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THE EFFECT OF INTERVAL TRAINING AND FARTLEK METHODS IN INCREASING AEROBIC ENDURANCE OF THE UMKO PHYSICAL EDUCATION PROGRAM'S FUTSAL TEAM

Yolanda Vingka Rani[1], Guntur Yulisatria[2], Mela Suhariyanti[3], Nur Hikmah[4], Pasha Erik Juntara[5]
Universitas Muhammadiyah Kotabumi[1,2,3,4,5], Indonesia
atmajaraniyolanda@gmail.com[1], guntur@umko.ac.id[2], melasuhariyanti02@gmail.com[3], nurhikmah.ima0597@gmail.com[4], pasha.erik.juntara@umko.ac.id[5]

Abstract
This study aims to determine the effect of Fartlek training method in increasing aerobic endurance of the UMKO Physical Education Program's Futsal Team, to find out how far is the effect of Interval Training method in increasing the endurance of the UMKO Physical Education Program's Futsal Team, as well as to discover the differences between Fartlek and Interval Training method on the endurance abilities of the UMKO Physical Education Program's Futsal Team. A quantitative experiment approach with a two-groups pretest-posttest is used in this study, by Fartlek and Interval Training model as a form of treatment given to the UMKO Physical Education Program's Futsal Team as the research subject. Purpose sampling technique is used to collect data. The study is using statistical data analysis with paired sample t-test and independent sample test by the help of SPSS to find out the effect of both training given. The result of hypothesis testing using paired sample t-test is knowing that both Fartlek and Interval Training could affect endurance abilities since both get the value of sig.(2 tailed) each less than 0,05 (interval training = 0,00 and fartlek = 0,02). As seen by the increasing percentage on interval training group by 13,24% and on fartlek group by 11,31%, both groups undergo an increasing from earlier phase and after given treatment phase. This result means that there is no significant different effect between these two exercises; by means between Interval Training and Fartlek on body's endurance abilities.

Keywords: Fartlek; Interval Training; Endurance

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Correspondence Author: Yolanda Vingka Rani, Universitas Muhammadiyah Kotabumi, Indonesia.
E-Mail: atmajaraniyolanda@gmail.com

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INTRODUCTION

Nowadays, sports are something that cannot be separated from human's life. The aim of sports is for education, performance, and recreation. One of the most popular sports chosen by the citizens to play is futsal. Futsal is chosen since it involves people. Futsal is played by two opposite teams, can be played by anyone, youngster or oldies, men or women (Tenang, 2008). The development of Futsal as a sport is fast especially amidst children, from elementary up to university students.

HALAMAN OLAHRAGA NUSANTARA
Jendral A. Yani Street Lorong Gotong Royong 9/10 Ulu Palembang South Sumatera
email jurnal: jurnalhon@univpgri-palembang.ac.id
situs web: http://www.univpgri-palembang.ac.id

Futsal is not an individual but a team game (Hermans, 2011). Each team consists of 5 people, one of them is a goal keeper, so teamwork is needed in order to achieve the expected triumph. Less team member makes all the player needs to play with total football (Irawan, 2009). So that when the team attacks, not only forwards work. Likewise, when the team defends, the forwards needs to help the defense. That's why, futsal players are required to own optimal stamina and endurance, since they have to always move as long as the match runs. One of the must-have ability by the futsal players is aerobic endurance (Pratama et al., 2022).

Not only good techniques, tactics, and mental maturity factors, physical condition factors as the basic component in futsal holds an important role just like other sports. Good condition of an athlete is required that cannot be ignored and very important to achieve best performance (Arisman et al., 2021).

Futsal is a sport that combines both aerobic and anaerobic energy. Futsal, which requires excellent physique with high intensity in a relatively long time, use aerobic as its main energy resource. From the sentence above, it can be seen that aerobic endurance is one of the most physical condition component needed in futsal. An athlete is said to have a good endurance when he/she is able to do a long term activity without experiencing significant fatigue (Suharjana, 2013). To be able to improve aerobic endurance, the chosen exercises must last long enough, such as long distance running, fartlek, interval training, long distance swimming, or any form of exercises that can force the body to work long enough (Sukadiyanto and Muluk, 2011). A good and well-planned physical exercises will cause physiological changes in the body which leads to the ability of producing bigger energy and improve appearance, or athlete's performance becomes more optimal.

UMKO Physical Education program was established in 2018. Although newly established, but the PE program has already got a futsal team. The futsal team that has only been formed in these recent years does not have any achievement yet, but the players are experienced and have quite good abilities. The players who are

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students and not having an athlete background make aerobic endurance ability of the player is different to each other. There are players with quite high vo2max, but there are also some who need to be improved so that their aerobic endurance ability could be in equal level when they are in a match.

Based on the observation results, the researchers have found problems exist in the UMKO PE program's futsal team. Preliminary study has shown that UMKO PE Program's futsal team is more focused on technical exercises and fun futsal, whereas exercises lead to the physical training specially to improve aerobic endurance is concerned less. Exercises progress is done in conventional way and overlook the fundamentals of a training. Physical training in every sport is the main foundation in technical, tactical, and mental development. All bio motor components must be developed in order to support the athlete's achievement, with excellent physical condition, surely athlete would be able to master training phases.

In the next study, the researchers found another problem: UMKO PE Program's futsal team didn't have clear and measured training program yet. The training program that didn't run continuously, training method that was not in accordance with the character, as well as evaluations that had never been carried out regularly must be the main obstacles in improving training performance. Thus, it can be seen that one the must to be done efforts to improve the performance is the training. Training is the basic run-up of higher performance, in which the process is designed to develop motor and psychology abilities to improve one's capability. The effects of the training depend on the intensity and the amount of the training itself. (Almy & Sukadiyanto, 2014).

By seeing the phenomena occurred on the field, the researchers intend to do a research on increasing athlete's endurance especially aerobic endurance. One of the physical training that can be used to improve aerobic endurance is interval and fartlek training method (Ninzar, 2018). Researchers' reason of using interval and fartlek training because the training can be used in relatively short time, low risk of

HALAMAN OLAHRAGA NUSANTARA
JURNAL ILMU KEOLAHRAGAAN
Jendral A. Yani Street Lorong Gotong Royong 9/10 Ulu Palembang South Sumatera
email jurnal: jurnalhon@univpgri-palembang.ac.id
situs web: http://www.univpgri-palembang.ac.id

injuries, and the improvement is visibly fast. Based on the explanation above, the writers are interested to do the research to see how interval and fartlek training method affects the increasing of aerobic endurance of UMKO PE's futsal team. Meanwhile the aim as well as the urgency of this research is to find out the increasing of aerobic endurance of UMKO PE's futsal team so it can achieve better performance in the future matches, this research is also expected to add reference on physical training method to other lecturers, athletes, PE students, and practitians as well, especially under Muhammadiyah Association, so they can think of the appropriate method used in improving bio motor ability, especially in aerobic endurance, in order to the association's upturn, especially in performance sport sector.

METHOD

The method used in the research to achieve its aim is experimental method. This method shows the relations of two variables or more, or to find out the effect of one variable on other variable (Nana Sudjana and Ibrahim, 2012). (Sugiyono, 2017) states that experimental research is the most purely-quantitative, being said so since all the quantitative research principals can be done on this method (Putra et al., 2020).

The two-groups pretest-posttest study design has two data obtained from the earlier measurement, that is pretest (A1) and post-measurement or posttest (A2). The aim of this plan is to know the earlier condition (pretest) from one or more independent variable's effects on dependent variable. After that, another measurement is done once again (posttest) to know the results or the difference on before and after treatment. This experimental research is using two groups being treated differently, in which fartlek and interval training method exercises is given, this is the picture of the study design.

HALAMAN OLAHRAGA NUSANTARA
Jendral A. Yani Street Lorong Gotong Royong 9/10 Ulu Palembang South Sumatera
email jurnal: jurnalhon@univpgri-palembang.ac.id
situs web: http://www.univpgri-palembang.ac.id

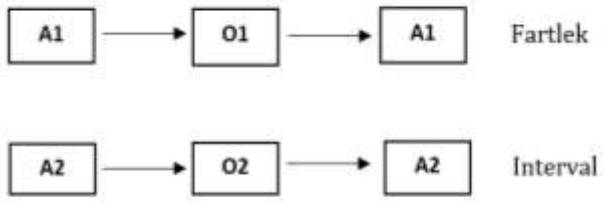

Figure 1. Research design

Description:
A1 : Pretest with Multistage Fitness Test
A2 : Pretest with Multistage Fitness Test
O1 : Fartlek method treatment
O2 : Interval training method treatment
A1 : Posttest with Multistage Fitness Test (MFT)
A2 : Posttest with Multistage Fitness Test (MFT)

The sample of the study is divided into two groups taken from the entire population (Miller, 2008). Before the groups are determined, pre-test is done first in order to find out the initial ability before the training program is given. After that, the population is divided into two groups to run different training method, and then posttest will be given after they have completed the prescribed training program.

Data Analysis Technique

This study counted as quantitative research so it uses statistical data analysis method.

Mean

Mean or average is a score obtained from dividing the number of the scores by the number of individuals. To calculate mean or average score, we can use the following formula:

$$M = \frac{\Sigma x}{N} (1)$$

Description:
M : Mean or average
Σx : the total number of values in the distribution

HALAMAN OLAHRAGA NUSANTARA
JURNAL ILMU KEOLAHRAGAAN
Jendral A. Yani Street Lorong Gotong Royong 9/10 Ulu Palembang South Sumatera
email jurnal: jurnalhon@univpgri-palembang.ac.id
situs web: http://www.univpgri-palembang.ac.id

N : the number of individuals
(Maksum, 2018)
Standard deviation

Standard deviation is deviation of a value from its mean or average value.

Homogeneity test

Homogeneity test is a test done to find out whether two or more sample data groups come from a population with the same variations or not (homogeneous).

A test to calculate increasing score from pretest and posttest

The following formula is used in order to find out whether there is a result change or not from the pretest and posttest:

$$\text{enhancement} = \frac{\text{MD}}{MPre} \times 100 \qquad (2)$$

Description:
MD : the average sum of the differences in each pair of scores
MPre : the average sum of pretest
(Erman, 2009)

One group data t-test

Paired Sample test is used to know the effect of treatment given by the help of SPSS. By significance criteria or Sig. (2-tailed) < 0,05 then the data is stated to have significant differences. While the Sig. (2-tailed) value > 0,05 then the data is stated as no significant differences.

Two groups data t-test

The test is used to find out the differences of two groups average using independent sample test by the help of SPSS. By the significant basic P value > 0,05 then the data can be stated as the variant of the two groups is similar. T-test significance is the first line (Equal Variants Assumed). However, if the P-value from Levene's test data is stated as the variant of the two groups is different, then the t-test significant is read on the second line (Equal Variances Not Assumed).

RESULT

Based on the treatment carried out on field, the data obtained for each method, both interval and fartlek training is as follows:

HALAMAN OLAHRAGA NUSANTARA
Jendral A. Yani Street Lorong Gotong Royong 9/10 Ulu Palembang South Sumatera
email jurnal: jurnalhon@univpgri-palembang.ac.id
situs web: http://www.univpgri-palembang.ac.id

Table 1. The Pretest and Posttest Result on Interval Training

No	Name	Age	VO2Max Pretest	VO2Max Postest	Margins
1	X1	20	22,8	26,4	3,6
2	X2	18	24,8	31,8	7
3	X3	20	31,4	33,9	2,5
4	X4	20	31,8	36,8	5
5	X5	22	33,2	36,8	3,6
6	X6	20	33,9	36,8	2,9
7	X7	19	37,5	42,9	5,4
8	X8	21	37,1	40,5	3,4
Sum			252,5	285,9	33,4
Average			31,56	35,74	4,18
Standard Deviation			5,30	5,12	1,50

Based on table 1 above, it can be described that the lowest score of VO2Max on the interval training group in the pretest is 22,8 and the highest score is 37,5. For interval training group's posttest, the lowest score of VO2Max is 26,4 and the highest is 42,9. Meanwhile the average VO2Max for interval training for pretest and posttest consecutively as 26,4 and the highest score is 42,9. Whereas the average of VO2Max for interval training group's pretest and posttest respectively of 31,56 and 35,74 with the pretest and posttest's standard deviations of 5,30 and 5,12.

Table 2. Fartlek Group of Pre-test and Post-test's Result

No	Name	Age	VO2Max Pretest	VO2Max Postest	Margins
1	Y1	21	26,8	30,2	3,4
2	Y2	21	35,4	36,8	1,4
3	Y3	20	29,8	33,2	3,4
4	Y4	21	31	35,7	4,7
5	Y5	21	34,7	37,1	2,4
6	Y6	19	33,2	41,8	8,6
7	Y7	19	34,7	36,8	2,1
8	Y8	19	36,8	40,5	3,7
Sum			262,4	292,1	29,7
Average			32,80	36,51	3,71
Standard deviation			3,35	3,70	2,23

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Meanwhile based on table 2 above, it can be described that the lowest VO2Max score on Fartlek group's pretest is 26,8 and the highest is 36,8. For Fartlek group's posttest, the lowest VO2Max score is 30,2 and the highest is 41,8. Meanwhile the VO2Max average for fartlek group's pretest and posttest respectively is 32,80 and 36,51 with the standard deviation of pretest and posttest is 3,35 and 3,70.

Table 1 and 2 are also describe the change occurred on each player, which can be seen from the margins between pretest and posttest's score. From interval training group, it is seen that the sum of the margins between pretest and posttest is 33,4 with the average score 4,18. Meanwhile for the fartlek group, it is known that the sum of the margins between pretest and posttest is 29,7 with the average 3,71. For the increasing percentage from each group on pretest and posttest can be seen on the following table:

Table 3. The Increasing Percentage of Pretest and Posttest

Groups	Pretest	Postest	Increasing Percentage
Interval	31,56	35,74	13,24%
Fartlek	32,80	36,51	11,31%

It can be seen from the table above that the increasing percentage from the interval training group is 13,24% and fartlek group is 11,31%, both groups shows improvement after having been given the treatment. From the table, it can be described that interval training method has higher score or percentage than fartlek method.

Table 4. Homogeneity Test

	Levene Statistic	df1	df2	Sig.
Pretest	0,841	1	14	0,375
Postest	0,658	1	14	0,431

Based on the homogeneity test table above, it can be described that the homogeneity significance of the pretest is 0,375 (>0,05), it shows that the pretest variable on interval training and fartlek groups are homogeneous. It is similar to the posttest since its homogeneity significance is 0,431 (>0,05) that shows interval

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Jendral A. Yani Street Lorong Gotong Royong 9/10 Ulu Palembang South Sumatera
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training and fartlek group are homogeneous.

Table 5. Paired Sample Test for Interval Training and Fartlek Groups

		Mean	Standard Deviation	t	df	Sig. (2-tailed)
Pretest - Postest	Interval	-4,175	1,505	-7,846	7	0,00
Pretest - Postest	Fartlek	-3,713	2,2274	-4,714	7	0,02

From the output of the table above, it can be seen that the Sig.(2-tailed) score on interval training group is 0.00<0.05 and the score of the Sig.2-tailed fartlek group is 0.02<0.05. Thus, it can be concluded that there is significant effect of interval training and fartlek training on the endurance of UMKO PE's futsal team.

Table 6. The T-Test of Independent Sample test on Interval Training and Fartlek Groups

	F	Sig.	T	df	Sig. (2-tailed)
Assumsed	0,691	0,420	0,347	14	0,734
Not Assumsed			0,347	12,746	0,734

The table above is presented to find out how big is the difference in influence between interval training and fartlek groups. It is seen that Sig.(2-tailed) 0,734 is bigger than 0,05 (0,734>0,05), in which can be concluded as there is no significant difference between both methods.

DISCUSSION

Build upon the result of the study above, it is known that interval training method has average score of pretest of 31,56 and posttest's average score of 35,74. Thus, there is an average margins from the pretest and posttest of 4,18. It can be concluded from the data, that there is an increase in the score between pretest and posttest in the interval training group. Increasing percentage calculation is run as well and it shows score of 13,24%. The increasing score obtained on interval training group is caused by training program given to the UMKO PE's futsal team.

While based on the data above, in the fartlek group, the pretest average score is 32,80 (ml/kg/min) and the posttest average score is 36,51 (ml/kg/min). Thus, the average margins between pretest and posttest is 3,71. So, it can be concluded that

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JURNAL ILMU KEOLAHRAGAAN
Jendral A. Yani Street Lorong Gotong Royong 9/10 Ulu Palembang South Sumatera
email jurnal: jurnalhon@univpgri-palembang.ac.id
situs web: http://www.univpgri-palembang.ac.id

there is an increase in the score between pretest and posttest in the fartlek group. Therefrom, an increasing percentage calculation on fartlek group is done and it shows score of 11,31%. Increasing percentage from fartlek group is obtained from the training program given to the UMKO PE's futsal team as well.

After it was analyzed from the data above using t-test (paired sample t-test), it is found that interval training method can affect endurance, since the score of Sig.(2-tailed) is less than 0,05; it is 0,00 (0,00<0,05). And then, fartlek training method is also affect one's body endurance as the score of Sig.(2-tailed) is less than 0,05; it is 0,02 (0,02<0,05). Thus, it can be concluded that both methods can lead to the increasing of endurance ability of UMKO PE's futsal team.

In order to find out how big is the difference in influence of interval training and fartlek method, the researchers did a calculation through independent sample t-test using statistical application and it is found that there is no significant difference of influence between both training methods, as the sig.(2-tailed) result is bigger than 0,05; it is (0,734>0,05).

As seen from the value of increasing percentage, interval training group has higher increasing percentage score than fartlek group; that is 13,24%, while fartlek group has lower increasing percentage score: 11,31%. By this calculation, although both training method make change on the player from the start of pretest until posttest, yet they have different results on each treatment group between interval training and fartlek method. Thus, it can be concluded that interval training method is more effective than fartlek training method, proven by bigger percentage score of interval training method than fartlek group. but even though there are differences in the improvement result, both training method can be used for aerobic endurance ability training. Besides, another thing in which may affect training result is uncontrolled life style of the subjects themselves, since this study didn't manage subjects' daily activities, yet they are able to accept and adapt to the training method given.

HALAMAN OLAHRAGA NUSANTARA
Jendral A. Yani Street Lorong Gotong Royong 9/10 Ulu Palembang South Sumatera
email jurnal: jurnalhon@univpgri-palembang.ac.id
situs web: http://www.univpgri-palembang.ac.id

CONCLUSION

Based on this study, it can be concluded that:

There is a significant effect of interval training method on aerobic endurance ability of UMKO PE's futsal team.

There is a significant effect of fartlek training method on aerobic endurance ability of UMKO PE's futsal team.

There is no significant effect between both interval training and fartlek method on aerobic capacity of UMKO PE's futsal team.

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JURNAL ILMU KEOLAHRAGAAN
Jendral A. Yani Street Lorong Gotong Royong 9/10 Ulu Palembang South Sumatera
email jurnal: jurnalhon@univpgri-palembang.ac.id
situs web: http://www.univpgri-palembang.ac.id

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