



INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING, TECHNOLOGY AND MANAGEMENT

Volume 10, Issue 3, March 2023



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.580



+91 99405 72462



+9163819 07438



ijmrsetm@gmail.com



www.ijmrsetm.com

Effect of Core Strengthening Exercises and Core Plyometric on Agility and Balance in Volleyball Players: A Pilot Study

Megha Doshi, Dr.Bhavana Gadhavi

MPT Scholar Physiotherapy, Parul Institute of Physiotherapy, Vadodara, Gujarat, India

Principal, Physiotherapy, Parul Institute of Physiotherapy, Gujarat, India

ABSTRACT:

BACKGROUND: Volleyball involves movements consisted of technical skills of different intensity performed in an aerobic environment in terms of playing. Core exercises and plyometrics include activity of back, abdominal and gluteal muscles. These muscles play important role in transferring power between upper and lower extremities.

OBJECTIVES: This study aims to compare the effect of core strengthening and core plyometric on agility and balance in volleyball players.

METHODOLOGY: 20 subjects who were meeting inclusion criteria are taken and randomly assigned into two group. Group A underwent core strengthening exercises where as Group B underwent core plyometric exercise for 6 weeks. Agility was measured by Illinois test. Balance was measured by Y balance test.

RESULT: The results of the Illinois test and the Y Balance test are reported in mean and standard deviation. On comparison of pre and post intervention of mean difference and standard deviation of core strengthening (Group A) vs core plyometric group (Group B) show significant improvement in agility (1.83 ± 0.4372) and (1.35 ± 0.5579), balance (5.8 ± 1.9888) and (4.9 ± 1.972) respectively. Wilcoxon test and Mann-Whitney test were performed to determine the significance of pre and post test parameters. After data analysis, a p value of 0.05 was discovered.

CONCLUSION: This study concludes that both groups show improvement in agility and balance but there is more significant improvement in group B with plyometric exercises.

CLINICAL IMPLICATION: Both plyometric and strength training are recognized as important components of fitness programs. The plyometric training is more emphasis along with strength training.

KEY WORDS: Core exercise, Plyometric, Volleyball, Agility, Balance

I. INTRODUCTION

Volleyball is a strenuous anaerobic activity that entails quick recovery intervals between explosive movements (i.e., in both vertical and horizontal directions). As a result, explosive strength is regarded as a crucial component of effective athletic performance. In fact, power emerges when maximum strength is paired with speed and agility.^[1]

To produce, transfer, and control forces to and from the terminal segments as efficiently as possible during functional tasks, one must have "core stability," which is the capacity to regulate trunk position and motion. Static control and dynamic control are both included in the notion of stability. This encompasses the neuromuscular system's capacity to maintain the trunk in (or bring it back to) an upright position (static) and regulate trunk motions (dynamic).^[2]

Core exercises are training exercise routines that volleyball players practise using their own body weight or assistive equipment, with the goal of developing central muscular strength and postural balance. Core exercises target the buttocks, back, and abdominal muscles. These muscles are crucial in transmitting power between the lower and upper limbs.^[3]

Plyometric exercises have been utilised to improve muscle power and strength across many sports. Eccentric motions in plyometric workouts are followed by concentric contractions of the same muscle group.^[3] When combined with a periodized strength training programme, plyometric training can improve vertical jump performance, joint awareness, and proprioception. Plyometric exercise programmes incorporate abrupt beginning, halting, and direction changes. These are the movements that can aid in the improvement of agility.^[4]

Agility is an important element of athletic performance since it refers to the capacity to perform whole-body and local motions quickly, effectively, and efficiently. While the capacity to swiftly and precisely change a movement's direction

or speed is the traditional definition of agility, most modern definitions now include a cognitive component. This includes characteristics like foresight, perceptual and visual recognition, reaction time, and concentration skills.^[5] Balance can be split into static and dynamic categories. Dynamic balance refers to the capacity to preserve the equilibrium of the body while it is in motion as opposed to static balance, which is the capacity to preserve the equilibrium of the body at a specific location or posture. Balance can be used for athletes both to increase sportive performance and to prevent injuries.^[8] Balance is a key component of physical motions that plays a part in the successful demonstration of sports skills, changing direction, maintaining a certain position of the body, and preventing damage.^[6]

A quick and accurate test to determine a player's balance is the Y Balance test.^[7] The individual is required to maintain balance on one leg while simultaneously reaching for the other leg in three different directions: anterior, posterolateral, and posteromedial. Thus, the exam gauges an athlete's power, steadiness, and balance in several planes. The Y balance test score is obtained by adding the findings of the three reach directions and adjusting them to the lower limb reach.^[8] The person begins the Illinois agility test by laying face down by the first cone.^[8] The agility area of the Illinois test is formed by four cones. Athlete completes two 9.2 m sprints to complete the agility course after sprinting 9.2 m on command from a standing posture, turning, and returning to the starting line. Technical guidance regarding the most efficient movement method was not provided. The athletes were told to finish the test as rapidly as they could. They were told not to cross over the markings, but rather to run around them.^[16] The time it takes to accomplish the task is then recorded. If a subject did not comply, the experiment was halted and re-tried after the required recuperation period.^[9]

II. METHOD OF COLLECTION OF DATA

This study was designed as a comparative study with the aim of analyzing and comparing the effect of two different interventions on a particular outcome. The sampling method used in this study was the odd and even method, which involves selecting participants based on whether their identification numbers are odd or even. A total of 20 participants were selected for this study using this sampling method. This method ensures that the sample is selected in a way that is unbiased and fair. By using comparative study design and the odd and even sampling method, this study can provide valuable insights into the effectiveness of the interventions being compared.

INCLUSION CRITERIA:

People who are willing to voluntarily participate in this study are welcomed. Eligible participants must meet the following criteria: they must be healthy individuals between the ages of 18 and 30 years. Individuals of both genders are eligible to take part in the study and they must have the ability to comprehend either English, Hindi, or Gujarati.

EXCLUSION CRITERIA:

The exclusion criteria for this study include any recent injuries or surgeries related to neurological or musculoskeletal conditions, any neurological disorder that affects balance, and any cardiorespiratory conditions that may impact agility.

OUTCOME MEASURES:

- ✓ Balance – Y Balance Test
- ✓ Agility – Illinois Agility Test

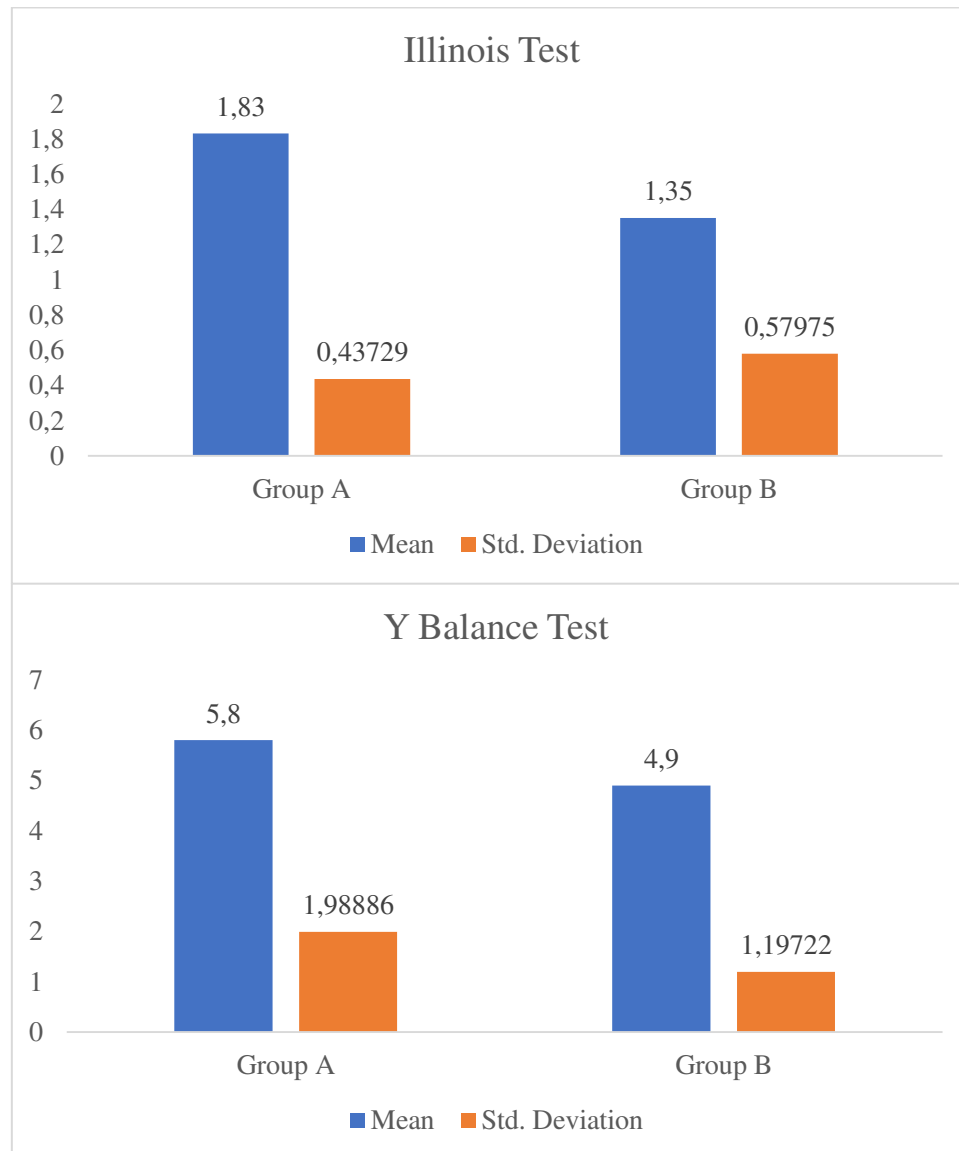
MATERIALS

- ✓ Pen
- ✓ Paper
- ✓ Swiss Ball
- ✓ Medicine Ball
- ✓ Stop Watch
- ✓ Cones
- ✓ Measure Tape

Athletes who want to willingly participant and match inclusion criteria were included in this study. Subjects were randomly assigned into two groups a core strengthening exercise group (Group A) and core plyometric exercise group (Group B). A total of 24 sessions were conduct for 6 weeks, 4 days a week. In training days, the session was consist of the warm up phase, core strengthening exercise and core plyometric exercise and cool down for group A and B respectively.

III. RESULT

The SPSS software, version 20, was used to conduct the statistical analysis. Comparison of the before and after was done. In the current study, descriptive analysis was used. The results of the Illinois test and the Y Balance test are reported in mean and standard deviation. Mann-Whitney test was performed to determine the significance of pre and post test parameters. After data analysis, a p value of 0.05 was discovered. Microsoft Word 2019 and Excel 2019 were used to create graphs and tables.



The results of the Illinois test and the Y Balance test are reported in mean and standard deviation. On comparison of pre and post intervention of mean difference and standard deviation of core strengthening (Group A) vs core plyometric group (Group B) show significant improvement in agility (1.83 ± 0.4372) and (1.35 ± 0.5579), balance (5.8 ± 1.9888) and (4.9 ± 1.972) respectively. The p value considered was >0.05 , indicating that there was a not statistically significant difference between group A and group B after the intervention, however, group A's results demonstrated a higher increase in Y Balance Test score than group B's. This study rejects the null hypothesis and therefore suggests that plyometric exercise improves agility and balance in badminton players than core strengthening exercise. Therefore this can be implemented in treatment protocol for further studies and to prevent injuries.

IV. DISCUSSION

In volleyball, agility and balance are most crucial elements. In order to balance when executing quick and precise techniques, agility is necessary (Vaczi et al., 2011). Balance is the capacity to sustain dynamic integration of internal and external pressures during motor action tasks (E. Bressel et al., 2007).

Mahemat et al., 2022 suggested that by including core exercises in volleyball training, results in agility, explosive strength, and balance appear to improve. The current research aimed to determine how core training impacted the balance, explosive strength, and agility of young female volleyball players.

Dr. Rajiv et al., 2018 conducted a study on core strengthening on dynamic balance and agility in badminton players. The modified star excursion scale result revealed greater distance in all three directions, and the t test result demonstrated increased agility. Core training has an impact on badminton players' dynamic balance and agility.

Raju et al., 2019 suggested that Pilates, Callisthenics and Plyometrics on sprint showed relatively little progress across all groups, which is not really noteworthy. In flexibility, Pilates group showed significant improvement and in parameters like agility and power the Plyometrics group showed significant improvement.

The study's purpose is to investigate the effect of Plyometric and Core strengthening exercise on agility and balance in volleyball players, as well as to compare the effect of Plyometric versus Core strengthening exercise.

Using simple random sampling, 20 people were selected for the research and divided into 2 groups. For six weeks, individuals in Group A performed core strengthening exercises, while those in Group B participated in core plyometric exercises. Agility was evaluated using the Illinois test. Balance was evaluated using the Y-Balance test.

This research indicates that plyometric exercise improves agility and balance in volleyball players more than core strengthening exercise because it rejects the null hypothesis. As a result, this can be incorporated into a treatment plan for additional research and injury prevention.

V. CONCLUSION

According to the findings of the study, while both plyometric and core strengthening exercises are effective for improvement of agility and balance. Based on examination and result it was decided that, the plyometric exercises were highly significant for increasing agility and balance than core strengthening exercises. Though, patients who were given the core strengthening exercises showed less but significant improvement in agility and balance comparison with Group B plyometric exercises.

ACKNOWLEDGMENT

Not applicable

SOURCE OF FUNDING

Self

ETHICAL APPROVAL

Ethical approval was obtained from The Institutional review board from Parul Institute of Physiotherapy, Waghodia, Vadodara.

CONFLICT OF INTEREST

None

CONSENT FOR PUBLICATION

All individuals participating in this research signed an informed consent form prior to their inclusion in the study.

AUTHORS CONTRIBUTION

M.D.: conceptualization, project administration, methodology, reviewing, writing, and editing; methodology, formal analysis, and reviewing; B.G.: reviewing, and editing. All authors have read and agreed to the published version of the manuscript.



REFERENCES

1. Ahmad T, Jain DR. Effects of lower body plyometric training in young Kashmiri female volleyball players. *Int J Phys Educ Sports Health* 7 (6): 151. 2020;156.
2. Taskin C. Effect of Core Training Program on Physical Functional Performance in Female Soccer Players. *International Education Studies*. 2016;9(5):115-23.
3. Devrim U, Erdem K. Evaluation of the Effects of Core-Quick Strength and Core-Plyometric Studies on Balance, Agility and Strength Traits of Volleyball Players. *Asian Journal of Education and Training*. 2019;5(3):482-7.
4. Khatoon M, Thiagarajan S. Comparative Study to Find out the Effectiveness of Core Strengthening Training (Pilates) versus Plyometric training to Promote Dynamic Balance and Agility in Elite Indian Badminton Players. Website: www.ijpot.com. 2021 Jan;15(1):85.
5. Mackala K, Vodičar J, Žvan M, Križaj J, Stodolka J, Rauter S, Čoh M. Evaluation of the pre-planned and non-planned agility performance: Comparison between individual and team sports. *International journal of environmental research and public health*. 2020 Jan;17(3):975.
6. Bagherian S, Ghasempoor K, Rahnama N, Wikstrom EA. The effect of core stability training on functional movement patterns in college athletes. *Journal of sport rehabilitation*. 2019 Jul 1;28(5):444-9.
7. Jagger K, Frazier A, Aron A, Harper B. Scoring performance variations between the Y-Balance test, a modified Y-Balance test, and the modified Star Excursion Balance Test. *International journal of sports physical therapy*. 2020 Feb;15(1):34.
8. Pooja D. Effects of Plyometric and Core Stability Exercise on Physical Performance of Badminton Players: A Comparative study (Doctoral dissertation, KG College of Physiotherapy, Coimbatore).
9. Hachana Y, Chaabene H, Ben Rajeb G, Khelifa R, Aouadi R, Chamari K, Gabbett TJ. Validity and reliability of new agility test among elite and subelite under 14-soccer players. *PloS one*. 2014 Apr 21;9(4):e95773.
10. Thomas B, Khan FM. Effect of core stability training on selected fitness components among cricket players. *International Journal of Physiology, Nutrition and Physical Education*. 2020;5(1):139-42.
11. Fathi A, Hammami R, Moran J, Borji R, Sahli S, Rebai H. Effect of a 16-week combined strength and plyometric training program followed by a detraining period on athletic performance in pubertal volleyball players. *The Journal of Strength & Conditioning Research*. 2019 Aug 1;33(8):2117-27.
12. Silva AF, Clemente FM, Lima R, Nikolaidis PT, Rosemann T, Knechtle B. The effect of plyometric training in volleyball players: A systematic review. *International journal of environmental research and public health*. 2019 Aug;16(16):2960.



INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING, TECHNOLOGY AND MANAGEMENT



+91 99405 72462



+91 63819 07438



ijmrsetm@gmail.com

www.ijmrsetm.com