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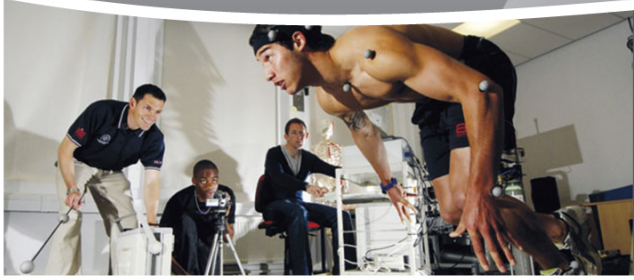

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Improving of Physical Fitness through Physical Education in School for Students Aged 12-13 Years Old

Lapousis X. George

Professional School Counselor of Physical Education and Sports Science

ABSTRACT

It is well recognized that physical fitness has several health outcomes in young students. Cardio respiratory fitness levels are associated with total adiposity, aerobic capacity with risk factors for cardiovascular disease and the muscular fitness with speed and agility. Fitnessgram is a test battery to assess the physical fitness. The purpose of this study was to evaluate a school based intervention program, to improve the levels of physical fitness. The sample consisted of 141 students (61 boys and 80 girls) aged 12 and 13 years old. One-mile run/walk test, the 90 degree push up test, the back saver sit and reach test, the trunk lift test and the curl up test and Body Mass Index were used. Paired samples t tests were used to assess mean differences between initial and final measurement. There was not a significant difference of the curl up test before the intervention program and at the end of the intervention program t (140) =-1,43, p=0,18, for the push up test there was a significant t(140)=-3,37, p=0,001, for the one-mile run/walk test there was a significant difference t(140)=5,67, p=0,000, for the back saver sit and reach, there was a significant difference t(140)=-4,16, p=0,000, for the trunk lift test there was a significant difference t(140)=-5,28, p=0,000 and finally for the Body Mass Index there was not a significant difference t(140)=1,79, p=0,086. In conclusion school has an important role for the cardiovascular health, and there is a need for development such programs inside as well as beyond school boundaries in the families and in society.

Keywords: Cardiovascular health, fitness, fitnessgram test battery, intervention program, physical education, school

INTRODUCTION

It is generally recognized that the health problems of the population are increasing although there is a rapid development of biological and medical sciences. As experts researchers mention, many of these problems could be avoided or at least reduce their consequences if the lifestyle and habits of people, were different to the early age in relation to physical activity and exercise. Moreover, the value of physical education in the education of the young generation as a regular sports activity broader popular masses (mass sport) results in the rapid development of physical education science. In the 1940s, the pioneers of fitness (Cureton, Bruno, Balke, and Peterb Karpovich) conducted empirical studies to investigate the effects of physical activity. Especially they studied the improvement in physical fitness in relation to the cardiovascular endurance and body composition. These studies led in 1978 to the adoption of the report on the American College of Sports Medicine (ACSM), which was primarily authored by Michael Pollock, who was interested to investigate the amount and the type of exercise needed to improve physical fitness (ACSM, 1988).

The same information, although modified slightly at the revisions of this reference (American College of Sports Medicine 1990, ACSM 1995), continued to be the main

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Address for correspondence:
Lapousis X. George, Professional School Counselor of Physical Education and Sports Science. E-mail: glapousis@hotmail.com

standard for improving fitness. These studies concluded that participation in physical activities has a significant effect on cardiorespiratory system. In fact the groups that had less physical activity than that recommended by the ACSM, did not differ significantly from the groups that were sedentary. At the same time, other epidemiological studies, investigated the risk factors of various health problems, especially for diseases of the heart. There have been several studies (Blair et al. 1989, Paffenbarger et al. 1986) that compared populations of lower or higher activity. The results showed that there is less risk of heart disease among the active groups as compared to the non-active groups.

In addition, other studies have investigated the relationship between the level of physical fitness and heart diseases or other problems. Haskel (1984) was one of the first experts, who noticed the relationship between physical activity and health. The (ASCM, 2008) reported briefly on the findings of laboratory research, about what should be done to bring about changes in the physical fitness of a person. Previous observations confirmed the importance of minimum activity level in order to reduce the high risk of cardiovascular disease in sedentary groups. The greatest decrease in risk factors of heart disease comes from the minimum activity. The gradually increasing activity and the higher levels of activity and fitness, showing the obvious benefits of reducing heart disease challenge probabilities.

There are many indications of the importance of primary prevention of cardiovascular disease (CVD), which is known that start from childhood. Studies autopsy performed on children and young people, after the unlikely deaths (PDAY, Research Group 1990, Newman et al. 1986, Berenson et al. 1998, McGill, et al. 2001), documenting the significant positive correlation between the established risk factors and the presence of atherosclerotic lesions in the aorta and the coronary arteries of children and young people. Recent data onto the Finland study (Raitakari et al. 2003) reaffirm the relationship between risk factors of childhood and adolescence and atherosclerosis during the adult's life. Further longitudinal studies show the relationship between risk factors and cardiovascular diseases from childhood to adulthood of the individuals (Lauer & Clarke 1989, Lauer et al. 1988, Janz et al. 2000).

Epidemiological studies, among which includes the "Third National Nutrition Examination Survey", (NHANES III), provide important data onto the prevalence of risk factors for the development of CVD and relate this trend behavior on health issues (Winkleby et al. 1999, Troiano et al. 1995, Ogden et al. 2002, Cook et al. 2003, Levin et al. 2003). These data are useful for giving information about individuals and devise the strategy to be followed for the improvement on public health. Also support the need for greater and more effective approach to the population of issues related to the cardiovascular health of children and young people. The data onto the physical activity from the same survey (Grunbaum et al. 2012), show that the percentage of students who exercised daily decreased from 43.7% in 2001 to 24.6% in 2011. According the students reported, only about one-third of them reported that exercised for 15 minutes or more during physical education classes. Moreover, participation in sports for recreation and entertainment decreased substantially from the ages of 7-11 years. This type of change is more intense and distinct among girls. Also in 2001, the YRBS study concluded that the rate of participation in girls in exercises and the maximum intensity was 63% in 8 years age and 41% at 11 years age (Grunbaum et al. 2002). Similar data from the longitudinal study "National Heart, Lung, and Blood Institute" (NHLBI), show that there is a sharp decline in physical activity during adolescence, between boys and girls (Kimm et al. 2002).

Also at the age of 18 and 19 years, 56% of the girls reported no physical activity in relation to sports or leisure. Notable factors that can predict the decrease in physical activity are the low educational level of parents and the high body mass index (Kimm et al. 2002). Overall, the available evidence points to the need for the individual and the overall approach from the population to primary prevention of CVD, which start from childhood. The guidelines of the American Heart Association (AHA) to improve cardiovascular health (Pearson et al. 2013) describe a comprehensive list of objectives, targets and strategies that can be reached from the general population. The Fitnessgram test battery is a set of assessment of fitness for young people. This method of fitness assessment developed by The Cooper Institute (Cooper Institute for Aerobics Research, CIAR) and responds to the existence of the need for a comprehensive evaluation of physical education programs. The assessment includes a variety of health-related tests, which were designed to evaluate the cardiorespiratory endurance, muscular strength, muscular endurance, flexibility and body composition.

Benchmarks have been established for children and young people for each of the categories related to the physical condition (CIAR 1999).

The Cooper Institute developed the Fitnessgram test in 1987 and was recognized and certified by the American Alliance for Health, Physical Education, Recreation, and Dance (AAHPERD). The primary purpose of the Fitnessgram battery test was to help students and establish physical activity as part of their daily lives. Tests of Fitnessgram package provide students with a number of options so it gives to everyone the opportunity to participate. This possibility of the existence of alternative tests that can examine and score the same parameter is particularly important at the assessment of physical fitness, because it gives more opportunities to complete all tests.Also, the package can be used by teachers to assess the needs of students and to help themselves to the design of physical education programs. Finally it can be used by parents to understand the needs of their children and to help in the planning of their physical activities (CIAR 1999).

Each test of Fitnessgram battery is chosen to calculate and assess some important aspect of health and not some skill. Students are not compared with each other, but with special standards, relating to health, which has been carefully verified for each age and sex. Participants receive objective, personal feedback and positive reinforcement, which is essential to change behavior and that essentially plays the role of the communication link between the teacher and the parents. Finally the Fitnessgram test battery emphasizes the participation in various physical activities for the development and maintenance of an acceptable fitness model. Four main fitness factors can be measured by the test Fitnessgram: the aerobic capacity, the body composition, the muscular strength and the endurance and flexibility.

Fitnessgram test battery uses specific benchmarks to assess the physical fitness. These standards have been established in such a way that the appropriate level of fitness can offer a degree of protection against disease and sedentary lifestyles. The performance of each individual is classified into two general areas, the "health zone" in the zone that "needs improvement"(CIAR 1999). As it was reported, a score belonging to the "health zone" represents a level of fitness that offers some protection from potential health risks. These standards reflect a reasonable level of fitness, which can be obtained from the majority of children that regularly participate in a variety of exercises, or involving themselves in physical activities. For this reason it is recommended to all students strive to achieve a score which will rank them among the health zone limits. It is not uncommon many students to achieve appropriate levels in some categories, while not succeed in others. In many children there are areas which are doing much better than others (CIAR 1999).

The category below the level of "health zone" referred as "needs improvement" and indicates that the physical condition of the person may need special attention. While the results of the low level of fitness may not affect health into adulthood, it is important to identify future risks promptly. Thus the level of fitness "needs improvement" can be used sliders to help children that they set new goals, to improve their level of fitness (CIAR 1999). The development of standards for physical fitness in young people (children and adolescents) is relatively recent. Until now the question about the amount of physical activity that is necessary to young's is not answered satisfactorily. But surveys show the importance of being able activity for health (Bouchard et al. 1990, Department of Health and Human 1980, Haskel et al. 1985, Malina, 1990) and the belief that intervention at an early age is important to maintain the active lifestyle in later life (Haskel et al. 1985, Pate & Blair 1978, Simons et al. 1988).

The best indicator for cardiopulmonary endurance is considered the aerobic capacity. Acceptable aerobic capacity levels correlate with the decrease of elevated blood pressure and reduce the risk of coronary heart disease, obesity, diabetes, certain cancers and other health problems (Safrit et al. 2000). Aerobic capacity consider the ability of the heart, lungs and circulatory system to receive oxygen from the atmosphere and expelling the carbon dioxide produced in the cells of the body in energy process. Whereas the level of aerobic capacity and assessing the level of physical activity, support the maintenance of good health throughout the duration of the remaining life (Blair et al. 1989, Karvonen 1982, Paffenbarger et al. 1986), which must be accompanied by a growing interest in the fitness early in the school age (Pate 1989, Whitehead et al. 1990). For the measurement of aerobic capacity it is used the lab, where the maximum amount of oxygen that one needs when performing a maximum muscle effort (usually running on the treadmill or the ergometer). However, it is more practical, and equally

accurate to assess the aerobic capacity in school or observing the total distance covered in 9 or 12 minutes run-walking or observing the total time needed for a running or walking 1 or 1.5 miles.

Muscular endurance and strength are important factors related to health and fitness. According Westcot (1991), four out of five Americans have felt discomfort in the lower part of back and 80% of these problems are muscular nature that can be corrected by power drills. Studies of Kibler et al. (1992) and Stone (1990) show that the strength exercises reduce the risk of injuries in the joints or muscles, which can occur during physical activity. Muscle strength is measured more accurately in the laboratory using a dynamometer the entasiometro or the Cybex machine. However, many muscle strength and muscle strength measurements may be held outdoors, such as school, with relative accuracy.

The most common measurement for the flexibility is the test by folding the seat position, used in fitness related to health. The fold test from the home location, based on the significance of the findings on the role of the flexibility of the body in preventing diseases of the lower part of the lower back (Jacson & Balker 1986, Kraus & Raab 1986). So this test has incorporated almost in every national fitness test including the American Alliance for Health Physical Education Recreation and Dance (AAHPERD), Physical Best (AAHPERD 1988), The President Council on Physical Fitness and Sport (PCPFS 1990), The Fitnessgram (Institute for Aerobics Research). The test normally used in schools, but there is a concern about whether a higher score indicates a greater flexibility or whether the relationship between the length of the hands and the length of the feet affect the score of the fold from the home location.

The body composition is considered as an indicator of the weight percent from fat. Maintaining proper the body composition is crucial for the prevention of obesity, which is associated with increased risk for diseases such as coronary heart disease. As a large percentage of body fat can be unhealthy also and the small percentage of fat may pose a health risk someone. Since the late 1970s, various interventions programs have been conducted, which aim to promote health in schools. Many of these interventions contained health literacy issues related to the heart, while in others intervened simultaneously in other risk factors for cardiovascular disease. Many of the early studies are considered to belong to the first generation, which were primarily teaching interventions and focused on the positive effect of the provision of knowledge on health issues or behavioral issues and attitudes. Since the mid 1980s the research was based on the school environment, focused and theoretical contributions from behaviors, but also evaluated and measured a number of factors were considered responsible for the occurrence of cardiovascular disease (Resnicow & Robinson 1997).

The results of this second generation of the surveys reviewed, analyzed and synthesized by Resnicow and Robinson, (1997), demonstrating the ability of these interventions in schools to improve risk factors for CVD in children and young people. Also documented investigations on the third generation, in which the investigation was extended beyond the classroom with interventions that focused on the wider school environment and included the nutrition and physical activity programs, which could be extended to other hours of the expiry school hours. Example of the third generation of the speeches is the CATCH research conducted in schools (Luepker et al. 1996, Dwyer et al. 1996, Edmundson et al. 1996, Lytle et al. 1996, Nader et al. 1999). A result of the CATCH intervention was a significant increase in the proportion of medium physical activity intensity during the school physical activity from 37% to 52% of students, with students in the intervention schools to be more physical activity to schools control (Luepker et al. 1996).

According to the research there are many intervention programs implemented in order to improve physical fitness. In Robinson's research (1999) took part children aged 9-11 years. Children belonging to the intervention group were taught during the six months that lasted the intervention eighteen 18 theoretical courses, which were designed to reduce TV viewing, video and games. The total number of participants in the intervention group was 106 people. The control group, which consisted of 121 people, attended the typical school subjects. After the end of the program students were followed for a period of seven months. The results showed a significant reduction in BMI in the intervention group. Significantly greater reduction was observed in the intervention group in skin folds triceps muscle and waistline. In research of Muller et al. (2001) the intervention was done in schools by trained educators who tried to give the following message to the student, that they must have physical activity at least

an hour a day and that should reduce watching TV in less than an hour day. At the end of the intervention it was found that there was a significant reduction in the BMI and skin fold thickness of the triceps muscle.

In research of Epstein et al. (1995) took part in obese people aged 8-12 years and their parents. There were three different groups. In the first group, emphasis was placed on reducing sedentary life, in the second group it was given emphasis on increasing physical activity and at the third group was given emphasis at the same time to increase physical activity and reduce sedentary lifestyles. The duration of the intervention was 4 months. The results showed a reduction in the intervention groups compared with the control group, the percentage of overweight and the percentage of body fat. In research of Epstein et al. (2000) that took part in obese people aged 8-12 years. In the control group participants were encouraged to reduce their sedentary lifestyle. Both groups followed the program for six months. The results showed that the pursuit of the objective of reducing sedentary behavior and increasing physical activity resulted in a reduction in the rate of obesity and body fat and improve aerobic capacity. Generally, the results suggested that reducing sedentary works positively towards reducing childhood obesity.

The purpose of the study was to evaluate the efficacy of a school based intervention program during the physical education lessons to improve the levels of physical fitness, using the Fitnessgram test battery (one-mile run/walk test, back saver sit and reach test (BSSR), trunk lift test, curl up test, and Body Mass Index) of students 12 and 13 years old.

MATERIALS AND METHODS

Participants

The sample consisted of 141 students (61 boys and 80 girls) aged 12 and 13 years old. (Table 1). They were from two schools of Central Greece region. The investigation excluded students who regularly practiced in sports teams or clubs or exercised regularly in private gyms or follow any form of training program.

Implementation of the School Program

For the implementation of the course of physical education according to the timetable of the school program, responsible was the physical education teacher. The physical education teacher was responsible in both the experimental group schools and in the control group schools. Children who participated in the control group were not taught any particular object, but they followed a typical fitness program during physical education classes. The duration of the intervention program in schools was about 10 months. The frequency of the exercise program identified with the frequency of weekly hours of physical education in high school. More specifically, for students in the first grade and the second grade of high school, the exercise frequency was three times a week, while for students of high school, the frequency of exercise was 2 times a week. The duration of daily exercise training during the physical education lesson ranged from 35-45 minutes, depending on the timetable of the class program. Special attention was given from the physical education teacher at the intensity of aerobic exercises which should range from 40% to 60% of maximum heart rate during the physical education lesson.

Table 1: Number of students by age and sex

Participants			
Gender	Girls	Boys	Total
	80	61	141
Age	12 years	13 years	Total
	76	65	141

Table 2: Paired samples statistics for the fitnessgarm tests of the intervention between initial and final measurement

Paired samples statistics				
Test	**Measurements**	**N**	**Mean**	**Standard deviation**
Curl up (rep.)	Initial measurement	141	49,59	20,75
	Final measurement	141	52,04	25,75
Push up (rep.)	Initial measurement	141	16,56	9,87
	Final measurement	141	19,21	10,79
One mile run walk (min: sec)	Initial measurement	141	9,61	2,11
	Final measurement	141	9,07	1,72
Back saver sit and reach (cm)	Initial measurement	141	24,47	7,39
	Final measurement	141	26,11	7,56
Trunk lift (cm)	Initial measurement	141	33,93	5,30
	Final measurement	141	35,66	5,39
Body mass index (Kg/cm^2)	Initial measurement	141	21,16	3,76
	Final measurement	141	21,04	3,65

Measurements

For the evaluation of the effectiveness of the intervention program, a series of tests were conducted at the beginning and at the end of the implementation of the program.

Measurement Procedure

Anthropometric measurements

Height and weight were measured with the students wearing light clothing and without shoes. Height was recorded to the nearest 0.5 cm and weight to the nearest 0,5 kg.

Body mass index (BMI) It was calculated as weight (kg) divided by height squared (m^2) per age and sex specific cut off points (20). Cole et al. (2000).

Physical fitness

The Fitnessgram tests that used were the one-mile run/walk test, the 90 degree push up test, the back saver sit and reach test, the trunk lift test and the curl up test.

One-mile run/walk test

The test measures the cardio-respiratory endurance. The purpose is to walk or run a mile distance as fast as possible. 90° push up test. This test measures the upper body muscular strength and muscular endurance (muscle fitness). Push-ups are done in a slow rhythmical pattern, with arms lowered to ninety-degree angles, with the back and legs straight. Girls executed the push up test using their knees to support the body. The test objective is to complete as many push-ups as possible at a rhythmic pace.

Back saver sit and reach (BSSR) test

This test measures the joint flexibility, which is important for functional health. The objective purpose is to reach the specified distance on the right and left sides of the body.

Trunk lift test

This test measures low back muscular strength and flexibility. The objective of the test is to lift the upper body off the floor using the muscles of the back and hold this position for some seconds.

Curl up test

This test measures the abdominal strength and endurance. The objective of this test is to complete as many curl-ups as possible.

Statistical Analysis

Paired samples t tests were used to assess mean differences in the scores of the Fitnessgram tests (curl up test, push up test, one mile run walk test, back saver sit and reach test, trunk lift test and Body Mass Index), before the intervention and at the end of the intervention program. A level of 0.05 was used to determine statistical significance for each of the t tests and a Bonferroni correction procedure was applied. The data were analyzed using the Statistical Package for the Social Sciences version 20.0 (SPSS Inc., Chicago, IL, USA). A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 80 females and 61 males (Table 1) were analyzed. A paired-samples t-test was conducted to compare the score of the curl up test before the intervention and at the end of the intervention program. There was not a significant difference before the intervention program (M=45,59, SD=20,75) and at the end of the intervention program (M=52,04, SD=25,75) conditions t(140)=-1,43, p=0,18. These results suggest that the intervention program really does have not had any effect at the score of the curl up test. For the push up test, a paired-samples t-test was conducted to compare the score of the push up test before the intervention and at the end of the intervention program. There was a significant difference before the intervention program (M=216,56, SD=9,87) and at the end of the intervention program (M=219,21, SD=10,79) conditions t(140)=-3,37, p=0,001. These results suggest that the intervention program really have effect at the score of the push up test.

For the one-mile run/walk test, a paired-samples t-test was conducted to compare the score of the one-mile run/walk test before the intervention and at the end of the intervention program. There was a significant difference before the intervention program (M=9,61, SD=2,11) and at the end of the intervention program (M=9,07, SD=1,72) conditions t(140)=5,67, p=0,000. These results suggest that the intervention program really does have an effect at the score of one-mile run/walk test.

For the back saver sit and reach, a paired-samples t-test was conducted to compare the score of the Back saver

Table 3: Paired samples correlation for the fitnessgarm tests of the intervention between initial and final measurements

Paired samples correlations				
Test	**Measurements**	**N**	**Correlation**	**Sig.**
Curl up (rep.)	Initial & final measurement	141	0,58	0,000
Push up (rep.)	Initial & final measurement	141	0,59	0,000
One mile run walk (min: sec)	Initial & final measurement	141	0,84	0,000
Back saver sit and reach (cm)	Initial & final measurement	141	0,73	0,000
Trunk lift (cm)	Initial & final measurement	141	0,97	0,000
Body Mass Index (Kg/cm^2)	Initial & final measurement	141	0,80	0,000

Table 4: Significant differences for paired sample T test for the fitnessgarm tests of the intervention between initial and final measurements

Paired samples test				
Test	**Measurements**	**t**	**df**	**Sig. (2-tailed)**
Curl up (rep.)	Initial & final measurement	-1,34	140	0,18
Push up (rep.)	Initial & final measurement	-3,37	140	0,00
One mile run walk (min: sec)	Initial & final measurement	5,67	140	0,00
Back saver sit and reach (cm)	Initial & final measurement	-4,16	140	0.00
Trunk lift (cm)	Initial & final measurement	-5,28	140	0,00
Body mass index (Kg/cm^2)	Initial & final measurement	1,72	140	0,08

sit and reach test before the intervention and at the end of the intervention program. There was a significant difference before the intervention program (M=24,47, SD=7,39) and at the end of the intervention program (M=26,11, SD=7,56) conditions t(140)=-4,16, p=0,000. These results suggest that the intervention program really does have an effect at the score of Back saver sit and reach test.

A paired-samples t-test was conducted to compare the score of the trunk lift test before the intervention and at the end of the intervention program. There was a significant difference before the intervention program (M=33,93, SD=5,30) and at the end of the intervention program (M=35,66, SD=5,39) conditions; t(140)=-5,28, p=0,000. These results suggest that the intervention program really does have an effect at the score of trunk lift test.

Finally a paired-samples t-test was conducted to compare the score of the Body Mass Index before the intervention and at the end of the intervention program. There was not a significant difference before the intervention program (M=21,16, SD=3,76) and at the end of the intervention program (M=21,04, SD=3,65) conditions t(140)=1,79, p=0,086. These results suggest that the intervention program really does have not have any effect at the score of Body Mass Index (BMI).

CONCLUSION

The present study was designed to study the effect of an intervention program in schools to improve the parameters of the physical fitness (aerobic capacity, strength and flexibility). The current study has shown that the school is an appropriate setting in which students can improve their physical fitness, that is related with health, during the physical education lessons. At this study the intervention included a curriculum-based workshop for all pupils. Improving the level of physical fitness through the course of physical education in school and the correlation with health is important because it leads to increased interest of the students and motivate them to increase their physical activity.

Also, the proper design, the implementation of similar programs, the evaluation of the intervention program helps the teachers of physical education, to set objectives, a process necessary for the achievement of learning (Pemberton, 1995). Risk factors for cardiovascular diseases in childhood influence health in adulthood (Harsha, 1995), and emphasize the need for maintaining and improving physical education for health. Evaluation of intervention programs is only part of the education process in the course of physical education in schools, for improving the fitness of students that promotes health. An efficient intervention program at school level during the physical education lesson, should develop equally all elements of fitness related to health (Pangrazi et al. 1996)

According to our results the Body Mass Index was not significantly reduced at the students who participated in our study. The results are consistent with the meta-analysis of Harris and his associates (2009), which

evaluated the effectiveness of educational interventions on Body Mass Index. Among 18 studies involving a total of 18.141 students the meta-analysis showed that BMI did not improved during the interventions. Our study results do not agree with the survey of Tamir and his collaborators (1990) that took place in Jerusalem, with duration of 2 years and used a modified version of the American program "Know your Body". It was found to be a reduced of the Body Mass Index at students in the experimental group. The results showed that it is possible to reduce the Body Mass Index after an appropriate training of students in school.

On the results of the study to improve the flexibility of the students who participated, it proved that there really was better because the scores of tests that assess flexibility were better at the end of the program. The results agree with the results of the study of Stephens et al (1998) in which ninety-nine students received a 15-week intervention program for three times a week, obtained field measurements among other the sit and reach test for flexibility. At the end of the intervention program the supplemental activity group showed significant improvements in flexibility, body composition.

Regarding the aerobic capacity of students at the lesson of physical education which was assessed by the test of one mile run walk, it was improved that there was a significant improvement at the end of the intervention program. The present study agree with other surveys such as the investigation of Kriemler and his associates (2010), lasting one school year, in order to assess the effectiveness of a curriculum in 15 schools and 540 students that were selected randomly, and performed physical program activity included suitably modified physical education lessons (3 per week). It was measured risk factors for developing cardiovascular risk factors and among other factors the aerobic capacity and results showed increasing aerobic capacity and physical activity. Also the present study agree with the results of the intervention of Laparidis et al. (2010), with a sample of 343 students aged 12–16 years and duration of intervention for 1 school year. Among others parameters that were measured VO2max found to improve during the intervention lesson of physical education in school.

For the effective exercise of the elements of the physical fitness the time provided by the curriculum of physical education course is not enough. The Pangrazi and colleagues (1996) suggest that the development of fitness can be achieved through practice basic motor skills that are related to health. The physical education teacher can help in this direction guiding and controlling the continuation of the activity of children outside the school environment.

It is necessary for students to practice in order to improve their physical fitness related to health. For this reason, it should be given special attention and care to improve physical fitness through the proper education during school hours in the lesson of physical education. Clearly more research is needed, particularly in Greece to establish effective programs on improving fitness in adolescents. There is need for development and evaluation of such programs beyond school boundaries in the families and in society. But because it is crucial to maintenance of any changes in physical activity additional studies are needed to stabilize and maintain the positive results that may arise.

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Oarignial Article

"The Effect of an Educational Program using Video on Shooting Skill Performance in Basketball for Secondary Stage Students (16-17 Years)"

Hammoudi Ayeda

Lecturer at Institute of Physical & Sport Education in Mesteghanem, Algeria

ABSTRACT

This study aims to determine the effect of using videos in educational sessions to improve the shooting skill performance level for secondary stage students (16-17) years in Mesteghanem – Algeria. Thus, the researcher adopted the empirical method using pre- and post-measurements on a sample of 24 students divided into two groups: an empirical group (12 students) and a control group (12 students) during the study year 2014/2015. As for the tests used, they are skill tests that measure performance in shooting skill in basketball (shooting from stationary, shooting while jumping and peaceful shooting). After statistical treatment of initial findings, the researcher found that the educational program using video contributed to enhance shooting skill in basketball for secondary stage students. The empirical sample depending on the educational program using video excelled over the controlling one depending on traditional method in results of performing the skill of shooting in basketball.

Keywords: Educational program, video, shooting skill, basketball

INTRODUCTION

Educational aids play an effective role in learning in general and in motor learning in particular as their use helps master motor skills. In addition, they work on acquiring accurate movement perception and advance with the motor skill as they help teachers use variety of teaching methods and provide the element of suspense that helps raise the performance level of students and reach them to the best possible level.

In some team sport activities listed or programmed in the session of physical and sport education such as basketball, whose most basic skills including shooting skill depend on quick performance, accuracy, timeliness and good positioning by students. Learning and developing this skill becomes difficult to be achieved by the teacher, especially using traditional method represented in oral explanation and presenting model of correct skill performance. Therefore, it moves to tackle errors of students through visual observation by teachers, which makes students inefficient in learning process and unaware of all of his/her mistakes unlike using audio and video means such as the video to record all stages of performing the move or skill.

Foreign studies, including: William Bertel (1970), John David (1977) and Mary (1988) referred that there is a clear and significant correlation between education aids and various psychological aspects. In addition, the study by Soliman (1984) showed that audio – video educational aids have a positive effect on motor performance level, whether in training or the latest technical exercises.

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Address for correspondence:
Hammoudi Ayeda, Lecturer at Institute of Physical & Sport Education in Mesteghanem, Algeria.
E-mail: harbachbrahim@hotmail.fr

Ibrahim Salama, 1999, Gardner & David, 2003 refer that the best methods used in learning motor skills is various drawings, video devices and other means that show the correct performance (Salama, 1999: p. 98 and Gardner & David, 2003).

Basketball is one of the competitive sport activities that are characterized with changing motor performance that requires the ability of quick response with match conditions. In addition, it is characterized by direct struggle between both teams, which affects skill and planning performance of players and, in turn, on match result. We should not underestimate or ignore giving full concern to its performance, especially in secondary education stage as the stage of maturity that needs development in all mental, psychological, skill and motor aspects. This is specifically provided by the game according to its nature in terms of intelligence concentration, suspense, speed and accuracy in movement. Therefore, the student becomes prepared in this stage to learn basketball skills, especially in presence of audio-video aids (video) that help present the optimal model and mental perception of movement for students. Although some teachers focus on practical side, the time spent by the student in practicing the skill is limited.

In addition, Siedentop (1991) noticed results of some results that tackled time spent by students in traditional physical education lessons and found that students spend time as follows: 27% in waiting, 20% in management, 15% in receiving orders from teachers and 50% in engagement in practicing the skill. Li and Duhem (1993) assert that this period of time does not give the student sufficient opportunity to own the new learned skill (Khalil, 2008, p. 116).

Within such problems facing the subject of physical education due to teaching reasons, the idea of this study emerges in an attempt to cope with the latest trends concerning teaching methods of physical education and providing a bit of basic information for those interested in using audiovisual (video) aids in teaching some of the skills of sport activities practiced in physical education.

Through modest experience of the researcher in the field of education, as well as some meetings that were held with professors of physical and sports education and some field visits, the researcher found that physical and sports education lesson lacks the use of certain audio-visual aids such as video, especially in learning and improving some basic skills in basketball like shooting that requires a lot of repetitions, focus and accurate review of performance and vision carefully by the student leading to consolidation of skill and awareness of errors to be avoided as this skill is output and result of all other skills and the specific outcome of the game and its impact on the psyche of the students. Thus, problem of study emerges over the impact of using video on performance of the shooting skill in basketball for secondary stage students.

Objectives of the Study

- Designing an educational program using video to improve the shooting skill in basketball for secondary stage students.
- Understanding the impact of using video on the performance of shooting skill in basketball among students.
- Determining the differences between the empirical sample that depends on an educational program using video and control sample that depends on the traditional method.

Field Procedures of the Study

Research methodology

The researcher used the experimental method due to its appropriateness of the nature of the problem.

Population and Sample of the Study

This sample has been chosen depending on quality of available equipment and tools in the educational institution, type of tests and nature of the program to be applied. Population of the study represents the second year students at Ben Qallah Touati Secondary School in Mestaghanem (Algeria) for the academic year 2014/2015. The estimated 220 students from whom a sample was chosen as by 24 students representing 10.90% divided into two groups:

The empirical group

Consists of 12 students who are taught the target skill using the video.

The control group

Consists of 12 students who are taught the target skill using the traditional method.

Skill Tests Used

- Shooting from stationary in basketball.
- Shooting while jumping in basketball.
- Peaceful shooting in basketball.

Main Trial

After designing the educational program using video to teach and improve performance of the shooting skill in basketball activity, and in order to ensure credibility of the study, the researcher followed a simplified method using modern scientific method to learn the steps, giving 08 educational sessions. First, pre-tests were applied on the empirical group and the control sample was studying using traditional method. After completing application of the programmed educational lessons related to study, post-tests were conducted for each of the two samples to determine collection rate and find out how effective the proposed tutorial is. In addition, program's objectives were represented in improving the level of the shooting skill performance from stationary, skill of shooting while jumping and peaceful shooting skill in basketball activity for secondary stage students.

RESULTS

1. Comparing results of pre-tests between empirical and control samples:
   Through statistical treatment of results in Table 1 using the T-Student test for significance, it is noticed that all calculated "T" values ranged between 0.34 and 1.62, which are all smaller than tabulated "T" estimated of 1.71 at freedom degree 22 and significance level 0.05. This shows that there are insignificant differences among such means and thus inequality between both samples of the study.
2. Results of Pre- and Post Tests
   2.1. Presenting and analyzing results of shooting from stationary test:
   Through Table 2, it is found that the empirical group in shooting from stationary test came with calculated "T" value of 5.001, which is bigger than tabulated one of 1.796 at significance level 0.05 and freedom degree 11, which shows that there are statistically significant differences between pre- and post-tests in favor of post-test. As for the control group, the calculated "T" value was 3.447, which is bigger than tabulated one of 1.796 at significance level 0.05 and freedom degree 11, which shows that there are statistically significant differences between pre- and post-tests in favor of post-test.
   2.2. Presenting and analyzing results of shooting while jumping test:
   Table 3 shows results of pre- and post-test in shooting while jumping test. In the empirical group, the calculated "T" value of 4.71, which is bigger than tabulated one of 1.796 at significance level 0.05 and freedom degree 11, which shows that there are statistically significant differences between pre- and post-tests in favor of post-test. As for the control group, the calculated "T" value was 4.94, which is bigger than tabulated one of 1.796 at significance level 0.05 and freedom degree 11, which shows that there are statistically significant differences between pre- and post-tests in favor of post-test.
   2.3. Presenting and analyzing results of peaceful shooting test:
   Table 4 shows results of pre- and post-test in peaceful shooting test. In the empirical group, the calculated "T" value of 4.05, which is bigger than tabulated one of 1.796 at significance level 0.05 and freedom degree 11, which shows that there are statistically significant differences between pre- and post-tests in favor of post-test. As for the control group, the calculated "T" value was 2.278, which is bigger than tabulated one of 1.796 at significance level 0.05 and freedom degree 11, which shows that there

Table 1: Equality between empirical and control samples in results of pre-tests using the T-test for significance

Variables	Empirical sample		Control sample		Calculated "T"	Tabulated "T"	Significance
	Mean	S.D	Mean	S.D			
Age (year)	16,41	1,16	16,38	1,31	0,34		Insignificant
Length (cm)	165,83	5,25	172,33	4,49	1,41		Insignificant
Weight (kg)	62,58	5,56	67,91	9,94	1,62	1.71	Insignificant
Shooting from stationary (degree)	3.41	1.5	3.16	1.75	0.43		Insignificant
Shooting while jumping (degree)	11,66	1,89	10,33	1,49	1,239		Insignificant
Peaceful shooting (degree)	1.41	0.99	1.08	0.79	1.07		Insignificant

Significance Level: 0.05, freedom degree (N2 – 2)= 22

Table 2: Results of pre- and post-tests

Statistical means	Pre-test		Post-test		Calculated "T"	Tabulated "T"	Significance
Samples	Mean	S.D	Mean	S.D			
Empirical sample	3.14	1.5	5.25	1.28	5.001	1.79	Significant
Control sample	3.16	1.74	4.66	1.43	3.447	1.79	Significant

Significance Level: 0.05, freedom degree (N – 1) = 11

Table 3: Results of pre- and post-tests

Statistical means	Pre-test		Post-test		Calculated "T"	Tabulated "T"	Significance
Samples	Mean	S.D	Mean	S.D			
Empirical sample	11.66	1.89	14.33	2.6	4.71	1.796	Significant
Control sample	10.33	1.49	12.5	1.56	4.91	1.796	Significant

Significance Level: 0.05, freedom degree (N – 1) = 11

Table 4: Results of pre- and post-tests of the sample in peaceful shooting test

Statistical means	Pre-test		Post-test		Calculated "T"	Tabulated "T"	Significance
Samples	Mean	S.D	Mean	S.D			
Empirical sample	1.41	0.99	2.83	1.26	4.051	1.796	Significant
Control sample	1.08	0.79	1.83	0.71	2.278	1.796	Significant

Significance Level: 0.05, freedom degree (N – 1) = 11

are statistically significant differences between pre- and post-tests in favor of post-test.

3. Presenting results of post-tests between both groups in shooting skill:
   From statistical treatment results of post-tests for both samples, the calculated "T" value between peaceful shooting and side shooting ranged between 2.2 as minimum and 2.34 as maximum, which is bigger than tabulated one of 1.717 at significance level 0.05 and freedom degree 22 and this shows that there are statistically significant differences except in shooting from stationary as the calculated "T" value was 1.34, which is smaller than tabulated one which shows that there are no statistically significant differences.

DISCUSSING RESULTS

Through the results obtained in the practical side where, it was noted that there are statistically significant differences between the two pre and post measurements in shooting skill of the empirical and control groups in favor of pro-measurement. Results of Tables 2-4 also showed statistically significant differences in variables of the study in favor of pro-measurement as ratios of improvement for both empirical groups ranged between (7.92 and 33.55%), while the improvement ratios ranged between (5.24 and 12.5%) for control groups and this shows the effectiveness of conventional and certified tutorial program depending on video device and this confirms that the use of audio-visual aids such as video contributed significantly to the improvement in the skill of shooting under discussion with members of the experimental group when compared to the control group, where the rates of improvement were better for the empirical group. The researcher attributes that progress in the improvement to the effectiveness of the proposed educational program that used the new method as well as the commitment of the study sample to perform what is required, through the use of interactive video that greatly helped in good employment of student efforts, helped to exert more effort and gave them the freedom to control track, relay and time is appropriate to their ability to learn. This was confirmed by Mohamed Zaghloul & Mohammad Yousuf (1995), Gardaner - Daved (2003), Jean (2010) and the study of Hassan Yahya Ismail (2013) on the importance and effectiveness of the use of audio-visual aids in improving basic skills in basketball, including the correction of various types, the role they play educational in its various aspects in multiple sports activities and the ability to improve the skills of all variables.

Concerning the significant differences between the average grades of the experimental group students and average grades of the control group students in

Table 5: Results of pre- and post-tests

Statistical means	Empirical group		Control group		Calculated "T"	Tabulated "T"	Significance
Samples	Mean	S.D	Mean	S.D			
Shooting from stationary	2.25	1.28	4.66	1.43	1.343	1.717	Insignificant
Shooting while jumping	14.33	2.6	12.5	1.56	2.2	1.717	Significant
Peaceful shooting	2.83	1.26	1.83	0.71	2.345	1.717	Significant

Significance Level: 0.05, freedom degree (2N – 2) = 22

favor of post-test, the Table 5 shows differences and improvement in the skill of shooting under study for the empirical group, which as the average rate of overall improvement all variables of the study is (13.54%). The researcher attributes the level of improvement in the empirical group to the use of the program based on video, which took into account levels, abilities and tendencies of students by segmenting the skill into small parts consecutively to facilitate the process of recognizing movement, skill and speed up their understanding and mastery. In addition, the video program contains diversity in sources of learning from diverse videos, sequential images, forms and illustrations, as well as audio commentary and explanation of audio. All these sources led to the involvement of more than one sense of the students, which increases their ability to absorb and understand the skill and speed up the learning process.

Therefore we can say that the new methods used in learning through the use of multi-aids to be more positive and effective than using traditional methods, where video gives the opportunity for students through interaction, suspense, enjoyable interest, attraction and positive engagement with the displaying mechanism for the students to become the best and this is what is interactionalism. Moreover, the study of (2003) Gardaner – Daved, Bursteni, D (2011), Gazelle Mahgoub (2011) and the study of Hassan Yahya Ismail (2013) also emphasize the advantages of using audio-video aids in education as they take into account individual differences among students in learning skills associated with sports activities.

CONCLUSIONS

- The proposed educational program using video contributed to improving the skill of shooting in basketball among students at the secondary stage.
- The use of video in the educational process leads to improvement in the skill of shooting in the activity of basketball.
- The rate of improvement is better in the control group than in empirical group in results of the skill of shooting in basketball.
- The use of video in educational programs increases the ability to understand and learn simple and complex (difficult) motor skills for students.

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Original Article

"The Effect of Self-Learning on Learning Hook Pass Overhead and Shooting while Jumping in Handball"

Huda Naji Zaidan, Abdulkareem Ibrahim Jasim

Department of Individual Sports, Faculty of Physical Education & Sport Sciences/Diala University

ABSTRACT

Learning basic skills for each event is one of the most important conditions for successful progress in performance on condition that it is based on correct scientific basics. This helps in quick learning, economic effort and movement. In addition, learning and good practicing certain skills contributes directly and indirectly in learning other skills, especially in team sports as they include various skills that may be similar in their paths. They include handball, which is considered one of the games in which the principle of transferring learning effect during education stages of basic skills, which in turn contributes to accelerate learning and save time, effort and money if used in a scientifically correct manner depending on learning transfer percentages.

Keywords: Effective self-learning in handball, handball, shooting while jumping, hook pass overhead

INTRODUCTION & SIGNIFICANCE OF THE STUDY

Learning basic skills for each event is one of the most important conditions for successful progress in performance on condition that it is based on correct scientific basics. This helps in quick learning, economic effort and movement. The only thing that distinguishes the educational unit is training in the light of building amount of learning and performance development. In addition, using scientific basics and diversification in training methods adopted by the physical education sciences within the scope of scientific and technical development around the world was the result of research and studies that led to the development of levels and sport achievements. Self-learning was, and still, receiving considerable attention by psychologists and education scholars as the best way to learn for any achievement by each learner that copes with his abilities and self-depending speed depending on motivation (Zaiton, Kamal Abdel-Hamid, 2004:45).

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Learning and good practicing of certain skills contributes directly and indirectly in learning other skills, especially in team sports as they include various skills that may be similar in their paths. They include handball, which is considered one of the games in which the principle of transferring learning effect during education stages of basic skills, which in turn contributes to accelerate learning and save time, effort and money if used in a scientifically correct manner depending on learning transfer percentages. In addition, shooting and passing are among the most important handball skills as both skills are similar in formation and response.

Significance of the study is shown by preparing and educational method through employing self-learning in learning hook pass overhead and shooting while

Address for correspondence:
Huda Naji Zaidan, Department of Individual Sports, Faculty of Physical Education & Sport Sciences/Diala University.
E-mail: alaakh.sport@gmail.com

jumping in hand ball besides increasing awareness of significance of physical activity in daily life.

PROBLEM OF THE STUDY

Choosing optimal method achieves our desired results and ensures the transfer of positive impact of learning among skills to be learned in accordance with age that this stage is the best stage for the learner and mastery of basic skills in this phase helps the player to the perform requirements of the game properly and correctly. Therefore, both researchers used the influence of self-learning effectiveness in learning hook pass overhead skill and shooting while jumping high in handball. In addition, traditional method of physical education lesson practiced and available teaching aids used in learning handball skills have little effect which results in loss of a lot of time and effort at a time when we need special curricula and teaching methods that provide a special opportunity for all students regardless of their abilities and interests to participate in sports activities so that physical education classes can benefit in an appropriate manner from the educational program.

OBJECTIVE OF THE STUDY

The study aims to determine the effect of self-learning on learning hook pass overhead and shooting while jumping in handball.

HYPOTHESES OF THE STUDY

1. There are statistically significant differences between pre- and post- tests for both the control and empirical groups in acquiring the skills under study.
2. There are statistically significant differences between post- tests for both the control and empirical groups.

METHODOLOGY OF THE STUDY

The researchers used the empirical method with the design of two empirical and control groups with pre- and post- tests.

SAMPLE OF THE STUDY

The sample was selected randomly among students of Faculty of Physical Education & Sport Sciences/Diala University (Second Stage). The sample consists of 16 students selected randomly for the academic year 2016/2017 to from (34%) of original population of the study (130 students).

SELECTION OF SKILLS AND THEIR TESTS

Legalized tests are these prepared by experts and they give the opportunity to use means and tools to get results using regular and consistent procedures with the same content of test. It shall be applied according to the same instructions and timing for performance in addition to main indications of good testing such as validity, reliability and objectivity. In addition, these tests are often applied on one or more groups of players in order to explain individual's performance in light of such standards.

First Test

Passing overhead on an oval drawn on a wall for (30) seconds and a distance of (3) meters (Mohamed Hassan Allawi, Mohamed Nasreldin Radwan 1979: 357).

Second Test

Shooting while jumping and overhead on shooting accuracy boxes (Mohamed Hassan Allawi, Mohamed Nasreldin Radwan 1979: 357)

Exploratory Trial

This trail was made on 01/10/2016 in the outdoors court of handball in Faculty of Physical Education & Sport Sciences/Diala University on a sample consisting of 10 students selected randomly from outside main sample of the study. The exploratory trial showed some matters that benefited the researcher including:

1. Validity of tools and equipment.
2. Consistency of tests with sample of the study.
3. Recognize the difficulties and obstacles faced by the research.
4. Setting the assistant team sufficient for the trial.
5. Identifying suitability of the educational unit time and number of repetitions allowed by the respondents.

Pre-tests

Before they started pre-test, the researchers organized the sample and divided it into two groups of the same number with the registration of names of the

players and then giving two educational units on how to perform the tests and the method of performance with explanation and clarification of the tests on 3-4/10/2016 After that, the researcher conducted tests on 06/10/2016 on the members of the sample.

Curriculum

The researcher prepared a curriculum for the first experimental group including the following:

A. The empirical group
   This group used the effect of self-learning on learning hook pass overhead and shooting while jumping in handball.

B The control group
   This group used traditional method for learning hook pass overhead and shooting while jumping in handball.

The period of this curriculum is 8 weeks (16 units distributed as two units per week for each group). Duration of the educational unit is (90) minutes (refer to annex 1 for details of units).

Post-tests

Post-tests were made on Sunday 27/11/2016 in the outdoors court of handball in Faculty of Physical Education & Sport Sciences/Diala University for both groups of the study in the same conditions in which pre-tests were conducted.

PRESENTING, ANALYZING & DISCUSSING RESULTS

Presenting and analyzing results of pre- and post-tests for the control group in skill tests and their discussion.

DISCUSSING RESULTS

Table 1 shows insignificant effect of the educational exercises used in the study for the control group. The researchers attribute it to two reasons as the used educational units have a positive effect on learning the skills of hook passing overhead and shooting while jumping in handball with requirements of learning the skill. The method of effective self-learning is training on a certain skill from a fixed position such as training on passing from a fixed point with the purpose of adapting and mastering spatial aspect of passing. Learning from a fixed position with the same conditions and requirements of the skill facilitate storing in memory and retrieve it in each time of using it (Kassem Lazam, 2005: 232). This method is related to open skills and makes them closed by fixing the variables which facilitate the education task (Wagih Mahgoub, 2001: 20).

Table 2 shows the empirical group in the skills of hook passing overhead, shooting from position, shooting overhead and shooting while jumping. This matches the opinions of many experts and specialists in the field of motor learning who asserted the effectiveness of self-learning or learner's ability to respond performance of a certain skill as a result of learning and training on similar previous skills in terms of performance of other skills. Wageh Mahgoub (2000) asserted on the fixed changes that happen on learner's behavior while acquiring skills as they will transfer and become experiences acquire other skills. This makes us say that we learn in order to transfer the effects of what we learned into new experience. The educational program prepared by both researchers played a great role in transferring learning, mastery and establishing the skill of hook passing overhead as a result of various exercises in the unit and performance variables (i.e., distance, speed, angles, etc). Moreover, both researchers in the curriculum focused on similarities between this skill and other skills for learning to be transferred to. In addition to common elements between both skills, learning one of them led to learn two skills that have not been learned by sample members in both groups. Moustafa Fahmy 1984 says that if there are common factors between a subject and another, training and learning will affect quick learning of the other (Moustafa Fahmy 1984: 110).

Results of Table 3 concerning pre- and post-tests for the control and empirical groups showed that there are statistically significant differences in favor of the empirical group. The researchers attribute this development to the use of visual educational aids as "audio and video aids are explanatory means that help recognize facts in clear and interesting manner for students and then become attached in their minds for a long time (Saher Al Khafagi, 1993: 38). Both researchers agree with (Afaf Abdelkerim 1990) concerning "the effect and impact of previous practices on learning or later performance" (Afaf Abdelkerim 1990: 45 - 47). Trough transfer of learning, we can notice different effects according to type of transferring used by the

Table 1: Arithmetic means, standard deviations, calculated & tabulated "T" values and their statistical significance for pre- and post- skill tests for the control group

S	Statistical treatments Tests	Control group				Calculated (T) value	Tabulated (T) value	Significance
		Pre-test		Post-test				
		Mean	S.D	Mean	S.D			
1	Passing from overhead (30) sec	18	0.845	19	0.895	1.523	2.36	Insignificant
2	Shooting while jumping	7	0.675	8	0.724	2.489		Insignificant

(*) under significance level (0.05) and freedom degree (7)

Table 2: Arithmetic means, standard deviations, calculated & tabulated "T" values and their statistical significance for pre- and post- skill tests for the empirical group

S	Statistical treatments Tests	Empirical group				Calculated (T) value	Tabulated (T) value	Significance
		Pre-test		Post-test				
		Mean	S.D	Mean	S.D			
1	Passing from overhead (30) sec	19	0.895	22	1.540	2.552	2.36	Significant
2	Shooting while jumping	9	1.256	13	0.930	2.95		Significant

Table 3: Arithmetic means, standard deviations, calculated & tabulated "T" values and their statistical significance for post- skill tests for the empirical and control groups

S	Statistical treatments Tests	Both groups						Calculated (T) value	Tabulated (T) value	Significance
		Empirical G			Control G					
		No.	Mean	S.D	No.	Mean	S.D			
1	Passing from overhead (30) sec	8	19	0.895	8	22	1.540	8.935	2.14	Significant
2	Shooting while jumping	8	8	0.724	8	13	0.930	7.835		Significant

(*) under significance level (0.05) and freedom degree (14)

teacher, skill nature, type and duration between a skill and another. Accordingly, the researcher found that the transfer of learning effect is the use of previous learning or information in performing new skill or motor task with a negative or positive effect.

CONCLUSIONS

1 Self-learning on learning hook pass overhead and shooting while jumping in handball is effective.
2 The prepared curriculum has a positive effect in acquiring skills under study.
3 There are statistically significant differences between results of post- tests in favor of the empirical group affecting students' acceptance of self-learning with poor response of control group students to the traditional method.

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Original Article

Predictive Significance of Some Functional and Morphological Variables of Level of Performance in 100 m Medley Swimming for Young Swimmers

Maha Rasim Jarrad

Assistant Profossor, Department of Physical Education, College of Arts and Science, Palestine Technical University-Kadoorie (PTUK), Tulkarem

ABSTRACT

This study aims to determine the relation between values of some functional and morphological variables with performance level in the 100 m medley swimming for young swimmers. In addition, the study aims to determine the contribution percentage of the most significant functional and morphological variables with performance level in the 100 m medley swimming for young swimmers. This study has been applied on a sample of (50) young swimmers. The researcher used the descriptive survey method by taking the necessary measurements using devices appropriate to the nature of measurements and the study. Through measures of this study and results obtained, the researcher found that there are significant relations between each of the time the 100-meter medley and variables of vital capacity, physical pattern and body mass index. Besides, the findings showed that body mass index is the variable with the most influential contribution at the duration of the 100m Medley where the percentage of contribution value was (93.2%). In light of that, the equation to predict the period of 100-meter medley was reached for sample of the study with significance of its variables.

Keywords: Swimming, prediction, morphology, physiology, palestine

INTRODUCTION TO THE STUDY

Determination variables that predict the swimmer's performance level is one of the most important objectives of sports sciences at the present time. It is also one of the most important objectives of record progress and development of achievement, as identifying the most influential variables in achievement allows instructors and sport specialists to focus on these variables in training significantly helping to shortcut time and effort for both the coach and swimmer and help achieve records in the shortest possible time. This is the essence of sports training process where competition for breaking records for various sports became the main concern for those working in the field of athletic and sport training. This interest has led to the orientation of researchers and specialists in the sports field to discuss the most influential factors in sport achievement and having the best records numbers within less possible time and effort. Gonçalves, C. (2012).

The study of morphological characteristics of the junior class is absolutely necessary where it was previously known to be of great importance to achievement of sports results in all branches of the sports. The morphological condition of the swimmer is considered an essential component that affects swimming performance and causes some sort of readiness for some parts of the body to perform swimming skills. Swimmers

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Address for correspondence:
Dr. Maha Rasim Jarrad, Department of Physical Education, College of Arts and Science, Palestine Technical University- Kadoorie (PTUK), Tulkarem. E-mail: dr.maharjarrad@hotmail.com

are affected by their morphological structure and its adaptability to work in aqueous medium perhaps more than other athletes. Anthropometric measurements, such as height and weight, have an effect to a large extent on the movement of swimmers. Moreover, the morphological dimensions of swimmers are considered influential components that have a significant impact on swimming performance and also considered an important element affecting the functional capabilities that cause readiness of swimmers for a certain way without another further after providing proper training (Popo, A., et al., (2010) and Đedović, D. et al., 2010).

In a study on the basic anthropometric characteristics necessary to succeed in swimming for young swimmers from contemporary, theoretical and applied sides to deal with the diverse tasks successfully, athletic training management process uses a broad range of different ways to measure all skills and characteristics related to athletes and swimmers in order to find those anthropological characteristics which have the greatest impact on achieving the highest results. However, anthropometric measurements in swimming are one of the most complex issues, since there are many overlaps some of which are linked to some of the different physical parameters and properties of athletes that cannot usually be measured directly without causing disability and tension for swimmers (Pop 2010).

Among the most important physical factors in achieving a record level in 50 meters swimming there are long arms, legs and then along the total length. Record levels can be predicted in terms of these variables using prediction equations. In addition, there is a correlation between record level and thee three variables of anthropometric measurements (Mehdi 2004).

Anthropometric determinants come in second place after physical ones in interpretation of swimming performance by the junior class with (45.8%), and then followed by physiological determinants to explain the swimming performance of this age group that increased by (45.2%). This was confirmed by Latt Evelin, et al., (2010). In addition, achievement progress and achieving better records are greatly dependent on morphological factors as the morphological structure of the body has a direct impact on the result of swimming. It has also been reached that the swimmer should be characterized by balanced, comprehensive and morphological qualities with homogeneous composition without exaggeration without maximum measurements. Popo Almir, et al., (2010).

On the other hand, physiological characteristics are important and useful of swimmers and rely heavily on type of swimming practiced by the swimmer whether a speed or endurance swimming. In addition, physiological factors are considered of the most factors subject to change as a result of type and amount of training. In recent years, there was a trend towards measuring capabilities of recovery for athletes in general and swimmers in particular as a means to measure the physiological characteristics of identifying and selecting talent. Whether a speed or a long-distance swimmer, each of them has specific abilities to recover from physical activity expended to the extent that will enable them to re-train and be active again with high efficiency.

Prediction of future performance levels is an important process in selection of teams and swimmers representing clubs and national teams, as the standard of time and distance is the foundation that supports the achievement.

PROBLEM OF THE STUDY

Prediction of the record level of young swimmers is one of the most important contemporary issues in scientific research, as it is the basis of selection and training for the stage of national teams. Junior stage is the main stage and the corner stone in formation of national teams. As the record achievement became the essence of the training process, predicting the level of performance of the swimmers is an urgent necessity because of its role in guiding the process of training towards appropriate materials for training and some determinants of record achievement and developing performance level.

SIGNIFICANCE OF THE STUDY

Significance of the study is shown in being an attempt to detect the most important morphological and functional determinants that may help predict the level of performance of a young swimmer, which will help to provide the trainers with the degree of relative importance shown by results of this study for these variables and thus help to take advantage of them in training direction process.

OBJECTIVES OF THE STUDY

1. Identifying the relationship between values of some of the morphological and functional variables and time period in the 100 meters medley swimming at the junior category.
2. Identifying the percentage of contribution of the most important morphological and functional variables with the time period in the 100 meters medley swimming at the junior category.

HYPOTHESES OF THE STUDY

1. There is a statistically significant relationship between some values of morphological and physiological variables and time period in the 100 meters medley swimming at the junior category.
2. Morphological and physiological variables under study contribute at different rates to time period of the 100 meters medley swimming for young swimmers.

METHODOLOGY OF THE STUDY

Based on theoretical studies and achieving the objective and variables of the study, the researcher used the descriptive survey method as it is appropriate to nature of the study.

SAMPLE OF THE STUDY

The study sample was selected randomly from clubs swimmers in Alexandria governorate consisting of (50) young swimmers who have coaching experience ranging from 5-6 years and registered at the Egyptian Swimming Federation for age group (14-16 years).

Means and Tools of Data Collection

Through the reference framework of the study and after reviewing the scientific research and studies related to prediction of record levels, level of performance by young swimmers as well as special studies of morphological and functional determinants and their relationship to the performance level for this target group, the researcher collected data by:

- Taking several specific morphological measurements. These measurements are: Weight, total length, Body Mass Index (BMI) and body patterns.
- Taking two functional measurements: Vital capacity and lactic acid.
- The time period of the 100-meter medley swimming was also measured.

Equations used to Study this Topic?

- BMI = weight/total body length^2
- Vital capacity = (21.78 - 0.101age) * Height.
- For body patterns, Heath and Carter equation was used.
- BMI = (170.18/length) * fat percentage.
- Muscle index = (sum of deviations/8) +4
- Thinness index = cube root length/weight
- Patterns from 10 to 3 were coded for statistical analysis purposes (Ross, W. D., & Marfell-Jones, M. J. (1991), Carter and Carter, J. E. L. 2015).

Statistical Treatments

The researcher used some statistical treatments to achieve objectives of the study using the (SPSS) statistical program as follows:

- The arithmetic mean, standard deviation, median, lines, long, convolution coefficient, splaying Kurtosis coefficient, correlation coefficient, partial regression coefficient (stepwise).

PRESENTATION AND DISCUSSION OF RESULTS

Results

Table 1 shows statistical description of the study sample as all values of Skewness and Kurtosis are close to zero and lie between (±3) which shows moderate values of these variables which are considered one of the conditions of correlation and skewness procedures.

Table 2 is about correlation coefficients between study variables and the 100 m medley swimming period and shows correlations between the duration of 100 m and the following variables (Vital Capacity, Body Pattern and BMI) with coefficient values of (-0.594, -0.681 and -0.626) consecutively.

Table 3 shows variables of: (multiple correlation, multiple correlation2 (total contribution percentage), adjusted (corrected) correlation coefficient, percentage, partial skewness coefficient, (t) value, (f) value of skewness equation of variables under study) in the 100 m Medley Period. It showed that BMI is the most effective and contributing variable in the 100 m medley swimming period as

Table 1: Statistical description of the study sample (N=50)

Statistical treatment measurements	Arithmetic mean	Standard deviation	Median	Mode	Range	Skewness coefficient	Kurtosis
Initial measurements							
Age	14.65	0.76	14.00	14.00	2.00	0.70	–0.90
Length	163.48	9.31	163.00	150.00	36.00	0.00	–0.71
Weight	52.87	9.60	53.00	52.00	47.00	0.00	0.08
Main variables of the study							
VC	3300.32	180.86	3303.20	3039.75	707.62	–0.03	–0.65
Body pattern	8.22	1.37	9.00	9.00	7.00	–1.11	2.29
L.A	5.32	1.50	5.15	4.60	7.50	1.05	1.54
BMI	19.60	2.27	19.74	18.00	10.97	–0.20	0.37
100m medley period	12.53	81.15	11.33	81.00	69.00	43.00	1.13

Table 2: Correlation coefficients between study variables and the 100 m medley period (N=50)

Correlation	VC	Body pattern	L.A	BMI=weight/total length^2	100 m medley period
Vital capacity					
R	1	0.903**	–0.246	0.981**	–0.594**
Sig		0.000	0.073	0.000	0.000
Body pattern					
R		1	–0.255	0.922**	–0.681**
Sig			0.063	0.000	0.000
L.A					
R			1	–0.234	0.234
Sig				0.088	0.088
BMI					
R				1	–0.626
Sig					0.000

Significant at level (0.05) = 0.355, **significant at level (0.01) = 0.456

Table 3: Multiple correlation, multiple correlation^2 (total contribution percentage), adjusted (corrected) correlation coefficient, percentage, partial skewness coefficient, (T) value, (F) value of skewness equation of variables under study in the 100 m medley period (N=50)

Prediction variables	Correlation (R)	Total contribution (R^2)	Adjusted R square	Contribution %	Partial coefficient	(T) value	(F) value
BMI	0.965	0.932	0.931	93.2	5.171	5.77**	**713.334
Body pattern	0.969	0.940	0.938	0.008	1.725	2.60*	**398.980
VC	0.972	0.945	0.941	0.005	0.021	2.087*	**284.939
Breaker value	121.999						

**Significant (T) Value at level (0.01) = 2.68, *significant (T) Value at level (0.05) = 2.01, **significant (F) Value at level (0.01) = 7.12, *significant (F) value at level (0.05) = 4.02

it singularly contributes to (93.2%) of performance time, which is a great percentage, followed by body pattern and VC with 0.008 % and 0.005 % consecutively.

From the findings in Table 3 above, the predictive equation can be formulated with a time period of 100 meter medley swimming in the study sample in terms of previous variables as follows:

Predictive Equation

Time: 100m Medley = [121.999 + (- 5.171 × BMI) + (- 1.725 × body pattern) + (0.021 × vital capacity)]

Discussing Results

It is evident from the Table 2 of the matrix correlation coefficients between the variables in question and the time period of 100-meter medley that there are correlations between each of the periods of the 100-meter medley and variables (vital capacity VC, body pattern and Body Mass Index), and values of the correlation coefficient (0.594, 681, 6260) respectively. 100m Medley is one of the speed swimming types that rely on muscle strength and by reference to the Table 1 we see that the arithmetic mean of body pattern was 8.22, which is classified as a muscular. In addition, according to the body mass index equation as described in the following: BMI = weight/total length of the body square. This confirms that the muscular pattern and intensity of muscle mass have a great relationship with achievement in the 100m medley swimming. With regard to vital capacity, as is the case in the dash races, the training speed depends primarily on the respiratory and circulatory endurance training. A swimmer in speed swimming needs a stock of oxygen to be able to produce the energy necessary to assist in clocking without feeling tired or exposure to cases of muscle contraction resulting from the accumulation of lactic acid in the muscles.

Moreover, at muscle training (strength and endurance training) to the body as a whole, the respiratory system muscles and the rib cage increase their strengths and efficiency, thereby increasing the ability to supply the body with adequate amount of oxygen required for body work during training and competition. This has been confirmed by a study by Vaithiyanadane.V, et.al, (2012).

With regard to the value of actual contribution of each variant of the influencing variables in the time period of 100-meter medley swimming, it is shown from Table 3 concerning (multiple correlation, multiple correlation2 (total contribution percentage), adjusted (corrected) correlation coefficient, percentage, partial skewness coefficient, (t) value, (f) value of skewness equation of variables under study), they have special contribution of the variables under consideration at the time of the 100 medley, the most influential contribution in a time of 100 was by the BMI variable for the study sample the terms of this variable contributed individually by (93.2%) of the performance time, a proportion followed by variables of body pattern and vital capacity with percentages (0.008%, 0.005%) respectively.

Depending on the type of sample (males from 14-16 years) and with an experience in training up to 6 years, the researcher found that those swimmers underwent intensive training modules using speed and strength, in particular. Thus, it was necessary to affect their muscular structure especially that they are at the beginning stage the effect of the hormone testosterone which assists in production of the necessary strength.

We must also acknowledge that that most of the training modules depended on strength in order to produce the required speed. Indeed, these exercises have had the greatest impact in muscular body building, which thus led to the player being characterized by muscular body pattern. The researcher also believes that the fact that this event is a speed sport and not of endurance as this may be the reason that vital capacity comes in third place in terms of participation and influence in swimming time. This was confirmed by Latt Evelin, et al., (2010) and Vaithiyanadane.V, et.al. (2012).

CONCLUSIONS

- There are correlations between each of the time the 100-meter medley and variables (VC vital capacity, body pattern, body mass index), and values of the correlation coefficient (0.594 -.,681 -, 626 -) respectively.
- BMI variable has the most influential contribution to the time 100-meter freestyle in the study sample as it contributes to this variable alone by body mass index variable (93.2%) of the performance time, which is a very large percentage, followed by the variables of body pattern and vital capacity ratios (0.008%, 0.005%) respectively.
- There is no significant correlation between the lactic acid and achievement in the 100 meters medley swimming as this variable did not contribute to the achievement.

RECOMMENDATIONS

- Relying on the physical structure of young swimmers in the selection for preparation of national teams,

particularly body mass, which reflects the extent of muscle mass index.
- Selection of swimmers with muscular style for national teams.
- Training swimmers on respiratory and circulatory endurance because of their impact on achievement.
- Do not pay attention to the variable of lactic acid as one of the selection factors or those affecting achievement in this age group under study.

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Original Article

The Relation between Fust Strength and Accuracy of Forehand and Backhand Serving in Tennis

Abdulkareem Ibrahimb Jasim[1], Adhwaawarwar Nemaa[1], Maher Mohammed Ismael[2]

[1]Department of Individual Games, Faculty of Physical Education & Sport Sciences, Diyala University, Baqubah, Iraq,
[2]Department of Theoretical Science, Faculty of Physical Education & Sport Sciences, University of Mustansiriya Baqubah, Iraq

ABSTRACT

Sport training settings study the relation between fist strength and muscular strength (which is the basis of elements of physical conditioning). It is the training that depends on muscular contraction, which in turn worked on developing strength of working muscles in motor performance during motor performance from work or performance similar to movement or effectiveness in the same direction of muscular work. Significance of the study lies in determining the correlation between strength of forehand and backhand serving fist in tennis.

Keywords: First strength, forehand serve, backhand serve, tennis

INTRODUCTION

Tennis in its current form is considered one of the highest rank games practiced in international and Olympic events. It is one of the individual sports that attracted the hearts of audience as it is characterized with attractive skill and physical basics being one of the games characterized with special features that distinguished it from the rest of other individual games for not being connected to certain periods of time. It is also distinguished in how to handle the ball as it is sometimes touched, caught and slammed in addition to the great combination between technical and aesthetic performances that is shown through movement of players in the field (Mohamad Hassan, 1998: 9).

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Sport managements and trainers around the world always search for the latest technologies and physiology to be transformed by various ways into something beneficial serving the sport field. Thus, sport training studies the relation between fist strength and muscular strength (which is the basis of elements of physical conditioning). It is the training that depends on muscular contraction, which in turn worked on developing strength of working muscles in motor performance during motor performance from work or performance similar to movement or effectiveness in the same direction of muscular work. Significance of the study lies in determining the correlation between strength of forehand and backhand serving fist in tennis as "serve is one of the most significant direct offensive strikes in the match as it is the first hit to score direct points and different types of serving with the flying ball require appropriate fist strength" (Jasmi et al, 1977: 65).

Problem of Study

Muscular strength in tennis depends on general and particular physical characteristics. Therefore, a serve is one of the main skills and the first opportunity to score a direct point and requires a point in order to each

Address for correspondence:
Abdulkareem Ibrahimb Jasim, Department of Individual Games, Faculty of Physical Education & Sport Sciences, Diyala University, Baqubah, Iraq. E-mail: Abdalkareem_timimi@yahoo.com

correct and mastered model of performance in serving to achieve winning.

Through observations of the researchers in the faculties' championship in Diala University, they found that there is a number of players who do not consider the role of their fists during serve performance. This may be due to lack of direction by their coaches in this case. Hence, problem of the study is shown in discussing the relation between fist strength and accuracy of forehand and backhand serving in tennis.

Objective of the Study

Defining the relation between fist strength and accuracy of forehand and backhand serving in tennis

Methodology of the Study

The researchers used the descriptive method as it is appropriate to nature of the study.

Sample of the Study

The sample was selected among players of team of Faculty of Physical Education & Sport Science/Diala University (6 players).

Means of Data Collection

Fist Strength Test (Allawi&Radwan 1982: 34).

Exploratory Trial

The exploratory trial was performed on 12/10/2016 in the outdoor tennis court in Faculty of Physical Education & Sport Science/Diala University on a sample consisting of (10) students tested in a random sample from outside the sample. The exploratory trial showed some aspects that benefited the researcher including:

1. Validity of tools and devices.
2. Appropriateness of tests with sample of the study.
3. Defining some difficulties and obstacles that may face the study.
4. Determining the assistant team sufficient for the trial.
5. Defining appropriateness of educational unit's time and number of repetitions allowed for sample members.

Main Trial

This trial was performed on the study sample on 15/12/2016 in the outdoor tennis court in Faculty of Physical Education & Sport Science/ Diala University.

Presenting and Discussing Results

Table 1: Arithmetic means and standard deviations of the study sample

Statistical features tests	Arithmetic mean	Standard deviation
First strength/kg	45.75	6.37
Forehand accuracy/degree	23.85	4.45
Backhand accuracy/degree	20.73	3.65

Correlation of the Study Sample

Table 2: Correlation between fist strength and accuracy of forehand swinging serve and magic swing in volleyball

Statistical features tests	Calculated (R) value	Tabulated (R) value	Significance
First strength/kg			
Forehand accuracy/degree	0.870	0.613	Significant
Backhand accuracy/degree	0.658	0.524	

DISCUSSING RESULTS

Results of Table 2 show that there is a significant correlation between fist strength and accuracy of forehand and backhand serving in tennis. The researchers attribute this to the significance and effect of fist strength on directing the ball with control in striking direction and ball serve towards its path above the net towards the front direction. Hassanin states that: "It is an important factor in various activities such as football, basketball and volleyball as upon which the target is determined and, in turn, achieving winning" (Hassanin 1995: 459).

Both researchers agree with (Ali SalloumJawad) that forehand is one of the most important and most used strikes in tennis as it is characterized with easy learning or being an offensive strike leading the player to gain points (Ali SalloumJawad Al Hakim 2002: 80). In addition, backhand ball striking by the player's hands that hold the racket and it was called so as it strikes the ball with back of the racket. Unlike the forehand from front left side of the racket, the backhand is done by the right front of the racket and it is one of the most frequently used strikes in matches in this game and its significance is not less than forehand hit as hitting the

ball in matches is always done from front, right or left of the player (Ali SalloumJawad Al Hakim 2002, 81).

CONCLUSIONS

1. Serving strength is affected by physical variables including fist strength.
2. There is a significant correlation between fist strength and accuracy of forehand and backhand serving in tennis.

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