ISSN : 2087-927X (print)
ISSN : 2685-0516 (online)
Altius: Jurnal Ilmu Olahraga dan Kesehatan
Volume 12 No. 1, May 2023, pp. 66-75
http://dx.doi.org/10.36706/altius.v12i1.21409

The effect of the combination of split jump and short sprint training on flexibility in volleyball

I Ketut Yoda[1*], Hendra Mashuri[2]

[1,2] Universitas Pendidikan Ganesha, Buleleng, 81116, Indonesia

[1]ketut.yoda@undiksha.ac.id*; [2] hendra.mashuri@undiksha.ac.id
*corresponding author

ABSTRACT

One of the elements of physical condition needed by volleyball players, especially the Volleyball Team of the Faculty of Sports and Health Undiksha is flexibility. This study aims to determine the effect of the combined plyometric split jump and short sprint training on the flexibility of the Faculty of Sports and Health Undiksha volleyball team. This research is quasi-experimental. The number of samples used was 40 people who were taken with a simple random technique. The data analysis technique used inferential statistics with hypothesis testing using paired T-test at a significance level of α=0,05, assisted by SPSS.25. The results of data analysis show that there is a significant effect between "The Combination of Plyometric Split Jump and Short Sprint Training toward Flexibility in the Volleyball Team of the Faculty of Sports and Health". Based on these results, it is advisable to recommend to volleyball coaches that in improving the physical condition of athletes, they will choose a training method that is on the elements of the physical condition that will be improved.

***Keywords**: plyometric split jump, short sprint, flexibility*

ARTICLE INFO

Article History:
Accepted : 20th October 2022
Approved : 22nd December 2022
Available Online May 2023

Correspondence Address:
I Ketut Yoda
Sport and Health Faculty, Universitas Pendidikan Ganesha
Jalan Udayana No. 11 Singaraja - Bali
E-mail: ketut.yoda@undiksha.ac.id

INTRODUCTION

For volleyball players to be able to perform movement skill techniques well, the players must also have elements of good biomotor ability/physical fitness. Biomotor ability or physical fitness or physical condition possessed by volleyball players is a very important foundation in performing maximum movement skills. Volleyball game is a team game consisting of 6 people playing with a goal game of turning off the ball in the opponent's area, as well as one of the games that becomes a game popular in Indonesia (Destriana, D., Destriani, D., & Muslimin, M, 2021).

Very often we see when a volleyball match takes place with long rely-relies and for a long time, there is fatigue among the players so that they are not able to carry out techniques, skills, and game strategies properly. Techniques, tactics, and strategies can only be carried out properly by volleyball players when the elements of the players' biomotor abilities/physical

fitness are in good condition. In other words the attainment of technical perfection.

Each sport requires different and specific dominant biomotor component abilities for that sport (Mashuri, 2017). This is due to the need for the implementation of the elements of movement skills possessed by each sport with very special characteristics both in terms of the time of implementation and the movement pattern of the skills of the sport. Edmizal, Donie, Soniawan, & Maifitri (2019) say that the physical abilities that need to be improved in volleyball games are as follows: (1) Explosive power (power) is used to jump and whip the ball in a smash, block, and service; (2) Speed of reaction (speed of reaction) is useful in the speed of movement reactions after being stimulated by the ball from the opponent; (3) Stamina, high endurance ability to play volleyball games with high tempo, high frequency, high energy and productive in a certain time; (4) Agility to change direction in taking body position while playing; (5) Flexibility of the joints (flexibility) so that the movements appear flexible so that the art of movement in playing volleyball arises; and (6) Movement coordination, accuracy, balance are elements that need to be maintained and improved for volleyball players. Yoda (2017) said that special biomotor elements for volleyball are needed for aerobic endurance, anaerobic endurance, strength endurance, action-reaction speed, fast strength, and flexibility. (4) Agility to change direction in taking body position while playing; (5) Flexibility of the joints (flexibility) so that the movements appear flexible so that the art of movement in playing volleyball arises; and (6) Movement coordination, accuracy, balance are elements that need to be maintained and improved for volleyball players. Yoda (2017) said that special biomotor elements for volleyball are needed for aerobic endurance, anaerobic endurance, strength endurance, action-reaction speed, fast strength, and flexibility. (4) Agility to change direction in taking body position while playing; (5) Flexibility of the joints (flexibility) so that the movements appear flexible so that the art of movement in playing volleyball arises; and (6) Movement coordination, accuracy, balance are elements that need to be maintained and improved for volleyball players. Yoda (2017) said that special biomotor elements for volleyball are needed for aerobic endurance, anaerobic endurance, strength endurance, action-reaction speed, fast strength, and flexibility. balance are elements that need to be maintained and improved for volleyball players. Yoda (2017) said that special biomotor elements for volleyball are needed for aerobic endurance, anaerobic endurance, strength endurance, action-reaction speed, fast strength, and flexibility. balance are elements that need to be maintained and improved for volleyball players. Special biomotor elements for volleyball are needed for aerobic endurance, anaerobic endurance, strength endurance, action-reaction speed, fast

strength, and flexibility (Yoda, 2017).

Statement about the importance of physical ability is very rational because playing volleyball at a high level takes place at a very fast tempo. The speed of the tempo of this game is largely determined by the ability of the players to master and apply basic techniques in volleyball such as passing, serving, smashing, and blocking. The ability to apply basic techniques is greatly influenced by the elements of physical abilities possessed by each player. The ability to work physically in volleyball games is related to the maximum function of physiological organs. A trainer who understands the science of coaching in preparing training programs to achieve maximum performance always programs training to improve elements of physical condition as a top priority with a higher percentage of training at the beginning of training. Bompa & Buzzichelli (2019) said the stronger the physical foundation, the greater the potential for developing capabilities in performing the technical, tactical, and psychological skills of the sport. Sports achievements can only be achieved through physical abilities which are dominated by a combination of strength, speed, and endurance which are biomotor abilities (Bompa & Buzzichelli, 2019).

In general, very few researchers in the field of sports examine flexibility. Flexibility will rapidly decrease when a person ends the adolescent period and enters adulthood, which is around the age of 18/20 years (Stathokostas, Little, Vandervoort, & Paterson, 2012; Suharti, 2016). Without having good flexibility, a person is unable to perform movement skills such as smash, block, pass, and serve well in volleyball. A sportsman or volleyball player is said to have good flexibility if he can perform volleyball technique movements such as smashes, blocks, serves, and passes in the maximum range of motion of the joints (range of movement). Joint flexibility (flexibility) is the ability of the various joints of the body to move at their maximum distance (Muhammad, 2018; Yoda, 2017). With good flexibility, it will reduce the use of excessive force when performing every movement technique in volleyball. Sports activities and daily physical activities that involve a wide range of joint motion are very influential in the way a person improves flexibility. Increasing the flexibility of each player is highly dependent on the selection and application of appropriate training methods according to the involvement of the body segments needed in volleyball. The goal of a flexibility training program is to increase the range of motion in the main muscle-tendon groups according to individual goals. Increasing the flexibility of each volleyball player is highly dependent on the selection and application of appropriate training methods according to the involvement of the body segments needed in volleyball. The goal of a flexibility training program is to increase

the range of motion in the main muscle-tendon groups according to individual goals. Increasing the flexibility of each volleyball player is highly dependent on the selection and application of appropriate training methods according to the involvement of the body segments needed in volleyball. The goal of a flexibility training program is to increase the range of motion in the main muscle-tendon groups according to individual goals (Stathokostas et al., 2012). So far, physical trainers have paid very little attention to training to improve flexibility. The coaches consider warming up, it is considered a form of flexibility training that can improve the athlete's flexibility. Besides that, the flexibility training methods that are often used are conventional single training methods such as dynamic stretching and static stretching. Monotonous and repetitive movements often make athletes feel very bored. Based on this description, a flexible training method is needed. On the FOK Undiksha volleyball team so that they can perform volleyball technical skills well, one of the training methods is easy to do and uses very simple facilities and infrastructure,

Training methods have been proven and are often used to improve the physical conditioning of athletes, and plyometric training is one of the most widely used (Chaabene et al., 2019; Idrizovic et al., 2018). The application of plyometric training in physical training can improve the physical conditioning of young athletes of both sexes (Mashuri, 2013). Coaches are encouraged to include plyometric training methods in their training periodization for young athletes who need increased sprint performance and speed of change of direction (Paes et al., 2022). When viewed from the movements performed, the plyometric training method is a resistance training method. PelatResistance-based training has a positive effect on sprint performance. Variable inputs of locomotor resistance and fixed plane resistance have resulted in the same percentage change in sprint performance (Bolger, Lyons, Harrison, & Kenny, 2015).

Sememeanwhile for the sprint training method, the researcher has proven the effectiveness of sprint-specific training on boys' sprinting ability and concluded that free sprinting is a useful method of increasing sprint speed up to 20 m with moderate to large effect. Researchers have reviewed the effectiveness of sprint-specific training on boys' sprinting ability, concluding that free sprinting is a useful method of increasing sprint speed up to 20 m with moderate to large effect (Uthoff, Oliver, Cronin, & Harrison, 2015).

The combination of plyometrics and short sprints appears to be the least scientifically researched combination training method of all. Most trainers use a single method without combining several types of training methods. The training methods that are often used are sprint

training methods with acceleration or hollow sprints, and various plyometric training methods without any combinations. To the best of the researchers' knowledge, apart from the above literature, there is still very little data regarding the advantages of combined plyometrics and short sprints on the flexibility abilities of young male volleyball players. Therefore, this study only evaluates the influence of a combination of Plyometric Split Jump and Short Sprint Training for Flexibility in the Volleyball Team of the Faculty of Sports and Health.

METHOD

This research is a type of quasi-experimental research that aims to find out possible causal relationships by giving one or more treatments to one or more experimental groups. Research design is a plan on how to collect, present, and analyze data to give meaning to the data effectively and efficiently. In determining a research design, one must pay attention to the usefulness of the research design to be able to test the truth of the research hypothesis and control variance as much as possible. The research design used in this study was a modified randomized pre-test post-test without control group design as follows:

The population is the whole or set of objects with the same characteristics. The population in this study were male students who took part in the volleyball achievement development program at FOK Undiksha, totaling 60 people. The sample in this study was taken using a simple random sampling technique, namely the method of taking research samples randomly or indiscriminately, all individuals in the population either individually or jointly are given the same opportunity to be selected as members of the sample. Sampling techniques need to be done because in a research activity it is not possible to do it by reaching the entire object. The number of samples subject to treatment in this study was 40 people, all of whom were male.

Variables are all characteristics or factors that can indicate variation or anything that is the object of research observation. In this study, the variables studied were as follows Independent variable is the combination of plyometric split jump training and short sprints and the dependent variable is flexibility.

Test instruments used in this study are the sit-and-reach test to measure flexibility. This test has often been used to measure the physical condition of athletes at regional, national and international levels. The research data was obtained from the measurement of the dependent variable, namely flexibility. The data was collected through an initial test (pre-test) which was

carried out before giving treatment to the study sample, and a final test (post-test) was carried out after the sample was given a combination of plyometric split jump and short sprint training for 12 times with the same test as the early (pre-test). The data collected is in the form of quantitative data. Data analysis was performed by Paired t-test at a significance level of 5% or $\alpha = 0.05$.

RESULTS AND DISCUSSION

Result

Based on the results of data analysis with the help of SPSS.25, where the number of samples was 40 in this study, after the initial test (pre-test) before the sample was given a combination of split jump and short sprint plyometric training, the following results were obtained average flexibility 13.25; standard deviation value 1.373; minimum score 11; and maximum score 15. While the results of the final test (post-test) of flexibility after being given training obtained the following results average flexibility of 36.1; standard deviation value of 6.33; minimum score of 22; and maximum value of 46.

Table 1. Description of Data on Student Flexibility Volleyball Team

	Pre-test	***Post-test***
N	40	40
Means	13.25	36.1
Median	13	37.5
Mode	15	31
Std. Deviation	1.37281	6.33286
Variances	1885	40.105
Range	4	24.5
Minimum	11	22
Maximum	15	46.5
Total	530	1444

The results of the paired t-test statistical analysis of the Influence of the Combination of Plyometric Split Jump and Short Sprint Training on Flexibility in the Volleyball Team of the Faculty of Sports and Health obtained Sig. count of 0.000 smaller than α=0.05 or sig. count (0.000)$\leq \alpha$=0.05. This shows that the combination of Plyometric Split Jump and Short Sprint Training has a positive and significant effect on increasing flexibility in the Volleyball Team, Faculty of Sports and Health, Ganesha University of Education.

Table 2. Paired t-test Statistical Analysis

	Means	***SD***	***t***	***df***	***Sig. (2-tailed)***
Pre-test-Post-test	-22.85000	5.78814	-24,968	39	.000

Discussion

Training is a process or period that lasts for several years until the athlete reaches a high standard of performance. The improvements that can be obtained include the ability to move (Yoda, 2017). The implementation of physical training for athletes must be correct and precise. Training is a physical movement and/or mental activity that is carried out systematically and repeatedly (repetitively) over a long period, with progressively and individually increasing loading, which has the aim of improving the physiological, energy requirements, and nutritional needs (Mashuri, Mappaompo, & Purwanto, 2022), and psychological systems and functions of the body so that when carrying out Sports activities can achieve optimal performance. Achieving optimal performance requires a good physical appearance. In sports, one of the physical components that can maximize athlete performance is flexibility. Flexibility is influenced by the shape, type, and structure of the joints.

The combination of plyometric split jump and short sprint training has the impact of permanent changes (chronic) in increasing the structural capacity (anatomy) and function of physiological organs so that it has an impact on the ability to increase performance or in other words, there is an increase in the elements of biomotor abilities. Split jump plyometric training exercises are characterized by strong muscle contractions in response to fast and dynamic loading, or stretching of the muscles involved (Furqon & Doewes, 2002). This exercise works the muscles of the lower back, especially the gluteals, and hamstrings, quadriceps, extensors, and lower leg flexors. The Split Jump is also specifically for developing the shape part of the "Split" kick. The joints (ligaments) and tendons (tendons) also affect flexibility, are more elastic, and with the wider movement, the joints become more flexible (Yoda, 2017). Muscles that pass through or border the joints also affect flexibility. In any movement, the active muscle contraction (agonist) simultaneously relaxes or opposes the antagonist's muscle. It's easier for a muscle to beat its resistance. The capacity of muscle fibers to stretch increases as a result of flexibility training. To be able to sprint properly and quickly, a person must have strong and fast muscle contractions. So sprint training which is carried out with full strength and speed along the track line from start to finish brings permanent changes to the body's anatomical and

physiological work system.

Ors, Bayraktar, Simsek, & Ertan (2018) outline that it can be considered that the static flexibility of the lateral split contributes to the stabilization and stability of the movement during the dynamically performed plyometric split jump. Plyometric exercises are effective for improving athlete coordination and landing technique; this greatly affects the reduction of specific sports injuries among athletes (Sannicandro, Cofano, Rosa, & Piccino, 2014). Research studies have shown that the jump training program resulted in a significant increase ($p < 0.05$) in dynamic postural control in two groups of players in ball games using a net (Paul & Kumar, 2018).

CONCLUSION

Physical activity, especially volleyball games, really requires elements of physical condition, especially the flexibility of the players so a volleyball player must be given training that can improve agility. The results of the statistical analysis in this study showed that there was a positive and significant influence of the combination of plyometric split jump and short sprint training for flexibility in the 2022 Faculty of Sports and Health volleyball team". Based on the results of this study, it can be recommended to volleyball coaches that in improving the physical condition of athletes, they want to choose a training method that is following the elements of the physical condition to be improved.

REFERENCES

Bolger, R., Lyons, M., Harrison, A. J., & Kenny, I. C. (2015). Sprinting Performance and Resistance-Based Training Interventions. *The Journal of Strength and Conditioning Research*, *21*(4), 1146–1156. https://doi.org/10.1519/JSC.0000000000000720.

Bompa, T. O., & Buzzichelli, C. A. (2019). *Periodization Theory and Methodology of Training* (Sixth Edit). Champaign IL: Human Kinetics Publisher Inc.

Chaabene, H., Negra, Y., Moran, J., Prieske, O., Sammoud, S., Ramirez-Campillo, R., & Granacher, U. (2019). Plyometric Training Improves Not Only Measures of Linear Speed, Power, and Change-of-Direction Speed But Also Repeated Sprint Ability in Young Female Handball Players. *Journal of Strength and Conditioning Research*, *35*(8), 2230–2235. https://doi.org/10.1519/JSC.0000000000003128.

Destriana, D., Destriani, D., & Muslimin, M. (2021). Efektivitas teknik pembelajaran drills

smash permainan bolavoli. Jurnal Pendidikan Jasmani Indonesia. 17(2) 115-121. doi:https://doi.org/10.21831/jpji.v17i2.44976

Edmizal, E., Donie, Soniawan, V., & Maifitri, F. (2019). Training and implementation of physical conditions for badminton coaches in the city of Padang. *Journal of PkM Science Education*, *2*(2), 20–25. https://doi.org/10.31851/dedikasi.v2i2.5408

Furqon, M., & Doewes, M. (2002). *Pliometrik untuk Meningkatkan Power*. Surakarta: Universitas Sebelas Maret.

Idrizovic, K., Gjinovci, B., Sekulic, D., Uljevic, O., João, P. V., Spasic, M., & Sattler, T. (2018). The Effects of 3-Month Skill-Based and Plyometric Conditioning on Fitness Parameters in Junior Female Volleyball Players. *Pediatric Exercise Science*, *30*(3), 353–363. https://doi.org/10.1123/pes.2017-0178

Mashuri, H. (2013). Perbandingan Latihan Tiga Modifikasi Pliometrik Depth Jump terhadap Daya Ledak Otot Tungkai. *EFEKTOR*, *23*(2), 48–53.

Mashuri, H. (2017). The Effectiveness of Basketball Shooting Training Model on Improving Shooting Capabilities of Basketball Players. *JIPES - Journal of Indonesian Physical Education and Sport*, *3*(1), 71–76. https://doi.org/10.21009/jipes.031.09

Mashuri, H., Mappaompo, M. A., & Purwanto, D. (2022). Analysis of energy requirements and nutritional needs of rock climbing athletes. *Journal Sport Area*, *7*(3), 437–445. https://doi.org/10.25299/sportarea.2022.vol7(3).10886

Muhammad, J. (2018). Perkembangan kemampuan fisik (kelentukan, kekuatan otot ekstensor, dan kelincahan) orang dewasa muda ditinjau dari usia dan etnik. *JPOS: Journal Power of Sport*, *1*(2). https://doi.org/10.25273/jpos.v1i2.2249

Ors, B. S., Bayraktar, I., Simsek, D., & Ertan, H. (2018). Examination of split jump and three-way split flexibility in rhythmic gymnastics in terms of kinematic components. *Conference: 9th International Biomechanics Congress*. Eskişehir.

Paes, P. P., Damasceno, V. D. O., Correia, G. A. F., Silva, L. R. Da, Lucena, E. V. R., Alexandre, I. G., … Santos, W. R. Dos. (2022). Effect of plyometric training on sprint and change of direction speed in young basketball athletes. *Journal of Physical Education and Sport*, *22*(2), 305–310. https://doi.org/10.7752/jpes.2022.02039

Paul, J., & Kumar, S. (2018). Comparative Effect of Squat Jump and Split Jump Exercise on Dynamic Balance among Female Netball Players. *International Journal of Physiotherapy*, *5*(2), 57–62. https://doi.org/10.15621/ijphy/2018/v5i2/170742

Sannicandro, I., Cofano, G., Rosa, R. ., & Piccino. (2014). A. Balance training exercises decrease lower-limb strength asymmetry in young tennis players. *Journal of Sports*

Science and Medicine, *13*(2), 397–402.

Stathokostas, L., Little, R. M., Vandervoort, A., & Paterson, D. H. (2012). Flexibility Training and Functional Ability in Older Adults: A Systematic Review. *Journal of Aging Research*, *8*, 1–30. https://doi.org/10.1155/2012/306818

Suharti. (2016). Perkembangan gerak: Kelentukan (flexibility). *Gelora: Jurnal Pendidikan Olahraga Dan Kesehatan IKIP Mataram*, *3*(2). https://doi.org/10.33394/gjpok.v3i2.444

Uthoff, A., Oliver, J., Cronin, J., & Harrison, C. B. (2015). Sprint-Specific Training in Youth: Backward Running vs. Forward Running Training on Speed and Power Measures in Adolescent Male Athletes. *Journal of Strength and Conditioning Research*, *29*(4), 1146–1156. https://doi.org/10.1519/JSC.000000000000720

Yoda, I. K. (2017). *Improving Physical Conditions*. Buleleng.