International Journal of Yoga, Sports, and Health Sciences
Vol. 1, Issue. 2, Jun 2025, pp. 37~47

Effect of Strengthening Exercise with Medicine Ball Training on Skill Performance Variables among Basketball Players

Dr.M.Rajkumar[1], L.Purunoopious[2], S.R.Athish[3], R.Vishnu[4]
[1]Professor, Department of Physical Education, Bharathiar University, Coimbatore, India.
[2,3,4]Master of Physical Education, Department of Physical Education, Bharathiar University, Coimbatore, India.

Article Info

Article history:

Received Apr 12, 2025
Revised May 18, 2025
Accepted Jun 8, 2025

Keywords:

Strengthening exercise
medicine ball training
Jump shot
Rebound
Basketball players

ABSTRACT

Basketball is a dynamic sports game where using techniques and tactics requires a lot of high-intensity movements. With limited recovery time, athletes with significant degree of physical fitness—including agility, power, and endurance—can perform well. Basketball players have benefited from a wide range of fitness training techniques, involving core, resistance, strength, game-based conditioning, high-intensity interval, and functional training. High levels of strength, power, and agility, along with a reasonably lean body composition, are essential for successful basketball players. Basketball players must concentrate on building strength, power, and agility through quick, intensive workouts if they want to succeed. Strength training (ST) enhances neuromuscular function and critical sports skills. In that regard, the best methods for enhancing the aforementioned skills are strength training in conjunction with force-vector specific training. Exercises utilizing a medicine ball (MB), sometimes called a fitness or training ball made of rubber, could be used to improve coordination, muscle strength, power, agility, balance, and speed. It also contributes to practice using a ball. Clown balls, body balls, and ball stability are some names for them. All levels of skills, ages, stages of growth, and sports can take advantage of MB practice. The program needs to be able to adjust to the exercise's movements in order to be more successful. The objective of this study was to examine the influences of strengthening exercises and MB training on the skill ability factors of basketball players. To accomplish the goals of the study, thirty (N=30) intercollegiate basketball players were selected from {DPE} Bharathiar University in Coimbatore, Tamil Nadu, India. The participants (n=15) were divided into two equal groups at random. Group I served as the experimental group (EG), while Group II served as the control group (CG). The CG received no training other than their regular tasks, while the EG engaged in strengthening exercises using MB training. For six weeks, the EGreceived training three days a week (Monday, Wednesday, and Friday). The Leilich basketball test was used to measure jump shots, and scores served as the unit of measurement. The Harrison basketball test is used as the unit of measurement for rebound. To decide whether there had been any considerable enhancement at the 0.05 significance= level of, the data gathered from the participants were statistically examined using the "t" ratio. The findings indicate that, despite the constraints of nutrition, climate, and lifestyle, the effectiveness of strengthening exercises combined with MB training led to a considerable improvement in skill performance. The study found that intercollegiate basketball players' skill performance was greatly enhanced by strengthening exercises combined with medicine ball training (MBT).

Corresponding Author:

Dr.M.Rajkumar,
Professor, Department of Physical Education,
Bharathiar University, Coimbatore, India.

1. INTRODUCTION

Basketball is a physically demanding sport that requires large amount of physical fitness, involving agility, balance, strength, and coordination. The success of players during competition is significantly influenced by these qualities. Basketball players engage in a variety of training regimens aimed at enhancing skills like strength, speed, and endurance in order to perform better on the court. Basketball games, in particular, require players to do sporadic movements in addition to running and jumping, which calls for both strength and endurance. The game is also known for its many starts, stops, and direction changes, all of which are kept inside a set time frame. Understanding the primary physical fitness characteristics that support good physical condition is a key goal for basketball coaches and high-performance teams. This understanding is likely to have a positive impact on the activity volumes and intensities that players can achieve during games.

Basketball coaches may be able to create more suitable, customized training stimuli to maximize players' physical readiness for competition by determining how physical fitness characteristics affect the activities carried out (i.e., outside demands) during games. It is crucial for basketball performers of all ages and skill levels to be physically fit enough to handle the unique external demands of games. As a result, tests that mimic particular movements and behaviors that are emphasized during game play should be used to evaluate key basketball fitness traits.

Strengthening exercises are physical activities established for improving muscle strength, endurance, and overall physical training. These exercises typically involve resistance, either through weights, resistance bands, or bodyweight, to stimulate growth and development and challenge the muscles. Common examples include squats, push-ups, and weightlifting. Strengthening exercises help increase muscle mass, support joint health, enhance posture, and boost metabolism, contributing to better overall health and athletic performance. Regular ST can further minimize the risk of injury and promote bone density, making it an important component of a balanced fitness routine.

A weighted, spherical ball is used in MBT to improve coordination, strength, and power. These exercises help increase explosive power, balance, and core stability by combining functional movements with resistance training. Exercises including slams, throws, twists, and passes are frequently incorporated into MB workouts. They are excellent for full-body fitness because they are adaptable and can target several muscle groups. MB exercises can be added to a range of fitness regimens for both novices and athletes to increase strength, flexibility, and general fitness.

In order to increase physical fitness, team sports, including football, rugby, basketball, and handball, frequently use plyometric or ST. The influence of various training regimens on team sport participants' physical fitness has not yet been investigated in any research. Players use a range of explosive motions, including changing direction and pace, kicking, tackling, jumping, turning, sprinting, and when playing intermittent team games. When playing sporadic team games, players employ a variety of explosive motions, like as kicking, tackling, jumping, turning, running, and changing direction and tempo. When a quick eccentric muscle contraction gives way to a rapid concentric muscular contraction, a stretch-shortening cycle operation takes place.

Strengthening exercises, sometimes known as as jump training or plyos, are established for increasing speed and power by concentrating on generating the considerable amount of muscular force in the shortest period of time. Groups of people with different degrees of physical fitness and athletic experience have found success with short physical therapy programs that involve two sessions per week. Strengthening exercise is divided into three stages.

Stretching of the muscle at the musculotendinous junction is a characteristic of the first stage, sometimes referred to as the preload or facilitative stage. The energy that has been stored during this phase is released during the concentric phase. There is a little lag between the first and the third and last phases, which are the concentric shortening phase and the amortization phase, respectively. The concentric phase involves rapid power output by utilizing the biomechanical characteristics of pre-stretched muscles. Combining these three stages enhances muscular function.

It has been acknowledged that the ball is an essential training aid for athletes. These days, the ball is usually utilized for a variety of drills and exercises with weights between one and six kilograms. However, in order to improve their physical performance, football players train with larger medicine balls that weigh up to twelve kilograms. The majority of MBexercises entail tossing, catching, and lifting the ball.

Athletes must use their core muscles—the gluteal, spinal erector, and abdominal muscles—to carry out these exercises efficiently. Because they provide force and power that may be transferred to other extremities, these muscles are frequently known as the human body's power zone. These muscles are widely

known as the human body's power zone since they supply force and power that can be transferred to other extremities.

Using external weights, MBworkouts are designed to strengthen the arms, shoulders, and chest muscles. Throwing medicine balls helps improve coordination, total body power (power), flexibility, core strength, and specific sports skills. Basketball passing skills can be improved with the help of this workout. Exercises involving MB throwing help muscles become more capable of contracting to automate arm movements. This is a result of the implementation procedure, which uses balls as items to be released from the hands. Throwing a MB is a technique that is more likely to cause contractions in the arm muscles. In addition to teaching the body to work as a whole rather than isolate certain muscles or muscle groups, MBT enables a range of basic exercises leading to more complicated movements.

In that regard, it was believed that athletes' performance may be enhanced by an integrated training program that included strength and endurance training with basketball practice. By concentrating on particular capabilities throughout workouts to improve total power, MB exercises can aid in the development of core strength. Additionally, some MB exercises complement resistance training and explosive movements like horizontal jumps, which can improve muscle architecture and endurance, two things that are crucial in basketball.

Sports experts have created certain recommendations to guide the practice in order to encourage hands-on training with the medicine ball. Using medicine balls of various weights and sizes is the first step. Second, the trainer needs to go over all the steps with the athletes regarding the exercises that must be done before the training session starts. Before beginning the training session, the third stage entails all of the participants participating in exercises to adequately warm up. In this investigation, these rules were closely adhered to.

Before gradually progressing to more difficult activities with high-weight balls, training sessions should begin with simpler ones with low-weight balls. Additionally, the trainer ought to design an exercise regimen that targets all body parts. Using a MB during rehabilitation can improve outcomes and speed up the healing process. Basketball participants can learn how to effectively and efficiently transmit and receive force by performing the Basketball Plyo Push-Ups. Gaining proficiency in this exercise might assist you develop stronger upper body muscles and faster, more explosive hand movements. A player's capability to pass, catch, and control the basketball can be greatly improved with the MB Wall Throws drill, which is also better for hand-eye coordination.

When you become proficient at this exercise, your upper body muscles will get stronger and your hand movements will become faster and more explosive. The MB Wall Throws practice is a fantastic way to enhance hand-eye coordination while also helping players pass, grab, and control the basketball. It helps improve hand-eye coordination, which is necessary to play basketball well. It also significantly improves one's core strength and rapid direction changes. For basketball players, the MB slam is one of the effective way to develop upper-body strength and power. This workout is great since it may improve athletic performance and can be done in a very small space.

The study objective was to look at how basketball players' skill performance variables were affected by strengthening exercises combined with MBT. Thirty (N=30) intercollegiate basketball players were chosen from DPE Bharathiar University in Coimbatore, Tamil Nadu, India, in order to fulfill the study's objectives. The participants (n=15) were equally split into two groups at random. Group-I served as the experimental group, while Group-II served as the control group. The CG received no training other than their regular tasks, while the EG engaged in strengthening exercises using MBT. For six weeks, the EG received training three days a week (Monday, Wednesday, and Friday). The Leilich basketball test was used to measure jump shots, and scores served as the unit of measurement. The Harrison basketball test is used as the unit of measurement for rebound. To decide whether there had been any considerable enhancement at the 0.05 significant level of confidence, the data gathered from the participants were statistically examined using the "t" ratio. The findings indicate that, despite the constraints of nutrition, climate, and lifestyle, the effectiveness of strengthening exercises combined with MBT resulted a considerable improvement in skill performance. The study found that intercollegiate basketball players' skill performance was greatly enhanced by strengthening exercises combined with MBT.

2. LITERATURE REVIEW

(Dinata, 2021) intended to observe the effects of 3 kg MBT on high school basketball players' passing skills. This study used an experimental methodology. Twenty-eight pupils from Seyegan 1 Public High School made up the study's population. Using random selection techniques, 20 male students made up the study's sample. The AAHPERD passing test is used by the device to gauge the basketball's passing

ability. The independent sample t-test significance level, α = 0.05, is the data analysis method employed. The findings demonstrated that the 3 kg MB exercise had an impact on high school extracurricular participants' passing abilities, as indicated by the value of 10,513> 2,101. According to study derived from data analysis, it is likely that the 3 kg MB workout had a considerable effect on high school extracurricular participants' passing abilities. The findings of the pretest and posttest differ on average.

(Miftahul'izza et al., 2024) Find out how MBT affects the basketball chest pass performance of ninth-grade pupils at SMP Negeri 3 Tanjung Bintang. One group randomized group design is used in this pre-experimental investigation. Twelve boys and sixteen girls from class 9A made up the 28 samples that were gathered by random sampling. Methods of gathering data results of the basketball passing test from the AAHPERD Basketball Test for the chest pass test. Wilcoxon test was employed for data analysis. Ho is rejected while Ha is approved based on the test analysis results, which showed that p 0.000 < a 0.05. It can be inferred that students' performance on basketball chest passes is impacted by the use of medicine balls. The precision of the chest pass ability will be impacted by a systematic training program that is phased in and includes the proper and quantifiable MB exercises.

(Viramontes et al., 2024) examined, with an emphasis on training frequency, the impact of a six-week ST intervention on the physical fitness of female high school athletes. After being recruited, twenty-three female high school basketball players have been divided into two different groups. One group engaged in ST once a week (S1), however the other group trained twice a week (S2). Since training sessions were optional and some individuals could only train once a week, the groups were not chosen at random. Body fat percentage, age, body height, body mass, grip strength, leg/back dynamometer (LBD) strength, vertical jump (VJ), seated MB throw tests from each foot, sprint times, and multistage fitness test shuttles were among the data collected from the participants both before and after the intervention. A two (time) x two (group) repeated measures ANOVA was used to assess the data. The Bonferroni correction process was used for post hoc pairwise comparisons if significant F ratios were found in any ANOVA computations. Increases in body height, body mass, grip strength, LBD strength, MBT distance, and VJ height, as well as shorter sprint timings, were among the significant main effects on time. Neither between-group main effects nor time by group ANOVAs were significant. Regardless of the frequency of training, these performance modifications took place. High school females can increase their strength (grip, LBD), power (MBT, VJ), and change-of-direction speed by attending at least one ST session each week.

(Han, 2023) Examine how ST affects basketball participants exercise endurance and cardiorespiratory capacity. The sportspersons in the EG engaged in ST during the experiment, which included comprehensive training, specific training without the ball, and special training to hold the ball. The CG was trained using dumbbells, single and parallel bars, and other conventional, fundamental track and field-based ST techniques. Every Tuesday, Thursday, and Saturday for the duration of the six-week experiment, participants engaged in an hour of physical training. The training techniques suggested in this research enhanced the athletes' sports endurance and cardiovascular capacity in comparison to conventional training approaches. Better dribble jump shots, two-minute continuous shots, T-shaped runs, three-lap backs with varying distances, and overall performance were all displayed by the experimental group. This program can raise athletes' competitive level by increasing their cardiovascular capacity and routine, and basketball-related sports endurance. Therapeutic studies, which look at the results of treatment, are at level II evidence.

(Bilali, 2023) Investigating the impact of a ST program on young basketball participants motor skills was the goal of this study (Pre Assessment Results). There are 49 young male basketball players (mean age: 16.2) who are taking part. There is one CG (N=14) and two intervention groups (ball drills, N=19, and equipment drills, N=16). Among the tests conducted in this study are anthropometric parameters, body mass, 10x5m, T-test, sit and reach-test, 20m sprint test, throw MB tests (overhead and chest pass), multistage shuttle run test, handgrip strength tests for upper limbs standing long jump, standing VJ, and CMJ. Health O meter scale, caliper, measuring tape, Vertec Jump, flexibility box, medicine ball, handgrip, chronometer, cone, etc., are the tools used for those measurements. The study's findings demonstrate that there is no statistically considerable variance in age characteristics between groups. Body height averages were 178 cm for the interventional group (ball drill), 184 cm for the equipment drill, and 179 cm for the control group. The interventional group, which drilled with a ball, weighed 70.5 kg on average, the control group, which weighed 71.4 kg, and the interventional group, which weighed 72.5 kg. The waist circumference of the interventional group was 81.2 cm following ball drilling, compared to 79.1 cm for the CG and 77.4 cm for the interventional group. With a sigma value of 0.012, the body-height characteristics are statistically significant. The mean for the sit and reach test in the intervention group's ball-drill was 27.05 cm (8.6 SD), whereas the mean for the equipment-drill was 29.3 cm (8.5 SD). The mean for the CG is 28 cm (8.1 SD). In the vertical jump CMJ, there is statistical significance between groups due to the sigma value of 0.000; however, in the standing long jump test, there is no statistical significance between groups due to the sigma value of 0.302. Since sigma is 0.000, the vertical jump steps test between groups is statistically significant.

The ANOVA's conclusions indicate that there is statistical significance for body height but no statistical significance for waist or body weight by group.

(Sowmiya and Mahaboobjan, 2025) Find out how basketball players' shoulder strength and leg explosive power are affected by ST programs that include and do not include additional resistance. Participants in the study were 45 female basketball participants randomly selected from various departments at Bharathidasan University in Tiruchirappalli, Tamil Nadu, India. They were between the ages of 21 and 25. They were split up into three equal groups, with fifteen players in each group. Specifically, the control group, EG-I (ST with extra resistance), and EG-II (ST without extra resistance). Their physical attributes, such as shoulder strength and leg explosive power, were assessed twice before and after the exercise. For eight weeks, the study's training period consisted of three alternate days per week. ANACOVA was employed to statistically assess the acquired data, and the significance difference between the experimental groups was fixed at the 0.05 level of confidence. It was determined that the experimental groups outperformed the CG in terms of shoulder strength and leg explosive power.

(Mir et al., 2025) Analyze how recreational basketball players' performance on the stationary three-point shooting test (S3P) is affected by partial range of motion (PROM) and full range of motion (FROM) triceps ST. The trial was randomized, controlled, and single-blinded. Thirty individuals were divided into three equal groups at random: control (CON), PROM, and FROM. A machine with an adjustable overhead cable crossover was used to exercise the triceps. ST from complete elbow flexion to full extension was done by the FROM group while both experimental groups' shoulders were over-head flexed to 160–180°. The PROM group, on the other hand, operated within a limited range, which was 60° to 110° elbow flexion/extension. For four weeks, both groups performed two sessions each week for four sets of ten repetitions at a 67% maximum of one repetition, whereas the CON group did not engage in any exercise regimen. S3P was tested both at baseline and at the end of the 4-week intervention. Descriptive analysis was used to determine the participants' mean age, height, and body mass index. In comparison to the CON group, the group analysis revealed a significant improvement in S3P in both FROM and PROM. In comparison to the FROM and CON groups, the group-by-time interaction showed that PROM was more promising. For basketball players, PROM triceps ST is a time-efficient method that increases shooting accuracy.

(Xue, 2024) examined the impact of core strength training (CST) on basketball players' shooting percentages, which is crucial since it provides valuable insights for enhancing athletic performance. The primary objective of this study was to evaluate how an 8-week CST program affected the shooting skills and stability of male basketball players. Thirty male, healthy athletes participated in the study; fifteen were in the EG, which had body weights of 88.2 kg and heights of 190.2 cm, and fifteen were in the CG, which had heights of 8.17 cm. The Star Excursion Balance Test (SEBT) and shooting tests for three- and two-point regions within 60 seconds were used to assess both groups. A two-way repeated measures ANOVA was used to statistically analyze the SEBT and the shooting test. During the first and final SEBT assessments, the results showed significant group-time interactions for the left and right sides of the lower extremities, among other regions ($p < 0.05$). Pre- and post-shot testing inside the group-time relationship also revealed significant differences between the three- and two-point areas. The results demonstrated how the 8-week CST program improved the balance and shooting skills of male basketball players.

(Arede et al., 2021) Examine how a ST regimen that incorporates random rest periods between sets affects a number of physical characteristics, high-intensity movements, and the spatial exploration index while simulating a basketball game. 20 male basketball participants, ages 19.45 ± 4.36, were randomized to either the CG ($n = 10$) or the ST group ($n = 10$). In order to maximize propulsive power output, the ST consisted of parallel bench press and back squat exercises twice a week for 10 weeks. The exercises were divided into two blocks, with variable passive recovery in between sets and constant passive recovery (3 minutes) between blocks. Bilateral and unilateral jumping, direction changes, straight sprinting, and a 5-on-5 full-court scenario were all included in the pre- and posttest evaluations. Individual heart rate monitors were used to record the internal training load, while the local positioning system was used to evaluate the exterior training load. In the 5-on-5 full-court scenario, a significant relationship was noted for countermovement jumps, peak accelerations and decelerations, unilateral right hops, and high-intensity accelerations and decelerations. There was a correlation between the training group's recorded and observed improvements in unilateral right hops, accelerations, and decelerations. Peak accelerations, decelerations, high-intensity decelerations, and sprints ranging from 0 to 25 meters showed comparable outcomes. The observed basketball players' physical and game-related attributes were improved by ST combined with arbitrary recovery periods.

3. METHODS

The study objective was to ascertain the impacts of strengthening exercises integrated with MBT on specific skill performance factors among basketball players. Thirty (N=30) intercollegiate basketball students were selected from DPE Bharathiar University in Coimbatore, Tamil Nadu, India, in order to fulfill the study's objectives. The subjects (n=15) were divided into two equal groups at random. Group I served as EG I, with 15 participants, whereas Group II served as the control group. The CG received no training other than their regular tasks, while the EG engaged in strengthening exercises using MBT. For six weeks, the EG received training three days a week (Monday, Wednesday, and Friday). The Leilich basketball test was used to measure jump shots, and scores served as the unit of measurement. The Harrison basketball test is used as the unit of measurement for rebound. To decide whether there had been any considerable development at the 0.05 significance level, the information gathered from the subjects were statistically examined using the "t" ratio.

Criterion Measures: The variables used to evaluate skill performance were selected as the criterion measures for testing in this study.

Table 1. Skill performance variables among basketball Players

SKILL PERFORMANCE VARIABLES			
S.NO	VARIABLES	TEST ITEMS	UNIT OF MEASURES
1.	Jump Shot	Leilich Basketball Test	In Scores
2.	Rebound	Rebound	In Counts

4. STATISTICAL ANALYSIS

To define whether there was a considerable development between the pre- and post-test, the data gathered on the aforementioned variables as a result of strengthening exercises with MBT were statistically examined using the "t" test. The 0.05 significance level was used as the threshold for statistical analysis in all the cases ($P < 0.05$).

Table 2. Analysis of Jump Shot performance among EG and CG

VARIABLE	**GROUPS**	**PRE MEAN**	**POST MEAN**	**SD**	**STD ERROR**	**T-RATIO**
Jump Shot	EG	11.06	12.46	0.73	0.19	7.35*
	CG	10.13	10.53	0.82	0.21	1.87

(0.05 significance for df of 14 is 2.145)

Table 3. Analysis of Rebound performance among EG and CG

VARIABLE	**GROUPS**	**PRE MEAN**	**POST MEAN**	**SD**	**STD ERROR**	**T-RATIO**
Rebound	Experimental	26.06	28.20	1.18	0.30	6.95*
	Control	22.60	23.13	1.35	0.35	1.52

The EG and CG had pre-test mean values of 11.0 and 26.06 and 10.13 and 22.60, respectively, and post-test mean values of 12.46 and 28.20 and 10.53 and 23.13, respectively. The mean standard deviation and t-value for each outcome measure are shown in Tables 1, 2 and 3.

The experimental group's Jump Shot (t=7.35) and Rebound (t=6.05) dependent t-test values were determined. At the 0.05 significance, a mean difference with degrees of freedom 14 requires a table value of 2.145.

The dependent t-test values for the experimental group's Jump Shot (t=7.35) and Rebound (t=6.05) were ascertained. With degrees of freedom 14, a significant difference necessitates a table value of 2.145 at the 0.05 significance.

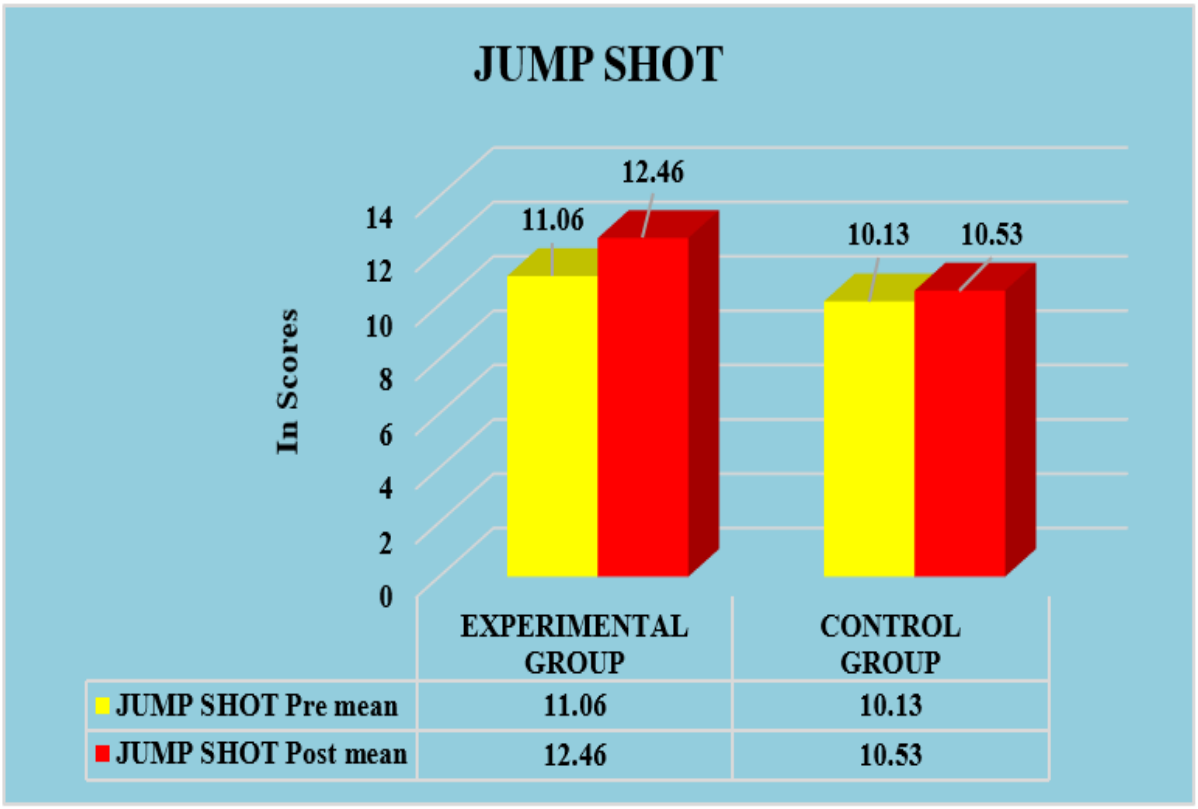

Figure 1. Mean Values of Jump Shot Among Basketball Players

The mean values of jump shot among basketball players is illustrated in Figure 1. The mean Values of Rebound Among Basketball Players is depicted in Figure 2. The basketball players mean values compared in Figure 3.

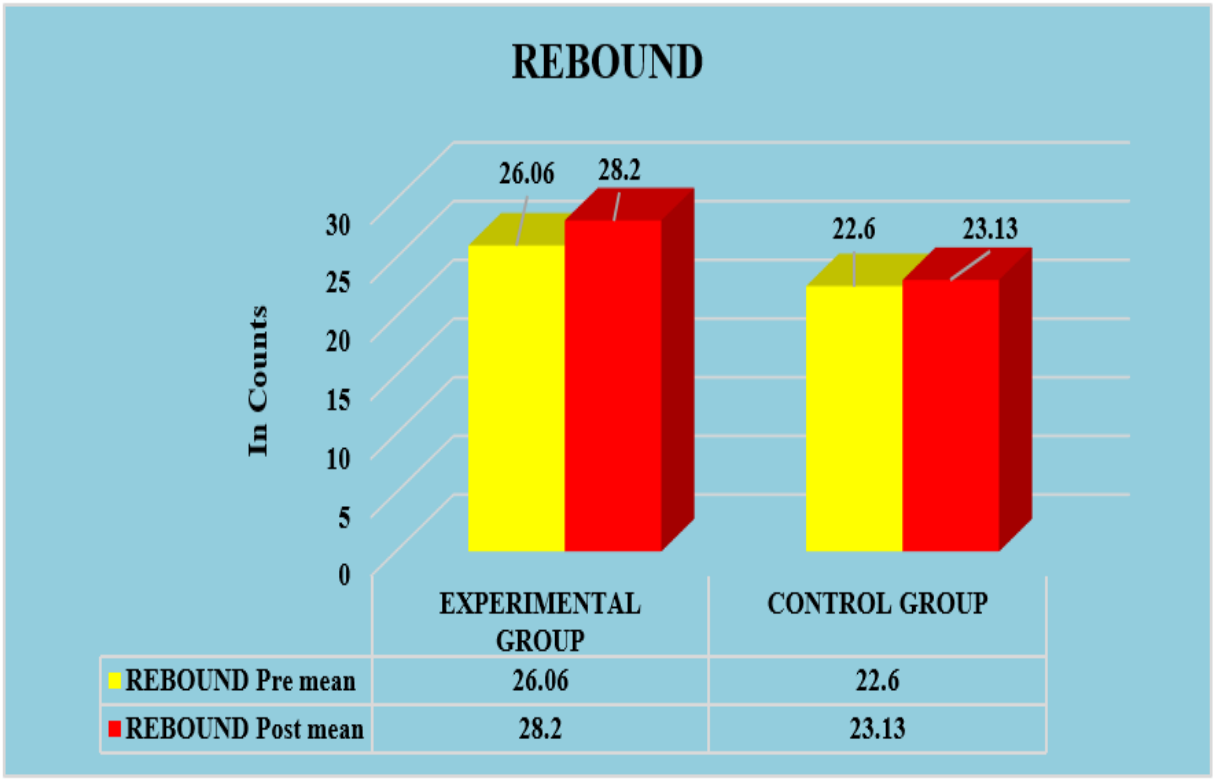

Figure 2. The Mean Values of Rebound Among Basketball Players

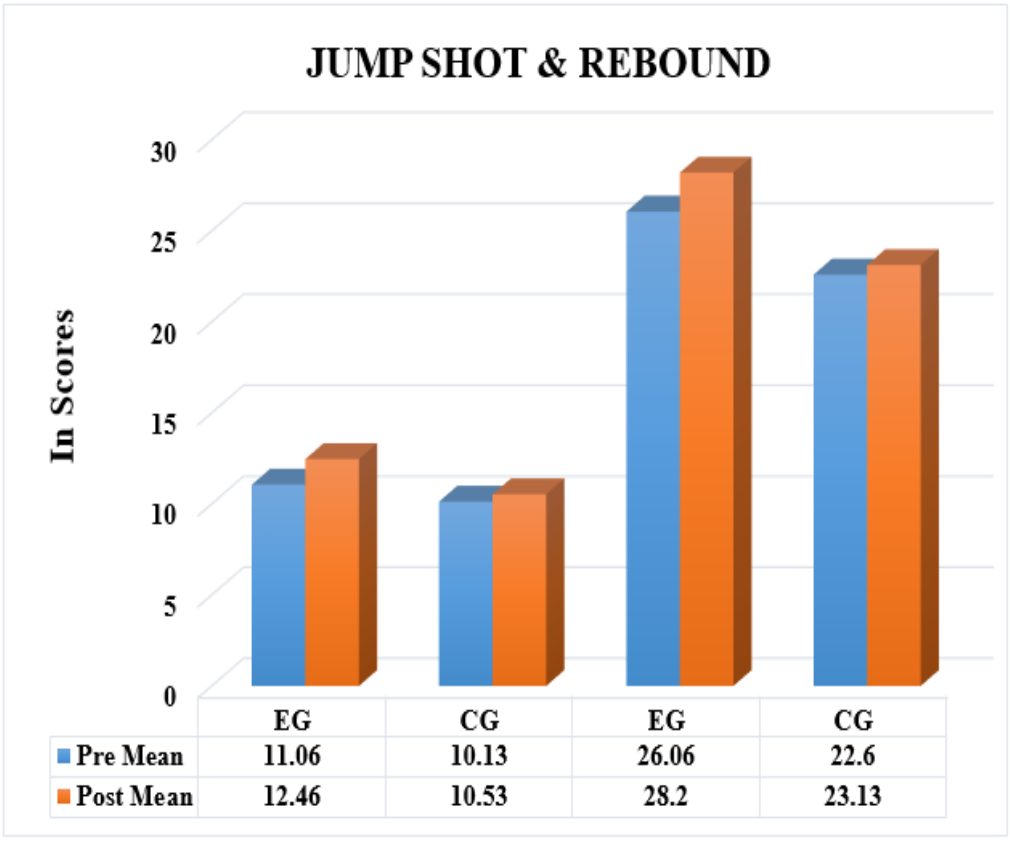

Figure 3. Comparative Analysis of The Mean Values Among Basketball Players

Study Limitations and Strengths:

- This study showed how medical ball training affected several basketball-related physical strength and jump shot performance metrics. The physical fitness of basketball players was assessed using reliable and precise methods.
- The study not only produced encouraging results, but it also offers more scientific support for the use of compound fundamental exercises. However, there are certain limitations. Due to the small sample size and the fact that all study participants were male, caution must be used while analyzing the findings.
- Furthermore, the athletes' daily eating and sleeping patterns were not organized, which would have provided a more thorough and accurate description of the phenomenon and assisted the athletes and coaches in developing more efficient training plans.

4. DISCUSSION AND FINDINGS

Basketball players' physical, technical, and tactical skill levels impact their performance. When choosing a player's position during a competition, coaches typically look at technical and tactical traits. They also modify the team's game to fit the individual profiles of each player in order to maximize performance.

Conversely, physical fitness monitoring is typically not applied to pinpoint certain performance profiles, which are heavily influenced by the players' sex. Thus, the current study examined how six weeks of MBT combined with strengthening exercises enhanced the skill performance factors of collegiate basketball players who were not playing.

According to the study's findings, MBT combined with specific strengthening exercises was more effective at eliciting the desired changes in the skill performance characteristics of collegiate basketball players who were not playing.

The conclusions of this study, impacts of 8-week MBT on Physical Performance Among Basketball Players, are consistent with those of earlier studies that have highlighted the significance of this specific topic.

According to the results, basketball players' skill ability is greatly enhanced when they undertake medical ball exercises freely. The Impact of Twelve Weeks of Technical Training on Basketball Fundamentals.

After twelve weeks of instruction, the study found that students' performance in basketball abilities improved significantly as a result of the technical training.

Debre Tabor men's U-17 football trainees' performance on specific skill-related fitness components after undergoing specific ST. The findings demonstrated that the chosen ST considerably enhanced the football trainees' chosen skill-related fitness components.

5. CONCLUSIONS

In this study, we examine the impacts of strengthening exercises and MBT on the skill performance factors of basketball players. To achieve the goals of the study, thirty (N=30) intercollegiate basketball players were chosen from DPE Bharathiar University in Coimbatore, Tamil Nadu, India. The participants (n=15) were equally split into two groups at random. Group I served as the experimental group, while Group II served as the control group. The CG received no training other than their regular tasks, while the EG engaged in strengthening exercises using MBT. For the period of 6 weeks, the EG received training three days a week (Monday, Wednesday, and Friday). The Leilich basketball test was used to measure jump shots, and scores served as the unit of measurement. The Harrison basketball test is used as the unit of measurement for rebound. To define whether there was any considerable development at the 0.05 significance, the information gathered from the subjects were statistically examined using the "t" ratio. According to the experimental outcomes and limitations of the study, it is noticed that the practice of strengthening exercise with MBT helped to optimize the skill performance variables of inter-collegiate basketball players. It was further observed that there is progressive development in the specified parameters of the EG of basketball players after six weeks of the training program.

6. PRACTICAL APPLICATIONS

Based on principal component analysis, the current study's findings could be used to provide several real-world applications for the various physical fitness capacities of basketball players:

1. It is essential to adapt the training effort depending on the players' sex and physical attributes because male players demonstrated higher fitness performance values, particularly in game actions that require effective output.
2. To create unique tasks focused on particular physical characteristics to enhance sports performance, it is essential to understand the various profiles of basketball students on all the teams based on their level of fitness.
3. The team staff may also be able to create playing systems and tactical dispositions that are tailored to the players' physical fitness profiles by using their knowledge. For example, playing systems with low aerobic capacity will involve prolonged attacks, playing systems with low speed changes and curvilinear locomotion will involve more static play, or playing strategies with lower jumping capacity will involve shots without rebounds.
4. The highest overall variance was found in in-game physical conditioning and aerobic capacity, suggesting that the combined work of aerobic capacity through modified game situations is a key characteristic to optimize the fitness performance of basketball players in both male and females.

REFERENCES

[1] Suntharalingam, T., Jawis, M. N. M., Malik, A. A., & Sivanesan, S. (2022). Effects of 8-week medicine ball training on physical performance among basketball players. Journal of Positive School Psychology, 1307-1319.
[2] Hussen, E., Yirga, B., & Aychiluhim, W. (2020). The Effects of Twelve Weeks Technical Training to Improve Basic Skills of Basketball. Ann Yoga Phys Ther, 4(1), 1042.
[3] Desalegn, W. (2022). The effect of strength training on selected skill-related fitness components of debre tabor male u-17 football trainees (Doctoral dissertation).
[4] Cao, S., Liu, J., Wang, Z., & Geok, S. K. (2024). The effects of functional training on physical fitness and skill-related performance among basketball players Frontiers in physiology, 15, 1391394.
[5] Varghesea, J., & Shelvam, P. V. (2014). Effect of resistance training on shooting performance of basketball players. International Journal of Physical Education, Fitness and Sport, 3(4), 133-138.
[6] Miller, M. G., Herniman, J. J., Ricard, M. D., Cheatham, C. C., & Michael, T. J. (2020). The effects of a 6-week agility training program on performance measures in soccer players. Journal of Strength and Conditioning Research, 34(7), 1890-1897.
[7] Haghighi, A.H., Hosseini, S.B., Askari, R., Shahrabadi, H. and Ramirez-Campillo, R., 2024. Effects of plyometric compared to high-intensity interval training on youth female basketball player's athletic performance. Sport Sciences for Health, 20(1), pp.211-220.
[8] Costa, R.R.G., Dorneles, J.R., Lopes, G.H., Gorla, J.I. and Neto, F.R., 2021. Medicine ball throw responsiveness to measure wheelchair basketball mobility in male players. Journal of sport rehabilitation, 30(8), pp.1230-1232.
[9] Neto, F.R., Loturco, I., Lopes, G.H., Dorneles, J.R., Gorla, J.I. and Costa, R.R.G., 2021. Correlations between medicine ball throw with wheelchair mobility and isokinetic tests in basketball para-athletes. Journal of sport rehabilitation, 31(1), pp.125-129.
[10] Luo, S., Soh, K.G., Zhao, Y., Soh, K.L., Sun, H., Nasiruddin, N.J.M., Zhai, X. and Ma, L., 2023. Effect of core training on athletic and skill performance of basketball players: A systematic review. Plos one, 18(6), p.e0287379.
[11] Beckham, G.K., Martin, E., Layne, D.K., Luke, R. and Mayhew, J.L., 2023. Assessing full body impulsive ability using a range of medicine ball loads for the backward overhead medicine ball throw. Sports Biomechanics, 22(10), pp.1278-1289.
[12] Cao, S., Liu, J., Wang, Z. and Geok, S.K., 2024. The effects of functional training on physical fitness and skill-related performance among basketball players: a systematic review. Frontiers in physiology, 15, p.1391394.
[13] Haghighi, A.H., Hosseini, S.B., Askari, R., Shahrabadi, H. and Ramirez-Campillo, R., 2024. Effects of plyometric compared to high-intensity interval training on youth female basketball player's athletic performance. Sport Sciences for Health, 20(1), pp.211-220.
[14] Kozin, V.Y. and Matlaiev, V.V., 2023. Training basketball players technology of of student teams of the humanitarian profile higher education institutions.
[15] Dinata, W.W., 2021, February. The Effect of 3 KG Medicine Ball Training on Extracurricular Participants Ability of Passing. In 1st International Conference on Sport Sciences, Health and Tourism (ICSSHT 2019) (pp. 348-350). Atlantis Press.
[16] MIFTAHUL'IZZA, H.A.F.I.D.Z., Runasari, R. and Ariesna, R.D., 2024. The Influence Of Medicine Ball Training On Chest Passes Of Basket Ball. AHSANTA JURNAL PENDIDIKAN, 10(1), pp.1-13.
[17] Viramontes, E., Dawes, J.J., Coburn, J.W. and Lockie, R.G., 2024. Strength Training Frequency and Athletic Performance in High School Girls Basketball Players. Journal of Human Kinetics, 91(Spec Issue), p.19.
[18] Han, F., 2023. Strength training influences on basketball players. Revista Brasileira de Medicina do Esporte, 29, p.e2022_0538.
[19] Bilali, A., 2023. An Intervention Study On The Effects Of Strength Training On Motor Abilities In Young Basketball Players-Pre Assessment Results Afrim Bilali, Daniela Dasheva.

[20] Sowmiya, V. and Mahaboobjan, A., Influence of Strength Training Packages with and Without Additional Resistance on Leg Explosive Power and Shoulder Strength Among Basketball Players. International journal of health sciences, 6(S2), pp.228-234.

[21] Mir, I.A., Mohd Jamali, M.N.Z., Humayra, S., Chong, K.W., Amalnerkar, T. and Sirajudeen, M.S., 2025. Partial versus full range of motion triceps strength training on shooting accuracy among recreational basketball players: a randomized controlled trial. BMC Sports Science, Medicine and Rehabilitation, 17(1), p.41.

[22] Xue, P., 2024. The effect of core strength training on basketball players' shooting percentage. Molecular & Cellular Biomechanics, 21(2), pp.452-452.

[23] Arede, J., Leite, N., Tous-Fajardo, J., Bishop, C. and Gonzalo-Skok, O., 2022. Enhancing high-intensity actions during a basketball game after a strength training program with random recovery times between sets. The Journal of Strength & Conditioning Research, 36(7), pp.1989-1997.

[24] Demirdağ, S., Savas, S., Çobanoğlu, G. and Güzel, N.A., 2024. Effects of a Strength Training Program on Basic Basketball Skills in Wheelchair Basketball Players. Gaziantep Üniversitesi Spor Bilimleri Dergisi, 9(1), pp.82-96.

[25] Zhang, W., Chen, X., Xu, K., Xie, H., Chen, J., Zhu, Z., Ji, H., Li, D. and Sun, J., 2024. The potential of a targeted unilateral compound training program to reduce lower limb strength asymmetry and increase performance: a proof-of-concept in basketball. Frontiers in Physiology, 15, p.1361719.

[26] Zhang, S. and Zhang, Z., 2023. Strength training and physical improvement in basketball. Revista Brasileira de Medicina do Esporte, 29, p.e2022_0532.

[27] Stojanović, M.D., Mikić, M., Drid, P., Calleja-González, J., Maksimović, N., Belegišanin, B. and Sekulović, V., 2021. Greater power but not strength gains using flywheel versus equivolumed traditional strength training in junior basketball players. International Journal of Environmental Research and Public Health, 18(3), p.1181.

[28] Yılmaz, N., 2022. Investigation of the effect of isometric core strength training in addition to basic basketball trainings on explosive power in children aged 9-17. Pedagogy of Physical Culture and Sports, 26(2), pp.75-82.

[29] Yang, Y.R., Chen, C., Pan, C.H., Yen, S.Y. and Cheng, C.F., 2025. Effects of Half-Time Re–Warm-Up With Core Strength Exercises on Subsequent Agility and Power Performance in Basketball Players. The Journal of Strength & Conditioning Research, 39(1), pp.62-69.

[30] Wang, X. and Dong, G., 2025. Dynamic image simulation of thermal radiation based on optical sensor technology in basketball game simulation: Monitoring of muscle thermal energy consumption. Thermal Science and Engineering Progress, 57, p.103189.