

The Influence of Training Model Based on Exercise Assistance to The Skills of Smash Kedeng Sepakraw in The Pontianak City Athletes

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Abstract

The main problem of the research is whether there is an effect of the model of the stone-based smash training exercise on Pontianak City sepaktakraw athletes. The purpose of this study was to determine the effect of training models using tools to smash skills in Pontianak city athletes. Subjects were Pontianak athletes of 40 Pontianak athletes. The research method used is the True Experimental Design experiment. The type of True Experimental Design used was Pretest-posttest Control Group Design. Data collection was carried out by conducting a preliminary test of the Kedeng smash skill with a measurement tool for pool grabstart skill assessment, practice (training model using video media) and the final pool grabstart skill test. Data analysis and hypothesis testing using comparative analysis techniques using the Dependent sample t-test, namely Paired sample t-test and Independent sample t-test, namely t-Test: Two-Sample Assuming Equal Variances with a significant level $\alpha = 0.05$. From the results of the hypothesis (t-test), the experimental group obtained a tcount of 9.67 with a t-distribution table at a significant level (α) = 5% with a table of 2.101. It means $t_{count} > t_{table}$, 2.0101 there is a difference in the results of the smash skills in the post est and pretest in the experimental group. , 64% Calculation of gain score with a training model based on training aids gives an effect of 31.64% on the ability to smash.

Keywords: exercise model, smash, sepaktakraw

INTRODUCTION

Sports is one form of efforts to improve the quality of Indonesian people directed at the formation of character and personality, both discipline and high sportsmanship, as well as increased achievement that can arouse a sense of national pride in order to become healthy and developing people. Sports from ancient times until now have always been an important part in the human body where human life actually requires very complicated movements that lead to health, pleasure and well-being in life both from an early age to the end of life. Achieving the best achievements must begin with good and right practice. Training that is based on existing training principles and is carried out in a correct and creative way, will help to produce skilled and mature soccer takraw athletes. The heart of the implementation of a

good takraw training starts from the family, community, sports teachers and sepak takraw sports clubs.

Exercise, designed and developed according to the characteristics of the athlete and the goals to be achieved. For example training for children will be different from training for adult athletes, both from the methods, tools to the rules used. But in reality at this time, the training carried out in many sepak takraw sports clubs is still not much developed, so the choice of variations in practice is still very limited. Sepaktakraw game is one sport that has a high level of difficulty where in this sport playing the ball with one foot and the ball must not fall to the floor this game is done with a few touches namely the head, legs and shoulders can only be done alternately and only 3 times the chance in each team in the game means that this sport must have a high level of balance and coordination of movement. To be able to play sepak takraw, basic skills need to be mastered for every sepak takraw player to provide the best game in both attack and defense (Hananto, 2015: 46).

The results of observations through observations and interviews at the Takraw challenges VII competition between Pontianak and Memawah municipalities, and the stronghold on 15-17 February 2019, at the club inter-club championship for junior high school (SMP) and high school (SMA) students throughout - Pontianak city, the smash has not contributed maximally in contributing figures from the data, there is an opportunity to obtain a number of smashes on an average of 15 times the chance to do a smash in each set, only 40% succeeded, 60% still failed.

The use of training model based on training aids is one of the models in the training process by applying various variations in accordance with the stages of the smash skill that must be mastered by an athlete, not only on the frequency factor of the entry of the ball but by paying attention to the correct smash motion process and carried out with the correct stages systematic

A. The Nature of Motion Learning

1. Learning Concepts

The definition of learning that is commonly used is a change of behavior and the results of Majid's experience, (2014) states that learning is a process of change in personality in the form of attitudes, habits and intelligence skills. This change is permanent in the behavior that occurs as a result of practice or experience. "It is essentially the ability to learn from experience: the power to retain from one experience, something is available in coping with the difficulties of later situation. This means power to modify action on the basis of the

results of prior experience of the power to develop dispositions. Without in the acquisition of habits is impossible”Dewey, (2004) According to Susanto (2013) states learning is an activity carried out by a person intentionally in a conscious state to obtain a concept of understanding, or new knowledge so as to enable behavioral changes that are relatively fixed both in thinking, feeling and in acting. The principle of learning is in the form of changes in behavior or the formation of inherent habits that occur through the learning process. To obtain these inherent changes and habits is a conscious effort from mankind itself to do consciously. According to Coker, (2004) learning is defined as a relatively fixed or permanent change in the ability of each individual to carry out movement skills as a result of an experience or practice. Learning according to the description above can be concluded that learning is a process carried out consciously in gaining knowledge where changes in behavior both cognitive, affective and psychomotor are obtained from permanent experiences.

2. Learning Motion

Motion learning according to Schmit (2000) motion learning or referred to as motor learning by stating motion learning is a series of processes associated with exercise or experience that leads to relatively permanent changes in a person's ability to display skilled movements. Motion learning is influenced by the form of learning and experience training and learning situations for students to be able to do it takes attention and concentration to students so that students experience changes in movement skills, four concepts contained in motion learning, namely: (1) Learning is a the process of gaining the ability for skilled action (2) Lessons caused by experience or practice. (3) Lessons are not directly regulated instead of processes and behaviors (4) Learning outcomes that have relatively permanent changes in behavior Gallahue & Ozmun, (2006). Schmit & Wisberg (2000) say: "Motor learning in contrast, is the internal process that reflects the levels of on individual performance capability and may be estimated by relatively stable performance demonstrations, in order for people to learn a motor task, however, the must engage in performance attempts for practice"

B. Smash Motor Skills in Sepaktakraw

According to Widiastuti (2011) motor ability is as a capacity of someone related to the implementation of physical abilities to be able to carry out a movement, or it can also be defined that motor ability is the capacity of one's appearance in displaying motion. Schmit (2000) learns motion or The so-called motor learning states that motion learning is a series of processes associated with training or experience that leads to relatively permanent changes in a person's ability to display skilled movements. Sepak takraw game is a sport that requires a

high level of movement skills where the movements in sepak takraw are included in high complexity movements, in the game takraw needed motor skills to support the sepaktakraw game. Power, speed, flexibility, agility, and coordination are components of motor skills needed in playing takraw. Smash is one of the takraw play techniques that are important in donating points if done well, right and right on target and is one of the movements that demands very high complexity of motor ability components that are very supportive in the smash movement is 1). Speed according to Widiastuti. (2015: 125) ability to make similar movements in a row. In the smash movement needed speed in the smash is needed on the swing of the foot when going to hit the ball. 2). Power is a combination of speed and strength is one component of motor ability that is very supportive to be able to produce a hard smash. 3). Agility (agility) is the ability of a person to change position in movement with coordinated control. In the game sepaktakraw agility is needed and plays an important role where the player must be able to chase the ball and try to keep the ball from falling to the floor. 4). Balance, According to Harsono (2018: 164) Balance is the ability to maintain the neuromuscular system (nervous-muscular system) so as not to fall or collapse.

The ability to maintain standing balance (postural control) is based on the complex interaction between the vestibular function, vision, proprioception and locomotor system components, and it is part of the broader concept of coordination of movements (coordination). Consequently, standing balance is important for the performance of sports activity (Hahn, 1999)

C. The Nature of Exercise

Definition of Exercise

Training according to Lakshmikrishnan and Silvakumar, (2013: 152-153) is an organized, planned and systematic pedagogical scientific process on the ability and readiness of performance with the aim of sports excellence and performance improvement in the context of sports competition. According to Nagarajan, (2013: 149), explaining the practice is the basic form of sportsman arrangement through a systematic process, up to a long period of time based on and carried out on scientific facts. While Bompa and Haff, (2009: 2) stated that training is the process of preparing athletes to achieve higher performance or levels. Bompa and Buzzichelli, (2015: 13) say that the entire training program aims to achieve peak performance in the most important competitions. Nossek, (1982) states that training is a process or a period of time that lasts for several years until the sportsman or sport reaches the

standard high appearance. Exercise is a systematic process with the aim of increasing the physical fitness of athletes by performing certain activities (Thompson, 1994). Training or training is a systematic process of work or practice, which is done repeatedly, with more and more days increasing the burden of exercise or work, (Hanif, 2011: 36).

Exercise Characteristics

Mylsidayu, A. & Kurniawan, (2015) suggested that the training process is always characterized as follows: 1) An exercise process reaches a better level of ability in sports, which requires a certain amount of time and requires proper and careful planning. 2) The process of training must be regular and progressive. Organized means that it is carried out steadily, progressively, and continuously (continuous), whereas it is progressive meaning that the material is given from easy to difficult, from simple to more difficult (complex), and from mild to severe. 3) At each one time face to face / training session must have goals and objectives. 4) The training material must contain theoretical and practical material, so that understanding and mastery of skills becomes relatively permanent. 5) Using a particular method, which is the most effective way that is planned in stages by taking into account the difficulty factor, the complexity of the motion, and the emphasis on the target practice.

The Purpose of Exercise

According to Harsono, (2018: 39-49) The main objectives and objectives of training are to assist athletes in improving their skills and achievements to the maximum extent possible. To achieve this, there are 4 aspects of training that are needed, namely:

1) Physical training is very important, without a good physical condition the athlete will not be able to follow the exercises perfectly. The main goal is to increase the physiological potential and develop biomotor capabilities to the highest level so that the highest achievements can also be achieved. 2) Technical training is an exercise to improve the movement techniques needed for skilled athletes to do their sport. 3) Tactic training is an exercise to nurture the development of interpretives or interpretations in athletes. Training or tactic planning will only be successful when the technical skill level of each team member is perfect. 4) The athlete's mental training is no less important than the development of the three factors mentioned above, because no matter how perfect the physical development, technique, and tactics of the athlete, if the mental is not developed, high achievement will not be achieved.

Principles of Exercise

Sukadiyanto and Muluk., (2011: 1) in principle, training is a process of change for the better, namely to improve: physical quality, functional ability of body equipment, and psychological quality of trainees. While Reilly.T, (2005: 17-15) states that training is the most important part of preparing for sports competitions. Richard and Fox, (1992: 143) By looking at its function, training can function as a program of physical or physical activities that are designed to improve some skills and increase one's energy capacity for specific activities. In detail also stated that the main task of a sports training is to: (1) Develop personality, (2) Improve physical conditions which include stamina, explosive power and speed, (3) Improve techniques and efficient movement coordination, (4) Develop tactics, (5) Strengthen mentally through mental training. The principles of training according to Bompa, (2015) 1) Overload Principle, 2) Individual Principles, 3) The Principle of Active Participation in Exercise, 4) Principles of Multilateral Development, 5) The Principle of Restoration of Origin, 6) Principle of Reversibility, 7) The principle of Avoiding Overload Training (Over Training), 8) Principles of Exercise Using Models.

Thus it can be concluded that, training is a systematic and continuous work or training process, carried out repeatedly with increasing training load. Systematic training is a well-planned training program, carried out according to schedule according to a predetermined pattern, and evaluation in accordance with the correct tools. Presentation of material must be made from the easiest material to the most difficult material, from the simplest material to the most complex material.

D. Characteristics of Youth

According to Santrock, (2007), adolescence is a period of developmental transition between childhood and adulthood which includes biological, cognitive and social emotional changes. In English, adolescence is called adolescence, derived from the word *adolescere* which means growing toward maturity.

Steinberg, L & Silk, (2002: 103) divides adolescence into three categories: early adolescents (11-14 years), middle adolescents (15-18 years) and late adolescents (18-21 years). Hurlock, (1980), divides adolescence into two parts, namely early adolescence and late adolescence. The beginning of adolescence takes place approximately from the age of 13-16 years and the end of adolescence begins from the age of 17-21 years, the age that is considered legally mature.

E. Game of Takraw Football

Sepak takraw is a traditional sport originating from the land of Indonesia and has long been developed in the country. With a lot of playing by the people of Indonesia, especially those who live on the beach in Makassar, it is often called soccer as a leisure time before going to sea. is a historic sport, the nation's culture and natural conditions and the results of Indonesian agriculture (Hanif, 2015: 3). Sepak takraw games played in Minangkabau are traditional games that are played in a circular manner on a field that is carried out by 5-10 people. Sepak takraw is a traditional game that uses balls made of rattan (Iyakrus, 2012: 1). Sepak takraw is a popular sport in Southeast Asia. It is now played worldwide. "Football" means to kick in Malay, and "takraw" means ball in Thai (Kubo at all 2016: 986). It means sepak takraw is a popular sport in Southeast Asia. "Football" means kicking in Malaysia and "Takraw" means ball in Thailand. Engel, (2010: 1) Sepaktakraw or commonly abbreviated as "takraw", commonly called "kick volleyball" or "soccer volleyball" (volleyball soccer). Takraw's game is a combination of three games consisting of the game of soccer, volleyball, and badminton Dervish and Wet in (Saputro and Upriadi., 2017: 112) .. Sepak takraw or kick volleyball is a popular sport in Asia and is becoming more popular around the world (Silalertdetkul, 2016: 289). That is, sepak takraw or volleyball is a popular sport in Asia and is becoming popular throughout the world.

F. Smash In Sepak Takraw

Smash or rejam (Malaysian term) is the most important work movement and is the final movement of the work movement of the attack. Failure to smash your opponent's spaciousness will give the opponent an opportunity to counterattack, on the contrary the success of the smesh will result in a point for the Darwis attacking team (1992: 66). Smash is one of the five techniques that have an appeal in the game of sepak takraw. Smash is the last movement in the work of the attack, for that it needs to be studied and trained regularly. Exercise is a process of systematically preparing athletes' organisms to achieve maximum quality achievement by being given regular, directed, increasing, and repetitive physical and mental burdens Suharno HP, (1990: 7). Darwis and the Head of Bases., (1992: 69) Failure to smash the ball on the opponent's pitch will give the other party an opportunity to counterattack or die on the own field or leave the playing field. Conversely the success of a smash can add numbers to the attacking team. So it is desirable that the two wedges are

needed to have good skills in smash. According to Hanif, (2015: 49) Smash is a series of movements consisting of: (1) the prefix attitude, (2) during repulsion, (3) during a smash (when the body is above). Smash in the soccer takraw game there are 2 namely smash rolls and straight smash. Juniidi and Pamot (1997: 60) say that kedeng smash is a type of smash in sepak takraw done with the feet and the initial position of the ball is above the front side of the player. Kedeng smash is a smash movement that is quite simple compared to other smash movements such as roll smashes (salto) or rotate which are both done using the feet, for that flank players namely left and right wedge which has many opportunities to do smashes in attacking opponents need to be trained properly in order to have the ability or good smash skills, Ratinus Darwis and Dt. Penghulu Basa (1992: 69). Smash kedeng can be analyzed its form and motion as follows: The body when it will make a smash on the position of the back of the net and the view adjusts the direction of the ball. 1) Smash repulsion is done with the right foot and the left foot following with a straight swing forward as a counterweight. 2) The right foot hits the ball when it reaches the highest range. 3) The position of the feet after making a smash is swung sideways or outward to form regular, continuous movements. 4) Position the body following the continued motion of the swinging arm, arms swung to maintain balance.

G. Modification of Training Aid

Modifications to sports equipment are often done to improve techniques, improve performance and / or adjust the level of difficulty of training / training level. One example of the modification was carried out by (Khelifa et al., 2012) who improved the basketball free-kick kinematics (freethrow) by modifying the ring diameter to be smaller than basketball rings in general. Pellett & Lox (1998: 453) states that in addition to the potential for improved performance, modifications in sports equipment must also be linked to increased self-efficacy (defined as a specific situation or form of self-confidence). In the realm of physical education, Metzler, (2011) states that modifications to equipment, space, and regulations to give teachers ideas about how to increase or decrease the level of challenge or complexity to better suit students' abilities. Arias et al. (2012) In the game of tennis, the results of testing the effectiveness of scaling equipment (modification of tennis balls and the size of the field) on the acquisition of beginner player skills showed positive results (Farrow & Reid, 2010).

H. Smash Soccer Takraw Training Model Based on Smash Training Aid

Some training strategies that can improve the ability of the Kedeng smash include practicing the Kedeng smash by hanging the ball, practicing the Kedeng smash by the ball being fed by themselves, practicing the Kedeng Smash by the ball being fed by others, practicing the Kedeng Smash by the ball by the hands of others. and others. In an effort to optimize the practice of smash techniques in sepak takraw, variations of the exercise need to be done by maximizing training aids in the form of ball hanging poles. The variation models developed will utilize various training aids that are used. Aids are used to provide various alternative exercises in accordance with the ability of athletes at each stage. Beginning stages, accuracy (impact) with the ball, until the smash accuracy. Aids in sepak takraw practice are often done to support the mastery of certain skills. For example, in the use of hanging balls for lower service exercises, based on Hidayat's research results (2015: 117), it shows that lower service exercises using hanging balls, can significantly improve the service skills under sepak takraw. A soccer takraw training aid that has also been developed is a ball throwing machine. Based on the results of Hidayah and Priyono's research, the ball-launcher "Ball-Launcher" can be used to practice and increase the endurance of athletes when they do soccer kicks Hidayah, Nurul & Priyono (2017: 197). On the other hand modifications made by international soccer takraw organizations, in particular the modification of Takraw balls. Historians say that the first use of rattan balls was around 500 years ago. However, due to reduced rattan, new regulations were established to protect the existence of rattan. In addition, rattan balls are also more easily damaged and broken in game nets. Then a synthetic ball appears in the same shape as the rattan ball and is still woven by hand. (Engel, 2010) The training aids used by researchers in this study by maximizing the smash training aids are ball hanging devices where the tools can be used to practice both in parts and whole in doing smash movements and can be used for variations of smash exercises.

METHOD

The method used in this research is the experimental method of the True Experimental Design design with the One Pretest-posttes Control Group Design.

Tabel 1 . Pola *Pretest-posttes Control Group Design*

	Grup	Pretest	Treatment	Posttest
R	Experiment	O ₁	X	O ₂
R	Control	O ₃	-	O ₄

In this study the sample selection technique used was purposive sampling, amounting to 40 athletes. Data collection techniques in this study were tests and measurements carried out using skills tests. This research instrument was validated by two experts in sepak takraw. Data analysis and hypothesis testing using comparative analysis techniques using the Dependent sample t-test, namely Paired sample t-test and Independent sample t-test, namely t-Test: Two-Sample Assuming Equal Variances with a significant level $\alpha = 0.05$.

RESULTS AND DISCUSSION

This study was conducted to determine the effect of the sepaktakraw smash training model based on smash aids. The number of samples in this study were 40 adolescents of Pontianak City divided into 2, consisting of 20 experimental groups and 20 control groups. From this sample the data obtained from the experimental class pre-test (before being treated) and post-test experimental class (after being treated) while the control class obtained pre-test data (not given treatment) and post-test (not given treatment). The results of the pre-test and post-test experimental and control classes are used to answer the problem formulation in the study. The results of this study shown in table 1.

Table 1. Frequency Distribution of Pre-Test and Post-Test Smash skills for the experimental group.

Interval Class	Experimental Group				Category
	<i>PreTest</i>		<i>Post Test</i>		
	Absolut	Relatif	Absolut	Relatif	
$\geq 67,40$	0	0	3	15%	Very well
63,21 – 67,39	0	0	4	20%	Well
50,64 – 63,20	10	50%	11	55%	Enough
42,26 – 50,63	8	40%	2	10%	Less
$\leq 42,25$	2	10%	0	0	Very, very little
Total	20	100%	20	100%	

Table 2. Frequency Distribution of Pre-Test and Post-Test Smash skills of the control group.

Interval Class	Experimental Group				Category
	PreTest		Post Test		
	Absolut	Relatif	Absolut	Relatif	
≥62,27	0	0	3	15%	Very well
58,78 – 62,26	1	5%	2	10%	Well
48,29 – 58,77	11	55%	8	40%	Enough
41,30 – 48,28	6	30%	6	30%	Less
≤ 41,30	2	10%	1	5%	Very, very little
Total	20	100%	20	100%	

Before testing a hypothesis, first testing the analysis prerequisites. The requirements analysis testing is done by:

a. Normality test

Before analyzing the data it is necessary to test the normal distribution. Data normality test in this study used liliefors test. The results of normality test data conducted on the results of the pretest and posttest can be seen in the table 3.

Table 3. Pretest and Posttest Normality Test Results

No	Variabel	n	L _o	L _{table}	Distribution
1	preliminary test of the experimental group	20	0,0738	0,190	Normal
2	final test of the experimental group	20	0,1492	0,190	Normal
3	initial control group test	20	0,0821	0,190	Normal
4	final control group test	20	0,1134	0,190	Normal

b. Homogeneity

The purpose of the homogeneity test is to test the similarity of variance between group 1 and group 2. This homogeneity test serves as a requirement in testing differences, where if there are differences between groups tested, this difference is really a difference in mean values. If F_{count} < F_{table}, then the pretest and posttest data are declared homogeneous. Homogeneity test results of pre-test and post-test data can be seen in the following table 4.

Table 4. Pretest and Posttest Homogeneity Test Results

No	Variabel	n	F _{count}	F _{table} (α = 5%)	Result
1	experimental group	20	2,08	2,15	Homogen

No	Variabel	n	F _{count}	F _{table} ($\alpha = 5\%$)	Result
2	control group	20	1,73	2,15	Homogen
3	experimental and control groups	20	0,88	2,15	Homogen

it can be concluded that the results of the final test of the experimental group and the final test of the homogeneous control group. Based on the description above, it turns out that the three results of research variable data are homogeneous, because each of the Fcount score variables is smaller than the Ftable at the level for $\alpha = 5\%$.

2. Influence Test

The influence test is carried out on the experimental class and the control class to find out whether the proposed hypothesis is accepted or rejected, namely by using t-test analysis. Based on the results of the test calculation the influence of pre-test and post-test data can be seen in the following table.

Summary of Results (T-Test) Effect of Smash training models with assistive devices

Table 5. Result t-test *Pretest* and *Posttest* Eksperimen group

Experimental Group	Mean	t _{hitung}	α	t _{tabel}	Information
<i>PreTest</i>	50,15	14,95	0,05	2,10	Ho refused H1 received

From the calculation of the experimental group data, t count > t. table (2,10), there are differences in the results of the smash training with the training aids.

Table 6. Pretest and Posttest Test Results

Group	Mean	t _{count}	A	t _{table}	Information
<i>Post Test</i> experiment	59,52	2,21	0,05	2,028	Ho refused H1 received
<i>Post Test</i> control	53,73				

From the above table t count 14.95 > t table 2.10 This means that there are differences in the results between the pretest and post test experimental group and the control group, the average pretest score is 50.15 and the post test 59.52, it can be concluded an increase in smash skills 31.64%

3. Gain Score

To see the magnitude of the increase in smash skills can be from the calculation of the gain score as follows:

Table 7. Control Group and Experiment Gain Score Results

Criteria	Experiment	Percentage	Control	Percentage
High	1	5%	0	0%
Is	12	60%	16	80%
Low	7	35%	1	20%

The table above shows in the experimental group the high category 1 subject with a presentation of 5%, the medium category 12 subjects with a presentation of 60%, the low category 7 percentages are 35%, while for the control group the category is High 0%, the moderate category is 16 Subjects are 80% presentation and low category 1 with 20% presentation.

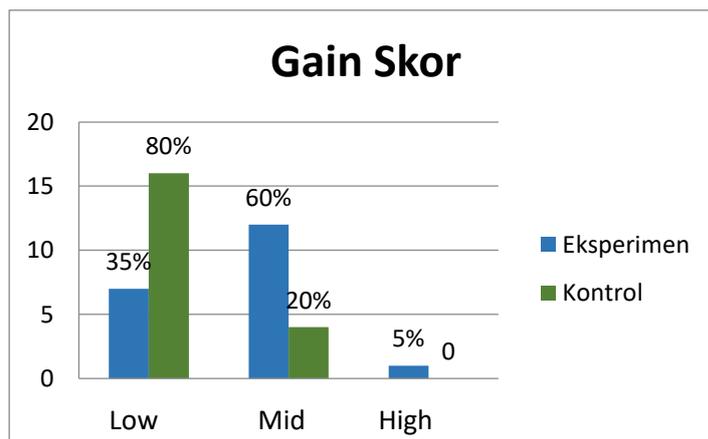


Figure 4. Gain Score on Smash Skills in the Experiment and Control Groups

From the calculation of the above data, it can be concluded that the experimental group smash skills treated with training-based smash training in Pontianak city athletes are better than the control group smash skills.

CONCLUSIONS AND RECOMMENDAIONS

Based on the processing of experimental class and control class data which is done by analyzing the influence test where the value of the experimental class ttest is 11.19 greater than the ttable value of 1.740 whereas, conclusions can be drawn that answer the research hypothesis that the hypothesis is accepted with an increase of

10.64%. Means that there is a significant influence with the modification of the takraw ball on the learning outcomes of sila in the experimental class. 1). There is an effect of the training model based on training tools on smash sepaktakraw skills from an average value of 50.15 to 59.52 with $t_{count} = 9.67 > t_t = 2.101$. 2). There is a difference in the effect of the smash training model based on training aids on the sepaktakraw smash skills with an average value of 59.52, there is an increase in the smash ability 31.64%.

REFERENCES

- Achmad Sofyan Hanif. (2015). Sepaktakraw For Students. Raja Grafindo Persada.
- Bompa T.O and Carlo A. Buzzichelli. (2015). Periodization Training For Sport Third Edition. United States of America.
- Bompa T.O and G. Gregory Haff. (2009). Periodization Theory and Methodology of Fifth Edition Training. Human Kinetics.
- Harsono (2018). Exercise Physical Conditions. Teen Rosdakarya.
- Lakshmikrishnan, R and Silvakumar, K. (2013). Effects Of Weight Training And Plyometric Training On Strength Endurance And Leg Strength. 11, 1.
- Mylsidayu, A. & Kurniawan, F. (2015a). Basic coaching. alfabeta.
- Metzler, M. W. (2011). Instructional models for physical education (3rd ed.). Holcomb Hathaway.
- Majid, A. (2014). Integrated Thematic Learning. PT Youth Rosdakarya.
- Nagarajan, S. Damodharan, C. Praven, A. (2013). Effeck of aerobic circuit training and parcours Training on Selected Physiological Variables Among college Men Students
- Pellett, T. L., & Lox, C. L. (1998). Tennis racket head-size comparisons and their effects on beginning college players' achievements and self-efficacy. *Journal of Teaching in Physical Education*, 17 (4), 453–467. <https://doi.org/10.1123/jtpe.17.4.453>
- Nossek, J. (1982). *General Theory of Exercise*. Afrcan Press.
- Ratinus Darwis and Dt. Head of Bases. (1992). Takraw's Choice of Sports. Ministry of Education and Culture.
- Richard W. Bowers and Edward L. Fox. (1992). *Sport Physiology*. Wm.C. Browns
- Pellett, T. L., & Lox, C. L. (1998). Tennis racket head-size comparisons and their effects on beginning college players' achievements and self-efficacy. *Journal of Teaching in Physical Education*, 17 (4), 453–467. <https://doi.org/10.1123/jtpe.17.4.453>
- Engel, R. (2010). *Fundamentals of Sepak Takraw*. PT Intan Sejat.
- Thompson. (1994). *Introduction to Coaching Theory*. IAAF.
- Widiastuti. (2011). *Sports Tests and Measurement*. PT. Bumi Timur Jaya.