EFFECT OF CORE STABILITY COMBINED WITH VERTICAL AND HORIZONTAL PLYOMETRIC TRAINING ON STRENGTH, BALANCE AND AGILITY IN BASKETBALL PLAYERS.

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ABSTRACT

BACKGROUND- Basketball is a strenuous physical sport that involves quick lateral running, sprinting, and jumping motions. Basketball demands both anaerobic and aerobic performance in addition to physical attributes including muscle strength, power, endurance, flexibility, speed, agility, and sport-specific skills. The athlete needs to have advanced high levels of agility as well as both anaerobic and aerobic external muscular power output to compete at the highest level.
The most notable physical characteristic of basketball athletes is their height, which results in a prominent center of gravity, a slight equilibrium angle, and low stability. **METHOD:**The subject has been screened according to inclusion and exclusion criteria. Written consent form the participant has been prior obtained. The study was conducted at Kridasankul, Kolhapur. Total 50 Participants were randomly divided into two Group A (Experimental group) and Group B (Control group) which were 25 participants in each Group, both male and female participants were included. Group A includes Basketball Specific Training and Group B includes Core strengthening exercises and Plyometric exercises). **RESULT:** Group A Age, height, weight, BMI with valuesrepresent mean age 22.65 ± 1.46 , mean Height 162.1 ± 1.59, mean Weight 62.16 ±6.35, mean BMI 21.36 ± 2.05, Group B Age, height, weight, BMI with valuesrepresent mean age 20.75 ±2.40 , mean Height 164.12 ± 7.45, mean Weight 58.21 ± 2.01, mean BMI 20.86 ± 3.53 **.** Vertical Jump Test Comparison between groups where the Group A was more significantly effective with P value of < 0.005. Sit –up Test Comparison between group where the Group A was more significantly effective with P value of < 0.005. Agility –T Test Comparison between group where the Group A was more significantly effective with P value of < 0.005. Y-Balance Test Comparison between group where the Group A was more significantly effective with P value of < 0.005

CONCLUSION: This study concluded core stability combined with vertical and horizontal plyometrics exercise showed a significant increase in core strength, vertical jump,agility and dynamic balance. Adding a Biplaner Plyometric exercises helped athlete to improve more explosive lower limb strength and power. This showed the good athletic performance.

KEYWORDS
Plyometric, core Stability, Agility, Dynamic Balance, Basketball

INTRODUCTION

Basketball is a team sport that is performed in 213 nations across the globe. In addition, both male and female basketball participation percentages are very high[1]. Basketball is often played nowadays in four 10-minute halves, with a 24-second attack time and an 8-second break to cross the game area's midway line[2].

Basketball is an athletic sport that is becoming more and more popular every day and is being observed with attention. Basketball is one of the sports where having the best motor abilities is

essential [3]. Basketball is a contact sport where the execution of skills in both offensive and defense demands a variety of conditional qualities. While implementing these fundamental technical skills, it is anticipated that the athlete's both static and dynamic equilibrium would be essential [4].

Basketball is a strenuous physical sport that involves quick lateral running, sprinting, and jumping motions. Basketball demands both anaerobic and aerobic performance in addition to physical attributes including muscle strength, power, endurance, flexibility, speed, agility, and sport-specific skills[5].

The ability of athletes to shift positions rapidly, leap, and bounce the ball while synchronizing lower and upper extremity motion is a major requirement for success in basketball, an open-skill competitive game. Specifically, to perform well, athletes need to be able to shoot, dribble, and rebound within time constraints and maintain exact coordination between their foot, hand, and eye movements with the ball and the other player [6]. Every time a team has ball possession, there are times when they exhibit relative stability (free throws), but other times when they exhibit instability (turnovers or mistakes when the opposition changes their defensive tactics).

These time-varying movements show how each team attempts to break or destabilize the opposition throughout every ball possession [7]. Sprints, rapid alterations of direction, rapid motions, and a multitude of stances are all necessary for playing basketball. Because of this, basketball players need to be extremely agile and balanced to make quick postural changes throughout the field[8].

Basketball has the highest injury rate amongst noncontact sports. The ankles, knees, and back area are said to be the most often injured joints in basketball players. A strenuous sport like basketball can be hard on players' physiques because of its intense body contact, common periodic sprints and jumps, individual battles, rapid shifts in direction with difficult technique, coordination requirements for dribbling, throwing, catching, sprinting, and low-intensity activities like walking, stopping, and jogging[9]. It showed that women were 60% more susceptible than men to getting injured. A number of studies have determined that there are notable differences among genders in injury prevalence, percentage, and risk at less competitive levels. It has been shown that women are more likely to have knee and ankle injuries when playing at the university and high school levels[10].

The capability of the abdomen and core areas to create or transfer power through the upper and lower limbs makes them crucial for entire-body balance and athletic success[11.] To stay balanced, a player needs to sustain an equal distribution of load around their center of gravity. The torso is in neutral alignment when a sportsperson, particularly a basketball player, sustains anatomically position, which causes the human body to allocate pressure evenly over the center of gravity[12]. As the middle link in the kinetic chain, the abdominal core is crucial to the body's function. This idea is crucial to comprehending how core strength training (CST) affects player performance, particularly in fast-paced, synchronized games like basketball.

The enhancement of physical fitness characteristics, including resilience, power, agility, equilibrium, and range of motion, has been facilitated by the widespread use of core stabilization training (CST) in the last few years[13]. In order to avoid or manage sports-related injuries, core exercises—which focus on torso strength—are widely employed in sports conditioning and recovery. Core workouts are used by many specialists; they are effective in treating and preventing backache as well as injuries to the extremities, such as hamstring strains and knee injuries. It's a common belief that improved core strength equates into improved athletic success[14].
Developing muscularity and quickness is usually a major focus of basketball conditioning and strengthening regimens. This emphasis is based on certain game actions that individuals frequently execute in both offensive and defensive scenarios, such as leaps, straight sprints, speeds, slowdowns, and direction shifts[15].Basketball athletes also practice intense diagonal motions and frequent runs, which highlight the necessity of giving it your all throughout a match[32]. The majority of sports performances depend on the development of explosiveness, which can be achieved through plyometric training. Plyometric drills are particularly helpful for athletics where quickness is a must. The capacity to use maximum force when moving at a fast pace is known as speeding-strength. Sports involving leaping for shots and basketball exercises call for quick strength[16]. The quick motions associated with plyometric training can enhance brain function. It is divided into 3 phases:

1) the pre-activation phase, or eccentric phase;

2) The amortization phase, or isometric phase; and

3) The shortening phase, or concentrated phase[17]

A quick run occurs for 21 to 39 seconds over a basketball game, while an HIA repeats every 10 to 20 seconds. The capacity to quickly shift directions in response to various inputs is known as reactive agility, or RA. Basketball athletes frequently need to respond to opponents with fast, explosive moves, therefore reactive agility in a wide-open setting is essential[18].

It can be categorized based on several factors. Isometric, concentric, eccentric, or eccentric-concentric contractions are examples of how power appears based on the neuro-muscularelement[19].The neuromuscular network is used in plyometric workout, which includes leaping, jumping around, and hopping in different paths, to engage muscle fibers throughout the eccentric part of contraction and to improve adaptable energy storage and utilization within the phase known as concentric. PT regimens are typically created to enhance a variety of athletic abilities, including power, quickness, stability, and optimal and dynamic strength[20].

Movements that are either vertical or horizontal, or a mix of the two, are included in plyometric training. Although the stress placed on the musculo-tendinous components is higher within the vertical jump, producing an additional stretching tension and permitting a higher usage of elasticity while the concentric phase, the SSC adds a greater amount to the success of vertical jumps compared to horizontal leap ability[21]. Plyometric exercises in basketball are designed to build powerful muscles, which enable players to jump above, run quicker, and make rapid shifts in direction more skillfully[22]. Latest study has shown that, in order to get the best activity effectiveness, force must be applied in the desired direction—vertical, horizontal, or lateral—rather than merely raising ground reaction stresses[23].

Muscle power is the quantity of effort that a muscle can do in a given length of a period of time whereas agility is the ability to manipulate the entire body quickly and shift motion or speed in reaction to an input[24]. Numerous investigations have shown how beneficial it is to combine both vertical and horizontal leaps to increase make a jump, running, and shifting directional-skills[25]. Additional height acquired throughout a basketball jump provides more favorable conditions for baskets and rebounding[26].

Movements that use the sagittal plane, like depth leaps, hurdle steps, and box jumps, are frequently highlighted in plyometric workout regimens. The implications of plyometric exercise undertaken

in various planes of movement weren't well studied. It was discovered that a multidirectional jump-training program enhanced performance[27].

Boosting Vertical Jump Performance (VJP) is key in numerous sports as well as is the result of muscle endurance and quickness. Plyometric workouts possessesan important impact on typical vertical leap efficiency, may improve at the rate of 4-8% on average in jump heights, and provides to the achievement of physical wellness in healthy people [28]. Among adolescents basketball enthusiasts, plyometric workouts is suggested as an essential component in the process of conditioning, with the objective to improve the velocity of quick sprints[29].

The most popular plyometric exercises are the countermovement leap, drop leap, and squat leap[30]. In terms of basketball, this approach is currently identified as an essential component in the procedure, specifically focused on boosting vertical leap capacity[31]. The capacity to quickly change directions throughout a sequence of motions yet retain control over your body's stance is known as agility[32]. In addition, basketball players' efficiency depends heavily on their dynamic coordination and quickness. These are the movements which can contribute to an increase of quickness [33].
Conditioning for balance needs to be among the factors necessary for agility abilities to be adaptable. Balance is dependent on the proper functioning of sensory signals, their understanding and processing in the central nervous system, and a motor system's efficient kinetic efferent control, which is produced by the CNS. The vestibular, somatosensory, and visual systems make up the majority of the afferent circuit [34].

The capacity to keep an individual's center of gravity within the framework of stability is known as postural control, and it may be classified into two categories: static or dynamic balance[35]. Risk variables: Foot and knee injuries can be linked to a loss of neuronal control over the lower extremities. The capacity to keep the human body's center of balance inside its base of support is known as neuromuscular regulation. Programs involving neuromuscular conditioning have been shown to be successful in lowering the likelihood of lower limb injuries in a range of athletics[36].

Dynamic stability is the capacity to carry out an action simultaneously preserving or retrieving an upright posture, or the capacity to keep or achieve equilibrium on an unsteady surface with the

least amount of unneeded movement. Dynamic balance, a skill-associated component of wellness that entails maintaining stability when moving, is increasingly included into fitness and strength-training programs[37].

According to theory, agility ought to develop through improved control and equilibrium over body positions throughout locomotion. plyometric drills were utilized in sports including tennis, football, soccer, and other competitions where sportsmen may benefit from increased agility because of their increased power as well as effectiveness[38].

Hence this study is aimed to find out whether combination of Core stability and Biplaner Plyometric exercises is beneficial in improving strength, agility and balance in basketball players.

METHODOLOGY

Type of study – Experimental, Study design – Randomized Control Trails. **Inclusion Criteria:** Professional Players who are regularly playing basketball since 1 Year, Age Group between 15 - 25 Year, District and State level player, Subjects willing to participate, Subjects of all gender are included. **Exclusion Criteria**: Subjects having trauma or fracture less than 3 months, Subjects with current pain, or previous surgery to the lower limb, History of injury in past 6 months.

PROCEDURE

Ethical clearance has been obtained from the institutional ethical committee of D.Y.Patil education society Kolhapur with reference no (DYPMCK/IEC.261/2023). The subject has been screened according to inclusion and exclusion criteria. Written consent form the participant has been prior obtained. The study was conducted at KridaSankul, Kolhapur. Total 50 Participants were randomly divided into two Group A (Experimental group) and Group B (Control group) which were 25 participants in each Group. Group A includes Basketball Specific Training and Group B includes Core strengthening exercises and Plyometric exercises). Before commencement of study, baseline values such as Vertical Jump Test, Sit-up Test, Agility-T test, Y-Balance test will have been be recorded. The duration of intervention given is 8 weeks. Training program has been last about 60 minutes, which includes 10minute warm-up session and 40minutes main exercises (Plyometric exercises and Core Exercises) and 10 minutes Cool-down session, 3 times a week. After 12th session that is in mid of session values will be recorded and after 24th session that is completion of 8weeks post-intervention data will be recorded on the next day of termination of the study. Statistical analysis has been recorded and the result is obtained.

RESULTS

Arithmetic mean & standard deviation was calculated for each outcome measure.Arithmetic mean was derived from adding all the values together and dividing the total number of values.The analysis was done with the help of Paired-t and Unpaired –t test. The statistical analysis was performed with using Microsoft excel.C:\Users\ddasi\AppData\Local\Microsoft\Windows\INetCache\IE\KG345XGS\masterchart final.xlsx

Interpretation

Group A Age, height, weight, BMI with valuesrepresent mean age 22.65 ± 1.46, mean Height 162.1 ± 1.59, mean Weight 62.16 ±6.35, mean BMI 21.36 ± 2.05

Represent Group A Gender Distribution among participant with 14 and 11 Male and Female Respectively

Table No. 1

	Mean	**Std. Dev.**
Age	20.75	2.40
Height	164.12	7.45
Weight	58.21	2.01
BMI	20.865	3.53

Table no. 1 Represent Group B Age, height, weight, BMI with valuesrepresent mean age 20.75 ±2.40 , mean Height 164.12 ± 7.45, mean Weight 58.21 ± 2.01, mean BMI 20.86 ± 3.53

Table No. 2

Gender	**No. of Participants**
Female	11
Male	14

Total	25

Table no. 2 Represent Group A Gender Distribution among participant with 11 and 14 Male and Female Respectively

Table No. 3

Vertical Jump Test		
	Pre- Session	**Post - Session**
Mean	33.28	59.56
Std. Dev.	5.19	6.46
p-value	5.18137E-19	

Table no. 3 represents Group A Vertical Jump Test within group mean and standard deviation, pre intervention mean was 33.28 ± 5.19 and Post intervention 59.56 ± 6.46 with P-value of less than 0.005($5.181\ E^{\times 19}$)

Table No. 4

Agility -T Test		
	Pre- Session	**Post - Session**
Mean	15.92	11.41
Std. Dev.	1.548	0.61
p-value	4.0478E-14	

Table no. 4 represents Group A, Agility T- Test within group mean and standard deviation, pre intervention mean was 15.92 ± 5.19 and Post intervention 11.41 ± 0.61 with P-value of less than 0.005($4.047E^{\times 14}$)

Table No. 5

Sit -up Test		
	Pre- Session	**Post - Session**
Mean	27.12	43.52

Std. Dev.	5.53	4.55
p-value	3.47163E-20	

Table no. 5 represents Group ASit-up Test within group mean and standard deviation, pre intervention mean was 27.12 ± 5.53 and Post intervention 43.52 ± 4.55 with P-value of less than 0.005($3.477E^{\times 20}$)

Table No. 6

Y- Balance test (Right Leg)		
	Pre- Session	**Post - Session**
Mean	56.28	72.88
Std. Dev.	8.90	7.08
p-value	1.81788E-12	

Table no. 6 represents Group AY- Balance Test (Right Leg) within group mean and standard deviation, pre intervention mean was 56.28 ± 8.90 and Post intervention 72.88 ± 7.08 with P-value of less than 0.005($1.817E^{\times 12}$)

Graph 1

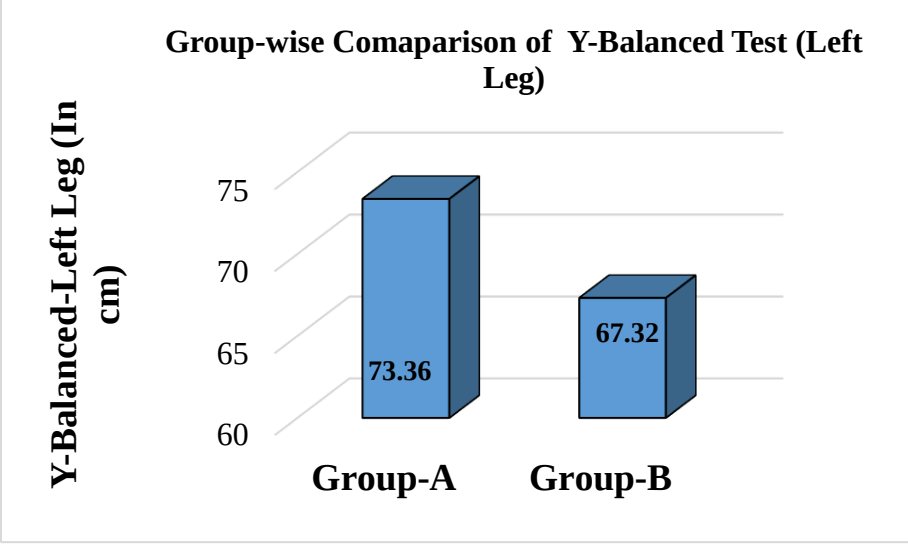

Table no. 1 represents Group A Y- Balance Test (Left Leg) within group mean and standard deviation, pre intervention mean was 57.6 ± 7.85 and Post intervention 73.36 ± 7.27 with P-value of less than 0.005($6.20\ E^{\times 14}$)

Table No.7

Vertical Jump Test		
	Pre- Session	**Post - Session**
Mean	30.56	48.24
Std. Dev.	6.73	3.65
p-value	1.39074E-16	

Table no. 7 represents Group B Vertical Jump Test within group mean and standard deviation, pre intervention mean was 30.56 ± 6.73 and Post intervention 48.24 ± 3.65 with P-value of less than 0.005($1.39\ E^{\times 16}$)

Table No.8

Agility -T Test		
	Pre- Session	**Post - Session**
Mean	17.032	15.532
Std. Dev.	1.97	2.06
p-value	4.5151E-08	

Table no. 8 represents Group B, Agility T- Test within group mean and standard deviation, pre intervention mean was 17.03 ± 1.97 and Post intervention 15.53 ±2.06 with P-value of less than 0.005 ($4.517E^{\times 8}$)

Table No. 9

Sit -up Test

	Pre- Session	Post - Session
Mean	24.36	31.36
Std. Dev.	3.84	4.24
p-value	2.5654E-14	

Table no. 9 represents Group B, Sit- up Test within group mean and standard deviation, pre intervention mean was 24.36 ± 3.84 and Post intervention31.36 ±4.24 with P-value of less than 0.005 (2.56 $E^{\times 14}$)

Table No. 10

Y- Balance test (Right Leg)		
	Pre- Session	**Post - Session**
Mean	63.36	70.6
Std. Dev.	8.64	7.52
p-value	9.08079E-14	

Table no. 10 represents Group B,Y- Balance Test(Right leg)within group mean and standard deviation, pre intervention mean was 63.36 ± 8.64 and Post intervention 70.6±7.52 with P-value of less than 0.005 (9.08 $E^{\times 14}$)

Table No. 11

Y- Balance test (Left Leg)		
	Pre- Session	**Post - Session**
Mean	61.68	67.32
Std. Dev.	7.15	6.45
p-value	1.60666E-13	

Table no. 11 represents Group B, Y- Balance Test (Left leg)within group mean and standard deviation, pre intervention mean was 61.68 ± 7.15 and Post intervention 67.32±6.45 with P-value of less than 0.005 (1.60 $E^{\times 13}$)

Table No. 12

Vertical Jump Test		
	Group-A	**Group-B**
Mean	59.56	48.24
Std. Dev.	6.462	3.655
p-value	4.09104 E-10	

Table no. 12 Group wise Comparison of Vertical Jump Test between group representing mean and standard deviation, Group A mean was 59.56 ± 6.46 and Group B 48.24 ± 3.65 with P-value of less than 0.005(4.091 $E^{\times 10}$)

Table No. 13

Agility -T Test		
	Group-A	**Group-B**
Mean	11.412	15.532
Std. Dev.	0.61	2.06
p-value	1.09881E-10	

Table no. 13 Group wise Comparison of Agility- T Test between group representing mean and standard deviation, Group A mean was 11.41 ± 0.61 and Group B 15.53 ± 2.06 with P-value of less than 0.005(1.09 $E^{\times 10}$)

Table No. 14

Sit -up Test		
	Group-A	**Group-B**
Mean	43.52	31.36
Std. Dev.	4.547	4.241
p-value	2.63024E-13	

Table no. 14 Group wise Comparison of Sit-up Test between group representing mean and standard deviation, Group A mean was 43.52 ±4.54 and Group B 31.36 ± 4.24 with P-value of less than 0.005(2.63 $E^{\times 13}$)

Table No. 15

Y- Balance Test (Right Leg)		
	Group-A	**Group-B**
Mean	72.88	60.52
Std. Dev.	7.079	4.18
p-value	1.0473E-08	

Table no. 15 Group wise Comparison of Y - Balance Test (Right leg) between group representing mean and standard deviation, Group A mean was 72.88 ±7.07 and Group B 60.52 ± 4.18 with P-value of less than 0.005(1.04 $E^{\times 8}$)

Table No. 16

Y- Balance Test (Left Leg)		
	Group-A	**Group-B**
Mean	73.36	67.32
Std. Dev.	7.274	6.453
p-value	1.590907E-04	

Table no. 16 Group wise Comparison of Y - Balance Test (Right leg) between group representing mean and standard deviation, Group A mean was 72.88 ±7.07 and Group B 60.52 ± 4.18 with P-value of less than 0.005(1.04 $E^{\times 8}$).

DISCUSSION

Basketball teams need to be developed to play at the highest level, which is a difficult task that depends on an awareness of the unique tactical, mental, emotional, and physiological

characteristics of athletes [38]. A variety of skills must be used in different circumstances throughout the match in order to win in basketball, which is a team sport. A complicated dynamic system that is challenging to regulate in its whole throughout competitions is determined by multidimensional parameters (offensive and defending strategies), which account for the majority of game-related data[39]. For many team basketball sports, sustaining peak performance throughout the whole season is a challenging but important goal [40].

The purpose of this study was to assess the impact of vertical and horizontal plyometric exercises combined with core stability on basketball players' strength, balance, and agility.

The Group A and Group B mean age of was 22.6 careers in their late teens and early twenties, hence large number of younger players are entering the sport. This was most convenient age and this was available near my place of study.

The experience of playing in basketball is major component in athletes, with well performed skills and a good physically fit. So in this present study the mean level of exprirence is 6.7 in group A and in Group B the level of experience is 7.1. So, by this, there is often development of foundation of skills and understanding the game. After 6-7 years of experience the players are likely to reach a certain level of competence skill, making them more proficient and consistent in their performance.

In order to successfully practice basketball sport, in addition to a high level of technical and tactical skills, the players must also process appropriate morphological characteristics[41]. The present study shows Group A mean weight, height and BMI is 62.1kg,162.6cm and 21.3 respectively.

Group B mean weight 58.3 kg, mean height 164.1cm and mean BMI 20.8. As the age criteria is 18-25 in our study, those in middle school or high school, the average height and weight would be lower than that of adult professionals. The Amateur player might have a different height and weight profile compared to professional athletes. A normal BMI suggest Basketball players tend to have a good balance between height and weight. While BMI is good indicator of healthy weight, basketball players often have higher muscle mass and lower body percentage.

This present study conducted study on effectiveness of core stability combined with vertical and horizontal plyometric training on strength, agility and balance in basketball players. The study concluded that after 8 weeks of core strengthening along with plyometric exercise helps in improving core strength, balance in basketball players

OzgurDogan et.al concluded that, the applied training program has an effect on the development of core strength and core stabilization, static and dynamic balance and basketball psychomotor development level. The core training program should be incorporated into fitness patterns for the growth to be durable. It is thought that doing it over the course of three days each week, on alternate days, and updating the program on a daily basis might be just given how it is implemented in the program, whereas in our current study there was significant increase in core strength and dynamic balance after performing a 8 weeks tailored protocol which includes core stability exercises which has been combined with plyometric exercises.

WeiweiFenget et.al conducted study on The effect of 12-week core strength training on dynamic balance, agility, and dribbling skill in adolescent basketball players and hence concluded that the 12-week CST program significantly improved dynamic balance, agility, and dribbling skills in adolescent basketball players, demonstrating its potential as a valuable training component.(ref) Meanwhile in this study showed results , there was good improvement in agility and core strength in basketball players. After following the modified core and plyometric exercises (in plyometrics includes vertical and horizontal plyometric exercises). So this study showed a progress in the performance of basketball game.

SentuMitra et.al concluded that the result reveals that there was significant effect of the plyometric training programme on agility of basketball players but no significant effect was found by resistance training programme. Based on the findings, plyometric training help to improve agility of basketball players since the agility performance of the subjects of experimental groups were found statistically significant. Basically this present study had a considerable improvement in vertical jump and agility and dynamic balance after 8weeks core strengthening and plyometric exercise protocol. And the basketball players performed well in their practice as well as tournaments.

Yixin Liu According to the findings, the experimental group suggested an increasingly notable enhancement of muscular group strength following further core strength conditioning, while the control group experienced a rise in muscle group strength following traditional exercise. The experimental group also exhibited improved balance and motor skills following core strength training, which led to a considerably greater shooting percentage.

One more author Abhilash PV et.al claimed that there was a positive correlation between core endurance (flexion and extension) and dynamic balance in professional basketball players. Daily core strength training programs help elite basketball players' dynamic equilibrium, that can ultimately lower their probability of injuries and increase their athletic ability, according to this research. Additionally Sajad Bagherian et.al suggested that, an 8-week core stability training program enhances functional movement patterns and dynamic postural control in collegiate athletes. The benefits are more pronounced in collegiate athletes with poor movement quality.

The current study found that core stability exercise with addition of biplaner plyometric exercises hence the core strengthening and balance in basketball players, the core and plyometrics help in improving strength and balance.

Lei Chen et.al The results show that after 16 weeks, the experimental group is obviously better than the control group in 28-meter sprint and vertical jump, but there is no significant difference explosive power, the enhanced training is more effective and overall.

Further, Dr Kaushik Talukdar et.al noticed that idzn comparison to the control group, the vertical group significantly improved Vo, Vmax, vertical and broad jump scores whereas the horizontal group significantly improved broad jump and 20 m split time scores, the findings of this study suggest that both HT and VT are effective in improving sprinting kinetics but within group changes in the horizontal plyometric training group was greater in this cohort.

other author Matthieu P. J et.al stated that while an 8-week plyometric training program was effective at improving both CMJ and agility performance for both shoe conditions, the improvements were greater for the group wearing raised forefoot platforms.,

lastly an author Brian T. McCormick et.al believed that Plyometrics training is an effective modality to improve power and CODS performance, and basketball coaches should use multidirectional plyometric training rather than training in only 1 plane.

Hence, Core and Plyometric exercise most beneficial in basketball player to enhance their Physical fitness and overall performance.

CONCLUSION

This study concluded core stability combined with vertical and horizontal plyometrics exercise showed a significant increase in core strength, vertical jump, agility and dynamic balance. Adding

a Biplaner Plyometric exercises helped athlete to improve more explosive lower limb strength and power. This showed the good athletic performance.

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