

Comparison of Extensive and Extensive Interval Exercises in Futsal VO2max Player Upgrades

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Abstract: During the game, a futsal player needs a very fast recovery capability, this requires a good capacity of VO2max. In increasing endurance or VO2Max there are several training methods, one of them with interval training. The purpose of this study is to know the comparison of extensive and intensive interval training methods to increase VO2Max in students attending futsal extracurricular in High School Bandung. The method used in this research is the experimental method. The population of 20 people using sampling technique is total sampling. The measuring instruments are test bleep and table form calculation. Based on the results of the research that the authors do as well as the calculation and data analysis of the measurement results, the conclusion of the results of this study is extensive interval training methods provide a more significant impact on the increase in VO2Max students attending futsal extracurricular in Bandung High School.

1 INTRODUCTION

During a futsal game, players perform various moves such as running, kicking, jumping, and others and requiring repetition of movements in turns with short recovery periods. The intensity and duration may change at any time according to the demands of the game. Futsal is an intermittent team sport that is characterized by activity with high intensity action, interspersed with short recovery period during game. Futsal is an intermittent sport that makes high physical, technical, and tactical demands on players (Soto, 2008). With a dimension of 40 x 20 m field size, unlimited and frequent attacking and defensive turnover, futsal players are required to perform high intensity locomotor activities such as sprints, acceleration, decelerations and high-demand alterations placed in aerobic and anaerobic metabolism systems. Thus, in addition to other physical qualities of strength and speed, as well as cardiorespiratory fitness and repeated sprint ability have been considered as important factors that determine success in futsal (Teixeira et al., 2017).

A previous study with heart rate analysis (HR) reported that players maintained HR at the maximum 85% HR level (HRmax). In addition, a study reported that futsal players should be able to alter locomotor activity (eg, run to run, run straight

to the side or run back) every 8-9 seconds. Thus, futsal can be regarded as a high-intensity game with important demands that the player needs by having a good aerobic and anaerobic energetic capacity (Pedro et al., 2013).

The performance of futsal games also depends on the player's aerobic capacity. Helgerud et al. found that improvements in maximum oxygen uptake (VO2max) lead to improved performance in futsal playing, evidenced by distance traveled, intensity of work, and number of sprints during the match. Thus, improving the fitness of futsal players through training is a complex process that requires improvement in both aerobic and anaerobic (Dupont, Akakpo, And Berthoin 2010). VO2max is one of the major determinants of aerobic endurance performance (Helgerud et al., 2007). A significant correlation between maximum oxygen uptake (VO2max) and distance traveled during football matches. In addition, the finding that the top four ranks of the best teams in Hungary's football division is equal to the rank among the average VO2max, thus strengthening the correlation between VO2max and performance. (Helgerud et al., 2001).

Just as football futsal players need good physical skills, the performance of players also depends on aerobic capacity. Helgerud et al. found that high

Volume Maximum Oxygen (VO2max) players lead to improved performance in matches, proven mileage, intensity of work, and number of sprints during the game. Thus, improving the fitness of players through training is a complex process that requires improvement in both aerobic and anaerobic qualities (Dupont, Akakpo and Berthoin, 2004)

Resistant Power Exercises involving manipulation of exercise intensity, duration, and frequency, with implicit goals to maximize performance, minimize the risk of negative training outcomes, and determine the fitness time and peak performance to be achieved are essential (Seiler 2010).

It is important to know the determination of the intensity of a different sport training activity as it may affect the adaptation of physiological parameters, accuracy in choosing the optimal training method for specific sports or to improve fitness in the general public. Cardiorespiratory endurance has long been recognized as one of the fundamental components of physical fitness. Since the accumulation of lactic acid is associated with muscle fatigue, anaerobic metabolism contributes to a quantitatively significant level of energy released (Helgerud et al., 2007).

In increasing endurance or VO2Max, there are several training methods used. One of them with interval training. Interval training improves fitness and decreases health risks (Astorino et al., 2012). According Harsono (1988: 156) „Interval training is a system of exercise interspersed by intervals in the form of periods of rest. So, exercise (eg run) - rest - exercise - rest - exercise and so on“. Interval training is an important exercise that is included in the whole exercise program. Interval training is highly recommended by renowned coaches because the results are very positive for the development of endurance and stamina athletes. Interval training method is the method of exercise that distance, time, rest and repetition have been determined, or also called the exercise variables that have been determined. Recent interval training has been used as an alternative method of endurance training to alter cardiorespiratory fitness, as demonstrated by Maximum Oxygen Volume (VO2Max) and muscle metabolism (Astorino et.al. 2012). Interval training is a kind of realistic exercise that can be done by elite athletes and untrained individuals. Interval training, revealing sports

potential with Intensity to stimulate adaptation of skeletal muscle in improving performance and having implications for improving health (Talanian et al.).

In the interval training there are several methods such as intensive interval training methods and extensive interval training methods that each has different characteristics, as Schmolinsky (1983: 66) notes that “the total load result from a great volume of work in time and space, we speak of extensive interval work; the intensive interval work is characterized by greater application of power and reduced volume in one unit of time“. The statement indicates that the total load is a form of the volume of work in time and space, hereinafter referred to as the extensive work interval, while the intensive work interval is characterized by the use of greater power and the decrease in volume in a single unit.

The purpose of this study was to investigate the comparison of extensive interval training methods and intensive interval training methods on the improvement of VO2Max.

2 METHODS

This method is used on the basis of the consideration that the nature of this study is to compare the differences as well as the effect of extensive interval training methods and intensive interval training methods on improving VO2Max in students attending futsal extracurricular in Bandung High School. Both groups then undergo the training process in accordance with the exercise program that has been prepared by the author. The sample used in this study is high school students in Bandung who are active in futsal extracurricular, as many as 20 students. The instruments used in this research data retrieval using a multi-stage test (bleep test) where the author took from the book Nurhasan (2013: 120).

2.1 Statistic analysis

2.1.1 Average Calculation and Standard Deviation

Table 1: Results Calculation of Average Score and Standard deviation Test of Futsal Extracurricular Members' VO2Max SMA YWKA Bandung.

GROUP	EARLY TEST		END TEST		GAIN	
		S		S		S
Exercise VO2max with Extensive Interval Training Methods	2.67	4.95	6.22	5.07	3.55	0.32
Exercise VO2max with Intensive interval training Methods	2.26	5.02	4.83	4.83	2.57	0.302

The data in Table 1 shows that the average of group A tests (VO2Max improvement exercise with extensive interval training method) is 42.67 and for group B (VO2Max improvement exercise with intensive interval training method) of 42.26. The standard deviation for group A was 4.95 and standard deviation of group B was 5.02. The mean and standard deviation values of the two groups' initial tests were almost identical due to the pre-exercise sample division into two groups with similar abilities. While for the final test the average of group A was 46.22 with standard deviation of 5.07 while the final test group B had an average of 44.83 with standard deviation of 4.83.

Table 4.1 also shows that the gain or gap from the initial and final test of the two groups, ie group gain A gain (VO2Max increase in training with extensive interval training method) is 3.55 with standard deviation 0.32 is greater than the mean - average group gain B (VO2Max exercise with intensive interval training method) of 2.57 and standard deviation of 0.302.

2.1.2 Normality Testing

The next step is to test the normality by using the liliefors normality test. From the results of this test will determine which approach will be used in data analysis, whether using parametic statistical approach or parametric statistics. The normality test results can be seen in the table below:

Table 2. Test Result of Normality Test of Both Group Before Experiment.

Group			Conclusion
Group A	0.2315	0.258	Normal
Group B	0.2257	0.258	Normal

Then, calculated the normality of both groups after the experiment was done. The result of the calculation can be seen in table 3.

Table 3: Calculation Result of Normality Test of the Second Group After Experiment.

Group			Conclusion
Group A	0.2238	0.258	Normal
Group B	0.2324	0.258	Normal

The test criteria for liliefors normality test are:

1. The hypothesis is rejected if $L_o > L_(t-)$ the conclusion is an abnormally distributed population
2. The hypothesis is rejected if $L_o < L_(t-)$ the conclusion is that the population is normally distributed

Based on table 4.2 and table 4.3 above it can be seen that all the highest absolute value (L_o) value is less than the value of value ($L_(t-)$) is 0.258, then the conclusion is that all populations are normally distributed.

2.1.3 Homogeneity Testing

After the measurement of the average values and standard deviation and the normality test results from both groups of samples, for the next step to test the homogeneity of the data by using the two variance equality test. The results of the test can be seen in table 4 below:

Table 4: Homogeneity test results of two variance of both groups.

Groups	F_{hitung}	F_{tabel}	Conclusions
F initial	1,028	3,18	Homogeneous
F final	1,12	3,18	Homogeneous

On the basis of the results of testing the similarity of two variance in table 4.2 above, kindly note that the result F_{hitung} initial test = 1.028 and final test = 1.12 smaller than F_{tabel} = 3.18 at dk (9.9) with a real level = 0.05. The conclusion of the two variance equality test results is that both groups are homogeneous.

2.1.4 Second Significance Test Forms of Exercise

The next step is to test the results of the test data from the two test results to the sample (this test and analysis to find out whether there is a significant increase of exercise results from both groups of samples). The results of statistical analysis can be seen in table 5 below:

Table 5. Significant Test Results From Both Forms of Exercise.

Sample group			Information
Group A	28.85	2,262	Significant
Group B	26.91	2,262	Significant

The calculation and the significant test of the increase of training result form is done by using two significant test of two parties ie t test. From the results of the test that is in table 4.5 obtained that:

1. For the form of group A exercise (VO2Max improvement exercise with extensive interval training method) obtained t count (28,25) > t table (2,262) at level of trust / s ignifle = 0,05 with dk (9,9). The test criterion is, accept if $-t_{1-\frac{1}{2}} < t_{count} < t_{1-\frac{1}{2}}$. In this other case tcount is in the rejection area of Ho, meaning Ho is rejected. The conclusion is that there is a significant influence from the extensive lati han interval form to the increase of VO2max in the futsal extracurricular students in Bandung High School.
2. For the form of group B exercise (VO2Max improvement exercise with intensive interval training method) obtained t count (26,91) > t table (2,262) at level of trust / significant = 0,05 with dk (9,9). The test criterion is, accept if $-t_{1-\frac{1}{2}} < t_{count} < t_{1-\frac{1}{2}}$. In this other case t_count is in the rejection area of Ho, meaning Ho is rejected. The conclusion is that there is a significant influence from intensive interval training form to the improvement of VO2max in futsal extracurricular students in Bandung High School.

2.1.5 Two-level Significance Test (One Party) Both Groups

The next step is to calculate and analyze the differences in the influence of both forms of exercise on the improvement of VO2Max in futsal extracurricular students in Bandung High School. For that required data in the form of the difference of the initial test results and the final test of each group of exercises as data increase exercise results. The data of the difference calculation can be seen in table 6 below:

Table 6. Significance Test Result of Two-Average (One Party) Both Group Exercises Difference.

Group	t _{hitung}	t _{tabel}	Information
Group A-B	7,54	1,734	Significant

From the test results obtained that t_count of 7.54 is larger than $t_{1-\frac{1}{2}} (-)$ (1,734). The test criterion accepts Ho if $t_{1-\frac{1}{2}} (-)$ at the real level = 0.05 with dk = 18. In this case t_ (count) is in the rejection region Ho, so Ho is rejected which means there is a difference from both forms of the method of training .

The conclusion is that there are significant differences in impact between extensive interval training methods and intensive interval training methods on increasing VO2Max in futsal extracurricular students in Bandung High School. This means that the extensive interval training method impacts better than extensive training methods on increasing VO2Max in futsal extracurricular students in Bandung High School.

3 RESULTS AND DISCUSSION

Extensive interval training methods have a significant effect on VO2Max improvement, while intensive training methods, although they have an effect on the increase in VO2Max, but the difference in the increase gives a real indication that there are factors that can affect the achievement of a person's maximum ability. Strong evidence supports the upgrading of aerobic and VO2max via the Sprint Interval Training (SIT), which coincides with muscle adaptation (Sloth et.al 2013). Endurance exercise with high aerobic intensity through interval methods showed significantly more effective than medium and low intensity training to improve VO2max (Helgerud et al., 2007).

Endurance Training and Exercise Interval both improve aerobic fitness and thus have a connection in risk of cardiovascular factors, fitness and all causes of death. Several studies have suggested that interval training leads to improvements in both aerobic and anaerobic fitness as well as improving endurance performance to a higher level. For example, Daussin et al. found Increased Maximum Oxygen Volume (VO2max) increased higher for trained men and women who participated in an Interval training program for 8 weeks (Milanovi , Sporiš and Weston, 2015). Many studies have shown that a sufficient high intensity interval (HIT), conducted at least 6 weeks, increases the peak

oxygen capacity (VO₂max) (Gibala and Mcgee, 2008).

Physiologically, the closer a person's ability to his or her maximum ability (the higher one's ability), the more difficult it is to improve it. However, many factors may influence both externally and internally. For example, one's physical fitness and one's level of motivation to improve the ability of physical condition. These factors may be one of the many obstacles that could inhibit VO₂Max increase. Interval training shows that the maximum aerobic velocity is increased. This study shows that physical quality improvement can be performed during the in-season period (Dupont, Akakpo and Berthoin, 2004).

4 CONCLUSIONS

The results of this study are extensive interval training methods giving a more significant impact on the increase of VO₂Max extracurricular futsal members in high school. Extensive interval training methods have significantly impacted VO₂Max increase in futsal extracurricular members of high school. That is the average gain or difference between the initial test and the final test of 3.55 with standard deviation 0.32. the test t-test is worth $t_{count} (28,25) > t_{table} (2,262)$. Intensive interval training methods have a significant impact on the VO₂Max increase in extracurricular members of high school futsal. That is the average gain or difference between the initial test and the final test of 2.57 with standard deviation 0.302. tested t-test is $t_{count} (26,91) > t_{tabel} (2,262)$. There are significant differences in impact between extensive interval training methods and intensive interval training methods on VO₂Max increase in extracurricular members of high school futsal. Compared to the fact that extensive interval training methods have a more significant impact on the increase in VO₂Max extracurricular futsal members of Senior High School. This can be seen from the results of the practice with extensive interval training methods obtain an average increase of 3.55 more than in the practice with intensive interval training methods that obtain an average increase of 2.57.

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