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Effectiveness of Plyometric Training and Bosu Ball Training on Agility, Speed and Balance Among the Volleyball Players

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ABSTRACT

BACKGROUND: Balancing, agility and speed are important skills of Volleyball players. Y Balance Test, t agility test are the type of outcome measure used to measure the Balancing, agility and speed.
PURPOSES: To find the effectiveness of plyometric training and Bosu ball to improve agility, speed and balance among the volleyball players.
METHODOLOGY: The study design was an experimental study; 30 male volleyball players were selected from Indhra Gandhi stadium. They were allocated divided into two groups, Group A (n=15) Bosu Ball and plyometric Training Group B (n=15) plyometric Training alone, 3 sessions in a week for 6 week, The outcome measure Y Balance Test, t agility test were measured in pre and post-test for 6 week period.
RESULTS: Data analysis was done by unpaired 't' test and paired 't' test for the between group and within the group analysis respectively. The statistical analysis done with unpaired 't' test within the Group A and Group B analysis shown significance ($p<0.01$). Which shows that Group A must be significant than Group B, it has been concluded that Group A shows improvement in balance, speed and agility in volleyball players with the outcome measures than Group B.
CONCLUSION: This study concludes that the Bosu Ball along with plyometric Training (Group-A) shows more significant improvement in balance, agility and speed in volleyball players when compared with conventional treatment (Group –B).

Keywords: Bosu Ball, Balance, speed, agility, Y Balance Test and t agility Test.

INTRODUCTION

Volleyball is an Olympic sport most of them played in India. This game constitutes movements like sprinting for short distance, jumping, changing of direction, hitting and diving. Agility, balance and speed are the most important fitness component required for a volleyball players[1]. Therefore, increasing all the three entity through the training in our study.

Plyometric can improve the player skills and strength. Plyometric training can increase the ability and physical performance to do different activities The plyometric training

consists of repeated rapid stretching (eccentric action) and contracting of muscles (or) shortening action of muscles which increase power in volleyball players. Plyometric training techniques used in volleyball players to improve strength and explosiveness.[2] Plyometric usually involve starting, changing directions and stopping in an explosive manner. These movements are improving the agility and speed. Agility is the ability to maintain control body position which quickly changing direction during the any activity. The power, speed and agility improved through the plyometric training in volleyball players[3,45].

BOSU- Both Sides Utilized. The bosu ball is a device that was used for training the balance in the players. The design of bosu ball provides a solid plastic base mixed with an inflatable rubber bladder that look like a half Swiss ball. It is a strong rubber hemisphere fixed to a solid circular base of industrial non- slipping fibres, but the ball is limited with prominent lines on its use full rotation but not slip from above or from the side and can be used and work the players in all directions[6,7,8].

The bosu ball provides unstable surface training. The device is often used for balance training. When the dome side faces up, the bosu ball provides an unstable surfaces training which is used. Bosu ball is considered by the modern means that assists in acquiring the basic physical fitness elements. Bosu ball as an assisting mean contributes to the acquisition of the specific physical qualities and general fitness[9,10].

NEED AND AIM OF THE STUDY

Among volleyball players, balance and agility performance are the most important. Several studies have shown that plyometric training improves agility in young basketball players, and another study showed that using a bosu ball to improve balance and jumps in football players. Upto my knowledge, there was no study has been done to find the effectiveness of plyometric training and bosu ball to improve agility, speed and balance among the volleyball players. So, this study focuses on effectiveness of plyometric training and bosu ball to improve agility, speed and balance among the volleyball players.

MATERIALS & METHODS

This study was an experimental study conducted on 30 male volleyball players who were separated into 2 groups, Group A experimental group (n= 15) and Group B control group (n= 15). Each group was undergone for various training protocol to enhance the balance, speed and agility performance among the volleyball players. In that experimental group subjects were trained with bosuball along with plyometric training and the control group were trained with plyometric training alone. All the subjects were taken consent and assist with YBT and T agility before interventions.

SELECTION CRITERIA

The male students between 18 to 23 years, who are beginner volleyball players (1to 3 months) were included. Players who have undergone surgery in the lower limb during past 6 months, any lower limb fractures and dislocations, elite players and who are not willing to participate were excluded.

PROCEDURE

OUTCOME MEASURE:

1. Y BALANCE TEST[11,12]

The dynamic balance was assessed for the dominant leg of the players using Y balance test. The subject stands in the single leg stands while reaching as far as possible with contralateral leg in three directions (anterior, postero-medial and postero-lateral) and measures the distance using the measuring tape the two lines extended at an angle of 135° from the anterior line. The test was demonstrated by the guide to create a better understanding to all participants. The accurate evaluation of dynamic balance to hold their both hands-on pelvic tilt and complete their practice trails in each direction with the dominant leg. The non-dominant leg is placed in the centre of the

intersection of two lines each participant was given one minute interval between each test for the dominant leg. The mean values of the three readings were taken and documented.[11,12]

FIG 2: YBT SHOWS ANTERIOR DIRECTION ON THE DOMINENT LEG

2. T- AGILITY TEST

The 3 cones are arranged in a straight line with a distance of 5 metres between each cone. A 4th cone is placed perpendicular to the centre cone at a distance of 10m so that the four cones form a T.

- ❖ The volleyball player starts at the base of the T (4th cone).
- ❖ The guide gives signal to start and when the player crosses the start line the guide starts the timer.
- ❖ The player runs to the centre cone and touches it.
- ❖ Player side steps 5 metres to the right-side cone and touches it.
- ❖ Player side steps 10 metres to the far left side cone and touches it.
- ❖ Player side steps 5 metres back to the centre cone and touches it.
- ❖ Player runs 10 metres backwards and touches the cone at the base of the T (4th cone).
- ❖ The guide stops the timer when the player crosses the end line.

FIG 3: T AGILITY TEST

TRAINING METHOD

BOSU BALL TRAINING

The name BOSU "Both Sides Utilized". It means that balance can be used on either side the dome or the unstable surface. One side it is inflated rubber hemisphere with flat platform other dome side has unstable surface. Bosu ball is placed in the centre of the volley ball court. The training was given for 6 weeks of duration it is done in frequency about 3 sets alternate days per week with 10 repetition for 6 weeks of duration[13]

The Bosu Ball Training Includes

1. Single leg hop on bosu ball
2. Lateral squat Jump on bosu ball

3. Squat on bosu ball
4. Two hand bump on bosu ball
5. Standing position on bosu ball

FIG 4: BOSU BALL

1. SINGLE LEG HOP ON BOSU BALL

Place the bosu ball flat surface down the subject left leg should be in single leg hop and right foot should be in the middle of the bosu ball and subject should hop and come to his starting position it is done with the frequency of 3 sets 10 repetition.

2. LATERAL SQUAD JUMP ON BOSU BALL

Place the bosu ball with the flat side on the floor start with their left foot in the middle of the bosu ball and your right foot on the floor squat down into a small squat. Their ankles, knee and hip should line up with each other the leg on the both will be the leg you push off with the leg on the bosu ball jump up switch leg on the bosu ball and squad back down again. It is done in frequency about 3 sets alternate days per week with 10 repetitions for 6 weeks of duration.

3. SQUAT ON BOSU BALL

Place the dome surface down the ground the subject was asked to stand on the unstable surface (arms raised forward, back straight and maintain the centre of gravity) then subject do the squat slowly on the bosu ball. The subject done with frequency of 3 sets 10 repetition and 10 to 15 seconds rest between each set for 6 weeks duration.

4. TWO HAND BUMP ON BOSU BALL

Place the dome surface down the ground in front of the wall the subject was asked to stand on the unstable surface and balance for 10 to 15 seconds. Then therapist gives the volleyball and ask them to do underarm pass in front of the wall by balancing on the bosu ball. The subject done with frequency of 3 sets 10 repetition alternate days per week. They have 10 to 15 seconds rest between each sets.

5. STANDING POSITION ON BOSU BALL

Place the dome surface down the ground the subject was asked to stand on the unstable surface the subject comfortable position placed the arms raised forward or placed the hand on hip, back should straight and maintain the centre of gravity. The subject stand on the bosu ball more than 40 seconds we progressing to eye closed.

FIG 5: SINGLE LEG HOP ON BOSU BALL

FIG 6: LATERAL SQUAD JUMP ON BOSU BALL

FIG 7: SQUAT ON BOSU BALL

FIG 8: TWO HAND BUMP ON BOSU BALL

FIG 9: STANDING POSITION ON BOSU BALL

PLYOMETRIC 6-WEEK TRAINING PROTOCOL[14,15]

The pre and post training was conducted used to determine the agility outcomes. The T- test was used to determine the sprinting, right and left side shuffling, speed with directional changes and back pedalling. The training program was based on intensity and volume from using sets, repetitions and drills. During the training, we instruct the subject how to perform each exercise under the supervision.

Training Week	Training Volume (Foot contacts)	Plyometric Drill	Sets X Reps	Training Intensity
Week 1	80	Side to side ankle hops Standing jump and reach Front cone hops	2 X 12 2 X 12 5 X 4	Low Low Low
Week 2	100	Side to side ankle hops	2 X 10	Low

		Standing long jump Lateral jump over barrier Double leg hops	5 X 6 2 X 12 5 X 4	Low Medium Medium
Week 3	110	Side to side ankle hops Standing jump and reach Front cone hops Double leg hops Lateral cone hops	2 X 10 4 X 6 2 X 10 3 X 8 2 X 8	Low Low Medium Medium Medium
Week 4	100	Diagonal cone hops Standing long jump with lateral sprint Lateral cone hops Single leg bounding Lateral jump single leg	4 X 8 4 X 6 2 X 9 4 X 7 4 X 4	Low Medium Medium High High
Week 5	100	Diagonal cone hops Standing long jump with lateral sprint Lateral cone hops Cone hops with 180 degree turn Single leg bounding Lateral jump single leg	2 X 5 4 X 4 4 X 5 4 X 7 4 X 5 2 X 7	Low Medium Medium Medium High High
Week 6	100	Diagonal cone hops Hexagon drill Cone hops with change of direction sprint Double leg hops Lateral jump single leg	2 X 10 2 X 10 4 X 6 X 4 X 6	Low Low Medium Medium High

TABLE 1: PLYOMETRIC 6-WEEK TRAINING PROTOCOL

STATISTICAL ANALYSIS & RESULTS

WITHIN THE GROUP ANALYSIS OF Y BALANCE TEST

TABLE 2: showing the pre and post test values of GROUP A (paired t-test values)

GROUP A	Mean	SD	t – value	p – value
Pre Anterior	73.8	7.311	4.09923	<0.001
Post Anterior	84.67	7.207		
Pre Posterolateral	68.26	6.818	6.51625	<0.001
Post Posterolateral	82.93	5.430		
Pre Posteromedial	74.67	6.007	5.22061	<0.001
Post Posteromedial	85.33	5.150		

TABLE 3: showing the pre and post test values of GROUP B (paired t-test values)

GROUP B	Mean	SD	t – value	p – value
Pre Anterior	74.13	9.187	2.8850	<0.001
Post Anterior	83.26	8.119		
Pre Posterolateral	72.73	10.278	2.0371	<0.001
Post Posterolateral	80.53	10.689		
Pre Posteromedial	74.53	9.014	2.4025	<0.001
Post Posteromedial	82.6	9.371		

WITHIN THE GROUP ANALYSIS OF T AGILITY TEST

TABLE 4: showing the pre and post-test values of GROUP A (paired t-test values)

GROUP A	Mean	SD	t - value	p – value
Pre Test	11.15	0.410	12.93	<0.001
Post Test	8.96	0.510		

TABLE 5: showing the pre and post-test values of GROUP B (paired t-test values)

GROUP B	Mean	SD	t - value	p – value
Pre Test	12.65	0.576	5.77	<0.001
Post Test	11.47	0.538		

Within group study inference

In the present study, 30 male volleyball players were taken with an average age group of 20.6±0.5. The pre and post-test of YBT and t-agility test mean difference for control group shows very significant with (t value anterior – 2.885, PL- 2.037, PM- 2.402) and p value (p<0.001). And the pre and post-test of YBT and t-agility test mean difference for experimental group shows very significant with (t value anterior - 4.099, PL- 6.516, PM- 5.220) and p value (p<0.001).

BETWEEN THE GROUP ANALYSIS OF Y BALANCE TEST

TABLE 6: showing the pre and post-test values of GROUP A & B (unpaired t-test values) –Anterior Direction

	Mean	SD	t – value	p – value
GROUP A	10.8666	0.9154	3.645	< 0.001
GROUP B	9.1333	1.597	3.90	< 0.001

TABLE 7: showing the pre and post-test values of GROUP A & B (unpaired t-test values) – Posteromedial direction

	Mean	SD	t – value	p – value
GROUP A	10.666	1.988	3.6210	< 0.001
GROUP B	8.0666	1.944	3.90	< 0.001

TABLE 8: showing the pre and post-test values of GROUP A & B (unpaired t-test values) – Posterolateral Direction

	Mean	SD	t - value	p – value
GROUP A	14.666	2.526	8.2428	<0.001
GROUP B	7.8	2.007	3.90	<0.001

BETWEEN THE GROUP ANALYSIS OF T AGILITY TEST

TABLE 9: showing the pre and post test values of GROUP A&B (unpaired t-test values)

	Mean	SD	t – value	p – value
GROUP A	2.189	0.319		< 0.001
GROUP B	1.177	0.112	11.573	

Between group study inference

The YBT and t agility test group analysis shows experimental group very significant than control group with the t value of (anterior- 3.645, PL- 3.6210, PM- 8.2428 and 11.573) since p value is (p<0.001).

DISCUSSION

The present study is an experimental study conducted to find out the "effectiveness of plyometric training and bosu ball to improve agility, speed and balance among the volleyball players". This study was selected for the purpose to improve the agility, speed and balance among volleyball players. Based on the inclusion criteria, the subject have been selected with the age group of 18 – 23 years.

30 male volleyball players were taken and are divided into two groups Group- A (n=15; bosu ball and plyometric training) and Group B (n=15; plyometric training alone). The outcome measure showed the significant improvement in balance, agility and speed in the experimental Group A (plyometric training and bosu ball) than the control Group B (plyometric training alone) which shows that the experimental group is significant than the control group.

PRATAMA D. NUGRAHA studied the effect of ankle strengthening exercise on balance in youth basketball player. Bosu ball is a tool that can be used in functional training or exercises related to daily movements. Based on this analysis, bosu ball exercise is better than theraband exercise because the muscle group responsible for maintaining balance in the training process is more complex, starting from the leg muscles to the back muscles. Whereas in theraband exercise, the balance guard muscles that are trained only focus on the muscles in the legs. When compare to my study the unstable devices like bosu ball which is mainly given to improve the balance among volleyball players[16].

MYER (2005) studied the effect of a six week, multi-component training program which included resistance training, plyometric training and speed training significantly enhanced strength, jumping ability and speed in female adolescent athletes. In relation to my study the plyometric training used to improve the

speed and agility among the volleyball players.[17]

From the above discussion the benefit of bosu ball and plyometric training for balance, agility and speed helps to maintain the biomechanical properties of joints and muscles, also the 6 weeks of training shows significant difference on improving balance, agility and speed performance in volleyball players.

Hence null hypothesis is rejected.

CONCLUSION

This study concludes that the Bosu Ball and Plyometric Training (GROUP A) shows significant improvement on agility, speed and balance performance when compare with Plyometric Training alone (GROUP B) for 6 weeks on volleyball players.

Limitations And Recommendations

The limitation of this study is that only male volleyball players have been taken this study and the sample size were small. In future study can have more participants and use the both genders then use the more outcome measure.

Declaration by Authors

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REFERENCES

1. Shalik Mannan, P. Johnson Impact of volleyball specific plyometric training on speed power and agility of male volleyball players. *Asian Journal of Multidisciplinary Research Volume 1- Issue 2-, pp-23-27 2015.*
2. Riadh Khlifa, Ridha Aouadi studied the effect of plyometric training program with and without added load on jumping ability in basketball player. *24(11)/2955–2961 Journal of Strength and Conditioning Research 2010 National Strength and Conditioning Association*
3. Craig, B. W. what is the scientific basis of speed and agility. *Strength and Conditioning Journal, v. 3, p. 13-14, 2004.*
4. Miller J. M. Hilbert, S. C. Brown, L. E. Speed, quickness, and agility training for senior tennis players. *Strength and Conditioning, v. 5, p. 62-66, 2001.*
5. Miller M. G. Hernimanj. J. Ricard, M. D. Cheatham, C. C. Michael, T. J. The effects of a 6-week plyometric training program on agility. *Journal of Sports Science and Medicine, v. 5, p. 459-465, 2006.*
6. Nevin Badr, studied the effect of bosu ball training on teaching and improving the performance of certain handball basic skill. *Science, Movement and Health, Vol. XIII, Issue 2 supplement, 2013 September 2013, 13 (2), 498-505*
7. Abdurrahman Denir studied the balance disc and bosu ball on strength development of ankle dorsiflexor and plantar flexor muscle of sedentary children. *European Journal of Physical Education and Sport Science ISSN: 2501-1235 ISSN- L: 2501 -1235*
8. Charmi Salot, P. Sathya, Jibi Paul, studied the effects of bosu ball exercise on jump performance in football players. *Int J Physiother. Vol 7(4), 136- 139, August (2020).*
9. Dr. Jaishree Tiwari. Comparative study of plyometrics pushups versus plyometrics drills exercises for throwing accuracy in basketball players. *Indian journal of applied research volume – 12, issue – 02, February – 2022.*
10. Young, W. Hawken, M. Mcdonald, L. Relationship between speed, agility and strength qualities in Australian Rules football. *Strength and Conditioning, v. 4, p. 3-6, 1996.*
11. Philip J. Plisky, Mitchell J RAUH Studied star excursion on balance test as a predictor of lower extremity injury in High school basketball players. *J Orthop Sports Phys Ther 2006 Dec; 36(12):911-9. doi: 10.2519/jospt.2006.2244.*
12. G Ipekoglu the effect of bosu training effect on dynamic and static balance in adolescent taekwondo athletes. *Kinesiologia slovenica, 24, 1, 5 -13 (2018).*
13. Aisha Elfateh effects of ten weeks of instability resistance training (bosu ball) on muscular balance and the learning level of fencing basics. *Science, movement and health, vol. xvi, issue 2 supplement, 2016*

September 2016, 16 (2, supplement): 273-279 original article.

14. B Singh studied the effect of a short term plyometric training program of agility in young baskertball player. *Brazilian journal of biomotricity 5(4), 271-278, 2011.*
15. Haryana Sonepat studied the effect of wobble board balance training program on static balance, dynamic balance and triple hop distance in male. Collegiate basketball athlete. *Int J Physiother Res 2014, Vol 2(4):657-62. ISSN 2321-1822.*
16. Pratama D Nugraha studied the effect of ankle strengthening exercise on balance in youth basketball players. *Pedagogy of physical culture and sports 26 (1), 57-67, 2022.*
17. Myer GD, Ford KR, Palumbo JP, Hewett TE. Neuromuscular training improves performance and lower-extremity biomechanics in female athletes. J Strength Cond Res. 2005 Feb;19(1):51-60. doi: 10.1519/13643.1.

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