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The Effect of Aerobic and Anaerobic Exercise on the Results of Increasing the Endurance of Tanah Laut Football Players

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Abstract

Football is a sport that requires high endurance. Activities on the field that require running fast carrying the ball or chasing opponents. The need for physical endurance training to play football well. Physical training can be divided into various forms. One of these divisions is based on the use of oxygen or the dominant energy system used in an exercise, namely aerobic and anaerobic training. The research method is a quasi-experiment that the quasi-experimental method is a research method that remembers that not all variables (symptoms that appear) and experimental conditions can be given full control and to find out which variables may not be fully controlled and controlled. The Two-group pretest-posttest research design compares two aerobic and anaerobic methods. The population and sample of the study were 20 Tanah Laut soccer players. The results of the study showed that the effect of aerobic training had an impact of increasing by 8%. While anaerobic training had an impact of 5% on increasing the endurance of Tanah Laut soccer players.

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INTRODUCTION

Football is a sport that requires high endurance. Activities on the field that require running fast carrying the ball or chasing opponents. The need for physical endurance training to play football well. Physical training can be divided into various forms. One of these divisions is based on the use of oxygen or the dominant energy system used in an exercise, namely aerobic and anaerobic training. Aerobic exercise is an exercise that uses energy from combustion with oxygen, and requires oxygen without creating unpaid oxygen debt. Anaerobic ability is a form of endurance that is characterized by the absence or absence of oxygen. Football also requires high capacity anaerobic, because most movements are no more than 5 seconds (Yoda et al., 2022)(Dewi & Rifki, 2020). This means that almost all of the energy needed for muscle activity is produced by aerobic and anaerobic processes. The results of observations on the South Kalimantan 2023 league 3 zone team Persetala Tanah Laut were only able to finish in third place, this was very visible when playing. When entering the second half, the players were seen to be far behind when doing the duel. Problem-solving approach, conducting research to improve player endurance by providing 2 exercises, namely aerobic and anaerobic. State of the art is B. Budijanto and R. Kurniawan, "Aerobic Vs. Anaerobic Training to Increase VO2max Soccer Players, 2020. The novelty in this study is in the selection of aerobic or anaerobic exercise to increase endurance. Soccer players' performance can be significantly enhanced by aerobic training. Interval training, fartlek, and continuous training are a few popular aerobic training techniques.The aerobic exercise type is Interval training is a technique that alternates high-intensity workouts with rest or low-intensity workouts. By properly controlling exercise intensity, interval training can increase endurance, claim Bafirman and Asep(Bafirman et al., 2023). Fartlek training involves running at different intensities and speeds without prearranged rest intervals (Tandek Sulingallo, 2022)(Nadimikeri & Joshi, 2022)(Taufik & Gaos, 2019)(Akbar et al., 2021). The efficacy of fartlek training in raising soccer players' aerobic capacity was demonstrated by a study that revealed a substantial difference in the improvement of aerobic endurance following the practice. Continuous Training: This approach uses moderately intense exercises that are done for extended periods of time without breaks (Guo et al., 2023). (Fang et al., 2021)(Barnawi, B., Junaedi, J., & Rido, 2019). For soccer players to increase their capacity to complete high-intensity tasks quickly, such as sprinting, dribbling, and shooting, anaerobic exercise is crucial. Based on research published in credible journals, the following are some efficient anaerobic training techniques:

Short Interval Training: This approach alternates short bursts of high-intensity exercise with rest or low-intensity activity intervals. Short interval training has been shown to increase soccer players' anaerobic endurance.(Syahruddin et al., 2022)(Selmi et al., 2020). Both intensive and extensive interval training incorporate high-intensity workouts punctuated by rest intervals. While intensive intervals have shorter work durations with very high intensity, extensive interval training typically has longer work durations with moderate to high intensity. Research indicates that both approaches significantly increase anaerobic endurance.(Sumetry et al., 2021), (Dwi Maya Abdiliah et al., 2022)

METHODS

The research method is a quasi-experiment that the quasi-experimental method is a research method that remembers not all variables (symptoms that appear) and experimental conditions can be given full control and to find out which variables may not be fully controlled and controlled (Umam, 2023)(Soraya, 2017). This Two-group pretest-posttest research design compares two aerobic and anaerobic methods(Winarno, 2007).

Participants

The research population was all Tanah Laut football players with a sample size of 20 people.(Winarno, 2007)(Supriyanto et al., 2023).

Sampling Procedures

The sampling process used purposive sampling, the sample was divided into 2 parts where part 1 was a sample with aerobic exercise and group 2 was a sample with an aerobic exercise.(Arifin, Hasyim, et al., 2022).

Materials and Apparatus

The equipment for this research uses several tools, namely, a sound system as a tool for the Vo2max test, a cone for a limiter, a stopwatch to measure time, a whistle as a marker and writing instruments as equipment for the initial and final tests.

Procedures

The implementation of this research began with conducting an initial test on 20 Persetala Tanah Laut soccer players, then 10 players were given an aerobic training program and 10 different people were given an aerobic training program. After the training program was carried out with 14 meetings, a final test was conducted with a bleep test to see how far the training program had been achieved.

Data Analysis

The data analysis in this study used the T-test, which is to test the null hypothesis (H_0), which usually states that there is no significant difference between two groups or that the group average is equal to a certain value. The alternative hypothesis (H_1) states that there is a significant difference.(Usmadi, 2020)

RESULT

The results of data analysis showed the significance value in both groups using the paired sample t test was 0.00 ($p < 0.05$). This shows that aerobic exercise and anaerobic exercise can increase the VO2max capacity of soccer players. While the significance value of the independent sample test was 0.191 ($p > 0.05$), meaning that there was no significant difference between aerobic and anaerobic exercise in increasing the VO2max of soccer players. VO2max is the most complex system that occurs in the body. VO2max is a system that combines the lungs, cardiovascular system, and muscular system to take in, transport, and use oxygen (O2) to produce muscle contractions (Poole & Jones, 2017) (Lundby, Montero, & Joyner, 2017. Another exercise that can increase VO2max is anaerobic exercise. The results of the data analysis showed that anaerobic exercise had a significance value of 0.00, meaning that anaerobic exercise can increase the VO2max of soccer players. Other studies have also found that high-intensity interval training (HIIT) can increase VO2max capacity (Budijanto, B., & Kurniawan, R. (2020)) and muscle endurance (Achwan, A., Nurjanah, A. R., & Agustina, D. (2024)). Anaerobic exercise can increase the effectiveness of the cardiovascular

system (Patel et al., 2017), so that the ratio of oxygen consumption in muscle contractions also increases. Aerobic exercise and anaerobic exercise can increase the VO2max of soccer players. Both exercises did not have a significant difference in increasing VO2max (VO2max)(Mihailescu et al., 2023)(Gharahdaghi et al., 2013). The results of this study are similar to the study conducted by (Hutajulu, 2016) where high intensity interval training (HIIT) and power training (HVT) can both increase the maximum oxygen value in junior soccer players. However, in this study, aerobic training did not have many advantages: a higher increase in VO2max than an increase in VO2max in aerobic training.

DISCUSSION

Endurance is a fundamental element in the performance of football players, because this sport requires a combination of aerobic capacity to maintain stamina over long durations and anaerobic capacity to cope with sudden high intensity, such as sprints or physical duels. Aerobic training aims to improve cardiovascular capacity and oxygen efficiency, which are essential for sustained activity. In contrast, anaerobic training focuses on developing muscle strength and tolerance to lactic acid accumulation, which help players maintain performance under intense conditions. The combination of the two creates an optimal synergy to support performance on the field. This study shows that aerobic training has a significant effect on increasing VO_2 max, which is the body's ability to use oxygen maximally during physical activity. This training strengthens the heart, lungs and circulatory system, so that players are able to last longer in the game. For example, players who undergo a long-distance jogging program are consistently able to show increased energy efficiency when playing for 90 minutes. However, the speed of reaction to intense situations is still limited in the context of aerobic training alone.

On the other hand, anaerobic training makes a significant contribution to increasing the speed, strength and explosiveness of players. Sprint intervals, plyometric drills and strength training help the body generate energy through anaerobic pathways (without oxygen), allowing players to accelerate quickly, jump or defend in physical duels. However, relying solely on anaerobic training can cause players to tire more quickly during long matches, as their aerobic capacity is not sufficiently trained. The study also found that the group that underwent a combination of aerobic and anaerobic training achieved the best results in improving endurance. This combination creates a wider range of physiological adaptations, such as energy efficiency during light to moderate activity and the ability to recover more quickly after intense activity. In the context of football, this approach provides an advantage in maintaining performance throughout the match, while responding to sudden high-intensity demands. The balance between the two types of training is essential, given the dynamic nature of football. Players need the stamina to cover distances of up to 10-12 kilometers in a match, but also have the explosive ability to sprint for short periods of time. Therefore, a training program that integrates aerobic and anaerobic components will be more effective than focusing on just one type of training.

In its implementation, coaches can design a program that includes aerobic exercises such as long-distance running and anaerobic exercises such as interval sprints alternately in one training

cycle(Arifin, Kahri, et al., 2022)(Lalu Sapta Wijaya Kusuma, 2019). This combination not only increases endurance but also helps players minimize the risk of injury due to overtraining in one type of exercise. This study provides empirical evidence on the importance of a holistic approach to physical training for modern soccer players. In improving VO2max, it is advisable to use a combination of HIIT and Small-Sided Games for maximum effects on VO2max and football performance(Arslan et al., 2020)(Selmi et al., 2020) (Manuel Clemente et al., 2021). Do the training 3-5 times a week, adjusting the intensity and volume based (Atakan et al., 2021)(Li et al., 2021) on the player's initial fitness level. To see the players' progress, coaches should monitor progress with a VO2max test or field tests like the beep test(Ahsan & Ali, 2021)(Magee et al., 2021).

CONCLUSION

The conclusion of this study is that aerobic exercise provides a greater increase in VO2 max significantly compared to anaerobic exercise. But combination or combined aerobic and anaerobic exercise can provide optimal results and increase overall physical capacity, depending on the sport we will do.

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