The Effect of Superdrill Exercise on the Increase of VO2 Max of *UKM* (*Students Activity Unit*) Tenis Athlete of Yogyakarta State University

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Abstract: The purpose of this study was to determine the effect of the "superdrill" exercise model on the increase of VO2 Max of *UKM* tennis athlete of Yogyakarta State University. This research's type was quasi-experimental research that aims to link of causality-causation. The design used in this study was "one group pretest-posttest design". The subject of this research used 7 athletes from *UKM* tennis of Yogyakarta State University. The instrument in this study was a multistage test. The data analysis technique uses the t-test, which is by analyzing the results of the pretest and posttest before and after treatment with the same data sample. Before the t-test, first test for normality and homogeneity. Based on the results of the paired t test obtained p value (sig.) of 0.003. Significance value 0.003 <0.05, so there is a significant effect. Thus it can be concluded that there is an influence of the "superdrill" exercise model on VO2 Max of *UKM* tennis athlete of Yogyakarta State University.

1 INTRODUCTION

Field tennis game requires the main biomotor components which consist of: endurance, strength, and speed. The ability to breathe air (oxygen) to the maximum extent possible (VO2 Max). By having an adequate VO2 Max the athletes will be able to quickly process the recovery and overcome exhaustion (Sukadiyanto, 2002). In the world of sports the term endurance VO2 Max is very highly need to resist exhaustion during activity or work in order to able to work longer and will not get tired more quickly. The component of endurance biomotor VO2 Max is often used as a benchmark to determine the level of physical fitness of the tennis athletes (Sukadiyanto, 2002). Endurance exercises affect the quality of the cardiovascular system, breathing, and circulatory system. Athletes who have good endurance (aerobic and anaerobic) in the good systems conditions, the fulfillment of the energy needs runs well.

Endurance training is the body's ability to resist exhaustion so that the body is able to do activities or work in a relatively fast time to get back in shape (Faiz, 2015). VO2 Max is maximum exertion. VO2 Max is stated in liters/minute (Faiz, 2015). In order to improve VO2 Max training programs must be carried out carefully, systematically, regularly and always improved, following the principles and methods of training that are accurate in order to achieve the expected goals.

Drill is an exercise that requires a lot of repetition in order to produce movements that are close to automation (if done repeatedly). The drill approach means students make movements according to what the teacher or trainer has instructed and do them repeatedly. This repetition of motions is intended to lead to automation. Superdrill is a training method that is very concerned about ratio, rest and work in its implementation. Applying this method can be done on over 17 year-old athletes, seeing that their abilities are technically, physically, tactically, and mentally able to do this method. The superdrill method in Indonesia is rarely applied by coaches who do not keep up with development of the world of field tennis training.

Superdrill is a new form of training method released by the International Tennis Federation (ITF, 2018) in international and national coach seminars led by popular Indonesian trainer in collaboration with the Dutch trainer Mr. Frank. Mr. Frank explained that the superdrill training method is a

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new exercise and can be applied during training in order to meet the needs of athletes.

Superdrill is usually done by two people in pairs by passing the ball themselves, then rallying as long as possible with a tempo that should not be too fast and should not be too slow and may not make slice shots. Or it can be done by the coach giving the ball to the athletes in the field so that a direct rally occurs. The purpose of this superdrill is to increase endurance and speed, since each athlete conducting a rally may give the ball to the target they want, but without killing each other.

The use of the superdrill method in Special Region of Yogyakarta itself is still relatively low, because the trainers rarely attend national trainer seminars and are knowledgeable about this method and they are still monotonous in making training programs. Therefore the researchers raised this topic to be applied to the athletes of UNY field tennis student activity unit to use this new method to improve the VO2 Max groundstroke technique of UNY Field Tennis UKM athletes.

Biomotor endurance (VO2 Max) is very important and is needed by most tennis athletes in the Special Region of Yogyakarta. From the data on the field from the UNY field tennis team can be observed that the athletes still have poor endurance. According to the trainers, it is due to not getting training for endurance and also the training given by the trainers is still very monotonous and has not varied. Data obtained by observation at the club approximately for a month shows that the tennis athletes during the rally with a target of 1.5 meters behind the baseline and 1 meter next to the ally line, they could only perform a maximum of 19 rallies with a program of 1 set of 8 repetitions. This is due to the poor level of training is which causes the athlete to get tired in a short period of time. Lack of knowledge of the trainer towards the training program will cause the athletes to develop less optimally. The trainer needs to apply the superdrill training method to find out the increased endurance (VO2 Max of the athlete).

Based on the problems arises the researchers will try to apply the superdrill training method to increasing VO2 Max on the UNY Field Tennis Team. Therefore, the problem found was compiled into a research entitled "The Effect of Superdrill Exercise on Increase of VO2 Max in Athletes of the UNY Field Tennis Student Activity Unit".

2 RESEARCH METHODS

2.1 Research Type

The research method employed by the authors is quasi-experimental method (Quasi Experiment). The design used in this research is "one group pretest-posttest design", a research design that has a pretest before being treated and posttest after being treated (treatment). Thus it can be known more accurately because it can compare between before being treated and after being treated (Sugiyono, 2015).

2.2 Research Time and Place

This research was conducted on 6 November-18 December 2018 at the UNY Outdoor Tennis Field. The pretest time was taken on November 6, 2018 at 16:00 West Indonesia Time and the posttest time was taken on December 16, 2018 at 16:00 West Indonesia Time. Treatment of this study was carried out for 16 meetings with a frequency of exercise 3 times in 1 week on Tuesday, Friday and Saturday.

2.3 Research Time and Place

The population of this study was UNY tennis field UKM athletes, amounting to 30 students. The sampling technique in this study uses purposive sampling technique because the sampling used does not apply on all UNY tennis field UKM athletes but possessed the following criteria: Having the ability to perform groundstroke, healthy both in spiritual and physical terms. The number of athletes taken to be sample are 7 male athletes.

2.4 Procedure

The research stage is all of the samples did a pretest and then given treatment. The test used is a Multistage Test to measure the VO2Max level of each sample. Then, this test is also used when taking the final post-test data.

2.5 Data and Data Collection Technique

The instrument in this research are tests and measurements. Data retrieved by conducting a physical test with the multistage test method.

Data collection will be carried out by conducting pretest, treatment and posttest, using test and measurement methods. The data collection mechanism is as follows:

(1) At the first meeting, the VO2 Max of the athletes of UNY Tennis Field UKM measured using the Multistage test.

(2) In the second, third meeting, up to the 17th meeting and afterwards, they took the form of superdrill treatment with a predetermined training session.

(3) At the 18th meeting posttest with multistage test conducted.

2.6 Data Analysis Technique

Data analysis uses normality test, homogeneity test and hypothesis test. Normality test aims to determine whether or not the distribution of samples is normal. Normality test in this research uses the Chi-Squared formula. Homogeneity test aims to determine whether or not the homogeneous population of the sample is taken. Homogeneity calculation using the F. test To test the hypothesis of this research using the t test. Tests are used to compare between two variables whether significant or not. After the test requirements are met, the hypothesis test is conducted, in this research the hypothesis test is used to determine whether there is a difference between the pretest and posttest.

3 RESEARCH RESULT AND DISCUSSION

3.1 Result

Table 1: Pre-test multistage test data description.

Name	Sex	VO_2Max
AIM	M	42,4
PEW	M	47,5
DRK	M	31
SRM	M	34,3
FGN	M	39,9
FRB	M	37,08
RDM	M	42,4

The result of the pre-test data research shows the lowest VO2 Max number of 31, the highest VO2 Max number of 47.5, the average value of 39.9, and the most number that appears (modus) of 42.4. From the results of the pretest data above follows summaries of VO2 Max categories of research subjects.

Table 2: Pre-test multistage test data result.

Category	Male	Total	Percentage
Very low M<38	3	3	42.85
Low M: 39-43	3	3	42.85
Average M: 44-51	1	1	14.28
Good M: 52-56	0	0	0
Very good M: 57-62	0	0	0

Table 2 shows that out of 7 research subjects 3 (42.85%) people are in the very low category; 3 (42.85%) people are in the low category; 1 (28.57%) person is in the average category. The following is a diagram of the Multistage pretest data against VO2 Max:

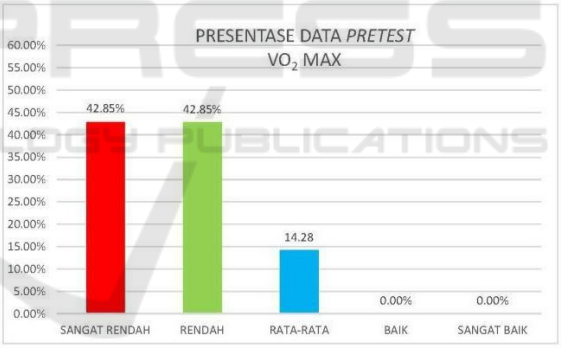

Figure 1: Diagram of the multistage pretest data against VO2 Max

The result of the pretest data research shows the lowest max number of 35.7, the highest VO2 Max number of 48, and the average number of 42.97. From the results of the pretest data above follows summaries of VO2 Max categories of research subjects. From the results of the pre-test data above follows summaries of VO2 Max categories of research subjects.

Table 3: Post-test multistage data description.

Category	Male	Total	Percentage
Very low M<38	2	2	28.57
Low M: 39-43	1	1	14.28
Average M: 44-51	4	4	57.14
Good M: 52-56	0	0	0
Very good M: 57-62	0	0	0

Table 3 shows that out of 7 research subjects as many as 2 (28.57%) people are in the very low category; 1 (14.28%) person is in the low category; 4 (57.14%) people are in the average category. Following is the Multistage posttest data diagram for VO2 Max:

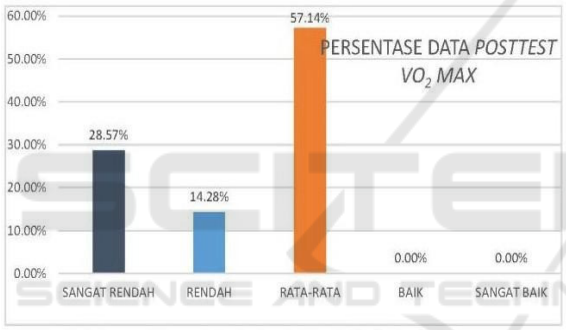

Figure 2: Vo2 Max posttest data diagram of researchers subject

Before testing the hypothesis, the normality test was done first. The result of this normality test can be seen in the table below.

Table 4: Normality test.

Variable		Sig.	Description
Multistage	*Pretest*	0.200	Normal
	Posttest	0.200	Normal

Based on the table above the Asymp.Sig value of the l dribbling variable pretest is 0.200 and the post dribbling test is 0.200. Because the Asymp.Sig value of the two variables are all greater than 0.05, the hypothesis stated that sample is based on a normally distributed population is accepted.

The result of this homogeneity test can be seen in the table below

Table 5: Homogeneity test.

Variable	Sig.	Description
Multistage VO2Max	0.946	Homogeneous

Based on homogeneity test results obtained p value (sig.) of 0.946. Significance value of 0.946> 0.05, this means that the variance is homogeneous.

The results of the t-test hypothesis test can be seen as follows:

Table 6: Paired t test.

Variable	Sig.	Description
Multistage VO2Max	0.03	Significant

Based on the paired t test result obtained p value (sig.) of 0.003. Significant value of 0.003 <0.05, then there is a significant effect. Thus it can be concluded that there is an influence of the "superdrill" training model on VO2Max at UNY Field Tennis UKM Athletes.

3.2 Discussion

Physical condition is one of the indispensable prerequisites in any attempt to improve the achievements of an athlete, it can even be said to be the basic foundation of a starting point for sports achievement. There are two energy systems in tennis, namely aerobics and anaerobic, and the one system dominant in tennis is the anaerobic energy system. With a good level of anaerobic endurance, it is very easy for athletes to hit while chasing the ball and running concurrently to get points. In this field tennis game it is crucial because in training or competition an athlete must be able to get points, either by killing, or the opponents make their own mistakes. In training the trainer gives a fixed target to the athlete so that the athlete can achieve maximum results, but at other times the trainer also provides several targets at each point on the field, in order to train the athletes physically and tactically. The results of the training process can be applied during the match in order to get the ball away from the opponents to make it easier for the athletes to get points.

Field tennis game has a character with an intermittent training pattern, because the duration of the game is sometimes short or long and only provides 60-90 seconds of rest interlude (Fernandez, Villanueva, and Pluim, 2006). The rules on rest have been set and controlled directly by the ITF, since

2004 the rest period was given 20 seconds at the change of point, 90 seconds at the change of place, and 120 seconds at the change of sets. Related to the duration of field tennis game sometimes takes more than 1 hour and in some matches the duration takes more than 5 hours.

Based on the calculation of the effective time used to play only 22% of the total time used to play the entire game, so it can be assumed that the main energy needs during tennis is 78% aerobic and 22% anaerobic. However, it can be seen that the dominant energy used when hitting the ball is the anaerobic system. Since when hitting the ball the ATP-PC energy system is more dominant. Tennis games requires 70% ATP-PC and LA energy systems, 20% LA-O2 energy and 10% energy from oxygen (O2) (Sukadiyanto, 2002). In reality in the field the predominant energy of tennis game is 70% anaerobic, but it needs to be based on the ability of good aerobic capacity even though only 10%.

In the superdrill training method athletes are required to always keep the ball tight and keep the ball away from the opponents. In this case superdrill is a training method that is very concerned about ratio, rest and work. Applying this method can be done on over 17 year-old athletes, seeing that their abilities are technically, physically, tactically, and mentally able to do this method. The superdrill method in Indonesia is rarely applied by coaches who do not keep up with development in the world of tennis court training.

Superdrill can be done by 2 people in pairs by passing the ball alone then, rallying for as long as possible with low intensity (50%) to medium intensity (70%) for a long period of time, but athletes are free to place the ball as they want, so that these athletes are required to be able to reach the ball anywhere. Or can be done by the coach giving the ball to the athletes in the field so that a direct rally occurs. However, in this method a slice shot cannot be taken, because the slice is considered to be difficult or deadly for the ball at the time of the rally. The purpose of this superdrill is to increase endurance and speed, because each athlete conducting a rally may give the ball to the target they want, but without killing each other.

Why can this method increase VO2 Max? Based on the calculation the effective time used to play takes only 22% of the total time of the entire game, so it can be assumed that the main energy needs during the tennis game is 78% aerobic and 22% anaerobic, but in reality in the field the tennis game predominant energy is 70% anaerobic, but it needs to be based on a good anaerobic capacity, even though only 10%. With this superdrill method, both athletes must be prepared to chase and hit the ball (groundstroke) made by the opponents. Tennis game is not only about technique, tactics and mentality, but physical is very important in supporting the athletes' game in the field, particularly at the advanced level. Because at the advanced level this groundstroke technique is widely used in various situations in playing tennis such as when receiving service, performing rallies, approaching shots and passing shoots.

Superdrill method is one way to increase VO2 Max through groundstroke technique, with the rule of 2 players doing rallies, placing the ball as they wish, using a single pitch, not allowed to do slice shots, the time given to do it until the specified break. In the case of finding and improving a physical quality, it will give 1 minute to rally and 1-4 sets and time to rest.

In this method must pay attention to work, rest and ratio. Thus W:R used is 1:1. The reason for applying work, rest, and ratio is due to the target of the intended training is to increase the maximum achievement of VO2 Max, it requires the consistently fit physical condition to be able to rally optimally. The training must be carried out steadily, progressively, and continuously (Sukadiyanto, 2002). Being steady means that the training must be carried out continuously, and avoid training by turns. Forward means practice is increasing by daily. While continuing means that in every exercise is a continuation of the process of previous exercises. By gradually increasing the load in an exercise program (Suharjana, 2007). When exercise adaptation has taken place, the heavy load will feel light. For that, in applying the principle of overload (overload) must be done in stages, carefully, continuously, and precisely. This means that each goal has a certain period of time to be adapted by athletes. After a period of time is reached, the training load must begin to increase.

Based on the analysis of the data above it can be concluded that efforts to increase VO2 Max through superdrill training methods have an effect in increasing VO2 Max UNY Field Tennis athletes. The importance of VO2 Max in the field tennis sports branch is very influential in the field performance, not only when training but also when the match takes place. By possessing a good VO2 Max a tennis athlete will not quickly experience

exhaustion while playing or in an efforts to improve certain techniques.

4 CONCLUSIONS

Based on the research conducted, it can be concluded that this superdrill training method has an influence in the increasing of VO2 Max of field tennis UKM athletes in UNY in supporting maximum performance.

Based on the analysis and discussion of research data, the results of the pretest data show that out of 7 research subjects as many as 3 (42.85%) people are in the very low category; 3 (42.85%) people are in the low category; 1 (14.28%) people are in the average category. After given the treatment as many as 16 times of meeting, it shows posttest results out of 7 research subjects as many as 2 (28.57%) people are in

Very low category; 1 (14.28%) person is in low category; 4 (57.14%) people are in average category. From the above research as a whole shows that VO2 Max of 7 athletes experienced an improvement of 9.53%.

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