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Effect of high-intensity interval training and fartlek on increasing VO₂max in futsal players

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Abstract

This study's goal was to find out how fartlek and high intensity interval training affected VO₂max growth. This study was conducted at the golden futsal field in Jambi from April to May. Three times a week the treatment is given 18 times. In this study, the pretest-posttest design was applied to one group. Jambi futsal players from the Pratama family made up the demographic that the researcher chose to study. For a sample of 14 persons, inclusion and exclusion criteria were applied. The research tool employed in the study, specifically equipment from the Multi Stage Fitness Test, was used to measure VO₂max pretest and posttest. The data analysis processes of normality, homogeneity, and hypothesis testing are carried out using SPSS. The distribution is normal and homogenous, according to this study's normality and homogeneity data (sig. > 0.05). The hypothesis test findings indicate a significance value of 0.000; 0.05, VO₂max of the Pratama family's futsal players in Jambi was raised via fartlek and high-intensity interval training. Additionally, this study demonstrates that fartlek training and high-intensity interval training both work to raise VO₂max by 61.9%. These results suggest that fartlek and high-intensity interval training are useful training methods for boosting VO₂max.

Keywords: VO₂max, high intensity interval training, fartlek

1. Introduction

One of the games that has received great attention lately is the game of futsal and is one of the most popular games in the world. Futsal is a game full of movement activities because futsal is a combination of sports components and physical activity (Korobeynikov *et al.*, 2020) ^[11]. Futsal is played by over 30 million players from 100 countries and is a sport in which two teams of five players compete against each other (Dogramaci S *et al.*, 2015) ^[6]. Futsal is a game played on a 40 x 20-meter court and unlimited substitutions can be made without stopping time which supports a high level of intensity throughout the match (Ayarra *et al.*, 2018) ^[1]. Futsal is a game that involves players who are always moving in terms of attack and defense so that futsal can be tiring. So futsal is a high intensity game (Naser *et al.*, 2017) ^[14]. High intensity futsal matches require physical effort, technique, and good tactic (Borges *et al.*, 2022) ^[3]. It also has a dynamic and complex environment that requires players to make quick and precise movements for successful performance (Iedynak, Galamandjuk, *et al.*, 2019; Iedynak, Marzec, *et al.*, 2019) ^[9, 10]. according to (Dal Pupo *et al.*, 2017) ^[4]. According to him, physical exercise is crucial for futsal players as futsal matches are interrupted by high-intensity work and short-term recovery.

Endurance is a very important physical factor in determining the performance of an athlete. Good endurance allows athletes to maximize the use of skills and tactics, allows athletes with good endurance to excel easily. Endurance is an important part of your physical condition for playing futsal, because it is involved in transporting oxygen throughout the body through the heart and lungs to produce energy. This is due to futsal periodic nature, which includes an aerobic metabolism that accounts for 75% of the energy consumed throughout a game (de Oliveira *et al.*, 2019) ^[5]. One of the most significant factors affecting endurance performance is maximum oxygen volume (Lundby *et al.*, 2017) ^[12]. In this situation, VO₂max is regarded as the gold standard for evaluating an individual's level of aerobic fitness. The higher the VO₂max value of futsal players, the more oxygen the body can use for metabolism and ensure sufficient stamina and stamina when competing.

A good endurance is characterized by the highest volume of oxygen and is the maximum reaction to oxygen consumption. (Pratama & Bafirman, 2020) ^[16]. Has a good VO₂max capacity, must be owned by futsal players to support a desired achievement. A good VO₂max helps support athlete performance (Teatro C *et al.*, 2017) ^[19]. Futsal players must exhibit optimal aerobic conditions to be able to tolerate the high intensity physiological demands presented both in training and in competition. To be able to handle the high intensity demands on one's body presented during both training and competition, futsal players must have ideal aerobic conditions, maximum oxygen consumption rate (VO₂max) has been linked to more sprints, longer distances traveled, more involvement with the ball, less weariness, and less cardiovascular stress while playing. (Matzenbacher *et al.*, 2014) ^[13].

From the results of observations made by the researchers, it was confirmed by tests and measurements to determine the player's VO₂max ability using a multistage fitness test. The measurement test that was followed by 14 players from the Pratama family jambi futsal team, the results of the VO₂max test were 2 players in the moderate category, 12 players in less category. The gold standard for determining fitness level is considered to be direct measurement of VO₂max. (Peric & Nikolovski, 2017) ^[18]. Before establishing a training program for athletes, trainers must first understand the athlete's endurance profile. (Nilsson & Cardinale, 2018) ^[15]. The researcher came to the conclusion that an exercise program was required to raise the player's VO₂max based on the findings of the tests and measurements that were done. Researchers also interviewed the head coach, So far, the only exercises that are often done are techniques and games. Exercise that leads to physical exercise, especially endurance training is still lacking, to increase VO₂max, players need to be given an appropriate and appropriate training program so that the preparations are carried out well. One of the training programs that the researchers implemented was high intensity interval training and Fartlek to get the players in good physical condition.

Fartlek is a type of endurance training intended to improve, maintain, and help one stay in top physical shape for a variety of sports, especially ones that need endurance. (Pratama & Kushartanti, 2018) ^[17]. The goal of fartlek training is to run more than usual so that we can determine the best running pace for each athlete's preferences and skills. (Pratama & Kushartanti, 2018) ^[17]. High intensity interval training is regarded as the best kind of exercise for athletes to improve their cardiovascular and metabolic health. (Buchheit & Laursen, 2013) ^[12].

2. Materials and Methods

2.1 Participants

One group pretest-posttest is the research design chosen because it is an experimental study. In this model a pre-test was carried out before treatment, so that the results of the treatment can be more clearly seen and compared with the results before treatment. The sample of this research is 14 pratama family team players. The study was conducted one month and a half and consisted of 18 lessons. Three meetings per week are held. The multistage fitness test was the tool employed in this investigation. Statistical analysis of variance (ANNOVA) methods were used to analyze the data (SPSS25).

2.2 Procedure

Before starting measurement, athletes warm up. The Multi Stage Fitness Test was the research tool employed in the

study, and it was used to track the growth of the athlete's maximal oxygen volume (VO₂max). The test consists of continuous running between two lines at a distance of 20 meters, where is heard "bleep" previously recorded, candidates are asked to try to run to the other end to match "bleep", every time a "bleep" is heard the candidate must reach one end of the runway. If the competitor fails to reach the 20-meter distance before the bleep sounds, he will be warned and must keep running until he reaches the limit, while increasing its speed so as not to be late for the next bleep. If a candidate fails twice in a row, he is considered eliminated from the test, the final score it achieves becomes the score for the test. Treatment lasts for one and a half months and entails 18 sessions, three of which are held each week. This test is used to evaluate how well fartlek exercises and high-intensity interval training (HIIT) raise VO₂max. Participants warmed up as an opening activity and finished each of the 18 treatment sessions with a cool-down exercise.

3. Results & Discussion

The results of the VO₂max score of 14 players are as follows:

Tabel 1: Data description

	N	Min	Max	Mean	Std. Deviation
Pretest VO ₂ max	14	41.1	50.2	45.64	2.23
Posttest VO ₂ max	14	44.5	52.8	49.77	2.14

The author employs a sample of 14 participants to produce descriptive statistics that describe the study's findings. gives a VO₂max ability initial test result with a mean of 45.64 and a standard deviation of 2.23, a minimum score of 41.1 and a highest score of 50.2, and a range of 41.1 to 50.2. The average VO₂max score for the final examination is 49.77 with a standard deviation of 2.14. with a minimum score of 44.5 and a maximum score of 52.8.

Before testing the research hypothesis, premise test. that is, normality and homogeneity tests were carried out. Table 2 displays the normality test findings, while Table 3 displays the homogeneity test results. In this study normality was tested by looking at the sig value using the Shapiro-Wilk test, with decision making > 0.05 is considered normal. The normalcy test's findings are as follows:

Tabel 2: Normality test

	Shapiro-Wilk			
	Statistic	Df	Sig.	Kesimpulan
Pretest VO ₂ max	0,967	14	0,841	Normal
Posttest VO ₂ max	0,940	14	0,422	Normal

Levene's test was used in this study to determine whether decision-making was homogeneous. Decision-making with a sig value > 0.05 is regarded as homogeneous. The homogeneity test's findings are as follows:

Tabel 3: Homogeneity test

	Levene statistics	df1	df2	Sig
VO ₂ max	0.054	1	26	0.818

The paired t-test was employed by researchers to assess their hypotheses. The findings of the study are shown in the fourth table below:

Tabel 4: Hypothesis Test

	Df	t-table	Sig
Pretest-Posttest VO ₂ max	13	- 14.464	0.000

As seen in the above table, high-intensity interval training and fartlek training have an impact on the VO₂max of pratama family futsal players. With a significant result of 0.000; 0.05, this t-test validation rejects hypothesis H₀ and accepts hypothesis H₁. The amount of the increase in VO₂max from fartlek and high-intensity interval training was then calculated in this study using the percentage increase. The analysis' findings are shown in table 5 below:

Tabel 5: Effectiveness test results

Variable	Pretest	Posttest	Difference	Percentage Increase
VO ₂ max	45.64	49.77	4,13	61,9%

According to the study in the table, fartlek and high-intensity interval training raised VO₂max by 61.9%.

This study looked at the effect of high-intensity interval training on VO₂max in the Jambi Pratama family futsal players. The findings of the study's statistical analysis of the variable VO₂max level of fartlek and high-intensity interval training. As many as 14 athletes who were sampled obtained a minimum pretest value = 41.1 and a posttest value = 50.2, maximum pretest value = 44.5 and post-test = 52.8. Mean (average) pretest = 45.64 and posttest = 49.77. Then the pretest standard deviation = 2.23, and the posttest standard deviation = 2.14. Based on the data, it is then tested by testing the hypothesis where the validation produces a significant value of 0.000 < 0.05, then the H₀ hypothesis is rejected and the H₁ hypothesis is accepted. Then do the effectiveness test, and the results showed that high-intensity interval training and fartlek training increased VO₂max by 61.9%.

These outcomes are consistent with those discovered (Festiawan *et al.*, 2020) [8], that after doing high-intensity interval training and the fartlek method, a person can achieve a better VO₂Max and exercise longer. Therefore, the fartlek look at and high-intensity interval training are both effective for raising VO₂max. According to this perspective, futsal players need to develop their technical skills, strategies, and physical fitness in order to have good physical abilities. (Fathoni & Rachman, 2020) [7]. Therefore, Today's futsal coaches and players can use fartlek and high intensity interval training as a guide. In order to get better and more meaningful results to raise the VO₂max of futsal athletes, bigger samples can be employed in future research instead of varied exercises.

4. Conclusions

On the basis of the six-week study's findings, it can be said that the Fartlek training method and high-intensity interval training significantly affect the VO₂Max level of Jambi Pratama Family futsal players. This study shows an increase in VO₂max of 61.9% in futsal players. In order for research in the same subject to advance, it is anticipated that this study will serve as a source of reference for other researchers.

5. References

1. Ayarra R, Nakamura FY, Iturricastillo A, Castillo D, Yanci J. Differences in physical performance according to the competitive level in futsal players. *Journal of Human Kinetics*. 2018;64:275. <https://doi.org/10.1515/hukin-2017-0201>.
2. Buchheit M, Laursen PB. High-intensity interval training, solutions to the programming puzzle. *Sports Medicine*. 2013;43:927-954. <https://doi.org/10.1007/s40279-013-0066-5>.
3. Borges L, Dermargos A, Gorjão R, Cury-Boaventura MF,

- Hirabara SM, Abad CC, *et al.* Updating futsal physiology, immune system, and performance. *Research in Sports Medicine*. 2022;30(6):659-676. <https://doi.org/10.1080/15438627.2021.1929221>.
4. Dal Pupo J, Detanico D, Arins FB, Nascimento Salvador PC, Guglielmo LGA, dos Santos SG. Capacidade de sprints repetidos e níveis de potência muscular em jogadores de futsal das categorias sub-15 e sub-17. *Revista Brasileira de Ciências do Esporte*. 2017;39:73-78. <https://doi.org/10.1016/j.rbce.2016.01.010>.
5. De Oliveira RS, Borin JP, Fernandes PT, Uchida MC, Borges T de O. Description of 18 weeks integrated training on the displacement speed in Brazilian futsal players. *Revista Brasileira de Ciências Do Esporte*. 2019;41:308-313. <https://doi.org/10.1016/j.rbce.2018.06.001>.
6. Dogramaci S, Watsford M, Murphy A. Activity profile differences between sub-elite futsal teams. *International Journal of Exercise Science*. 2015;8(2):2.
7. Fathoni A, Rachman HA. Effect of Sprint Training Exercise, Shuttle Run and Prevention on Base Softball Running Speed Among High School Students. *Acta Facultatis Educationis Physicae Universitatis Comenianae*. 2020;60(1):32-43. <https://doi.org/10.2478/afepuc-2020-0003>.
8. Festiawan R, Suhajana S, Priyambada G, Febrianta Y. High-intensity interval training dan fartlek training: Pengaruhnya terhadap tingkat VO₂ Max. *Jurnal keolahragaan*. 2020;8(1):9-20. <https://dx.doi.org/10.21831/jk.vil.31076>.
9. Iedynak G, Galamandjuk L, Koryahin V, Blavt O, Mazur V, Mysiv V, *et al.* Locomotor activities of professional futsal players during competitions. *Journal of Physical Education and Sport*. 2019;19:813-818. <https://doi.org/10.7752/jpes.2019.s3116>.
10. Iedynak G, Marzec A, Koryahin V, Galamandjuk L, Blavt O, Yurchyshyn Y, *et al.* Analysis of the energy expenditures by Ukrainian professional futsal players during the preparation and participation in competitions. *Journal of Physical Education and Sport*. 2019;19(2):1139-1144. <https://doi.org/10.7752/jpes.2019.02165>.
11. Korobeynikov G, Korobeynikova L, Bulatova M, Mishko V, Cretu MF, Yarmak O, *et al.* Relationship of successful formation of choreographic skills in young athletes with psychophysiological characteristics. *Journal of Physical Education & Sport*. 2020;20(2):915-920. <https://doi.org/10.7752/jpes.2020.02130>.
12. Lundby C, Montero D, Joyner M. Biology of VO₂max: looking under the physiology lamp. *Acta Physiologica*. 2017;220(2):218-228. <https://doi.org/10.1111/apha.12827>.
13. Matzenbacher F, Pasquarelli BN, Rabelo FN, Stanganelli LCR. Demanda fisiológica no futsal competitivo. Características físicas e fisiológicas de atletas profissionais. *Revista Andaluza de Medicina del Deporte*. 2014;7(3):122-131. [https://doi.org/10.1016/S1888-7546\(14\)70074-7](https://doi.org/10.1016/S1888-7546(14)70074-7).
14. Naser N, Ali A, Macadam P. Physical and physiological demands of futsal. *Journal of Exercise Science & Fitness*. 2017;15(2):76-80. <https://doi.org/10.1016/j.jesf.2017.09.001>.
15. Nilsson J, Cardinale D. Aerobic and anaerobic test performance among elite male football players in different team positions. *LASE Journal of Sport Science*.

- 2015;6(2):73-92. <https://doi.org/10.1515/ljss-2016-0007>.
16. Pratama R, Bafirman B. Pengaruh Circuit Training Terhadap Volume oksigen maximal (VO₂MAX) Atlet Sepak Bola Rajawali Tanjung Jati Kabupaten Lima Puluh Kota. *Jurnal Stamina*. 2020;3(5):240-254.
17. Pratama L, Kushartanti W. The effects of circuit and fartlek exercise method and peak expiratory flow on Vo₂max. In: 2nd Yogyakarta International Seminar on Health, Physical Education, and Sport Science (YISHPESS 2018) and 1st Conference on Interdisciplinary Approach in Sports (CoIS 2018). Atlantis Press; c2018. p. 310-315. <https://doi.org/10.2991/yishpess-cois-18.2018.77>.
18. Peric R, Nikolovski Z. Validation of four indirect VO₂max laboratory prediction tests in the case of soccer players. *Journal of Physical Education and Sport*. 2017;17(2):608-613. <https://doi.org/10.7752/jpes.2017.02092>.
19. Teatro C, Thompson M, Kulinna PH, Mars HVD, Kwan J. Coaching behaviors and stakeholders' views of coaches' efficacy. *International Journal of Sports Science & Coaching*. 2017;12(4):452-460 <https://doi.org/10.1177/1747954117718094>.