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Effect of Selected Physical Fitness Exercises in Maximizing Muscular Strength and Endurance Performance of Selected Male Basketball Players in Shone Preparatory School of Grade Eleveln Students

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Abstract: *Strength and endurance are important components of physical fitness in maximizing basketball abilities. The study was conducted to maximize muscular strength and endurance performance on selected 30 male basketball players of Shone preparatory school Grade 11 students. These selected thirty male students were assigned as one group and their age ranges 18 and 19 years. All subjects participated in physical fitness exercises for 12 weeks i.e., three days per week and 90 minutes duration per day. Pre-test, during training test and post training tests were conducted on the physical fitness variables such as step test, Squat test, sit-ups, Pushups and 12 minutes run/walk. The data collected from subjects were analyzed by paired sample t-test to determine the differences between pre-test and post-test mean value results of the participants of the study. According to the findings of current study, step test* ***26.6*** *(beats per minute) mean differences, and squat test* ***7.86*** *(squats per minute) mean differences were recorded. The mean differences value of sit-ups and pushups performances of mean differences* ***8.07*** *and* ***8.24*** *(number per minute) were respectively recorded. In twelve minutes run* ***271.16*** *meters increments were observed. The results obtained in the study indicate that, there were significant improvements in squat, sit-ups, pushups, 12 minutes run and in the case of steps test, heart beat was reduced because of improvement in the performance. It is noted that the final findings of this study were significantly improved on all physical fitness variables due to the twelve weeks of physical fitness training program.*

Keywords: Physical fitness, School, 12 week, Training,

INTRODUCTION

One of the most popular sports around the world, Basketball is a fast-paced game played by men and women of all ages and ability. The game involves both offence and defense of play. The basic offensive skills are passing, ball handling, shooting, and rebounding. Defensive skills include guarding opponents, blocking and positioning to defend the basket, using quickness to intercept or steal the ball, and rebounding missed shoots. Basketball has been popular in some part of Africa for many years. The rate of development of basketball popularity and playing techniques within the Africa countries varies with geography. According to the national federation in 1939 E.C. the game was introduced in Ethiopia by the Canadian physical education teachers at Teferi Mekonen School. Then, the Basketball was spread in all schools of Addis Ababa and throughout the country. The International Basketball Federation (FIBA) was established to spread the game in the world under well-organized rules, techniques and tactics of play.

The effectiveness of many physical performances is related to various basic traits found in boys and girls including their maturation, body size, physique type. Many of these traits are related to heredity; others, such as body weight have hereditary implications, also be affected by environmental influences, including the nature and amounts of exercises, nutritional practices and health habits (Mazumdar, 2012).

Hence, the present study was employed with a view to improve with regard to the relationship of selected physical fitness variables to maximize the ability of basketball players of Shone Preparatory School. Shone town is the investigator's working area where he served and has more than seven years work experiences in teaching physical education and sport in Shone Preparatory School. Within this long period of time he was observed a lot of problem in muscular strength and endurance performance of basketball players at East Badewacho Woreda of Hadiya Zone, SNNPR.For this reason the investigator selected Shone Preparatory School to conduct a research in maximizing strength and endurance abilities of this school of grade 11 male students.

STATEMENT OF THE PROBLEM

There have been many studies analyzing training program, muscle strength, muscle endurance and cardiovascular endurance performance. Endurance allowed players to play harder than everyone else, which allowed them to be better defensive players and have enough strength to hit shots up to the end of the game (Scholich, 1990).

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Beside this a few researches have been done on the improvement of physical fitness variable of basketball players.

To develop basketball fitness it is clear that participating in training and conducting research is mandatory. Investigator's has more than seven years work experiences in teaching physical education. Within this time he observed a lot of problems in muscular strength and endurance performance of Shone students. Research was not conducted at this area in muscular strength and Endurance performance of basketball players. Hence, the investigator of this study planned to conduct a research on this area. The study was expected to investigate the effect of physical fitness exercises in maximizing muscular Strength and Endurance performance of Shone Preparatory School selected male basketball players.

Therefore, the following basic research questions were answered in this study

a) What are the selected physical fitness exercises to maximizing muscular strength and endurance performance of Shone preparatory school selected male basketball players?
b) What are the effects of physical fitness exercises in muscular strength and endurance performance of basketball players' after 12 weeks of exercises?
c) What is the change observed in muscular strength and endurance parameters of the selected male basketball players?

Significance of the Study

The main purpose of this study was to examine the effects of physical fitness exercises of muscular strength and endurance in maximizing performance of selected male basketball players of Shone preparatory school at East Badewacho Woreda of Hadiya Zone. This study was reduced muscular strength and endurance performance problems that occur at Shone preparatory School of selected basketball players. After finding of the problems, the investigator would suggest solutions and recommendations in regard with maximizing strength and endurance abilities of grade 11 male students.

OBJECTIVES OF THE STUDY

General Objective

The general objective of this study was to examine the effects of physical fitness exercises in maximizing muscular strength and Endurance abilities of selected male basketball players.

Specific Objectives

- To examine the effect of selected physical fitness exercises in maximizing muscular strength performance of Shone preparatory school students.
- To assess the effects of selected physical fitness exercises in maximizing muscular endurance abilities on selected Shone preparatory school of male basketball players.
- To investigate the significance changes in muscular strength and endurance performance of Shone Preparatory School of selected male students.

MATERIALS AND METHODS

In this Section the experimental site, experimental materials, experimental design, source of data, target of study population, sampling size and sampling techniques, inclusion and exclusion criteria, method and procedures of data collection, performance test analysis, methods of data analysis, data quality control and protocol and ethical consideration were briefly discussed.

Study Area

East Badewacho Woreda is found in Hadiya Zone, SNNPR. It is located between 7^0 9` to the south, and $8^0$15` to North latitude and $37^0$5` to $40^0$00`to east longitude. The Woreda is bounded by Alaba special Woreda of SNNPR to the North- East and Siraro - Woreda of Oromia Region to the East, Kadida Gamela Woreda of KembataTembaro Zone and Mirab Badewacho Woreda which was the former part of Badewacho Woreda to the West and Wolaita Zone to the South. Woreda's capital, Shone town is situated at about 345kms away from Addis Ababa on the asphalt road running from Shashemene to Arbaminch. The special feature in terms of location of East Badewacho is none boundedness with other Woreda's of Hadiya Zone except West Badewacho Woreda from that of 10 Woreda's of Hadiya Zone and Hosanna town reform administration, since it is separated by the presence of KembataTembaro Zone between East Badewacho Woreda and other Woreda's of Hadiya zone.

Study Materials

The investigator used Shone Preparatory School basketball ground for field tests as well as to conduct the training program of the experimental group/subjects. The following materials were used through the process of the study. These materials are stopwatch, football, measuring tape, whistle, mats, Stadiometer, marking cones, Rope, pen and score recording sheet.

Study Design

For this study 30 male students with age of 18-19 years were selected from Shone Preparatory School of grade 11. In this study purposive sampling design was applied. The PT, DTT and PoT on selected physical fitness, such as step test, Squat test, sit ups, Pushups and Twelve minutes run/walk (Cooper test) were administered for the selected experimental group. The studies subjects were engaged in designed training program for twelve weeks. The training schedule

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includes three days per week i.e., Monday, Wednesday, and Friday. Totally 36 days in three months (February, March and April, 2015) was planned for training sessions in which 90 minutes were allotted for each session. In this study a single group for experimental purpose was participated and standard norms were applied. Thus, there was no a control group in this study.

Source of Data

The primary data were collected from experimental study group through pre, during and post tests on selected physical fitness parameters. The secondary data were collected from different written materials like journals, prior researches works, published books and other documented materials.

Target of Population

The study populations were Shone Preparatory School of grade 11 male, students between ages of 18 and 19 years in East Badewacho Woreda of Hadiya Zone, SNNPR. The investigator of this study selected only 30 students from the total of 220 grade 11 male students based on selection criteria.

Sampling Techniques and Sample Size

To this specific study the investigator followed purposive sampling technique. In this research instances, the researcher wished to use small number of participants on the basis of participant knowledge, skills and abilities. Its elements and purpose of the study may be members of subjects are easily identified from its larger population (Babbie, 2007). The selection of subjects based on their grade level, age, health status and on their interest to participate in physical fitness exercises program of muscular strength and endurance. The sample size of this study contained 30 selected male students between the ages of 18 and 19 years from 220 grade 11 male students of Shone Preparatory School at EBW, Hadiya zone, SNNPR.

Inclusion and Exclusion Criteria

Subjects who Grade eleven students and who fulfill a questionnaire for history of health status and whose ages are between 18 and 19 years were included in this study. In addition to this, the subjects who have any recent physical injury and poor medical conditions have not participated in this study.

Methods and Procedures of Data Collection

After giving training for selected male students of basketball players' quantitative data were collected using the appropriate physical fitness Variables as mentioned below:

- **Steps test**: to measure muscular strength-endurance of legs in connection with Cardio-respiratory ability
- **Squat test**: to measure lower body or leg muscular strength-endurance
- **Sit ups:** to measure muscular endurance of abdominal muscle.
- **Pushup tests**: for measuring muscular strength-endurance of arms and chest.
- **12 minutes run/walk:** for measuring cardiovascular endurance.

The data was recorded by the investigator with the help of one assistant data recorder

Physical Fitness Test procedure

The following fitness tests as the parameter of physical fitness variables were recorded for pre-test, during training test and post-tests of the study.

Steps Test

Before starting this test the investigator collected essential instruments for this test, such as 12 inches or 30.61cm bench, stopwatch, and heart rate monitor (optional). By the help of assistant data recorder the investigator took subjects' resting heart rate before performing warm-up exercise. Purpose of this steps test was to measure cardio respiratory fitness.

The Subjects stood in front of a step bench. Assistant data recorder ordered commands to "Go", and then the stop watch started counting. Subjects started steps up and down on the flat form at a rate of steps in one minute. The complete of up and down steps were counted as one step of up and down. The subjects stopped up and down immediately on completion of the test, and the heart beats were counted for 15 seconds. Finally we multiplied these 15 seconds by 4 in order to get the beats per minute (McArdle *et al*., 1972).

Squat Test

Before starting this test the investigator collected essential equipment for this test, such as Stop watch, mats and Score record sheets. This test was used to measure lower body or leg strength also raising heart rate during training sessions. Before test, the subjects performed warming – up exercise properly. Subjects stood upright in front of a mat with their feet shoulder wide apart. Assistant score recorder ordered to 'Go" then stop watch started counting. Subject's squats down lightly pushes down and Jump up, repeats this sequence of movements until they are unable to continue with no rest in one minute. The assistant data recorder counted and recorded the number of successfully completed squats (Fry *et al*., 2014).

Sit-up Test

Before starting this test the investigator collected the equipment for this test such as mat, stop watch, pen and score record sheets. The participants performed enough warming up and stretching exercises. The Subjects lie on back, hands on back of

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neck with fingers clasped, knees bent less than 90 degrees, feet on floor and heels no more than 12 inches from buttocks. Up torso until elbow is in contact with knees and return to starting position. Subjects were encouraged to perform one or two trial repetitions before test. The complete of one sit ups (up and down) of repetitions were counted as one half sit up. The assistant score recorder recorded number of repetitions of sit-ups performed in 60 seconds (YMCA, 2000).

Push-Ups Test

The muscles of the upper body and shoulders are another frequently measured muscle group. Push-up is used to measure the strength and endurance of upper body muscle groups. Less muscular strength and endurance of the upper body and shoulder group may increase the chances that a person may have shoulder pain.

In this test, only the upper body is load. Before starting this push up tests the participants performed warming up and stretching exercises.

- The subjects started push-up (military position)
- Participant hands were shoulder wide apart
- Arms extended straight out under the shoulders
- Back and legs in a straight line, and toes curled under.
- Starting in the up position,.
- The completion of one complete push up (down and up) was counted as one pushup.
- The total numbers of pushups the subjects did in one minutes were recorded as their scores.

Twelve (12) Minutes Run/ Walk Test (Cooper test)

The subjects of quasi experimental group started running on athletics track. The subjects did their best to run many laps around running track for 12minutes. When 12 minutes over the subjects stopped running and they stood on their spot. Then, the amount of distance covered by subjects within twelve minutes and the exercise heart rate (EHR) of each subject were measured in meter and beat per minute. In addition, after getting plenty of resting time, resting heart rate (RHR) of the subjects was measured in best minute.

Methods of Data Analysis

The data was collected through physical fitness assessment tests and analyzed by using computerized statistical package software of version twenty (SPSS V20). The paired sample t-test was used to compare the data among pretest, during training test and posttests. Level of significance was < 0.05%.

Data Quality Control

To ensure quality of the data of muscular strength and endurance the standardized physical fitness test was used with appropriate tools. To reduce the mistakes which could be occurred during data collection and to collect the appropriate data the assistant fitness test recorder was trained among physical education teachers of Shone preparatory school. Additionally, all tests were recorded with photograph and video recorder for further checkup on test procedures.

Protocol and Ethical Consideration

The study was designed in such way that ethical issues were properly addressed. Privacy of the participants and confidentiality were strictly observed and maintained throughout the study. The study was conducted under Addis Ababa University rules and code of conduct in governing research activities and ethical issues. The written consent/ agreement form was given and informed to the concerned bodies.

RESULTS AND DISCUSSION

This chapter deals with the analysis of data collected from the samples under this study. The purpose of the study was to evaluate the effects of physical fitness exercises in maximizing muscular strength and endurance performance of selected basketball players in Shone preparatory school of grade 11 male students. To achieve the purpose of the study 30 male students from Shone preparatory school were selected as subjects and their age was 18-19 years. They were assigned in one group and the selected exercises were given for 12 weeks. The variables which were selected for this study were **Step test, squat test, sit ups, pushups** and **12 minutes run**. Pre-test, during training test and post training tests were conducted for all 30 study subjects and the test results were recorded. The collected data were analyzed by paired sample t-test using Statistical Package for Social Sciences (SPSS) version twenty (V-20) software. The results for each variable are presented in tables and graphs as depicted below.

Mean and SD Values of Step Test Performance (min)

Table 1: Mean and Standard deviation of step test (Pre-test, during-test and Post-Tests)

		Experimental group		
Variable	N	PT	DTT	PoT
ST	30	**148.46±4.38**	**136.1±8.01**	**121.86±8.05**

Values are in the form of mean + SD = standard deviation, PT, = pre training test, DTT= during training test, PoT= post training test, ST = step test.

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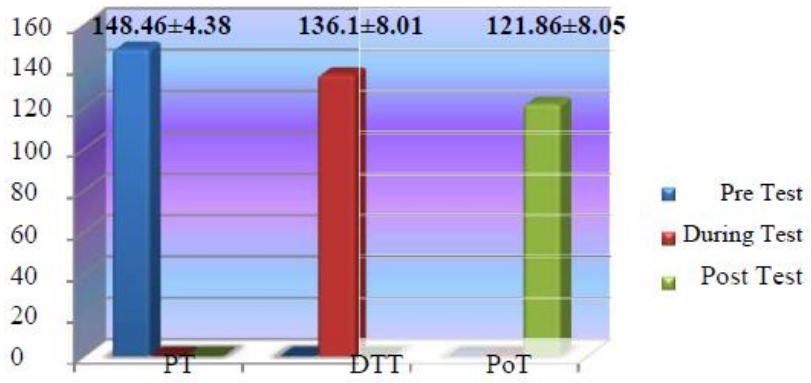

Figure 1. Mean comparison among pre, during and post step test results of the study subjects

The above table 1 and figure 1 showed that there was significant change in pre-post test results. The improvement was seen on step test mean differences values due to the twelve weeks physical fitness training, in which the subjects were engaged in. The mean value for step test before training was 148.46 + 4.38 beats per minute, during training test results was 136.1 + 8.01 beats per minutes and post training results mean value of step test was 121.86 + 8.05 beats per minutes after twelve weeks training program. The mean differences value was decreased by **26.6 beats** per minutes. This finding showed that there was a significant improvement on cardiovascular fitness performance of the study subjects after 12 weeks training.

The step test result was compared with an international step test norms among similar age groups that range from 18 and 19 years (www.topendsport.com). The international step test norms is 148- 121 for this age groups while the step test mean value result of this s**t**udy was 121.86. Hence, the study result has fallen in above **average standard** (norms found on Appendix, page 39).

Mean and Standard deviation Values of Squat Test (number/min) Performance

Table 2: Mean and Standard deviation of Squat Test (Pre, during and Post test)

		Experimental group		
Variable	N	PT	DTT	PoT
Sq	30	**34.4±5.57**	**39.83±5.91**	**42.26±5.67**

Values are in the form of mean + SD = standard deviation, PT, = pre training test, DTT= during training test, PoT= post training test, SqT = squat test.

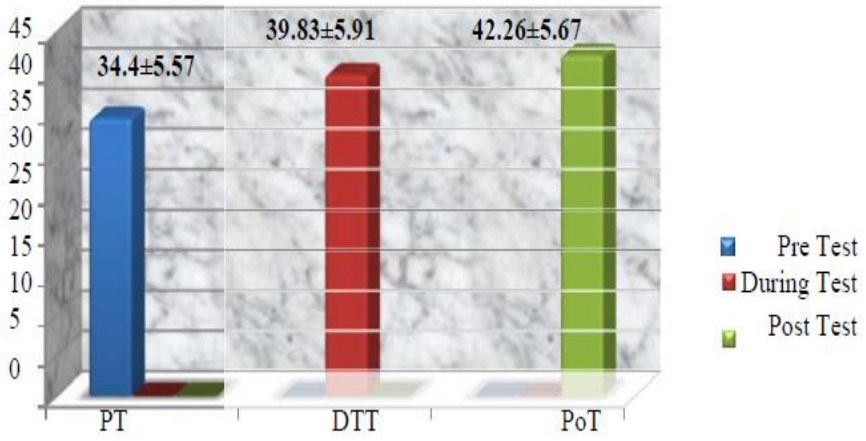

Figure 2. Mean comparison among Pre, during and post squat test results of the study subjects

As depicted above in table 2 and figure 2 the squat test mean value and standard deviation of pre training test results was 34.4±5.57, during training test results was 39.83±5.91 and post training test result was

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42.26±5.67. When we compare performance of pre - training test result with post training test result of the squat mean difference was **7.86** squat per minutes. The finding of this result showed an improvement in the squat performance of the participants after three months exercise of this study. It also showed the 3 months physical fitness training program had positive effects on the performance of participants' muscular strength and muscular endurance performance.

In this study, comparison was made between the international squat norms and squat test result of this finding. Based on international squat test norms the age group range from 18 to 25 years is from 39- 43 squats per minute(Boot Camp,2013) while this study result depicted 42.26 squats, per minutes for the same age group. Thus, the result found in this study is **above the average** standard. (Norms found on appendix, page 39).

Mean Values of Sit Ups (number/minute) Performance

Table 3: Mean value and standard deviation of sit ups data of the participants (pre, during, post test)

	Experimental group			
Variable	N	PT	DTT	PoT
SU	30	**32.03±5.97**	**36.9±5.48**	**40.10±4.64**

Values are in the form of mean + SD, SD = Standard deviation, PT, = pre training test, DTT= during training test, PoT= post training test, SU =Sit ups.

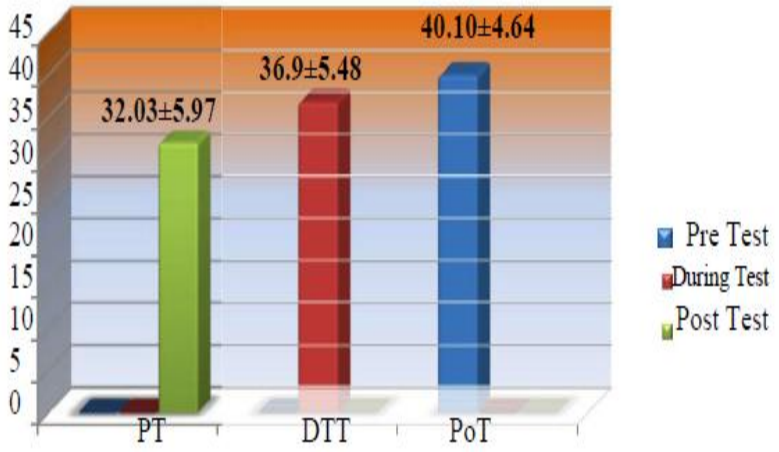

Figure 3. Mean value Comparison among Pre, during and post Sit-ups test results of the study subjects

The above table 3 and figure 3 showed that there was a significant difference in before the exercises and post training after 12 weeks of individuals' sit- ups performance. The mean values of pretest results of sit up was 32.03±5.97 mean values and SD, during training test result of sit up was 36.9+5.48 and post training test result of sit up was 40.10+4.64. To **f**inding this study results the researcher was compared the mean value of pre training test results with the post training test results. There was the significant increment was observed in the sit ups within **8.07** mean differences after twelve weeks fitness exercises.

The study has comparative examined the sit-ups for age group ranged from 18 to 25 years. The sit-ups (number per minute) at international standard norms range from 42 to 40 sit-ups (Golding, *et al.,* 1986) whereas the finding for this study was 40.10 sit-ups per minute. Therefore, this study result is above the average standard (Norms found on appendix, page 39).

Mean Values of Pushup s Performance number/minutes

Table 4. Mean value and standard deviation of Pushups data of the participants (pre, during, posttest)

	Experimental group			
Variable	N	PT	DTT	PoT
PU	30	**25.26±2.92**	**28.72±3.94**	**33.5±5.10**

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Values are in the form of mean + SD, SD = Standard deviation, PT, = pre training test, DTT= during training test, PoT= post training test, PU = pushups.

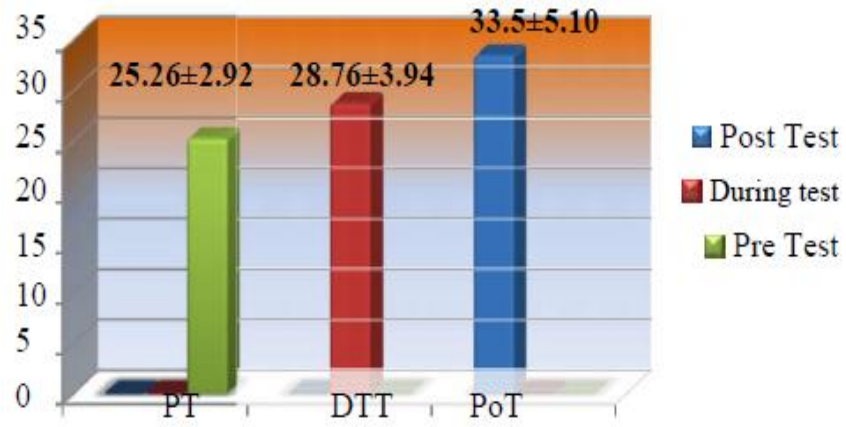

Figure 4. Mean comparison among Pre, during and post Pushups test results of the study subjects

The above table 4 and figure 4 revealed the mean values of pushups test results. The mean values of pushups of pre

training test results was 25.26 + 2.92, during training result of pushups mean value was 28.76 + 3.94(Standard deviation) and post training test results after twelve weeks exercises was 33.5. When we compare the mean value of pushups performances of pre training test results with post test results of the participants after twelve weeks of exercises were improved by **8.24** + 5.10 mean differences and standard deviation.

The result of pushups for the study subjects was compared with that of an inter**n**ational standard test norm for age group ranges from 15 to 19 years. The international standard **t**est norms ranged from 29 to 38 pushups, numb er per minutes (Golding, *et al*., 1986) while this study has demonstrated the finding to 33.5 pushups (number per minutes) for the same age groups. Therefore, the result of this study in **good standard** (Norms found on appendix, Page 40).

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

- Basketball performance means the ability of the players of muscular strength and endurance. There had been basketball players' performance problems which could be from muscular strength and Endurance performance of basketball players at East Badewacho Woreda of Hadiya Zone, SNNPR, and Ethiopia.
- The aim of this study was to examine the effects of physical fitness exercises in maximizing muscular strength and Endurance abilities of selected male basketball players. The change observed in muscular strength and endurance parameters of the selected male football players after 12 weeks of training program.
- To achieve the purpose of this study, 30 male students with age of 18 and 19 year were selected from Shone preparatory school of grade 11 students. In this study purposive sampling design was applied, Pre test, During training test and Post test on selected physical fitness parameters from their muscular strength and endurance exercises. The parameters used to measure muscular strength and endurances were step test, Squat test, Sit ups, Pushups and Twelve minutes run/walk were administered for the selected experimental group.
- The exercise schedule was designed for twelve weeks. At which three days exercise session per week with 90 minutes durations and low to moderate intensity was applied. Each 90 minute sessions were divided in to three phases: warming up, main parts and cooling down. The data were collected and analyses were done using SPSS version twenty (V-20) software.

The paired sample t-test was used to compare the mean value of pre test and post tests of this study. Based on the result analysis made, at the end of the study significant improvements were observed in cardiovascular endurance, muscular strength and muscular endurance performance of the study subjects. In step test result a heart beats was reduced, because it shows improvement on the performance of the study subjects.

Conclusions

Based on the major finding of this study the following points were stated as the Conclusions.

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- The finding of this study showed that, there were improvements on cardio-respiratory endurance of the subjects in 12 minutes run with 271.16 meters mean differences and step test results with 26.6 beats per minute mean differences.
- The result of the study showed improvement in squat test performance with 7.86 squats per minute of the subjects who took part in three months exercise program of this study. It showed that, the 3 month physical fitness training program had effects on the muscular strength and endurance performance of the participants.
- The results of the study showed increments in sit-ups and pushups test results with 8.07 sit ups (number per minute) mean differences and 8.24 pushups (number per minute) mean differences.
- These results showed, that the 3 months physical fitness training program had effects on the performance of subjects' muscular strength and endurance performance and in step test results a heart beats was reduced, because it shows improvement on the performance of the study subjects.

Recommendations

By considering the major findings and discussion of the study, the following recommendations were made.

- To improve the strength and endurance proficiencies of basketball players, the responsible bodies should provide financial, material and motivational supports.
- Future researches may follow the methodology more sophisticated while using more subjects of current study in order to maximize basketball performance by using longer training period.

Further researchers may conduct studies on more different types of Physical fitness Components that could improve basketball players' performance.

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