

## **EFFECT OF MEDICINE BALL EXERCISES ON SELECTED PHYSICAL FITNESS COMPONENTS OF BASKETBALL PLAYERS.**

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### **ABSTRACT**

The purpose of the study was to evaluate the effect of medicine ball exercise on selected motor components of basketball players. For the purpose of this study, thirty male basketball player from JCT and GCTA clubs of Coimbatore (T.N) were selected as the subject for this investigation. . The subjects were selected randomly and divided into two equal groups i.e. Experimental Group-A (N=15) and Control Group-B (N=15). Initially, all participants from Group-A and Group-B were tested on selected motor components i.e. speed, explosive power, muscular endurance before start the protocol. After than, Group-A went for nine week medicine ball training program and no training program was set for Group-B during this training period. After nine weeks medicine ball training program, all the subjects of Group-A and Group-B were tested again on selected. motor components in the same way as the initial done. The data was collected from both the groups before and after experimentation of motor fitness performance. To examine the effect of medicine ball exercise on selected motor components for Basketball players, t-ratio was computed at 0.05 level of significance. The result of the study indicated that basketball players of Group-A had improved more of speed, explosive power, muscular endurance performance after nine weeks medicine ball exercise program than the basketball players of Group-B. It was also concluded that the medicine ball exercise program had positive effect on physical performance of Basketball players.

**Key Words:** Medicine ball, Exercise, . Motor components, Training, Basketball player

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## INTRODUCTION

Modern civilization has made life soft and luxurious. The diminished physical efforts and artificial life is responsible for physically weak population people today, lack both strength and endurance. The average man spends more time in attending his automobiles than in attending his body.

Modern age is an age of technology which inhibits physical activity. Machines are used to perform much of our work and we are forced to lead a sedentary life. Our life span is increasing but physical fitness is deteriorating. Most of our leisure time is also passed in a very inactive way sitting before television.

As in primitive society the fitness is very much essential in modern age also. However, the reasons for the two are entirely different. Today fitness is needed for top level performance in sporting activities and maintaining good health. Now a days the level of competitions have reached the nerve breaking stage only superbly fit athletes, players or team can think of achieving success at high levels.

Fitness is the deciding factor in our daily tasks and it decides the effectiveness of the activities we prefer. So the athletes seeking a place in competitive sports must admit the physical fitness first and motor fitness next. The principle in strength training is to overcome a given resistance, be it in the form of an apparatus, sports implement or one's own body weight. But for success, one must train with the use of a specific type of progressive resistance exercise to suit the individual needs and kind of sports concerned. Strength training can be very effective through a carefully planned program; which is a fundamental requirement to improve the performance, strength training progresses through basic strength, combined strength and specific strength. The above three qualities of strength can be improved systematically by using Medicine ball as a device for training.

The dominance of different components of physical fitness is not uniform in various activities of game and sports. There are certain activities in which speed is dominating factors, in some sports strength dominates whereas in a large number of activities endurance is limiting factors..

All areas of fitness are affected by regular physical activity but three that seem to be especially impacted by regular physical activity are muscular fitness, cardiovascular fitness (aerobic fitness) and anaerobic power. For most girls, muscular fitness increases until about age 14, but for sedentary girls it may slow more rapidly or even decrease (Blinkie, 1989).

The physical fitness is the sum of five motor abilities namely speed, strength, flexibility, endurance and coordinative abilities and their complex form like strength endurance, maximum strength, explosive strength, maximum speed and agility are the basic prerequisites of human motor action. Therefore the sports performance is depend to a greater extent on these abilities. The improvement and maintenance of specific physical fitness or condition is the main aim of sports training. Each sport requires different type and level of specific fitness as a result different types of fitness training is requiring for different sports. Some sports like running requires a very high level of endurance and low level of other motor abilities, sports like shooting and archery do not require high level of physical fitness (Singh, 1978).

Physical fitness is the capacity to carry out our various reasonable well forms of physical activities without being unduly tired and include qualities improvement to the individual's health and well being, regular participation in vigorous exercise increase physical fitness is

desirable for full productive life, sedentary living habits and poor physical fitness have a negative impact on both health and daily living (Albara, 1947).

. Sharma (2011) revealed that male School children engaged in aerobic dance activity demonstrated higher strength endurance, cardiovascular-endurance; and flexibility and confirmed the positive effects on them over six weeks. Chatzinikolaou A, et al., (2010) revealed in his study that performing an acute bout of intense plyometric exercise may induce short-term muscle damage and marked but transient inflammatory responses. Jumping performance seems to deteriorate for as long as 72 hours post exercise, whereas strength appears to remain unchanged. The acute-phase inflammatory response after a plyometric exercise protocol appears to follow the same pattern as in other exercise models. Khlifia, R, Aouadi, et al, (2010) revealed that loads added to standard plyometric training program may result in greater vertical and horizontal-jump performances in basketball players. Drinkwater EJ, et al, (2009) concluded that high-volume plyometric training results primarily in peripheral fatigue that substantially impairs force and rate of force development. We recommend that coaches carefully monitor the volume of plyometric training sessions to avoid neuromuscular impairments that can result in sub optimal training. Sedano Campo S., et al, (2009) concluded that a 12-week plyometric program can improve explosive strength in female soccer players and that these improvements can be transferred to soccer kick performance in terms of ball speed. Avery faigenbaum (2007) suggested that the addition plyometric training to a resistance training program may be more beneficial than resistance training and static stretching for enhancing selected measures of upper and lower body power in boys.

Therefore, the study of Learner is highly specific to the learning situation for the most effective assessment of the learner. Each teacher must individually measure and evaluate the characteristics and ability of the group for which he is responsible. The medicine Ball is a good tool for complete bodywork out. It can be used to strengthen shoulders, back, arms and legs as well as improving core trunk strength and joint integrity.

The purpose of the study was to evaluate the effect of medicine ball exercise on selected motor components of basketball players. It was also hypothesized that there would be significant effect of medicine ball exercise on motor components in college level basketball players.

## **METHODOLOGY**

### **Subjects:**

Thirty male Basketball players were selected randomly from JCT and GCTA clubs of Coimbatore (T.N) and divided into two equal groups, which were treated as Experimental group-A (N= 15 ) and control group –B (N=15 ), ranging in age between 18 to 21 years. Group-A will under go a program selected medicine ball exercises and Group-B will be control group. Group-A followed the program of instruction for a period of nine weeks and training was carried for 9 weeks.

### **Physical Fitness Tests and their Variables:**

The fifty meter dash for speed, vertical jump for explosive power of leg and one minute maximum sit-ups for strength endurance of abdomen were conducted upon all the subjects of experimental and control groups.

**Criterion Measures:**

Measurement for various variables were taken at the beginning (pre- test) and at the end of experimental period, after nine weeks (post-test). The data was collected before and after six weeks of experimental period by using standard tests. Maximum vertical distance jumped from ground level to upward direction and reach at maximum height was recorded in to nearest Meter-centimeter, Number of correctly executed sit-ups performed in one minute, 50 meter dash test was measured in seconds.

**Training Program:**

The training schedule for the period of 60 minutes in a day for the duration of nine weeks in alternate days (Monday, Wednesday & Friday) for the experimental group was set. Twenty minutes warming up time was given for a experimental group of players before implementation of the training program. The training schedule is presented in TABLE 1.

**TABLE 1**  
**NINE WEEK MEDICINE BALL TRAINING PROGRAM FOR MALE**  
**BASKETBALL PLAYERS**

| <b>Week -1 to 3 for Monday, Wednesday &amp; Friday</b> |                                       |            |
|--------------------------------------------------------|---------------------------------------|------------|
| 1                                                      | Duration of each exercise             | 2 Minutes  |
| 2                                                      | Recovery period between each exercise | 30 Seconds |
| 3                                                      | Weight of medicine ball               | 1 Kg.      |
| 4                                                      | Number of exercises                   | 08         |
| 5                                                      | Frequency of exercises                | 02 sets    |
| <b>Week -4 to 6 for Monday, Wednesday &amp; Friday</b> |                                       |            |
| 1                                                      | Duration of each exercise             | 2 Minutes  |
| 2                                                      | Recovery period between each exercise | 30 Seconds |
| 3                                                      | Weight of medicine ball               | 2 Kg.      |
| 4                                                      | Number of exercises                   | 08         |
| 5                                                      | Frequency of exercises                | 02 sets    |
| <b>Week- 7 to 9 for Monday, Wednesday &amp; Friday</b> |                                       |            |
| 1                                                      | Duration of each exercise             | 2 Minutes  |
| 2                                                      | Recovery period between each exercise | 30 Seconds |
| 3                                                      | Weight of medicine ball               | 3 Kg.      |
| 4                                                      | Number of exercises                   | 08         |
| 5                                                      | Frequency of exercises                | 02 sets    |

**Selection of Medicine Ball Exercises:**

In the present study, various exercises with the medicine ball were performed on Monday, Wednesday and Friday is unchanged throughout the training period. Here, only the weight of the medicine ball was changed, as mentioned in the training schedule. The weight of the medicine ball used for giving exercise was 1 kg, 2 kg and 3 kg. A total of eight exercises in a day were performed during the training period as mentioned below in Table 2.

**TABLE 2**  
**LIST OF EXERCISES IN ALTERNATE DAYS WITH VARIATION IN WEIGHT OF THE MEDICINE BALL**

| S.NO. | Days      | Medicine ball exercise                                                                                                                                                                                                              |
|-------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.    | Monday    | Overhead Throw, Under hand Throw, Half Twist Pass, Standing Chest Pass, Medicine Ball Lunge, Over and under Pass, Running with medicine ball, and Sit-ups Leg-Arms extended (08 exercises)                                          |
| 2.    | Wednesday | Backward throw, Standing Overhead Side, Standing squat throws out, Standing squat throws out, Kneeling overhead (one leg kneeling), Zig-Zag pass in between legs, Medicine Ball Crunches, Shovel Toss and Scoop Toss (08 exercises) |
| 3.    | Friday    | Underhand Throw, Medicine ball Lunge, Full Twist Pass, Kneeling Over Head, Standing Overhead slide, Kneeling Over-Head Side, Standing Chest pass and Scoop Throw (08 exercises)                                                     |

**RESULTS AND DISCUSSION**

In order to find out the significance of difference in the mean scores gained by each group for selected variable, means, standard deviations, and t-ratios were computed for obtained data by using SPSS 16.0 program. The difference of initial and final scores was taken into the account. The level of significance was set at .05 level of confidence and data pertaining to this have been presented in Table 2 to 5.

**TABELE 3**  
**DESCRIPTIVE STATISTICS OF PHYSICAL FITNESS COMPONENTS OF BASKETBALL PLAYERS OF EXPERIMENTAL AND CONTROL GROUPS ON PRE-TEST AND POST-TEST**

| Test Variables | Treatment | Experimental Group (N=15) |       | Control Group (N=15) |       |
|----------------|-----------|---------------------------|-------|----------------------|-------|
|                |           | Mean                      | SD    | Mean                 | SD    |
| 50 meter Dash  | Pre-test  | 6.827                     | 0.070 | 6.833                | 0.072 |
|                | Post-test | 6.513                     | 0.092 | 6.900                | 0.085 |
| Vertical jump  | Pre-test  | 1.089                     | 0.018 | 1.049                | 0.018 |
|                | Post-test | 1.155                     | 0.016 | 1.049                | 0.018 |
| Sit-ups        | Pre-test  | 20.733                    | 1.624 | 19.333               | 1.589 |
|                | Post-test | 29.933                    | 1.438 | 19.467               | 1.727 |

The mean scores of various components of physical fitness on pre-test and post-test of experimental and control group of male Basketball players have been depicted in figures 1 to 3.

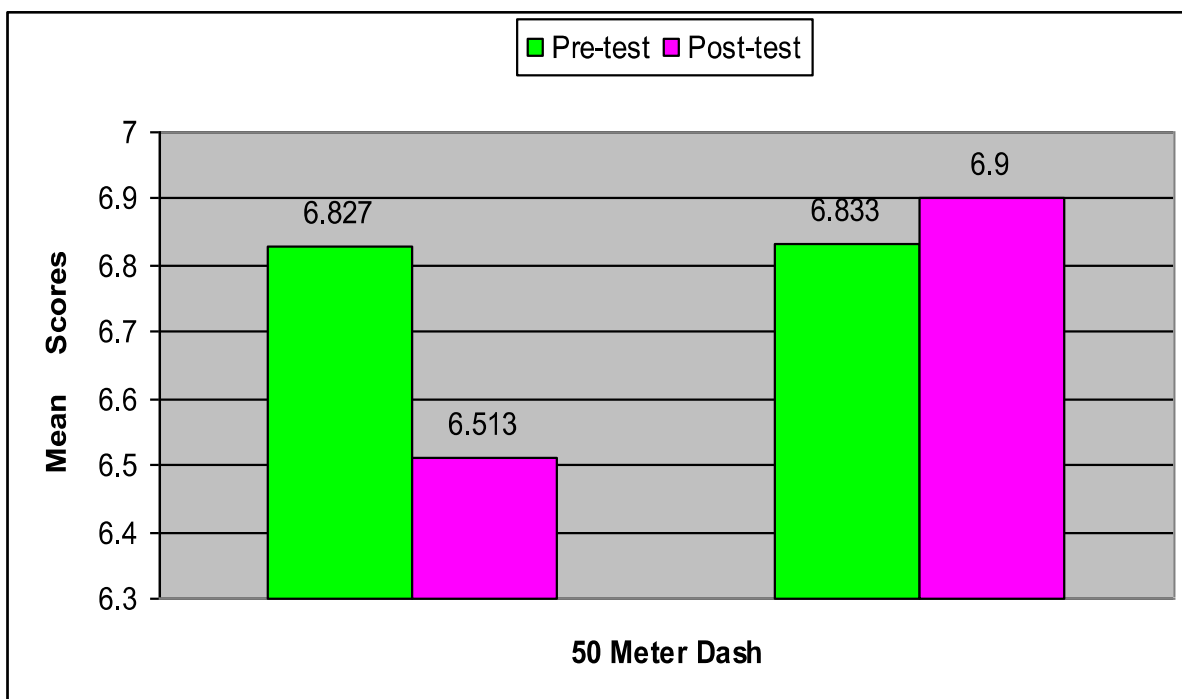


Figure-1: Mean Scores of 50 Meter Dash on Pretest and Post-test of Experimental and Control Group of Basketball Players

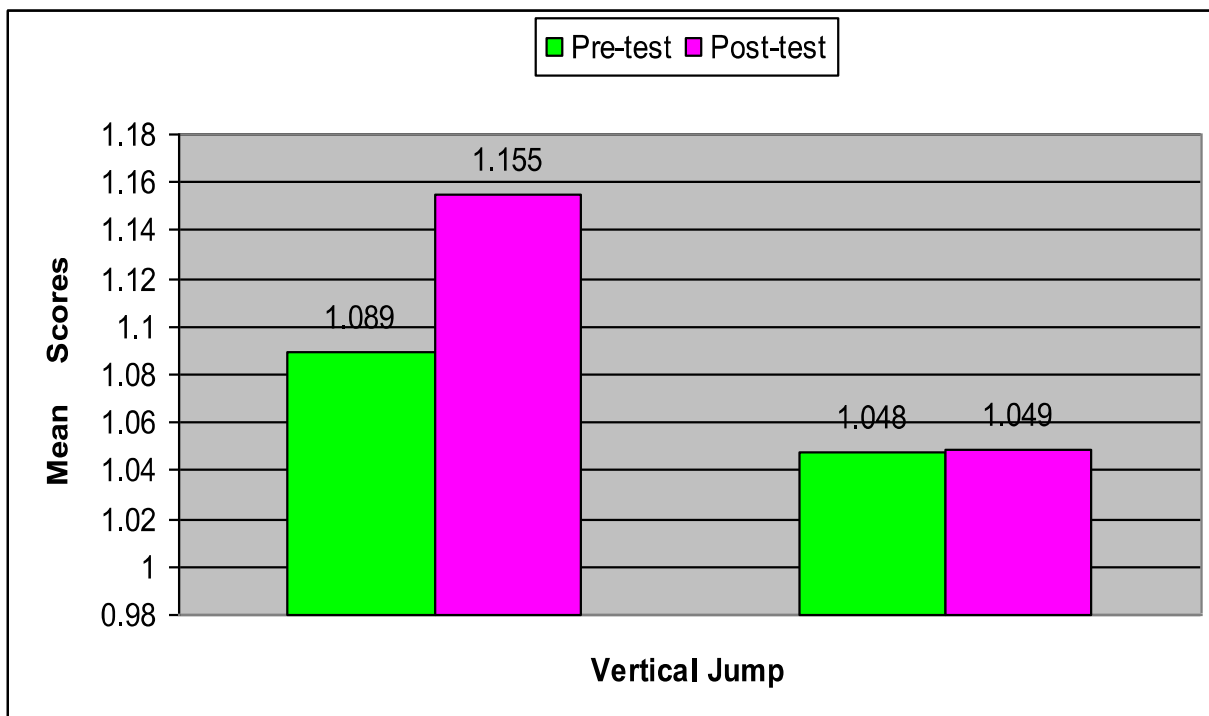


Figure-2: Mean Scores of Vertical Jump on Pretest and Post-test of Experimental and Control Group of Basketball Players.

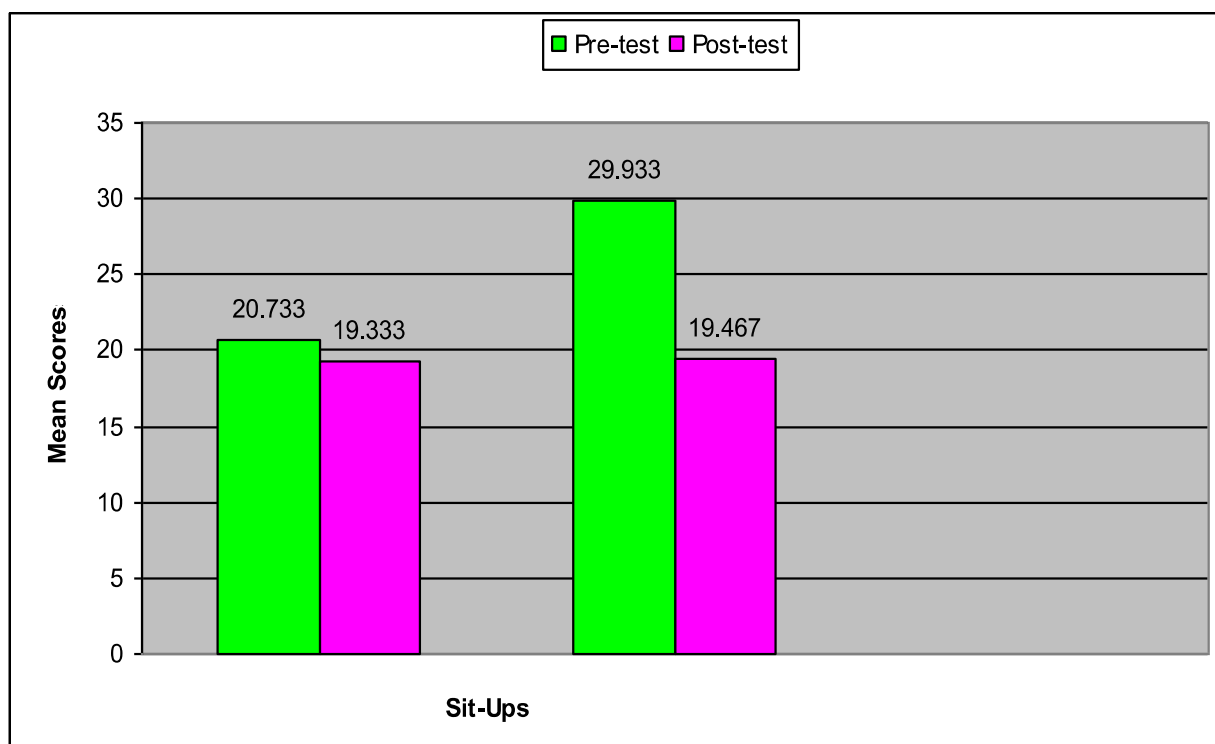


Figure-3: Mean Scores of Sit-Ups on Pretest and Post-test of Experimental and Control Group of Basketball Players

**TABLE 4**  
**SIGNIFICANCE OF DIFFERENCE BETWEEN PRE-TEST AND POST-TEST**  
**MEAN SCORES OF 50 METER DASH OF EXPERIMENTAL AND**  
**CONTROL GROUP OF BASKETBALL PLAYERS**

| Test      | Groups             | Mean  | M.D.  | $\sigma$ DM. | t-value |
|-----------|--------------------|-------|-------|--------------|---------|
| Pre-test  | Experimental group | 6.827 | 0.006 | 0.026        | 0.26    |
|           | Control Group      | 6.833 |       |              |         |
| Post-test | Experimental group | 6.513 | 0.687 | 0.032        | 12.01*  |
|           | Control Group      | 6.900 |       |              |         |

Significant level at 0.05

$t_{0.05}(28) = 2.00$

It is evident from Table 4, that statistically significant difference was not found between the pre-test means of 50 meter dash of experimental group and control group, as the obtained t-value of 0.26 was less than the required value of  $t_{0.05}(28)=2.00$ . This implies that both the groups are homogeneous with respect to speed performance at pre-test point. But the significant difference was found between the post-test means of 50 meter dash of experimental group and control group, as the obtained t-value of 12.01 was much higher than the required value to be significant. This suggests that there is a effect of treatment on the speed test performance.

**TABLE 5**  
**SIGNIFICANCE OF DIFFERENCE BETWEEN PRE-TEST AND POST-TEST**  
**MEAN SCORES OF VERTICAL JUMP OF EXPERIMENTAL AND**  
**CONTROL GROUP OF BASKETBALL PLAYERS**

| Test      | Groups             | Mean  | M.D.  | $\sigma$<br>DM. | t-value |
|-----------|--------------------|-------|-------|-----------------|---------|
| Pre-test  | Experimental group | 1.089 | 0.041 | 0.006           | 6.12*   |
|           | Control Group      | 1.049 |       |                 |         |
| Post-test | Experimental group | 1.555 | 0.106 | 0.006           | 17.32*  |
|           | Control Group      | 1.049 |       |                 |         |

\*Significant level at 0.05

$t_{.05}(28) = 2.00$

It is clearly evident from Table 5, that the statistically significant difference was found between the pre-test means of vertical jump of experimental group and control group, as the obtained t-value of 6.12 was higher than the required value of  $t_{.05}(28)=2.00$ . But the significant difference was also found between the post-test means of vertical jump of experimental group and control group, as the obtained t-value of 17.32 was much higher than the required value to be significant. This suggests that there is an effect of treatment on the sit ups test performance i.e. strength endurance of the subjects at pre-test point and post-test point.

**TABLE 6**  
**SIGNIFICANCE OF DIFFERENCE BETWEEN PRE-TEST AND POST-TEST**  
**MEAN SCORES OF SIT-UPS OF EXPERIMENTAL AND CONTROL**  
**GROUP MALE SCHOOL GOING CHILDREN**

| Test      | Groups             | Mean    | M.D.  | $\sigma$<br>DM. | t-value |
|-----------|--------------------|---------|-------|-----------------|---------|
| Pre-test  | Experimental group | 1595.10 | 11.93 | 5.45            | 2.39*   |
|           | Control Group      | 1583.17 |       |                 |         |
| Post-test | Experimental group | 1635.87 | 30.67 | 7.47            | 18.04*  |
|           | Control Group      | 1605.20 |       |                 |         |

\*Significant level at 0.05

$t_{.05}(28) = 2.00$

Table 6 reveals that there was no statistically significant difference between the pre-test means of sit-ups of experimental group and control group, as the obtained t-value of 0.18 was less than the required value of  $t_{.05}(28)=2.00$ . But the significant difference was also found between the post-test means of sit-ups of experimental group and control group, as the obtained t-value of 18.04 was much higher than the required value to be significant. This suggests that there is an effect of treatment on the sit ups test performance i.e. strength endurance of the subjects at post-test point.

## DISCUSSION

Today, it is generally accepted that resistance exercise can be safe and worthwhile for children and teenagers provided that the training intensity and training duration are sufficient (Faigenbaum et al. 1996; Guy & Micheli, 2001). In general, it seems that boys and girls can increase their strength by about 30-50% during the first eight weeks of resistance training (Falk & Tenebaum, 1996). The present results are comparable with these findings as the progressive training program that included explosive types of medicine ball exercises resulted in gains in upper body and lower strength of 42% and 34%, respectively. The mechanisms responsible for these gains are not entirely understood nor were they examined in this study, but changes in motor unit activation and motor unit coordination, recruitment and firing are probable mechanisms that can explain, at least in part, these short-term training-induced gains (Ramsay et al., 1990).

The primary finding of this investigation was that regular participation in a progressive medicine ball training program produced greater magnitudes of improvement in muscular fitness and speed performances of experimental group than control group after short-term training. No injuries occurred as a result of medicine ball training throughout the study period. The present observations suggest that incorporating medicine ball training into the basketball coaching and training may be a safe and valid means to promote physical fitness in college level Basketball players. These findings have important practical relevance for designing training program for college level Basketball players since muscular fitness is an important health related fitness component that contributes to tasks of daily life, participation in sports activities, and reduction of disease (National Association for Sport and Physical Education, 2004).

The present study confirmed the positive effects on speed, explosive power of legs and strength endurance of abdomen of college level male Basketball players over six weeks. Male Basketball players engaged in medicine ball training program of nine weeks demonstrated the development in speed, explosive power of legs and strength endurance of abdomen. The results of the present study was partially supported by Hopkin (1999) & Sharma (2011).

In the present study, students who participated in the medicine ball training program made significantly greater gains on the speed, explosive power and strength endurance than changes in the control group. These results show that college level Basketball players respond to medicine ball training by increasing their ability to perform selected strength endurance and explosive power. Moreover, medicine balls provide a unique type of resistance that can be used for a variety of exercises that can be performed at different movement speeds (from slow to explosive). Thus it is likely that the ability of medicine ball training to enhance skill's performance is due to the ability to create exercises with medicine balls that mimic natural body positions and movement speeds that occur in daily life and game situations. Medicine ball training also resulted in significant gains in speed of basketball players as compared to control group gains.

It was also hypothesized that there would be significant effect of medicine ball exercise on motor components in college level basketball players is partially accepted, as the positive effects was found on speed, explosive power of legs and strength endurance of abdomen parameters of physical fitness over nine weeks school children engaged in medicine ball training program.

A limitation of this study is that it addressed only the initial phase of medicine ball training in college level Basketball players. Thus, the results from this investigation may not be applicable to other populations nor do the results provide insight into long-term training adaptations. Notwithstanding these limitations, the practical importance of incorporating medicine ball training into a basketball training schedule should not be overlooked. Athletes in this study had an opportunity to learn proper medicine ball training procedures and develop the skills necessary to design a personal medicine ball fitness program that can help them achieve and maintain a health-enhancing level of physical fitness. In addition, a medicine ball training program may be more acceptable and certainly will be more cost-effective for enhancing muscular fitness in college level Basketball players than other type of training program.

## CONCLUSIONS

Within the framework of the present investigation, the following conclusions may be drawn:

Training with medicine ball exercises has significantly increased speed. The findings of the study demonstrated that medicine ball training has significant improvement in explosive power. Muscular endurance has improved significantly as a result of medicine ball exercise. The result of the study indicates that speed, explosive power, and muscular endurance has been improved significantly after the implementation of medicine ball exercise training program.

## RECOMMENDATIONS

Further studies to classify fitness levels obtained by these programs based on more detailed analysis for training duration, training schedules as well as fitness indices will enable assessment of the most optimal training methods. Additionally this methodology could be applied to a female student population to investigate any differences in response between genders to fitness training in other countries.

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