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The Effect of the Shadow Training Model on VO2 Max Ability in Badminton Game

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ABSTRACT
This study aims to determine the effect of a patterned shadow training model and non-patterned shadow training on the performance of the body's aerobic metabolism VO2Max in badminton games. By using the field experiment method, the population used in this study were badminton athletes in Makassar City with the number of sample 30 people taken by accidental random sampling. The data analysis used is the t-test at a significant level of 95%. The findings suggest that: (1) There is a significant effect of the patterned shadow training on the performance of VO2 Max badminton athletes in Makassar, shown by the value of t_0 = 78.180 with a level of probability (0,000) <0.05. (2) There is a significant influence of the non-patterned training on the performance of Vo2 max badminton athletes in Makassar, shown by the value of t_0 = 24.403 with a level of probability (0,000) <0.05. (3) There is a significant difference in the effect between the patterned and the non-patterned training on the performance of VO2 Max Makassar City badminton athletes, as shown by the value of t_0 = 8.207.

Keywords: *Shadow training model, badminton game, VO2 max*

1. INTRODUCTION

Badminton is a sport that consists of several basic techniques requiring the ability of physical conditions. The improved achievement in badminton cannot be separated from the mastery of basic techniques that must be possessed by a player supported by a good physical condition. There are four basic technical skills in badminton [1], i.e., a) the technique of holding a racket, b) the technique of regulating footwork, c) the technique of hitting the ball, d) the technique of mastering attack and defense patterns. The basic technical skills of badminton that need to be learned can be generally grouped into several sections, namely; (1) holding a racket; (2) standing attitude (stance); (3) footwork; and (4) strokes [2]. In addition, Boroujeni and Shahbazi [3] considered that improving the skills of a player will also improve his choice of shots, accuracy, and strength of play, which therefore increase his ability to deceive opponents. While the basic characteristics of high-quality technical skills are the accuracy of movement [4]

The basic techniques will determine the success of an athlete improve the mastery of badminton playing skills. The mastery of basic techniques in the game of badminton may lead an athlete to know the types of skills in playing badminton because an athlete who has good skills can also increase the degree of maturity or ability or stability of success in achieving goals effectively. Meanwhile, science and technology in sports have been widely carried out in developed countries to improve the performance of their athletes. This is due to the competition in sports, which demands an increased achievement in maximum physical work ability. Changes in the body due to exercise that support the improvement of the quality of health and physical performance still become the problems that require solving through scientific research, especially the use of scientific research. Moreover, in the case of badminton sport, Blomqvist et.al [5] argues that badminton movement skills are the mastery of the basic techniques of badminton players such as lob, service, and smash. Meanwhile, Brahms [6] [7]according to, the types of beats that must be mastered are service, lob, drop shot, smash, netting, underhand, and drive.

Based on experience in the field of badminton, a sport that has an aerobic and anaerobic system, many forms of aerobic exercise can be used to increase the endurance of the heart's lungs so that it can increase the body's aerobic metabolism (VO2Max), increase heart rate and allow sustained improvement over time. The main aerobic

activity produces the effect of exercise in a shorter time than additional activity. The additional aerobic activity of athletes can be useful in maintaining aerobic freshness during the rest period. Therefore, from all methods or forms of training that lead to an increase in the ability of VO2 Max, the model or method of a patterned and not patterned drill can be applied to increase the performance of VO2 Max.

The increased endurance depends on the maximal aerobic (VO2 Max) and anaerobic threshold. But in some activities, a large increase in efficiency might occur. Aerobic exercise techniques, in general, are ongoing activities. With this kind of activity, the heart rate increases to the expected level and persists at that level during the training period. The intensity of the activity differs from stage one to another with the next exercise. The lion's share of training for endurance activities should consist of moderate-intensity activities that are continuous (70-80 MHR) and last relatively long. This is called slow long-term exercise. Thus, sportsmen who have endurance will take benefit from the matches they have.

Tinley suggested that Strong or hard training can significantly increase Vo2 max by up to 30%, especially if it is applied to people who are just training [8]. Therefore, badminton is expected to require maximum aerobic capacity (VO2 Max), for men about 70 ml/kg/minute, while for girls 60 ml/kg/minute. Meanwhile, Rushall and Pyke [9] stated that the characteristics of the aerobic system are: (1) the ability to support long-term work, (2) breaking down glycogen by providing oxygen to produce energy, (3) possible use of fat and protein as supporting energy sources.

Patterned shadow training is a form of badminton skill training in which the movements are almost the same as real playing. This form of training does not use shuttlecock. Patterned shadow training is done repeatedly with several kinds of badminton training techniques.

Before implementing this exercise, one needs to use a guide in front of the net as a command giver in showing what movements a player or student should do. This exercise must be done repeatedly through the instructions of a guide. The mastery of the patterned motion exercises of an athlete is expected to have the skills to play badminton properly and correctly. Intensive and continuous training will have an effect on badminton games such as footwork and hitting techniques supported by an adequate level of VO2 Max.

Moreover, non-patterned shadow training is a form of training in badminton, which has the same form as the movements during actual play. However, it does not use shuttlecock. The form of this exercise is the same as the patterned shadow training form. The difference is that it does not use a guide (the command giver). So, this exercise is done freely.

Based on the explanation about the forms of patterned shadow training and non-patterned shadow training, it is known that both forms of training have the same basic techniques or movements in badminton games, such as smash, lob, netting, and so on. However, the difference between the patterned shadow training and non-patterned shadow training lies in the use of the command giver. Theoretically, these two forms of training are very supportive of increasing one's VO2 Max. So, it can be used in the aerobic system against badminton games. Based on the main ideas that have been raised on the background of the problem, this research formulates three objectives. Firstly, this research aims to find out the effect of the patterned shadow training model on the ability of VO2 Max in badminton games. Secondly, this research examined the effect of the non-patterned shadow training model on the ability of VO2 Max in badminton games. Thirdly, this research finds out the difference of effect between the patterned shadow training model and the patterned shadow training model on the ability of VO2 Max in badminton games.

2. METHOD

This research applied the experimental design in the form of a cause-and-effect relationship between two or more variables while eliminating or controlling all other possible confounding factors. Moreover, it has a dependent variable and at least one independent variable. The independent variables of this study are patterned and non-patterned shadow exercise. While the dependent variable is the ability of VO2 Max in badminton games. The study was conducted at the Faculty of Sport Science, Universitas Negeri Makassar. The research design used is Randomized Pretest-Posttest Design with the total of the sample is 30 students. The samples are evenly divided into two groups, i.e., 15 samples are in the patterned exercise group and the other 15 samples. Moreover, this study applies both descriptive statistics and inferential statistical analyses. The latter analysis technique used is the t-test, which analyses data, namely the ability of VO2 Max from the two experimental groups in badminton games using statistical software on the computer. There are three hypotheses which would be tested, i.e.,

- H_0. There is no effect of patterned shadow training on the VO2 max ability of the badminton athlete's vs. H_1 that There is an effect of patterned shadow training on the VO2 max ability of the badminton athletes
- H_0. There is no effect of non-patterned shadow training on the VO2 max ability of the badminton athlete vs. H_1. There is an effect of non-patterned shadow training on the VO2 max ability of the badminton athletes
- H_0. There is no significant difference in the effect between patterned shadow training and non-patterned shadow training on the VO2 max ability

of the badminton athlete vs. H_1. there is a significant difference in the effect between patterned shadow training and non-patterned shadow training on the VO2 max ability of the badminton athletes.

3. FINDINGS

Based on the data analysis, there are some findings both analyzed by both descriptive statistics and inferential statistics. The result of the descriptive statistics analysis for the patterned exercise group is shown in table 1.

Table 1. The result of the descriptive statistics analysis for the patterned exercise group.

Descriptive	Patterned Exercise	
	Pretest	**Post-test**
N	15	15
Sum	467.10	611.80
Mean	31.14	40.786
Standard Deviation	1.908	1.658
Range	6	5.10
Minimum	27.60	38.20
Maximum	33.60	43.30
Variance	3.644	2.750

Table 1 suggests that there is a high difference between the mean of the pretest and the posttest of the VO2 max Although one may assume that the patterned training brings significant impact, it will be further analyzed inferentially.

Meanwhile, the result of the descriptive statistics analysis for the non-patterned exercise group is shown in table 2.

Table 2 The result of the descriptive statistics analysis for the non-patterned exercise group

Descriptive	Non-Patterned Exercise	
	Pre-Test	***Post Test***
N	15	15
Sum	473.70	550.80
Mean	31.553	36.72
Standard Deviation	1.775	1.048
Range	5.20	3.50
Minimum	28.70	35.00
Maximum	33.90	38.50
Variance	3.154	1.100

Based on table 2, the mean of VO2 max of the samples in the pre-test is relatively the same as that of in the post-test, i.e., 31,553, and 36,72. Although it suggests that there is no significant increase of Vo2 max of the samples, it will be further explained in the inferential statistics analysis to know whether the treatment affects statistically on the VO2 max ability.

Concerning the inferential statistics analysis, in the first hypothesis, based on the value of t_0 = 78.180 with a level of probability (0,000) <0.05, the H_1 hypothesis is accepted: there is a significant effect of patterned exercise on the ability of VO2 Max Makassar City badminton athletes. According to the t-test results, it turns out that from the calculation results the observation t value is greater than the value of the t label at a significant level of 95%. This proves that the first hypothesis proposed was accepted at a significant level of 95%. The prediction that can be stated is that by giving a systematically programmed patterned exercise, it will be able to improve the ability of VO2 Max badminton athletes in Makassar. An exercise that is done systematically will provide a change automatically. As in the patterned exercise to improve one's VO2 Max ability. This exercise, if done routinely and regularly, will be able to increase the ability of VO2 Max. Besides that, patterned training also has the potential to develop basic movement skills in the mastery of the field. The rally that occurs when playing badminton can be overcome easily. Performing badminton playing techniques requires good mastery of the field to be able to overcome or return the ball quickly to the opponent's area. Therefore, it is necessary to be given a programmed patterned exercise to assist in the movements made so that it can produce maximum results.

In the second hypothesis, as the value of t_0 = 24,403 with a level of probability (0,000) <0.05, H_1 is accepted: There is a significant effect of no-pattern training on the ability of VO2 Max badminton athletes in Makassar. According to the results of the t-test of the non-patterned training group, it turns out that from the calculation results the observation t value is greater than the t table value at a significant level of 95%. This proves that the second hypothesis proposed is accepted at a significant level of 95%. Predictions that can be stated that by giving a non-patterned exercise can improve the ability of VO2 Max Makassar badminton athletes. Non-patterned training also aims to establish good mastery skills optimally. This non-patterned motion is very supportive in terms of training agility and endurance. Because a badminton player must have the agility and good VO2 Max to be able to achieve brilliant achievements, therefore, this form of exercise has a function with the first form of exercise that is optimizing the results of the ability of maximum footwork to increase VO2 Max.

The third hypothesis is accepted; There is a significant difference in effect between patterned and non-patterned training on the ability of VO2 Max badminton athletes in Makassar. In accordance with the results of the t-test in group A for patterned training and group B for pattern less training, it turns out from the

calculation results obtained observational t values are greater than the value of t table at a significant level of 95%. This proves that the third hypothesis proposed is accepted at a significant level of 95%. Predictions that can be stated that both forms of exercise have a positive influence or improvement on the ability of VO2 Max Makassar City badminton athletes. However, when compared to seeing the results obtained on the average final test and statistical testing of the unpaired t-test, the patterned exercise is more effective and efficient in increasing the ability of VO2 Max. The two forms of exercise used as research material are patterned, and non-patterned exercises have the same goal, which is to increase VO2 Max but also to form motor in the legs so they can move quickly.

However, in principle, both the exercises are forms of training that can make a positive contribution to be able to direct players to improve VO2 Max and in achievement. Therefore, it is hoped that future researchers will look for other forms of exercise to be better able to improve the ability of badminton.

4. CONCLUSION

Based on the data analysis and the discussion, it can be drawn the conclusion that the patterned training has an effect on the VO2 Max ability of the badminton athletes. Conversely, based on the previous assumption that there is no relatively significant increase from the pre-test to the post-test result, based on the descriptive analysis, the non-patterned training statistically has no effect on VO2 Max ability of the badminton athletes. It can be further concluded that there is a significant difference between the patterned training and the non-patterned training is affecting the VO2 Max ability of the badminton athletes. Based on the findings of this study, it can be suggested for athletes and coaches to apply patterned shadow training to optimize VO2 Max ability. Moreover, it can be recommended for future research to apply this kind of method to other branches of sports.

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