and confirmed by the high percentage of injuries suffered by soccer players.If the characteristics of Algerian footballers are similar to those reported in the literature, it is still important to prevent these athletes, their parents and their coaches from the dangers to which they are exposed. The best strategy remains the prevention of the triad through education.

Table 2: Frequency and nature of the menstrual cycle disorders of women footballers

N=44	17	15	12 (27,27%)		
			5	5	2
Profile of the menstrual cycle	Non-notified cycles	regular cycles	amenorrhea antecedents	cycle disorders: 24j ≤ Cycles ≥ 35j	2 symptoms at the same time

Table 3: Comparison of the rate of oestradiol in the blood of the women footballers

N=35	Footballer NR (n=23)	Footballer TC (n=12)	T test
œstradiol	29.76±21.5	34.39±13.9	-0.75

Table 4: Comparison of the results of the food survey of sportswomen

Paramètres	Footballers (NR)	Footballers (TC)	Significance
% AET			
Protein	21±7.64	11.03±9.06	-8.414*
Lipid	23±11.91	20.62±11.23	-2.211*
Carbohydrate	55.62±14.62	68.33±16.85	-5.646*
Global energetic contribution (Kcal/j)	2067±383	1633.66±225	-1.392*

GEC: Global energetic contribution, *Significant

Table 5: Correlation between the energetic results and the regularity of the women footballers' cycle

Variables	n	r	p- value
Corrélation between energetic results & regularity of the menstrual cycles	44	-0.522	0.01

Table 6: Frequency of injuries undergone by women footballers

Training injury	(NR) (n=15)	(TC) (n=12)
yes	5	7
No	10	5
% of injuries	33,33%	58,33%

RECOMMENDATIONS

The present recommendations come from the findings of the study and recent consensus on the triad (2014 Female Athlete Triad Coalition Consensus: 1st international conference held, California 2012 + 2nd international conference held, Indiana 2013) What should be monitored?

First, it is important for the athlete and his/her living environment to be well educated about the triad. This allows us to recognize the warning signs, but above all to avoid behaviors that can exacerbate the eating disorders of the athlete.

It is also paramount to make the complete history of the stress fractures or frank suffered by the athlete. Then we want to know the history of menstruation: Its regularity, its duration, etc. Finally, it may be appropriate to look at the athlete's social network. Is she under pressure to lose weight or win at all costs, does she have controlling parents? Is she socially isolated due to her sport? Is she a subject to punishment when gaining weight…etc?

When such behaviors are discovered, the evaluation must be immediately initiated and the athlete, coaches and caregivers must be met in order to establish a preventive strategy.

Prevention

Faced with such an insidious problem, the best prevention is the education of parents, coaches and athletes. Another very effective strategy for recognizing early signs of the disease is pre-participatory assessment.

Unfortunately, it is not mandatory in Quebec and schools, whether private or public, do not seem to be interested in taking the lead on this issue.

As a coach: Remind the athlete that eating is an important part of performance. Emphasize good lifestyle and health rather than body weight. Help the athlete get good resources in nutrition, psychology and medical service. Pay attention to warning signs such as repeated fractures.

As an athlete, you have a tremendous responsibility that begins by balancing performance and health. Make a schedule of your periods and consult a specialist if you observe any irregularities. The main cause of amenorrhea is pregnancy, but there are a host of other possible causes that deserve investigation. If you are regularly injured or undergo stress fractures, see also; have your training plan reviewed. Ask for help if you find that you are constantly looking for ways to lose weight or if you regularly consume "slimming"

supplements. To develop a diet that meets your needs based on your sport, a nutritionist can help. Finally, choose your living environment, do not be intimidated.

Treatment

When one of the elements of the triad is identified, an effective prevention strategy must be put in place. This should be based on a multidisciplinary approach including a nutritionist, psychologist, sports chiropractor, coach, parents and attending physician 6, 10. The first step is to increase energy intake 4. However, it is important not to make the athlete feel that you want to control him/her. The strong method will not be useful. Although it can be prohibited from participating in competitions, the athlete may still train on his or her side.

We must convince her to gradually reduce her training volume until her periods return. She should be encouraged to eat enough to meet her needs and to take supplements of calcium (1200-1500 mg), vitamin D (400-800 IU) and potassium (60-90 mg). Hormone therapy can be considered, but no research has demonstrated its effectiveness for this problem. 12 In addition, CMHA does not recommend taking contraceptive pills or hormonal supplements in athletes with the triad. It is rather suggested to promote the resumption of menstruation naturally. Biphosphonates do not appear to increase bone mass and should not be used in pre-menopausal women. Let us remember that no medicine can restore the lost bone mass.

The measurement of body weight should be performed as rarely as possible and discontinued as soon as the patient has reached a sufficient weight. It is more important to put emphasis on making good lifestyle habits. Being surrounded by friends during workouts and meals can promote healthy habits. The long-term consequences are significant and include osteoporosis of course, but also osteoarthritis and joint disorders due to multiple fractures. That's why the best strategy is prevention of the triad through education. Health and fitness professionals should learn about the topic and promote training in their workplace and with their patients.

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