Advances in Social Science, Education and Humanities Research, volume 394
3rd International Conference on Innovative Research Across Disciplines (ICIRAD 2019)

Comparison Between the Effects of 10 Repetition 2 Sets Footwork with 5 Repetition 4 Sets Footwork for Improving Trainees' Agility in Badminton Training

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***Abstract*— Aimed at comparing the effectiveness of footwork with 10 repetition 2 set and with 5 repetition 4 set footwork, this study was conducted in pretest-posttest control group design, involving 42 male badminton students enrolled in professional training program of Ganesha University of Education. Group 1 was given footwork with 10 repetitions 2 sets and group 2 was given footwork with 5 repetitions 4 sets. The increase of the agility between both the groups before and after the training was tested with the t-independent test with a significant score of $\alpha = 0.05$. The average agility showed that both groups experienced an increased effect of ($p<0.05$), with the increase of group 1 higher then the increase of group 2. Thus, the footwork with 10 repetitions 2 sets was proven to be more effective in improving the students' agility than the footwork with 5 repetitions 4 sets.**

Keywords—agility; footwork 10 repetition 2 sets; 5 repetitions 4 sets.

I. INTRODUCTION

Physical fitness is very necessary in living life, people who have good physical, must have a healthy physique. People who have poor physical fitness will be more susceptible to chronic diseases such as heart attacks, diabetes, fatigue and muscle weakness [2]. Physical ability is one of the most dominant components in the achievement of badminton sports achievements. Badminton achievement cannot be separated from the elements of tactics, techniques and the quality of physical conditions. Badminton players really need quality strength, endurance, flexibility, speed, agility, and good coordination of motion. These aspects are needed to be able to move and react to explore every corner of the field during the match. Sports achievements cannot be separated from the elements of the physical condition of athletes whose aim is to make physical abilities excellent and useful to support sports activities in order to achieve excellent performance. In order to get high achievements, physical conditions such as agility, speed, power, coordination, endurance, reaction time, flexibility and strength are needed by athletes in badminton.

To be able to run or bounce quickly is one of the physical requirements to be a good badminton player. In order to maintain the rhythm of running fast or bouncing during a match an athlete's hands must be strong to smash. The athlete should be able to smash several times with maximum strength without feeling fatigue. An athlete should also be able to jump to do a smash. When an athlete does a smash, all body muscles must be strong especially the leg muscles [1]. Every player who wants to do their punch must chase the shuttlecock with speed and agile footsteps to all corners of the field. That is why the strength of the leg muscles is very important for badminton player.

Specific trainings are needed to build strong leg muscles. That is why, badminton player needs to have specific training to build their leg muscle because they need strong leg muscles to enable them to jump and move back and forth [3]. Footwork is the basis for being able to produce blows with good quality, as a support to good positioning and good hitting. An athlete must have the ability to move quickly without losing balance. The speed of footwork cannot be achieved if the footwork is irregular [4]. Doing footsteps with high agility requires good physical ability. A badminton athlete who can master footsteps with high agility will be able to perform better in anticipating the coming shuttlecocks. In order to master good footsteps techniques, in addition to physical conditions, it also requires the ability to control the motion of lower body parts as well as overall body motion, in other words a good automation motion is needed to perform footsteps with high agility [1].

The observations in each championship held by the Ganesha University of Education both inside and outside the campus, for example the recent PORSENI FOK championship (The Sport and Arts Week Championship) in Singaraja. Among all components of the technical physical condition in the badminton games, the present study only concerned itself on the agility for "footwork" (footsteps) of the athletes to support achievement. There has been very little data available the agility in badminton professional training in Ganesha University of Education. Limited data is the cause of errors of teachers or sports coaches

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in providing workloads that must be given so that there tends to be a decrease in achievement. Reference [1] revealed a number of the problems in the branch of badminton in Indonesia, namely: (1) In the game of badminton the ability of footsteps with high leg strength is very important to pursue shuttlecocks to all corners of the field; (2) Footsteps with low leg power are technically an obstacle in chasing the shuttlecock to all corners of the field; (3) Indonesian Badminton players have a generally weak leg power; (4) Appropriate training methods are needed to improve low and high speed footsteps; (5) Appropriate training methods are needed to improve the agility of footsteps with high strength; (6) The existence of footsteps with different levels of speed and strength become opportunities for badminton agility abilities; (7) There are differences of opinion about the role of agility towards the appearance of motion in athletes in high skill levels (skilled athletes) and athletes with low skill levels (novice athletes).

There are several points that need to be given special attention based on the results of observations and direct observations in the field namely, especially concerning failures that occur in the game are caused by a player being unsuccessful in mastering body movements and footwork. The preliminary observation showed that most of the students did the footwork carelessly, so that what became the achievement of badminton footsteps was not on target. Mistakes in the implementation of the footwork movement will not give maximum results which impact on the speed of experiencing fatigue during training or competition. There was also a decrease in the skill of agility of footwork when they are playing. It was seen that the movements made were less effective and still not coordinated during the practice on the field. In connection with these problems, more attention is directed to the problem of exercise methods with alternatives to improve the components of physical condition, which in this study takes the problem of the influence of footwork training on agility as a solution to improve athlete's fitness and achievement.

One of the motoric components that affect the goal of achieving physical fitness is agility. Agility is the ability to change the direction and position of the body quickly, right at the time of movement, without losing balance and awareness of body position [5]. Based on the problem, the researchers conducted research related to increasing the agility of badminton players through badminton footwork training consisting of 10 repetition 2 sets and 5 repetition 4 sets. This study examines the various forms of footwork training methods to improve the agility of the students enrolled in the professional training of Ganesha University of Education through the 10 repetition 2 set and 5 repetition 4 set footwork.

II. RESEARCH METHOD

The design of this study is "The Randomized Pretest-Posttest Control Group Design" [6]. Each group consists of 21 people, namely group-1 and group-2. Both groups were given an initial test in the form of agility test results. Group 1 was given footwork training 10 repetition 2 sets and Group 2 was given footwork training 5 repetition 4 sets, each training was given for 6 weeks, with training frequency 3 times a week, namely Monday, Wednesday and Friday. The time of the training was in the morning at 07.30-09.00 and in the afternoon at 16.30-18.00 WITA at the Sports and Health Faculty Gymnasium, Ganesha University of Education Singaraja and St. Paul Singaraja Sports Hall, on February 15 until April 8, 2016.

The outreach population was the male students participating in the Badminton Ganesha University of Education 2015/2016 academic year. There were a total of 50 people who met the inclusion and exclusion criteria. The research sampling technique was Simple Random Sampling. Sampling of the sample unit can be done with the help or through a lottery (lottery) random numbers [7]. From a total of 50 male students as the population in the study at Ganesha University of Education, 42 people were randomly chosen as research samples, which were then divided into two groups by means of Ordinal Pairing. Each Group consisted of 21 people. Ordinal pairing technique is a way of dividing the research sample into several groups in order to have almost the same ability for maintaining homogeneity or similarity between the treatment group and the comparison group [8].

Badminton footwork training 10 repetitions 2 sets are physical badminton training, which is carried out with footsteps movements that regulate the body to all corners of the field to master and position the body in such a way that makes it easier to hit the shuttlecock in its position. The goal of success is to touch the angle of the field, as much as 20 times (10 repetition of 2 sets within 20-30 seconds per set, resting between sets for 30 seconds). Movement of footsteps towards the corner of the field was 2 - 6 steps. Whereas the 5 repetition 4 footwork training is physical training of badminton footsteps to master and position the body in such a way in all directions of the field angle so that it makes it easy to hit the shuttlecock in its position. The goal of success is to touch the angle of the field, as many as 20 times (5 repetition 4 sets within 20-30 seconds per set, resting between sets for 30 seconds). Movement of footsteps towards the corner of the field was 2 - 6 steps.

Agility is the ability to change the position of the body or the direction of body movements quickly when it is moving fast, without losing balance or awareness of orientation to body position. Therefore, in order to measure the ability of agility, there the Zigzag Run test was conducted. The measurement results are the best time of the three occasions.

Differences in training effects in this study were tested by Paired Sample T-Test and Independent Sample T-Test, which was preceded by tests of normality and homogeneity of data. Paired - Samples T Test (paired t-test) was used to analyze differences in the results of intra-group of agility before and after training in the two treatment groups because the data were normally distributed and homogeneous. The limit of significance was $\alpha = 0.05$. Independent - Samples T-Test was used to analyze differences in the results of agility between treatment groups, both before and after treatment. The limit of significance was $\alpha = 0.05$.

III. RESULT

A. Descriptive Analysis of Research Sample Characteristics

Table 1 below display the data characteristics of the research samples analyzed including their age, height, weight, and body mass index.

TABLE I. PHYSICAL DATA CHARACTERISTICS OF THE STUDENTS

Characteristics	n	Group 1		Group 2		p
		Average	SD	Average	SD	
Age (year)	21	20.71	1.27	20,14	1.06	0.12
Height (cm)	21	169	5.08	168	5.78	0.32
Weight (kg)	21	64.19	6.68	62.00	8.44	0.35
Body Mass Index	21	22.25	1.62	22.16	2.96	0,48

Information:
n : Number of Samples
SD : Standard deviation

Table 1 shows that there was no significant differences of the characteristics of age, height, body weight and Body Mass Index between the two groups before the training. The results of the analysis obtained p values greater than 0.05 (p> 0.05). Then it could be concluded that both group had the same physical characteristics and abilities.

B. Test the Normality and Homogeneity of the Research Group

To find out the data distribution of the research sample, normality tests were performed using the Saphiro Wilk Test and homogeneity of the data with the Levene Test can be seen in the following Table 2.

TABLE II. NORMALITY AND HOMOGENEITY TEST RESULTS AGILITY DATA BEFORE AND AFTER TRAINING

Variable	Training	(p) Normality Test (*Shapiro Wilk Test*)		(p) Homogeneity Test (*Levene Test*)
		Group 1	Group 2	
Agility (seconds)	Before	0.31	0.39	0.41
	After	0.27	0.38	0.57

Table 2 shows that the analysis of data with normality and homogeneity test results of the agility tests results before and after training. Both groups obtained p values greater than 0.05 (p> 0.05), which means that the results of agility data before and after training were normally distributed and homogeneous data variations so that further tests could be conducted using parametric statistical tests.

C. T-paired test (paired-t test)

Different test results are used to find out and compare the average results of agility, before and after training.

TABLE III. RESULT OF MEAN AGILITY DIFFERENCE TEST BEFORE AND AFTER INTRA GROUP TRAINING

Agility (Seconds)	N	Average ± SD	t	p
Group 1 Before Training	21	7.78 ± 0.34	6.87	0.00
After Training		7.28 ± 0.28		
Group 2 Before Training	21	7.74 ± 0.38	2.87	0.00
After Training		7.59 ± 0.31		

Table 3 shows that the average results of agility test before and after training between the two groups obtained the p values less than 0.05. This shows that the average results of agility after training in each group increased significantly (p <0.05). Thus, the results of the average agility before training between Group 1 and Group 2 are comparable. The difference in agility after training was significantly different, meaning the difference in the final result was caused by differences in repetition and sets in the training of each group.

D. T-independent test

To find out the increasing agility between the two groups both before and after the training. The results of the significance analysis with the t-independent test can be observed Table 4.

TABLE IV. TEST RESULT FOR INCREASED AGILITY BEFORE AND AFTER TRAINING BETWEEN GROUPS

Variable	Training	Average ± SD		t	p
		Group 1	Group 2		
Agility (Seconds)	Before	7.78 ± 0.34	7.74 ± 0.38	0.28	0.78
	After	7.28 ± 0.28	7.59 ± 0.31	-3.35	0.00

Table 4 shows that the average agility before training between the two training groups obtained a p value greater than 0.05 while after training has a p value less than 0.05. This means that the average agility data before training between the two groups was not significantly different (p> 0.05). Thus, the average agility before training was comparable. While the difference in agility after training is significantly different (p <0.05) means the difference in the end result is caused by differences in repetition and sets in the training.

E. Percentage Increase in Agility in Both Groups

After 6 weeks of training, there was a difference between the increase of agility and percentage. Percentage of increasing agility in both groups, using the formula from [9]:

$$P = \frac{T2 - T1}{T1} x(100\%)$$

TABLE V. PERCENTAGE OF AGILITY

Agility (Seconds)	Group 1 (*Footwork* 10 Repetition 2 Sets)	Group 2 (*Footwork* 5 Repetition 4 Sets)
Before Training (T1)	7.78	7.74
After Training (T2)	7.28	7.59
Increase Difference (T1–T2)	0.50	0.15
Percentage	7%	2%

Table 5 shows that the increase in agility after training in Group 1 was greater than in Group 2. This shows that both treatment groups had the same effect of increasing after being given footwork training. The percentage of increase in agility in Group 1 training gave a better effect than in Group 2 training. Therefore, the hypothesis was proven where the improvement

that occurred in group 1 given footwork training 10 repetition 2 sets was better than in group 2 given footwork training 5 repetition 4 sets in increasing agility.

IV. DISCUSSIONS

A. The Effect of Badminton Footwork Training 10 Repetition 2 Sets on The Students' Agility

Badminton footwork training 10 repetition 2 sets with intensity increasing every week for 6 weeks based on the maximum pulse rate so that, the muscles, bones and joints in the limbs will become trained. The muscles will become more elastic and the joint space will be better so that the joints will become very flexible. Thus, agility will be able to increase. The effectiveness of weight training and plyometric training in increasing leg muscle strength and reaction speed states that, muscle elasticity is very important because the longer the leg muscle can stretch, the stronger and faster it can shorten or contract. Muscles that are elastic will not inhibit leg muscle movements so that footsteps can be done quickly and long [10].

Programmed, measured and regular physical exercise will provide an adjustment to increased physical work, both in physiological and psychological terms. During the badminton footwork training program, the sample involved him in physical and psychological training. As a result of the exercise carried out in addition to cause changes in the body that are physiological, it also causes the accumulation of values from the benefits of exercise so that it will increase the "days" to take part in the exercise. Physiological changes that occur due to exercise are characterized by increased function of body organs and muscles, which in turn will provide efficiency for the perpetrators [11].

According to [11], changes occur at the level of muscle tissue due to anaerobic footwork training including: (1) an increase in the ATP-PC system as an increase in ATP-PC reserves; (2) an increase in glucose reserves and glycolytic enzymes; (3) increased speed of muscle contraction; (4) hypertrophy in fast muscle fibers; (5) increased capillary density per muscle fiber; (6) increasing the strength of tendons and ligaments; (7) increasing the ability to recruit motor units; (8) increasing body weight without fat. The other physiological changes are the changes that occur in the motor nerve structure. Physiological research from training focuses on changes in skeletal muscle, focusing on the neuromuscular junction and motoneuron because both of these nerve structures show changes as a result of exercise. These changes include cellular and subselder adaptations in their structure, changes in body reflex speed, biochemical responses and in motoneuron [11].

Badminton footwork exercises cause changes in the nervous system that make a person better in controlling the coordination of the activation of his muscle groups, thereby increasing his agility and power and increasing. Agility, power is related to nerve adaptation. The mechanism of "neural adaptation" that occurs as a result of footwork exercises causes an increase in the muscular contraction force that is directly recognized. This increase occurs due to increased activation of the main movable muscles, synergistic muscles contract more precisely, and increased inhibition of the antagonistic muscles. The increase in reflex activation of the major movers is an increase in excitatory motoneuron tissue, which in turn can result in increased excitatory input and reduced inhibitory input. The implication is that a trained athlete can activate his muscles optimally under normal conditions that are functionally stored energy can be immediately used as a maximum effort that is realized [11].

Good footwork is absolutely needed by a badminton player, because a player will be able to move as efficiently as possible to all parts of the field [12]. Badminton footwork training 10 repetitions 2 sets influence on increasing agility supported by [13] on "The Effect of Table Tennis Footwork Training on Reaction Speed and Agility in Class VII Male Students of SMP Negeri 2 Denpasar 2013/2014 Academic Year" that by doing footwork training in accordance with the principles of training will later have a physiological influence on the level of skills, especially agility and with this change will have an impact on increasing the agility of players so they can reach the shuttlecock to the corners of the field with agility.

B. Effects of Badminton Footwork Training 5 Repetition 4 Sets on Increasing Agility

Foot agility is an important physical element and great benefits about foot agility; sports movements that are carried out are practically economically so as not to quickly cause fatigue, maintain leg agility in movement so that the implementation of the next movement can be done perfectly, and is useful to master high techniques in the sports that they participate in. Thus, the player can move swiftly, so that they can optimally perform the technique [14]. There are three characteristics of agility in badminton footwork training, namely the speed and coordination of changes in direction of running / footsteps, changes in body position, and changes in the direction of body parts. The agility criteria are based on a number of physical qualities (biomotor abilities) that are possible, namely: (1) difficulty in coordinating movement tasks; (2) accuracy of appearance; and (3) performance time. These three criteria are relevant and as a basis in terms of measurement and training to increase agility [11].

Agility is seen as a special case, because agility is closely related to the component of physical fitness, influenced by the nervous system and depends on hereditary and environmental factors. Agility is specifically dependent on speed, and is influenced by factors somatotype, age, and fatigue. The characteristics of agility are composed of the components of coordination, strength, flexibility, reaction time and power. Coordination regarding special movements, is the most important component of agility, if someone's coordination is bad, then he will not have good agility [11].

The purpose of agility is to coordinate multiple movements or stimulants, facilitate mastery of high techniques, movements efficiently, effectively, and economically and facilitate orientation towards opponents and the environment [15]. One way to improve agility is to do footwork training 5 repetition 4 sets correctly, this is supported by [16] in his research on the effect of badminton shadow training on increasing agility and reaction speed similar to his footwork in playing badminton, occurs a decrease in the value of the average time of the data from the pretest and posttest results data. This shows a decrease in travel time from the average value while doing the test which

indicates the better travel time due to the agility of training given. This change will have an impact on increasing the agility of players so they can reach the shuttlecock to the corners of the field with agile.

C. Badminton Footwork Training 10 Repetition 2 Sets Better Than 5 Repetition 4 Sets Against Increased Agility

Training that uses high repetition will produce greater speed compared to lower repetition training. In this training Group 1 has more repetition than Group 2 so that the burden borne by Group 1 is heavier on each set. With a heavier training load on each set automatically requires greater ability and energy to complete the training load before resting [17].

High repetition will make training very effective and it will be very good to develop fast type muscle fibers which is one of the times spent each set. Thus, the body's ability to adapt to do heavier workloads so that muscles and other biomotoric components adapt to the workload done. Besides footwork 10 repetitions 2 sets and 5 repetitions of 4 sets of footwork that are trained repeatedly for 6 weeks, each group will be patterned on the central nervous system as a sensory experience. Sensory experiences that are increasingly performed will be more strongly patterned in the nervous system [12].

Footwork training 10 repetition 2 sets with high intensity maximum pulse so that the muscles, bones and joints in the legs will become trained. The muscles will become more elastic and the joint space will be better so that the joints will become very flexible, and the agility will increase. This factor can cause a greater Group 1 training load so that training can be more specific and maximal than in Group 2. The results of this study are supported by [18] with the title "Effect of Plyometric Training on the Agility of Studies Enrolled in Required College Badminton Program "shows an increase in the agility of the experimental group by 7% from the control group of 2.5%. The difference in the body's physiological response to the training provided is the occurrence of repetitive muscle strains that causes contractions or greater impetus for movement [19]. The research sample in Group 1 had the opportunity to make more repetitive steps and be able to coordinate the steps well and quickly so that the body would adapt to the treatment. While the research sample in Group 2, did the same footsteps but repetition (repetition) is shorter to adapt to the treatment given during training.

V. CONCLUSION

Based on the research that has been done, it can be concluded; (1) Badminton footwork training 10 repetition 2 sets improve agility, (2) Badminton footwork training 5 repetition 4 sets increase agility, (3) Badminton footwork training 10 repetition 2 sets are better than footwork training 5 repetition 4 sets to increase agility of the students enrolled in the professional training program of University of Education Year 2015/2016.

ACKNOWLEDGMENT

The authors express the gratitude to all parties involved in the process of completing this research. In order to improve agility, it is recommended to use the badminton footwork exercise method because it is more effective for its implementation and has an effect on the game (skill) on badminton athletes. For other studies, these results can be used as guidelines or references in conducting similar research. It is expected that in training to use 10 repetition 2 sets footwork exercises so that athletes can more quickly improve physical fitness, especially agility.

REFERENCES

[1] T.H. Karyono, Pengaruh Metode Latihan dan Power Tungkai Terhadap Kelincahan. (Studi Eksperimen). Yogyakarta: Universitas Negeri Yogyakarta Fakultas Ilmu Keolahragaan, 2011

[2] G.T.MS. Doddy, "Hubungan Indeks Masa Tubuh Dengan Kesegaran Jasmani Pada Anak Usia 13-15 Tahun di SMP N 3 Singaraja," Jurnal PENJAKORA, ISSN 2356-3397, vol. 2 (1), pp. Hal. 81-91, 2015

[3] N. Nala, Prinsip Pelatihan Fisik Olahraga. Denpasar: Universitas Udayana Press, 2011

[4] Y. S. Yoniel, Metode Pelatihan Distributed Practice Lebih Efektif Dari Pada Massed Practice Dalam Meningkatkan Kecepatan Smash Bulutangkis Pada Mahasiswa Semester VIII Universitas PGRI NTT. (Tesis). Denpasar: Universitas Udayana, 2013

[5] I P.G. Adiatmika, Pemeriksaan Kebugaran Jasmani. Denpasar: Udayana University Press, 2002

[6] S. J. Pocock, Clinical Trials A Practical Approach. New York: A Willey Medical Publication, 2008

[7] S. Arikunto, Manajemen Penelitian. Jakarta: PT Rineka Cipta, 2005

[8] I N. Kanca, Metode Penelitian Pengajaran Pendidikan Jasmani dan Olahraga. Singaraja: Universitas Pendidikan Ganesha Press, 2010

[9] S. Arikunto, Dasar-Dasar Evaluasi Pendidikan (Edisi Revisi). Jakarta: Bumi Aksara, 2004

[10] S. Hanafi, "Efektifitas Latihan Beban dan Latihan Pliometrik dalam Meningkatkan Kekuatan Otot Tungkai dan Kecepatan Reaksi," ILARA, vol. 1(2), pp. 1–9, 2010

[11] Ismaryati. "Peningkatan Kelincahan Atlet Melalui Penggunaan Metode Kombinasi Latihan Sirkuit Plyaiometrik dan Berat Badan," PAEDAGOGIA, vol. 11(1), pp. 74–89, 2008

[12] Guyton & Hall. Otot dan Gerakan Dalam Olahraga. Denpasar: Yayasan Ilmu faal Widhya Laksana, Universitas Udayana, 2008

[13] E. Gunawan, Pengaruh Pelatihan Footwork Tenis Meja Terhadap Kecepatan Reaksi dan Kelincahan Pada Siswa Putra Kelas VII SMP Negeri 2 Denpasar Tahun Pelajaran 2013/2014. (Skripsi). Singaraja: Universitas Pendidikan Ganesha, 2013

[14] M. Ishak, "Kontribusi Daya Ledak Lengan, Kelentukan Pergelangan Tangan dan Kelincahan Kaki terhadap Pukulan Smash dalam Permainan Bulutangkis," Competitor, vol. 2, pp. 93-104, 2011

[15] Z. P. Daryanto, & K. Hidayat "Pengaruh Latihan Kelincahan Terhadap Kemampuan Menggiring Bola," Jurnal Pendidikan Olahraga, vol. 4(2), pp. 201-212, 2015

[16] G. N. A. Kusuma, Pengaruh Pelatihan Bayangan (Shadow) Bulutangkis terhadap Peningkatan Kelincahan dan Kecepatan Reaksi pada Peserta Ekstrakurikuler Bulutangkis SMA N 4 Singaraja Tahun Pelajaran 2012/2013. (Skripsi). Singaraja: Universitas Pendidikan Ganesha. 2013.

[17] P. Pate, Prosedur Pelatihan Untuk Meningkatkan Prestasi. Surabaya: PT. Usaha Nasional, 2004.

[18] J.L. Heang, "Effect of Plyometric Training on the Agility of Studies Enrolled in Required College Badminton Programme," International Journal of Apllied Sport Science, vol. 24 (1), pp. 18-24, 2012

[19] I M. K. Laksana, Pelatihan Melompati Rintangan Setinggi 60 cm Lebih Baik Dibandingkan Rintangan Setinggi 30 cm Untuk Meningkatkan Ketepatan Jumping Smash Pemain Bulutangkis SMK Negeri 2 Kuripan Lombok Barat. (Tesis). Denpasar: Universitas Udayana, 2015