

THE EFFECT OF EXERCISE AND KINESTHETIC METHODS TO BACKHAND GROUNDSTROKE SKILLS ON FIELD TENNIS GAMES

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Abstract

This experimental research aims to know the influence of exercise and kinesthetic skills against the backhand groundstroke tennis sports field. The research was carried out at the tennis FIK UNM. Factorial design experiments using the method 2x3. The sample consists of 60 students. Technique of data analysis is a two-way analysis of variance (ANOVA) and tukey test T-: results of this research show that: (1) Wrist curl practice methods better influence from horizontal swing exercises against backhand groundstroke tennis field tennis, (2) Wrist curl practice method is better than cable rotation exercises on backhand groundstroke tennis skills, (3) Horizontal swing practice method is better than cable rotation practice on backhand groundstroke tennis skills, (4) There is interaction between wrist curl practice method, horizontal swing practice method, high rotation kinesthetic training method for backhand groundstroke tennis field tennis, (5) Wrist curl practice method is better than horizontal swing practice method against backhand groundstroke skill high tennis kinesthetic tennis, (6) wrist curl exercise method is not better his influence from the method of horizontal swing exercises against the skills of backhand groundstroke tennis kinesthetic high, (7) Cable rotation training method is better than the horizontal swing practice method against backhand groundstroke skills of high kinesthetic tennis field tennis, (8) The horizontal swing practice method is better than the wrist curl practice method for backhand groundstroke skills of low kinesthetic tennis court, (9) The cable rotation training method is better than the wrist curl practice method of backhand groundstroke skills of low kinesthetic tennis court, (10) The horizontal swing practice method is better than the cable rotation training method of backhand groundstroke skills on low kinesthetic tennis court.

Keywords : Training methods, kinesthetic and backhand groundstroke skills on the tennis court

Tennis is one of the sports contested the Olympic Games, the sport pupuler in Indonesia but have not been able to demonstrate achievement in the world by, therefore it is the duty and responsibility of coaches, trainers provide intensive coaching, to be able to improve the performance of tennis both in the country and outside country.

Achievement tennis is not only determined by the mastery of basic techniques, but also influenced by the readiness of the physical condition needed to play tennis, among another, strength, speed, flexibility, endurance, explosive power (power), balance and coordination. This is in accordance with the opinion of James Tangkudung (2012: 3) which says: the state of a good physical condition will affect psychological aspects in the form of increased motivation, morale, confidence, thoroughness, and so forth.

The goal of the game is to try to hit the ball over the net and fall on the opponent's playing field and try to keep the opponent unable to hit the ball. The purpose of playing tennis is to get pleasure, fulfill the desire to move, maintain body health and for achievement.

In the game tennis field is strongly influenced by good physical condition, among others: endurance cardiorespiratori, muscle endurance, strength, agility, flexibility, speed, power, etc. Each of these physical abilities greatly affect the appearance of a player. In addition to physical conditions that have been trained technical skills also can not be ignored because it is a form of the game it self.

In tennis there are some basic techniques that must be mastered, namely forehand, backhand, volley, service, and smash. According to Muguel Crespo, Dave Miley, (1998: 67-89) basic techniques of punch in playing tennis are: Forehand - backhand groundstrokes, serve, volley, smash.

Prolonged tennis playing in the competition can cause muscle fatigue so that it can interfere with the ability on the field Martine Duclos (2014: 8).

Of the various basic techniques and variations of the punch there is a groundstroke punch, groundstroke is a blow made after the ball bounces off the field and most often done at the back of the field (base line) as proposed by According to Jim Brown, (2007: 31) the groundstroke is a blow after the ball bounces into the field. Tennis field is a sport that needs physical condition one of them is power, because the power is also an important role in doing a strike or shot hard into the opposite field by using forehand groundstroke and backhand groundstroke hard forehand would not be complete if weak backhand. According to Handono Murti (2002: 35) If backhand is weak or does not provide a meaningful effect, it will give the opponent an opportunity to attack on the left side of the field with constantly firing. Therefore the achievement of field tennis achievement needs to be trained and enhanced more intensively and optimally.

The resulting punch strength with a forehand punch is greater than that produced by a backhand blow Darryl D. D'Lima and Shantanu Patil, (2011: 29 - 58). Success in backhand groundstrokes can be synergized with various physical components by using weight training methods, wrist steal exercises, horizontal swing

exercises, and rotational exercises, this should also be supported with good playing technique skills so that physical ability and playing skills are balanced with so the quality of the game will be better.

According Harsono (2017: 40) physical components consisting of strength, speed, power, endurance, flexibility, balance, agility, precision, and stamina. Of the various physical components is badly needed in the game of tennis. If linked with backhand groundstroke skills, muscle strength is very supportive and play a crucial role. Muscle strength is a component of the physical component that can be increased in accordance with the need for any sport that needs it, in order to increase muscle strength can only be obtained through weight training.

Regarding the implementation of backhand groundstroke, the dominant factor in the increase is by increasing muscle strength. Weight training that leads to increased arm muscle strength is wrist curl exercise while weight training which leads to increased strength of togek muscles is a horizontal swing exercise, and a rotational exercise of rotation.

In order for an exercise to be efficient, it must consider several factors that influence such as perceptions of kinesthetic, the level of difficulty given, the facilities and infrastructure used and goals to be achieved. In the process of skills training, kinesthetic perception is a factor that helps determine whether or not athletes can master movement techniques or sports skills in the exercise. Kinesthetic is the ability of a person to realize the position and motion that has been done

In the backhand groundstroke skills, players attempt to coordinate the body's drive components. muscles, tendons, and joints are the main components in gestures. Movements in tennis such as forehand, backhand, serve, smesh need the accuracy of a player's movements and therefore a very helpful kinesthetic about the movement technique that will be done gives the perception of the player with the movement that has been done or felt before will be stored in memory as an internal analysis material and provide information for the correction of movement or subsequent performance. Kinesthetic can give players the ability to control the movement of the blow and the direction of the ball and take the position with the right timing so that the backhand groundstroke is more accurate.

Along with the issues that have been raised about wrist curl exercises and horizontal swing exercises applied in improving backhand groundstroke skills in tennis games viewed from kinesthetic, the researchers tried these three forms of exercise to be examined and their interrelationships between those exercises with kinesthetic perception rates. Based on these matters, there is a need to research to prove the extent of the influence of wrist steal exercise, horizontal swing exercise, and cable rotation training in improving backhand groundstroke skills in terms of

kinesthetic perception. Along with the problems that have been raised about wrist curl exercises, horizontal swing exercises, and cable rotation exercises applied in improving backhand groundstroke skills in tennis games in terms of kinesthetic perceptions, the researchers tried these three forms of exercise to be examined and their interrelationship between the exercises with level of kinesthetic perception.

Based on these matters, research is needed to prove the extent to which wrist curl exercises, horizontal swing exercises, and rotational training in improving backhand groundstroke skills in terms of kinesthetic perceptions. Based on the background of the problem, problem identification, and problem restrictions related to the research, the problem in this research can be formulated as follows:

1. Whether there is a difference of influence of wrist curl exercise method, the method of horizontal swing, exercises against the skills of punch backhand groundstroke tennis?
2. Whether there is a difference of influence of wrist curl exercise methods with method of cable rotation exercises against the skills of punch backhand groundstroke tennis?
3. Whether there is a difference of influence of method of horizontal swing exercises with exercise cable rotation against the skills of punch backhand groundstroke tennis?
4. Whether there is an interaction between the form of exercises and kinesthetic skills against backhand groundstroke tennis?
5. Whether there is a difference of influence of wrist curl exercise with a horizontal swing exercises in groups of high skill blows against kinesthetic backhand groundstroke tennis?
6. Whether there is a difference of influence of wrist curl exercise with cable rotation exercises in groups of high skill blows against kinesthetic backhand groundstroke tennis?
7. Whether there is a difference of influence of horizontal swing exercise with cable rotation exercises in groups of high skill blows against kinesthetic backhand groundstroke tennis?
8. Whether there is a difference of influence of wrist curl exercise with a horizontal swing exercises on a group of low-skill blows against kinesthetic backhand groundstroke tennis?
9. Whether there is a difference of influence of wrist curl exercise with cable rotation exercises on a group of low-skill blows against kinesthetic backhand groundstroke tennis?
10. Whether there is a difference of influence of horizontal swing exercises with exercise cable rotation on a group of low-skill blows against kinesthetic backhand groundstroke tennis?

Tennis Game Field

Tennis, sports games racket, played by two single player (single) were facing one on one, or four players double (double) play two against two, and the field is divided into two main parts, namely, his own field and field opponent. The field itself is a place of attack and defense as a place, whereas the opponent's court as the target of the blow, which is restricted by the net and the lines of the field, where we can and can not place the ball. A fun and healthy sport game tennis, this sport can be played by anyone who can hold a racket, including people in wheelchairs. Tennis is enjoyed by millions of recreational players and is also a very popular sporting spectacle worldwide. Tennis court including competitive sport types that emphasize more on the biomotor component because these components are needed players especially the power of hitting in an attack towards the opponent. Tennis games actually last only 17-28% of the total time during play. The rest is the lapse of time when points and breaks in each game Ching-Lin Wu, (2010: 1).

The goal of playing tennis won the game by hitting the ball towards the opponent's field and trying to keep the balls hit could not be reached by the opponent, according to Sukadiyanto (2011: 26) technique of hitting the ball to pass over the net and into the opponent's area of service, groundstroke, volley, and smas.

playing tennis is not easy because there are some basic techniques players should know about, according to Tina Hoskins-Burney (2014: 20) states a tennis player in demand must master the basic techniques of playing tennis, namely, forehand drive, backhand drive, lob, half volley, smash, and subsequent service Basuki Widiyarso (2008: 85) states almost everyone who is just learning to play tennis in trouble, so the game of tennis is often classified into types of skills that are difficult and complex. The condition of the playing environment is difficult to control or difficult to predict beforehand by tennis players there are some known grip handles in forehand groundstrokes and backhand groundstroke, ie eastern, western and continental. While the groundstroke punch in the game of tennis is done after the ball bounces in the field this punch is commonly used in the back line (base line) according to Brown, groundstroke technique is to hit the ball after the first bounce in the field.

Motion Skills

Motion skills are the embodiments and correctness of body mechanics that affect the efficiency of the use of energy and the effectiveness of achieving goals. To achieve high sports achievements, the fostering of motion skills is as important as physical development. According to Cheryl A. Choker (2004: 5) suggests that motion skills are goal-oriented actions or tasks that require a voluntary body or limb movement.

Backhand Skills

According to Rex Lardner (1990: 43-44) the backhand is a more natural stroke than the forehand. The swing from the side gives the arm and hand greater control over the racket, this swing can give as much strength. When the stroke is done properly, move forward and follow the direction of the ball with free movement and the body swinging behind with great strength. Based on the opinion of experts above understood that the backhand skills is a more natural stroke than the forehand, that is because the body is not facing the target shot. When the stroke is done properly, move forward and follow the direction of the ball with a free movement and the body swinging behind with great force.

Exercise Method

Exercise is a process of repeating physical activity or work well and correctly to improve the achievement of optimal performance in order to achieve the highest achievement. Exercise or training is a systematic process of practicing done repeatedly with increasingly increasing the number of workloads and intensity of training James Tangkudung, (2006: 45). Exercise is a very complex process, organized and planned systematically, gradually and continuously implemented in order to improve sports performance.

Wrist Curl Exercises

One form of weight training to improve backhand groundstroke skills is wrist curl exercise. This exercise is a burdened exercise form, using the help of an external burden of barbell or dumbbell. This exercise intends to increase strength and is expected in its implementation by performing this activity quickly and in the end it is expected to form muscle explosive power.

Horizontal Swing Training

The horizontal swing movement is the same as the horizontal arm swing. and horizontal swing is a form of weight training that intends to increase the strength that involves the shoulder and arm muscles as well as the posterior, lateral and anterior trunk muscles. This exercise is very good for developing waist strength

Cable rotation (in the transverse plane) drill

Cable rotation is a way of exercise that can produce strong muscle contraction so it is the key to success in all activities. Mikhael Barnes (2006: 2) defines Cable rotation is a form of natural exercise that aims to stimulate the body's nervous system so that the appearance becomes more effective, cable rotation is an exercise with specific dynamic muscular loading features as "stretching"

Kinesthetic

Kinesthetic is awareness of body position and part movement body parts. Guyton A, C (2006: 220) suggests that Kineste tick, which means to consciously recognize the speed of movement of various parts of the body. Drowatzky (175: 184) states that kinesthetic is the ability to sense the orientation of the body in space and the loose relationships between the body parts. This is based on input from the "proprioceptive" and vestibular receptors. This is not a common skill but very specific to difficult body parts and movements.

Based on the theory and the previous description, it can be argued that the perception of kinesthetic is the ability se se the command and control over his body properly, which stemmed from a tip stimulus in muscles, tendons, and joints then channeled through the nerves to the brain, and the brain such information processed and interpreted in the form of decisions, then the decision was responded appropriately to perform the movement with a smooth, efficient, and accurate results. Someone who makes the decision and responded appropriately to do backhand groundstroke movement then the punch results will be smooth, efficient, and accurate to the target opponent. According to Barry. L. Johnson, Jack. K. Nelson (1994: 75) Kinesthetic perception is the ability to move the body or whole body in doing muscle motion that refers to the senses that exist in the muscle.

Research Hypothesis

Based on the background of the problem, problem identification, and problem restrictions related to the research, the problem in this research can be formulated as follows:

1. There is a difference in the effect of wrist curl exercise with a horizontal swing exercises against the skills of backhand groundstroke tennis court
2. There is a difference in the effect of wrist curl exercise with cable rotation against the skills of backhand groundstroke tennis court
3. There is a difference in the effect of horizontal swing exercises with exercise cable rotation against the skills of backhand groundstroke tennis court
4. There is an interaction between the form of exercises and kinesthetic skills against the backhand groundstroke tennis court
5. There is a difference in the effect of wrist curl exercise with a horizontal swing exercises on a group of high skill against kinesthetic backhand groundstroke tennis court
6. There is a difference in the effect of wrist curl exercise with cable rotation exercises in groups of high skill against kinesthetic backhand groundstroke tennis court

7. There is a difference in the effect of horizontal swing exercises with exercise cable rotation group a high backhand skills against kinesthetic groundstroke tennis court
8. There is a difference in the effect of wrist curl exercise with a horizontal swing exercises on a group of low-skill against kinesthetic backhand groundstroke tennis court
9. There is a difference in the effect of wrist curl exercise with cable rotation exercises on a group of low-skill against kinesthetic backhand groundstroke tennis court
10. There is a difference in the effect of horizontal swing exercises with exercise cable rotation on a group of low-skill against kinesthetic backhand groundstroke tennis court

METHOD

Based on the study of problems to be studied then the method used in this study is the experimental method. The design to be used is a 2x3 factorial design. The research design is described as follows:

Table 1 2x3 Factorial Design Research

Treatment Variables		Exercise method (A)		
		Wrist curl Training (A ₁)	Horizontal Swing Training (A ₂)	Cable Rotation Training (A ₃)
Attribute Variables				
The perceptual kinesthetic (B)	Height (B ₁)	A ₁ B ₁	A ₂ B ₁	A ₃ B ₁
	Low (B ₂)	A ₁ B ₂	A ₂ B ₂	A ₃ B ₂
Total		A ₁	A ₂	A ₃

The population in this research is the son all students majoring in physical education FIK UNM Makasar, whereas the population affordable fixed on physical education majors who have program an courses of tennis courts. The sampling technique uses a ramdommized design. To obtain the high and low component group Verducci, Frant, M. (1980: 176) explains that procedures for obtaining high component groups and low component groups in all three exercise methods are: first, 27% of the total score of each group ; second, take the sequence from start of highest score to the required number of samples and take the order from the lowest score to the required number of samples, mid score between the highest score and the lowest score removed / eliminated. When the test participants are large enough, the division of the upper and lower groups, taken by 27% of the

students who scored high as the upper group, and 27% of the students who scored the lowest as the lower group, so the total number of students who has passed The technique used in data analysis is a two-way variance analysis technique (ANAVA) with a significant level of $\alpha = 0.05$. Prerequisites need in the analysis of variance is normality test using Liliefors test and homogeneity test using Barlett test, followed by Tukey's test if there is an interaction. Data analysis technique using SPSS version 16.

RESULTS

The proposed is as follows :

Table 2 Anova test results analysis of backhand groundstrokes data skills student of FIK UNM

Source Variance	Level Free	amount Square	Average Square	F _n	F _t
Average Line	1	1848.14	924,070	3.68	3,22
Average Column	2	1425.02	1425,0151	5,6814	4.07
Interaction	2	12095,530	6047,7648	24,112	3,22
Error	55	10534,431	250.8198	-	
amount	60	25903,115			

Table 3. Summary of ANAVA Results
 Advanced Stage with the T- Tukey Test

Which group Compared	Price Difference Absolute Average	Price of HSD Crisis (qt)	Information
A ₁ and A ₂	5.50	2.11	Significant
A ₁ and A ₃	8.61	2.11	Significant
A ₂ and A ₃	14.11	2.11	Significant
A ₁ B ₁ and A ₂ B ₁	33.44	2.04	Significant
A ₁ B ₁ and A ₃ B ₁	1.44	2.04	Non Significant
A ₂ B ₁ and A ₃ B ₁	32.00	2.04	Significant
A ₁ B ₂ and A ₂ B ₂	22.44	2.04	Significant
A ₁ B ₂ and A ₃ B ₂	18.67	2.04	Significant
A ₂ B ₂ and A ₃ B ₂	3.78	2.04	Significant

The results of the analysis test mapped the results of the analysis Tukey test obtained $F_{(OA)} 5.50 > F_{(tab)} 2.11$ or H_0 rejected. Thus there is a difference in average backhand groundstroke skills from the group given wrist curl, horizontal swing and cable rotation training on FIK UNM Makassar students. The results show that the group of students who follow wrist curl training (A1) has an average score of 102 which is greater than the result of backhand groundstroke skills following the horizontal swing training (A2) which has a backhand groundstroke skill level with an average value of 95. means wrist curl training significant influence over the horizontal practice swing.

Hypothesis two states Tukey test analysis results obtained $F_{(OA)} 8.61 > F_{(tab)} 2.11$ or H_0 rejected. Therefore there is difference of backhand groundstroke skill from group given wrist curl training and cable rotation training on FIK UNM Makassar student. The results show that the group of students who follow the wrist curl (A1) practice has an average score of 102 which is greater than the result of backhand groundstroke skills that follow the training of rotational cable (A 3) which has the backhand groundstroke skills level with an average value of 95. means the exercise of rotational rotation significantly influence than wrist curl exercise. Observing the results of the calculation, the difference in the average score of backhand groundstroke skills test results and further tests, it can be concluded that there is a significant effect of the application of Wrist curl exercises against backhand groundstroke skills of FIK UNM students. Thus the Wrist curl exercise is better than the exercise rotation cable.

Hypothesis three states the results of ANAVA on obtained $F_{(OA)} 14.11 > F_{(tab)} 2.11$ or H_0 rejected. Thus there is no difference in the average backhand groundstroke skills of the group given the horizontal swing and cable rotation training on FIK UNM Makassar students. The result of the calculation shows that the group of students who attended the horizontal swing training (A₂) had an average score of 70.33 smaller than the result of skill backhand groundstrokes to follow the practice of cable rotation (A₃) who have the skill level backhand groundstrokes with an average value of 72.00. means the horizontal swing exercise significantly influences the exercise of cable rotation. Observing the results of calculations, the average difference in test result score skill backhand groundstrokes and a further test, it can be concluded that there is no significant effect of the application of horizontal drills swing to the

backhand groundstrokes skills of FIK UNM students. Thus the horizontal swing exercise is no better than the exercise rotation cable.

Hypothesis four states a summary of the calculation results obtained by the analysis of variance $F_{\text{calculate}}$ the price of interaction (F_{AB}) = 24. 112 and $F_{\text{table}} = 3. 22$, it appears that the $F_{\text{count}} > F_{\text{table}}$, so the zero hypothesis (H_0), which states there is no interaction between training methods and kinesthetic perceptions against rejected groundstroke backhand skills and alternative hypothesis (H_1) received. In other words it can be stated that the achievement of backhand groundstroke skills level influenced by the interaction between exercise and kinesthetic perception.

Based on the research data, the average score of backhand groundstroke skills is obtained wrist curl training group on high kinesthetic perception was 122, in the horizontal swing exercise group on high kinesthetic perception at 83. 40, the cable rotation training group on high kinesthetic perceptions equal to 115,41, wrist curl practice group on low kinesthetic perception of 82,02, horizontal swing training group on low kinesthetic perception equal to 105. 73, the cable rotation training group on the low kinesthetic perception of 102. 37.

Thus the research hypothesis that states there is an interaction between exercise and kinaesthetic perception against the skill level backhand groundstroke. Hypothesis five states the results of Tukey test analysis, on the analysis of differences in average results backhand groundstroke skills high perceptual group kinesthetic wrist curl exercise and horizontal swing practice obtained $t_{\text{arithmetic}}$ is 33. 44 > $t_{\text{table}} 2. 04$, this means H_0 rejected and H_1 received. This means that there is an average difference in backhand groundstroke skills results in the wrist curl training group and horizontal swing exercise of high kinesthetic perception. The results of the calculation, it can be seen that the group of students who follow wrist curl practice has an average score of 122, horizontal swing practice 83. 40. Means the wrist curl training group is better than the horizontal swing training group.

Hypothesis six states the results of Tukey test analysis, on the analysis of differences in average results backhand groundstroke skills high perceptual kinesthetic group exercises wrist curl and cable rotation training, obtained $t_{\text{arithmetic}}$ is 1. 44 groups $t_{\text{table}} 2. 04$, this means H_0 rejected and H_1 rejected. This means there is no average difference in backhand groundstrokes results in the wrist curl training group and the high kinesthetic cable rotation exercise perception. The result of the

calculation shows that the students who follow wrist curl practice have an average score of 122, the cable rotation exercise 115,41. This means that the wrist curl training group and the rotational training group have no significant differences.

Hypothesis seven states the results of the Tukey test analysis, on the average difference analysis of the results of backhand groundstrokes skills of high kinesthetic perception groups of horizontal swing training and training of rotational obtained $t_{\text{arithmetic}}$ is 32.00 > t_{table} 2.04, this means H_0 rejected and H_1 received. This means that there is an average difference in backhand groundstroke skills results in the horizontal exercise swing training group and the rotation cable training high kinesthetic perception. The result of the calculation shows that the group of students who followed the horizontal swing exercise had an average score of 83.40 and the cable rotation training was 115.41. That means the group of cable rotation training is better than the horizontal swing training group.

Hypothesis eight states the results of the Tukey test analysis, in the analysis of the difference in the average results of backhand groundstroke skills of low kinesthetic perception groups wrist curl exercises and horizontal swing exercises, obtained $t_{\text{arithmetic}}$ is 22.44 > t_{table} 2.04, this means H_0 rejected and H_1 received. This means that there is an average difference in backhand groundstroke results in wrist curl training group and horizontal swing practice low kinesthetic perceptions. The result of the calculation shows that the group of students who attended wrist curl practice had an average score of 82.02, horizontal swing exercise 105,73. This means that the horizontal swing training group is better than the wrist curl training group.

The nine hypothesis states the results of the Tukey test analysis, in the analysis of the difference in average results of backhand groundstroke skills of low kinesthetic perception group of wrist curl exercise and exercise of cable rotation, obtained $t_{\text{arithmetic}}$ is 18.67 > t_{table} 2.04, this means H_0 rejected and H_1 received. This means there is no average difference in backhand groundstroke results in wrist curl training group and cable rotation training low kinesthetic perceptions. Results of the calculations, it appears that the group of students who follow the practice wrist curl had an average score of 82.02, the exercise of cable rotation 102.37. That means the group of cable rotation training is better than the wrist curl training group.

Hypothesis ten states the results of Tukey test analysis, in the analysis of differences in average results backhand groundstroke skills low kinesthetic perception groups horizontal swing training and cable rotation training obtained $t_{\text{arithmetic}}$ is 3.78 > t_{table} 2.04, this means H_0 rejected and H_1 received. This means that there is an average difference in backhand groundstroke skills results in the

horizontal exercise swing training group and the exercise rotation cable low kinesthetic perceptions. The result of the calculation shows that the group of students who followed the horizontal swing exercise had an average score of 105.73 and the cable rotation exercise 102.37. This means that the horizontal swing training group is better than the rotational training group.

DISCUSSION

Based on the description of data analysis and hypothesis testing research that has been done, it can be explained as follows:

1. Differences wrist curl exercise group with horizontal swing against backhand groundstroke skills

The training method used in this research is basically to improve the backhand groundstroke skills in the field of sports tennis field of motion skills in doing backhand groundstroke punch is necessary to support the power of the punch, Widiastuti (2008: 52) suggests that the hit is to throw the object (ball) to achieve maximum accuracy with speed is a critical success, hitting the ball, therefore it is necessary to observe in depth the characteristics of training provided to the athlete to improve his skills backhand groundstrokes.

Exercise wrist curl and exercise horizontal swing is a form of weight training which in practice is a move that is very complex and would require good physical condition as well. Furthermore, James Tangkudung (2006: 5) says that " weight training or weight training is one form of exercise custody to increase strength. This can be a good series of motor coordination and can produce backhand groundstrokes hard toward the opposite field, if supported by the physical condition through exercise method in accordance with the characteristics of the sport tennis, so that it can deliver results skill to hit the maximum.

Wrist curl exercises that contribute to arm strength. and wrist curl is one form of weight training that intends to increase strength in the field tennis sport. the ability of motion or blow coordination is necessary to support the power of the blow, therefore it is necessary to observe deeply about the training characteristics given to the athlete to improve the backhand groundstroke skills in playing tennis. Wrist curl exercises require a dumbbell that involves the shoulder and arm muscles as well as the trunk muscles the posterior, lateral and anterior parts. This exercise is very good at developing arm power and can be applied to field tennis sports.

Based on Tukey test analysis results obtained $F_{(OA)} 5.50 > F_{(tab)} 2.11$ or H_0 rejected. Thus there is a difference in average backhand groundstroke skills from groups given wrist curl training, and horizontal swing on FIK UNM Makassar students. The results show that the group of students who follow wrist curl training

(A₁) has an average score of 102 which is greater than the result of backhand groundstrokes skills that follow the training of horizontal swing (A₂) which has a backhand groundstroke skill level with an average value of 95. means wrist curl exercises significantly influence the horizontal swing exercise.

Thus, based on the results of this study, it can be recommended that wrist curl exercises are better applied than horizontal swing exercises in an effort to improve the skills of backhand groundstroke field tennis.

2. Differences Group wrist curl exercises with cable rotation against the backhand groundstroke skills level

At the time of the skills of the backhand groundstroke required coordination of movements begins the swing arm rearward of the body (back swing), swing fore coming into contact with the ball (reket forward swing), the final blow (followthrough). Heri Rahy yam states (2012: 313) skills is a picture of a person's motor skills demonstrated through the mastery of movement, ie the ability of a person to perform a task optimally motion according to his ability, This is in accordance with the opinion of DLIS Firmansyah, (2008: 485) that : Learning-based development identifies learners in the learning level of motion and composition skills to facilitate the learning process

This is seen through wrist curl exercises. Exercise wrist curl a good contribution to all skills, backhand groundstrokes, the goal is to increase the explosive power of muscles, muscle elasticity, and the motion of the joints strong and elastic. While the exercise of cable rotation is also a very important factor in playing tennis, the tennis philosophy sometimes reveals that if athletes hit hard against the opposing field, then the chances of winning the game are greater than playing with defense.

Based on Tukey test analysis results obtained $F_{(OA)} 8.61 > F_{(tab)} 2.11$ or H_0 rejected. Thus there is difference of backhand groundstroke skill from group given wrist curl training and cable rotation training at FIK UNM Makassar student. The results show that the group of students who follow wrist curl training (A₁) has an average score of 102 which is greater than the result of backhand groundstroke skills that follow the training of rotational cable (A₃) that has a backhand groundstroke skill level with an average value of 95. means that rotational cable training significantly influences the wrist curl exercise. Observing the results of calculations, the difference between the average score of backhand groundstroke skills test results and further tests, it can be concluded that there is a significant influence of wrist curl exercise application to the backhand skills of groundstroke students FIK UNM. Thus wrist curl exercises are better than cable rotation exercises.

Means exercise wrist curl significant influence over the practice of cable rotation rate to skills, backhand groundstrokes in the exercise group wrist curl students FIK

UNM Makassar can be said to have a significant effect compared to the exercise of cable rotation.

3. Differences in horizontal swing training groups with cable rotation against backhand groundstroke skills

Arm muscle strength is a supporting factor in doing blow, because with larger muscle mass to give effect to all skills, punch / power punches. Moderate exercise cable rotation is also a very important factor in the game, because by doing hard blows to the opposite field the opportunity to win the game more than playing with the last (defense).

A person who has good muscle endurance is expected also in doing the exercises will be easier than someone who does not have good endurance. According to Pate, Rotella, and Mc Clenaghan (1993 : 318) exercise as a systematic participation in exercises aimed at increasing the physical functional capacity and endurance of exercise. This is in the opinion of Sukadiyanto, (2011: 1) that Exercise is a process of change to a better direction, namely to improve the physical quality, functional ability of the body equipment, and the psychic quality of an athlete.

Therefore the method of horizontal swing exercise is a form of weight training which in its implementation is a very complex movement and necessarily require good physical condition as well. When viewed from the exercise movement has a characteristic in accordance with the movement of a punch in playing tennis. It can be a good series of motor coordination and can result in a blow to attack the stricken area opposite field with a heavy blow, if supported by the physical condition through exercise method in accordance with the characteristics of the sport tennis, so that it can provide results to skills, backhand groundstrokes maximum. While cable rotation is a form of exercises to improve arm strength to form concentric and eccentric contractions combinations that use dynamic loading. A sudden stretch before the muscle contracts back allowing the muscles to reach maximum strength in a very short time. The forms of training of rotational cable are very diverse forms and utilization in accordance with the branch of sports that want to be developed can be said as a systematic way of training that can be used to improve arm strength that can ease the movement to skilled backhand groundstroke to the expected goal.

Based on the calculation of variance analysis obtained $F_{(OA)} 14.11 > F_{(tab)} 2.11$ or H_0 accepted. Thus there is no difference in the average backhand groundstroke skills of the group who were given horizontal swing and cable rotation training on FIK UNM Makassar students. The result of the calculation shows that the group of students who attended the horizontal swing training (A_2) had an average score of 70.

33 which is smaller than the result of skill backhand groundstrokes who follow the practice of cable rotation (A_3) who have the skill level backhand groundstrokes with an average value of 72.00. means the horizontal swing exercise significantly influences the exercise of cable rotation.

4. The interaction between exercise and kinesthetic perceptions of backhand groundstroke skills.

Kinesthetic perception is the ability to respond to take a decision what to do or as information. The information is processed and interpreted in the form of a decision, then the decision was responded appropriately to perform the movement with a smooth, efficient, and accurate results. according to Schmidt, Richard A, (1991: 210) states that, kinesthetic is an awareness that allows us to sense body position, weight or a movement. The perception of kinesthetic is something that enters the afferent resulting from the spindle and skin muscles, or the afferent signals of the central nervous system underlying deliberate movement. This is in the opinion of Drowatzky, John. (1996: 98) states that kinesthetic alone is not enough to provide information to learn new skills. This becomes important once other sensory sources are initiated / involved in the learning process and after the athlete has improved the feelings of kinesthetic

Kinesthetic perception is also the sensory information of motion from the environment to the brain and transmitted to muscle tissue, tendons, and joints to contract in a very short time. Individual knowledge of NPL (Program Neurolinguistics) is positive for improving positive action which is an important factor to stimulate the most effective brain function in backhand groundstroke punch in playing field tennis.

The third implementation exercise requires the perception of kinesthetic high due for kinesthetic perception as a source of feedback and always provide sensory information to the central nervous system associated with the movement characteristics, such as the direction, position in space, speed, and muscle activation because with a good kinesthetic perception the player can control the movements made so that it becomes more accurate and consistent.

Based on the results of the analysis of variance calculations, the price obtained F_{count} of interaction (F_{AB}) = 24.112 and F_{table} = 3.22, it appears that the $F_{count} > F_{table}$, so the zero hypothesis (H_0), which states no interaction between the practice and perception kinesthetic against backhand groundstroke skills are rejected and alternative hypothesis (H_1) is accepted. In other words, it can be stated that the achievement of backhand groundstroke skills is influenced by interaction between kinesthetic perception.

Based on the research data, the average score of backhand groundstroke skill of wrist curl exercise group on kinesthetic height was 122, in the horizontal swing

training group at high kinesthetic at 83. 40, the cable rotation training group on kinesthetic high was 115. 41, the group wrist curl exercises at low kinesthetic of 82. 02, low swing kinesthetic swing training group of 105. 73, training group of cable rotation at a kinesthetic low of 102. 37.

Thus the research hypothesis that there is interaction between exercise and kinestetik against the level of backhand groundstroke skills tested.

5. Group differences between wrist curl exercises with horizontal swing exercises on high kinesthetic perceptions.

In doing backhand needed power in doing the punch begins movement backward swing body (back swing), swing forward in contact with the ball (forward swing), the end of the punch (followthrough). To gain maximum strength in need of practice. Tudor O Bomba, (2003: 9) argues that exercise is a systematic, progressive and long-lasting sport activity in accordance with the individual level. This is in accordance with the opinion of James Tangkudung, (2012: 65) that one form of resistance training to increase muscle strength is by weight training. to increase the power of the punch by giving two methods of wrist curl exercises and horizontal swing exercises. The goal is to increase muscle explosive power, muscle elasticity, and strong and elastic joint motion

This is seen through wrist curl exercises, exercise wrist curl a good contribution to all skills, backhand groundstrokes, compared to exercise horizontal swing.

Based on the results of the analysis of test Tukey, the analysis of differences in average skill results backhand groundstrokes group of high kinesthetic perception exercises wrist curl and exercise horizontal swing, obtained t_{count} was 33. 44 > t_{table} 2:04, this means that H_0 rejected and H_1 received. This means that there is an average difference in backhand groundstroke results in wrist curl training group and horizontal swing training high kinesthetic perception. The result of the calculation shows that the group of students who attended the wrist curl training had an average score of 122, the practice of horizontal swing 83. 40. This means that the wrist curl group is better than the horizontal swing training group. so wrist curl exercises can be said to be better than horizontal swing exercises in high kinesthetic groups.

6. The group differences between wrist curl exercises with cable rotation exercises on high kinesthetic perceptions.

In playing tennis needed power is a supporting factor in doing a hard and accurate punch therefore given weight training. The goal is to increase muscle explosive power, muscle elasticity, and strong and elastic joint motion. Harsono, (2017: 103) In order for achievement to increase, athletes should always try to practice with a heavier workload than can be done at that time, Tudor O Bomba, (2009: 3) states that the exercise is a sporting activity systematic, progressive and

carried out in a long time according to the individual level. So a high kinesthetic group is given two methods of wrist curl exercises with exercise rotation cable.

This is apparent through the wrist curl exercise. Wrist curl exercise contributes to the skills of the backhand groundstroke, compared the horizontal swing exercises on a group of kinesthetic high.

Based on the Tukey Test analysis results, on the average yield average backhand groundstroke motion group perception kinestetik high wrist training and cable rotation training, obtained tcount of $1.44 > t_{table} 2.04$, this means H_0 rejected and H_1 rejected. This means that there is no average average angle of return motion results in the wrist training group and high kinesthetic wiring perception rotation exercises. The results show that the group of students who followed the wrist training had an average score of 122, a rotational cable exercise of 115.41. Means wrist curl training group and group of rotation cable exercises have no significant difference. Wrist exercises can be done better than cable rotation exercises

7. Group differences between horizontal swing exercises with exercise rotation cable on high kinesthetic perception.

Kinesthetic perception is the ability to respond to take a decision what to do or as information. The information is processed and interpreted in the form of a decision, then the decision was responded appropriately to perform the movements with the yield smooth, efficient, and accurate implementation of the three exercise requires kinesthetic high because when doing punch required timing is right therefore kinesthetic very influential on to skillfully hit. William H. ES (2011: 9) Learn to move is a process associated with practice or experience that leads to a relatively permanent change in one's ability to display a skilled movement. Mahendra, Agus. (2007: 7) Motion learning process is an early phase in learning the movement of skills that are tried, which is the middle phase characterized by the level of mastery of movement where learning is able to perform movements in the form of series.

Kinesthetic also affects all the blows, during the match. The influence of horizontal swing practice with the coordination of several movement sequences ranging from shoulders, hips and arm impulses provides rapid and strong blow-motive coordination capability, so the kinesthetic factor contributes greatly to the stroke so that the horizontal swing exercise is better than the exercise of rotational cable.

Based on the result of Tukey test analysis, in the mean difference analysis of backhand groundstroke skill result of high kinesthetic perception group of horizontal

swing and cable rotation training obtained t_{count} is $32.00 > t_{\text{table}} 2.04$, this means H_0 rejected and H_1 received. This means that there is an average difference in backhand groundstroke skills results in the horizontal exercise swing training group and the rotational cable training high kinesthetic perception. The result of the calculation shows that the group of students who followed the horizontal swing exercise had an average score of 83.40 and the cable rotation training was 115.41. That means the group of cable rotation training is better than the horizontal swing training group. so the practice of cable rotation can be said better than the horizontal swing exercise.

8. Group differences between wrist curl exercises with horizontal swing exercises on low kinesthetic perceptions.

kinesthetic is a supporting factor in performing a series of backhand backhand movements on a tennis court game. Johansyah Lubis (2013: 12) further said that the basic principles of training are the first step in the development of an optimal training program in which the principles will be effective if applied, and systematically related to the training process. Lars IE Oddsson, Patrick Boissy, Itshak Melzer, (2007, Vol 4, p. 16) says the principles of physical practice include awareness, continuity, motivation, length of practice, development in each period and specificity.

therefore the three types of exercises given will not contribute significantly if a person does not have a good kinesthetic.

therefore the three types of exercises given will not make a significant contribution if one does not have a good kinesthetic perception. In the low-kinesthetic perception exercise group the result of blow ability in the horizontal swing training group is better than the wrist curl exercise. However, in the horizontal swing and wrist curl exercise groups did not contribute significant mean differences. This is due to the low level of kinesthetic perception of FIK UNM students that causes the effect of the training is not so quickly responded by the muscles that function at the time of hitting the backhand groundstroke.

Based on the result of Tukey test analysis, on the mean difference analysis result of backhand groundstroke skill lower perception kinesthetic group wrist curl exercise and horizontal swing practice obtained $t_{\text{arithmetic}}$ is $22,44 > t_{\text{table}} 2.04$, this means H_0 rejected and H_1 received. This means that there is an average difference in backhand groundstroke results in wrist curl training group and horizontal swing training low kinesthetic perceptions. The result of the calculation shows that the group of students who attended the wrist curl training had an average score of 82.02, the horizontal swing exercise 105,73. This means that the horizontal swing training group is better than the wrist curl training group.

9. The group differences between wrist curl exercises and the exercise of rotational cable on low kinesthetic perceptions.

Kinesthetic perception is a contributing factor of all ranks of movement in performing backhand groundstrokes skills in tennis, therefore the three types of exercises given will not contribute significantly if a person does not have a good kinesthetic perception. Rahantoknam B. Edwar (1988: 129), The components of motor perception are largely determined by: visual perception, perception of kinesthesia, perception of touch, auditory perception and perception of sensory integrity. Kinesthetic or physical intelligence a person is capable of or skilled at using his limbs to perform movements.

In the low-kinesthetic perception exercise group the result of blow ability in the cable rotation training group was better than the wrist curl exercise. However, in the cable rotation and wrist curl training groups did not contribute significant mean differences. This is because the low rate of reaction that causes the effects of the exercise is not so quickly responded by the muscles that function at the time of a backhand groundstroke. Based on the Tukey test analysis results, on the analysis of the difference in average results backhand groundstroke skills kinesthetic perception of the low exercise groups wrist curl and practice of cable rotation, obtained t_{count} was $18.67 > t_{table} 2:04$, this means that H_0 rejected and H_1 received. This means there is no average difference in backhand groundstrokes results in wrist curl training groups and low rotational exercises of kinesthetic perception. The result of the calculation shows that the group of students who followed the wrist curl practice had an average score of 82.02, the cable rotation exercise 102.37. This means that the group exercise of cable rotation is better than wrist curl training group.

10. Group differences between horizontal swing exercises with exercise rotation cable on low kinesthetic perception.

Kinesthetic perception is a contributing factor in performing backhand blow skills, therefore the three types of exercises given will not contribute significantly if a person does not have a good kinesthetic perception. Yudi Hendrayana (2010: 20) a person capable or skillful use of his limbs to perform movements such as, running, punching, dancing. Success in appearance often depends on how effectively the offender detects, feels, and uses the relevant sensory information. Jack K. Nelson (1979: 227) states that, "Kinesthetic perception plays an important role because of the kinesthetic perception of the element of physical ability that allows one to recognize the position of the body and the motion being performed. "

In the low-kinesthetic perception exercise group the result of blow ability in the horizontal swing training group is better than the wrist curl exercise

Based on the result of Tukey test analysis, in the mean difference analysis result of backhand groundstroke skill of low kinesthetic perception group of horizontal swing and cable rotation training obtained t_{count} is 3.78 > t_{table} 2.04, this means H_0 rejected and H_1 received. This means that there is an average difference in backhand groundstroke skills results in the horizontal swing training group and the exercise rotation cable low kinesthetic perceptions. The result of the calculation shows that the group of students who followed the horizontal swing exercise had an average score of 105.73 and the cable rotation exercise 102.37. This means that the horizontal swing training group is better than the rotational training group.

CONCLUSION

Based on the results of data analysis, the results of hypothesis testing and the results of research discussions that have been obtained then can be explained conclusion as follows; overall, wrist curl exercises have a better effect than the horizontal swing exercise on the backhand groundstroke skills of FIK UNM Makassar students, overall, wrist cur exercises have a better effect than horizontal swing on the backhand groundstroke skills of FIK UNM Makassar students, and overall, horizontal swing exercises have a better effect compared to the rotational exercise of backhand groundstroke skills of FIK UNM Makassar students. There is a high interaction between training method and kinesthetic perception of backhand groundstroke skills of FIK UNM Makassar students. Exercise wrist curl, horizontal swing and cable rotation has a high impact on the skill backhand groundstrokes FIK UNM Makassar students in group same perception kinesthetic high, drills horizontal swing, wrist curl and cable rotation has the effect of a low to a skill backhand groundstrokes FIK UNM Makassar students on group perceptions kinesthetic low

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