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The Effect of Pec Deck Flyes and Cable Crossover Exercises on Arm Muscle Strength and Tennis Forehand

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Abstract

The purpose of this study was to determine the effect of Pec Deck Flyes and Cable Crossover training on Arm Muscle Strength and Forehand in male tennis players. This type of research is an experimental study using "Randomized Control Group Pretest-Posttest Design". The population in this study were 30 male tennis players. Then divided into 3 groups, experimental group I was given Pec Deck Flyes treatment, experimental group II was given Cable Crossover treatment and the control group was given conventional treatment. To determine the strength of the arm muscles, each subject was given a push-up test for 30 seconds and for forehand results, the subjects were given the opportunity to hit 15 balls with the forehand technique. Based on the Multivariate analysis, testing the equality of variance-covariance in both dependent variables together using the Box's Test Of Equality Of Covariance Matrices, a significance value of 0.130> 0.05 was obtained, because the Box's value was greater than alpha 0.05, then the variance-covariance were the same. Testing the equality of variance-covariance on both dependent variables individually using the Levene Test Of Error Variances number for arm muscle strength obtained a significance value of 0.134> 0.05 and a significance value for forehand results of 0.296> 0.05, because the significance value is greater than alpha 0.05. It can be concluded that both dependent variables have different Variance-Covariance Matrices in the independent variable group. The difference between groups using the Wilks' Lambda test obtained a significance value of 0.00 <0.05. Because the Wilks' Lambda significance value is smaller than alpha 0.05, it can be concluded that there is a difference in the increase in arm muscle strength and forehand results.

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1. INTRODUCTION

A nation's sporting achievements can be used as a benchmark that shows the level of welfare and greatness of the nation among other nations. In various branches of sport achievements that continue to develop, it is certain that there will always be changes from year to year, either in the form of increasing or decreasing achievements. The changes that occur in the field of sports which are a prerequisite for creating a brilliant achievement are a characteristic that is inherent in a coach in providing training to his athletes in order to achieve maximum achievement in modern sports. This is in line with what Bompa (1983) expressed that all success achieved is highly dependent on the quality and closeness of the relationship between the coach and his athletes, where the role of direction is played by the coach himself. Tennis is a game that uses the arm to swing the racket in each game. Skills and expertise are needed in this game, tennis is played individually (one on one) and doubles (two on two). And tennis is a complex sport, where this sport uses almost all physical components.

Tennis is one of the sports played by everyone, both men and women of all ages. It can even be done by people with disabilities with special tennis for them. Tennis is a game that uses the arm to swing the racket in every game. The basic techniques that must be mastered in playing tennis include serve, forehand, backhand and smash, of the five basic techniques, the forehand stroke is the most common and frequently used, this is in line with what Ladner (2000) expressed. The forehand stroke is the most common stroke used in tennis. In playing tennis, the forehand stroke is one of the basic techniques in playing tennis that requires components of arm muscle strength, because the strength component is the ability of basic physical movement or human physical activity. In its implementation, the forehand to be able to hit the ball over the net from the baseline area and the ball that must be hit falls in the baseline area of the field requires certain physical abilities, namely hand strength and arm strength to swing the racket. This is in line with the results of research conducted (Renstrom, 2002) the wrist and forearm showed 20-30% greater strength in the dominant arm for flexors and extensors when hitting a tennis ball. So in learning tennis strength must be directed at the arms, hands, wrists and shoulders, to increase the effectiveness of strokes in playing. Strength training in the arms and wrists is an important factor in playing tennis because various strokes are done repeatedly, this depends on the strength of the contracting muscles (Renstrom, 2002) A tennis elite Renstrom (1988) said that upper body strength deserves attention to achieve optimal stroke potential and prevent injury.

To increase the strength of the most effective training is to use weights or "weight training" Sajoto (1995). To improve the components of physical condition, it is necessary to pay attention to the characteristics of a sport, so that it can be prioritized which components need to get more attention compared to other components according to the goals and targets to be achieved. Thus, to support athlete achievement, a training method is needed that leads to increased arm muscle strength. According to Grosser (2001) said that the maximum benefit that can be obtained from training stimuli will only occur if the stimulus is similar or resembles the movements carried out in the sport.

The human muscular system is made up of striated or skeletal muscles. The study of muscles in general, especially in terms of energy, is very interesting and ssential for understanding the motor functions of the human body. The alternating energy of the muscles on the bones and joints achieves the harmonious kinetic functions of body parts, which are unlimited, e.g. the upright posture, the gait, the upper limb conceiving abilities, the hormonal motions of the torso to maintain balance, etc. (Capitano, Moriggi, & Gelfi, 2017; Tohanean, 2018; Lai, Biewener, & Wakeling, 2019; Burute, P., & Vatsalaswamy, P., 2017)

This review addresses the activated muscles during the basic strokes of forehand and backhand drives in the very popular racquet sport discipline of tennis. It is noteworthy that during the action of a muscle not all muscle fibers are contracted, but only certain motor units, depending on the mechanical work performed. The bigger the project, the more motor units operate. Muscle force is exerted on the adhesive points of the muscle. Almost all the body muscles are involved in tennis. Many of the muscle actions regarding the lower body are just the same for all the tennis strokes (Ivancevic, Jovanovic, Đukic, Markovic, & Đukic, 2008; Elce et al., 2017; Saeki, J., at al, 2018)

In this study, to improve arm muscle strength and forehand results, two weight training models were used, namely Pec Deck Flyes and Cable Crossover. The selection of these two training models was based on the consideration that both models in their implementation resemble a forehand stroke. The problem to be explored in this study is whether undergoing Pec Deck Flyes and Cable Crossover training can improve arm muscle strength and forehand results in the subjects in this study, there is a difference

2. METHOD

This research was conducted at the Mandalika University of Education, West Nusa Tenggara at the men's tennis UKM. The research method used in this study was an experiment with a research design "randomized control group pretest-posttest design" (Maksum, 2009). Data

collection for arm muscle strength used a 30-second push-up test and forehand results used a forehand test with the opportunity to hit the ball as many as 15 balls with a forehand hitting technique.

The subjects in this study were members of the men's tennis UKM, totaling 36 people, 30 boys and 6 girls. Because this study used only boys and the number of research subjects was limited, the entire population was used as a research sample or in other words this study is a population study. Data analysis using the SPSS program (Statistical Package for the Social Solution For Windows Persi 17.0.

3. RESULTS AND DISCUSSION

The Effect of Pec Deck Flyes Training on Arm Muscle Strength and Forehand

Arm muscle strength.

Based on the calculation results of SPSS For Windows Persi 17.0, using the T-Test in the Paired Samples Test table, the t_count result was 36.261 with a significance level (P) of 0.00. Because t_count is greater than t_table (28.577> 1.833) and the significance level (P) is smaller than alpha (0.00 <0.05). It can be concluded that the Pec Deck Flyes treatment can increase arm muscle strength.

Forehand.

Based on the calculation results of SPSS For Windows Persi 17.0, using T-Test in the Paired Samples Test table, the t_count result was 26.022 with a significance level (P) of 0.00. Because t_count is greater than t_table (26.022> 1.833) and the significance level (P) is smaller than alpha (0.00 <0.05). It can be concluded that the Pec Deck Flyes treatment can improve forehand results.

The Effect of Cable Crossover Training on Arm Muscle Strength and Forehand.

Arm muscle strength.

Based on the calculation results of SPSS For Windows Persi 16.0, using the T-Test in the Paired Samples Test table, the t_count result was 30.713 with a significance level (P) of 0.00. Because the t_count is greater than the t_table (30.713> 1.833) and the significance level (P) is smaller than alpha (0.00 <0.05). It can be concluded that the Cable Crossover treatment can increase arm muscle strength.

Forehand.

Based on the calculation results of SPSS For Windows Persi 17.0, using the T-Test in the Paired Samples Test table, the t_count result was 21.767 with a significance level (P) of 0.00. Because the t_count is greater than the t_table (21.767> 1.833) and the significance level (P) is smaller than alpha (0.00 <0.05). So it can be concluded that Cable Crossover treatment can improve forehand results.

Differences in the Effects of Pec Deck Flyes and Cable Crossover Training on Arm Muscle Strength.

To determine the difference in the effects of the two forms of training, a further test was conducted with LSD. In the further test with LSD, the mean difference value between Pec Deck Flyes training and Cable Crossover for arm muscle strength was -8000 with a significance level (P) of 1.10. This means that there is no significant difference between the two forms of treatment. This difference explains that the Cable Crossover treatment program or experimental group II is 8,000 with a significance level (P) of 1.10, meaning that Cable Crossover training or experimental group II is more effective in increasing arm muscle strength when compared to the Pec Deck Flyes treatment program or experimental group I.

The mean difference in increasing arm muscle strength between experimental group I and the control group is 8.7000 and a significance (P) of 0.00, meaning that there is a significant difference between the two research groups. This difference explains that the Pec Deck Flyes treatment program or experimental group I is more effective in increasing arm muscle strength when compared to the control group.

The mean difference in the increase in arm muscle strength between the experimental group II and the control group was 9.5000 and significance (P) 0.00, meaning there was a significant

difference between the two research groups. This difference explains that the Cable Crossover treatment program or experimental group II is more effective in increasing arm muscle strength when compared to the control group.

The difference in the effect of pec deck flyes and cable crossover training on forehand.

To determine the difference in the effects of the two forms of training, a further test was conducted with LSD. In the further test with LSD, the main difference value between Pec Deck Flyes training and Cable Crossover for forehand results was -1.8000 with a significance level (P) of 0.03. This means that there is a significant difference between the two experimental groups I or the Pec Deck Flyes treatment group and the experimental group II or the Cable Crossover treatment group on forehand results.

The mean difference in increasing arm muscle strength between experimental group I and the control group was 8.6000 and a significance (P) of 0.00, meaning that there was a significant difference between the two research groups. This difference explains that the Pec Deck Flyes treatment program or experimental group I is more effective in increasing forehand results when compared to the control group.

The mean difference in increasing arm muscle strength between experimental group II and the control group was 10.4000 and a significance (P) of 0.03, meaning that there was a significant difference between the two research groups. This difference explains that the Cable Crossover treatment program or experimental group II is more effective in increasing arm muscle strength when compared to the control group.

Training is the way to achieve maximum performance. To become an accomplished athlete, the athlete does not only rely on talent and interest. Great talent and interest without getting the right training, poor training methods, or sufficient training dosage will result in less than achieving an athlete. So in short, to become an accomplished athlete, you must get programmed, continuous, and ongoing training. According to Harsono (1982) in Harsono (1988: 101) training is a systematic process of practicing or working that is done repeatedly with increasing training or workloads. It is said to be systematic in the sense that training is carried out regularly, planned, according to a schedule, according to a certain pattern and system, methodical, continuous from the simple to the more complex. According to Kemenengpora (2007) quoted from several training experts, it is a process of improving sports through a scientific approach, especially educational principles, in an orderly and planned manner so as to increase the ability and readiness of athletes (Hare, 1982) while according to Bompa (1999) said the development program for the match, in the form of increasing skills and energy capacity. And according to Thomson (1993) it is a systematic process to improve athlete fitness according to the chosen sport.

Weight training is a systematic exercise where weights are only used as a tool to increase muscle strength in order to achieve certain goals, such as improving physical condition, health, strength, achievement, in a sport and so on (Harsono, 1988). Therefore, the loads used in weight training are not as heavy as the loads given in weight lifting training for bodybuilding. Weight training is the most effective training method to increase skeletal muscle strength (J.P. O'Shea. 1976 and Philip, J., Rasch. 1982) in (Sajoto, 1988) weight training is the activity of many muscle fibers for one contraction. Muscles are stimulated through motor nerves, strong stimulation plays a very important role in maximum contraction. Only through maximum or almost maximum stimulation, and training that is getting heavier day by day, will these changes be achieved (Harsono, 1988).

When weight training is done regularly and accompanied by good eating habits, various body systems will change positively. Muscles become stronger, can carry greater loads and will show less fatigue with increasing training time. The neuromuscular system will function harmoniously, because muscles learn to complete muscles that have specific needs to carry out various loads, speeds of movement, and movement patterns needed in various movements. With increased muscle strength, it is likely that players will be able to make hard shots to the opponent's area with little effort (Renstrom, 2002)

4. CONCLUSION

Tennis is a sport that involves muscles not only of the arms and wrists but also a series of complex movements which begin from the feet and end in a racket swing as the final move. It requires a well-trained and honed set of muscles to execute movement with the speed needed as well as the power that is demanded regardless of the player's tennis level. That is because each player uses the same group of muscles in all of them. The feet movements used for jumping and running are the initial links, which are followed by hips, legs, trunk, arms and the hand at last. Initially, muscles of the lower body are the first group involved when playing tennis. Following up are the upper legs, which include the quads and the hamstrings. The energy and power are transferred to the gluteus maximus and medius. The group of trunk muscles are next in the continuous kinetic action. Finally, regarding the upper body it includes the major muscles, and the upper back mainly sets in motion the rhomboid and trapezius, which continue to the upper arms. The last muscles that also take part are the flexor and extensor of the antibrachium. The insight for the action of the muscles in tennis should be effectively utilized in tennis players in order to enhance their physical performance. Moreover, this knowledge is considered strongly helpful for the coaches and the favourable building of the training process as well as for the sports doctors and physiotherapists coping with injuries in tennis players.

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