COMPETITOR:
JURNAL PENDIDIKAN KEPELATIHAN OLAHRAGA
e-ISSN: 2657-0734 & p-ISSN: 2085-5389 ‖ Volume 17, Number 1, 2025 ‖ P.248-255
DOI: 10.26858/cjpko.v17i1.70868

The Effect of Aerobic Activity on Blood Sugar In BKMF Volleyball FIKK UNM Athletes

Wahyudin[1A-E*], Muslim Bin Ilyas[2B-D], Atssam Mappanyukki[3B-D]

[1,3] Health Administration Study Program, Faculty of Sports and Health Sciences, Makassar State University, Makassar City, South Sulawesi, Indonesia
[2] Health Physical Education and Recreation Study Program, Makassar State University, Makassar City, South Sulawesi, Indonesia

wahyuddin@unm.ac.id[1], muslim.bin.ilyas@unm.ac.id[2], atssam.mappanyukki@unm.ac.id[3]

ABSTRACT

This study aims to analyze the effect of aerobic activity on the increase in blood sugar in BKMF Volleyball FIKK UNM athletes. The research method uses a statistical test with the application of SPSS 21. The research sample consisted of 20 athletes whose blood sugar levels were tested before and after doing aerobic activities. The results of the analysis showed that the average blood sugar level before aerobic activity (pre-test) was 93.1500, while after aerobic activity (post-test) decreased to 82.8500. Statistical tests showed a significance value (sig. 2-tailed) of 0.000 ($p<0.05$), which indicated a significant difference between blood sugar levels before and after aerobic activity. The average difference in blood sugar levels between the initial test and the final test was 10.3, which showed the influence of aerobic activity on the decrease in blood sugar levels in BKMF Volleyball FIKK UNM athletes. Thus, it can be concluded that aerobic activity contributes to lowering blood sugar levels in volleyball athletes.

ARTICLE HISTORY
Received: 2025/02/12
Accepted: 2025/02/24
Published: 2025/02/28

KEYWORDS
Aerobic activity;
Blood sugar;
Volleyball.

AUTHORS' CONTRIBUTION
A. Conception and design of the study;
B. Acquisition of data;
C. Analysis and interpretation of data;
D. Manuscript preparation;
E. Obtaining funding

Cites this Article : Wahyudin, Wahyudin; Ilyas, Muslim Bin; Mappanyukki, Atssam. (2025). The Effect of Aerobic Activity on Blood Sugar In BKMF Volleyball FIKK UNM Athletes. **Competitor: Jurnal Pendidikan Kepelatihan Olahraga**. 17 (1), p.248-255

INTRODUCTION

Exercise has an important role in improving the health and fitness of the body (Lengkana & Muhtar, 2021). Regular physical activity can help maintain the body's metabolic balance, increase endurance, and prevent various metabolic diseases, including impaired blood sugar levels (Hardjanti, 2011). In the world of sports, one form of exercise that is widely used to improve fitness is aerobic exercise. Aerobic exercise is a type of exercise that involves moderate to high-intensity physical activity for a certain duration, thereby increasing oxygen consumption and supporting the function of the cardiovascular system (Personal, 2015). Aerobic exercise not only improves physical fitness but also has an impact on the body's metabolic regulation, including blood glucose

Wahyudin[1A-E*], Muslim Bin Ilyas[2B-D], Atssam Mappanyukki[3B-D]
wahyuddin@unm.ac.id[1*]

metabolism. Aerobic activity can increase insulin sensitivity and accelerate the process of glucose metabolism, which has an impact on the stability of blood sugar levels (APRILIANTO, n.d.).

Blood sugar has a crucial role in maintaining the body's energy balance, especially for athletes who need optimal endurance and strength in every game. Good blood sugar regulation can improve athletes' performance, prevent premature fatigue, and accelerate muscle recovery after training or competing (Siagian et al., 2024). Therefore, monitoring blood sugar levels is an important aspect of coaching athletes, including volleyball athletes. Volleyball is one of the sports that requires a combination of strength, speed, and endurance (Sukron Abdi, 2024). Volleyball athletes need enough energy to perform a variety of explosive moves, such as jumps, smashes, and quick reactions in matches. With programmed aerobic activities, it is hoped that there will be an increase in fitness that contributes to the optimization of energy metabolism and the balance of blood sugar levels. Therefore, this study aims to analyze the effect of aerobic activity on the increase in blood sugar in BKMF FIKK UNM Volleyball athletes, so that it can provide insight into the development of more effective training programs for athletes.

In addition, aerobic exercise that is done regularly can help improve muscle endurance and heart work efficiency. With increased aerobic capacity, athletes can reduce the risk of fatigue and maintain peak performance during the event (Mubarok & Kharisma, 2021). This is an important aspect of training strategies, especially in sports that require dynamic movements and quick reactions such as volleyball. A controlled increase in blood sugar can also contribute to faster recovery after exercise. After an intensive training session, the body needs time to recover energy levels, and in this case, good blood sugar regulation can speed up the muscle recovery process and reduce the risk of injury (Hardjanti, 2011). Therefore, further understanding of the relationship between aerobic activity and blood sugar is urgently needed in the context of athlete training.

In addition to physiological aspects, psychological aspects are also important factors in athlete performance. Aerobic activity is known to increase the production of endorphins which play a role in reducing stress and improving mental focus. Athletes who have a good mental balance will be better prepared to face the pressure of the match and improve their performance on the court (Akbar et al., 2024).

Furthermore, this research is expected to contribute to the development of more effective and science-based training methods for volleyball athletes. With an evidence-based approach, coaches can design optimal training programs to improve athletes' physical fitness and metabolism, so they can achieve their best performance. By understanding the relationship between aerobic activity and increased blood sugar, it is hoped that the results of this study can be a reference for the development of more effective and scientifically based training strategies in the coaching of volleyball athletes. This will not only improve the quality of athletes but also help in creating a more efficient and directed training pattern for other sports.

Wahyudin[1A-E*], Muslim Bin Ilyas[2B-D], Atssam Mappanyukki[3B-D]
wahyuddin@unm.ac.id[1*]

METHODS

This study uses an experimental method with a quantitative approach to analyze the effect of aerobic activity on increasing blood sugar levels in BKMF Volleyball FIKK UNM athletes. The population in this study is volleyball athletes from BKMF FIKK UNM, with a sample of 20 people who were selected by purposive sampling based on certain criteria, such as fitness level and training experience. The design of this study involves measuring blood sugar levels before and after performing structured aerobic exercise (Mulyana et al., 2024). The aerobic exercise implemented consists of a warm-up session, core exercises in the form of a combination of interval running and other cardio exercises, and cooling down. Blood sugar level measurement is carried out using a digital glucometer to ensure data accuracy.

Data analysis was carried out by comparative statistical tests to determine the significant difference between blood sugar levels before and after exercise. The results of this study are expected to provide a clearer picture of the impact of aerobic exercise on glucose metabolism in the body of volleyball athletes. In addition, the study also considered other factors that can affect blood sugar levels, such as athletes' diet and hydration levels. Therefore, before taking measurements, the athletes were instructed to maintain the same diet for a certain period so that the results of the study were more valid and reliable.

With a systematic and controlled methodology, this research is expected to contribute to the development of a more effective science-based training program for volleyball athletes. The findings of this study can be used as recommendation material for coaches and athletes in developing more optimal training strategies and oriented towards improving sports performance.

RESULTS AND DISCUSSION

Result

To get an overview of the data of a study, descriptive data analysis was used on the effect of aerobic activity data on the increase in blood sugar in BKMF Volleyball FIKK UNM athletes. This is intended to give meaning to the results of the analysis that has been carried out. The results of the descriptive analysis of the data can be seen in the following table:

Table 1.
The results of the descriptive analysis of data on the effect of aerobic activity on the increase of blood sugar in BKMF Volleyball FIKK UNM athletes

Variable	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
Initial test of BKMF Volleyball FIKK UNM athletes.	20	28.00	82.00	110.00	1863.00	93.1500	8.30520	68.976
The final test of BKMF Volleyball FIKK UNM athletes.	20	27.00	74.00	101.00	1657.00	82.8500	7.46412	55.713

The table above is a descriptive description of the variables The results of the descriptive analysis of the data The effect of aerobic activity on the increase in blood sugar in BKMF Volleyball FIKK UNM athletes. The conclusion of the results in the table above for more details is described as follows:

1. Based on the data from the results of the research on the effect of the initial blood sugar test on BKMF Volleyball FIKK UNM athletes, a value of N 20, Renge 28.00, a minimum value of 82.00, a maximum of 110.00, a sum of 1863.00 mean/average value of 93.1500, std. The deviation/deviation (s) is 8.30520 and the variance is 68.976.
2. Based on the data from the results of the research on the effect of the final blood sugar test on BKMF Volleyball athletes FIKK UNM., a value of N 20, Renge 27.00, a minimum value of 74.00, a maximum of 101.00, a sum of 1657.00 mean/an average value of 82.8500, std. The deviation/deviation (s) is 7.46412 and the variance is 55.713.

One of the assumptions that must be met for parametric tests to be used in research is that the data must follow the normal distribution, so a data normality test is carried out. Data normality testing can be carried out to find out whether the data obtained in the research results is in a normal distribution. Data normality testing can be done with the Kolmogorov-Smirnov test. The criteria for stating whether the data from the sample used are normally distributed or not can be done by comparing the Sig coefficients. Or a P value of 0.05 (Significant level). If the P value is greater than 0.05 (significance level),. On the other hand, if the P-value is less than 0.05, it means that the data comes from an abnormally distributed population.

Table 2.
Results of Normality Testing Data The Effect of Aerobic Activity on the Increase in Blood Sugar in BKMF Volleyball FIKK UNM Athletes

Variable	Absolute	Positive	Negative	KS-Z	Asymp.Sig	Information
Initial test of BKMF Volleyball FIKK UNM athletes.	0.202	0.202	-0.113	0.904	0.387	Normal
The final test of BKMF Volleyball FIKK UNM athletes.	0.249	0.249	-0.129	1.112	0.168	Normal

Based on the table of data normality test results using the Kolmogorov Smirnov Test above, the results for each variable can be known as follows:

1. Data from the normality test results of the initial blood sugar test variable in BKMF Volleyball FIKK UNM athletes above obtained absolute values of 0.202, positive 0.202, negative -0.113, Kolmogorov-Smirnov 0.904, *Asymptot. Sig* 0.387 (P>0.05), then it can be said that the data follows the normal distribution or is distributed because the KS-Z value obtained is greater than 0.05 (significant level) which is 0.904>0.05 and the Asymp sig value of 0.387 means that the data from the initial blood sugar test variable in BKMF FIKK UNM Volleyball athletes is normally distributed.
2. Data from the results of the normality test of the final blood sugar test variable in the BKMF Volleyball FIKK UNM athletes above obtained absolute values of

Wahyudin[1A-E*], Muslim Bin Ilyas[2B-D], Atssam Mappanyukki[3B-D]
wahyuddin@unm.ac.id[1*]

0.249, positive 0.249, negative -0.129, Kolmogorov-Smirnov 1.112, *Asymptot. Sig* 0.168 (P>0.05), then it can be said that the data follows the normal distribution or is distributed because the KS-Z value obtained is greater than 0.05 (significant level) which is 1,112>0.05 and the Asymp sig value of 0.168 means that the data from the final blood sugar test variable in BKMF FIKK UNM Volleyball athletes is normally distributed.

In the hypothesis test, the test used is Regression analysis is carried out to determine the influence of each independent variable with bound va. The regression analysis used was the T-test, at a significant level of 95% or α 0.05. This is intended to find out the effect of aerobic activity on the increase in blood sugar in BKMF FIKK UNM Volleyball athletes. The results of statistical calculations on the research hypothesis can be described as follows.

Table 3.
Results of hypothesis test The effect of aerobic activity on the increase in blood sugar in BKMF Volleyball FIKK UNM athletes

Variable	N	Mean	Mr.
Initial test of BKMF Volleyball FIKK UNM athletes.	20	93.1500	0.000
The final test of BKMF Volleyball FIKK UNM athletes.	20	82.8500	0.000
Difference	20	10.3	0.000

Based on Table 4.4 above, it can be seen that the results of the T-Test are as follows:

1. From the initial test data of the increase in blood sugar in BKMF Volleyball FIKK UNM athletes.above N (sample) 20 people, Mean 93.1500, and sig. (2 tailed) 0.000 (p<0.05). This means that the initial test data is distributed.
2. From the final test data of the increase in blood sugar in BKMF FIKK UNM volleyball athletes.above N (sample) 20 people, Mean 82.8500, and sig. (2 tailed) 0.000 (p<0.05). This means the final test data is distributed.

From this data, it can be seen that there are initial and final tests for blood sugar increase in BKMF FIKK UNM volleyball athletes. Above the title The effect of aerobic activity on blood sugar increase in BKMF FIKK UNM volleyball athletes obtained a difference or difference of 10.3 in other words, there is an increase in the effect of blood sugar increase in BKMF FIKK UNM volleyball athletes.

Discussion

In this study, the variables used are the effect of aerobic activity on the increase in blood sugar in BKMF FIKK UNM Volleyball athletes, by involving 20 samples who are BKMF FIKK UNM Volleyball athletes. With a weight criterion of 50-65 kg the research process, namely measuring blood sugar by giving a jogging treatment for 12 minutes then re-testing the athletes' blood sugar with several people who are the appropriate assessment team with the test blanks provided and guided by the researcher and assisted by the recorder and stopwatch holder.

Wahyudin[1A-E*], Muslim Bin Ilyas[2B-D], Atssam Mappanyukki[3B-D]
wahyuddin@unm.ac.id[1*]

The results of the data analysis tested at SPSS 21 with the title "The effect of aerobic activity on the increase of blood sugar in BKMF FIKK UNM Volleyball athletes", From the test data carried out in the SPSS application looking for the effect of aerobic activity on the increase in blood sugar in BKMF FIKK UNM Volleyball athletes obtained the calculation on the above data, namely the initial test data for the increase in blood sugar in BKMF FIKK UNM Volleyball athletes. Mean 93.1500, and the value of sig. (2 tailed) 0.000 ($p<0.05$), the final test data of the increase in blood sugar in BKMF Volleyball FIKK UNM athletes.above N (sample) 20 people, Mean 82.8500, and sig. (2 tailed) 0.000 ($p<0.05$), and from the initial and final tests of blood sugar increase in BKMF Volleyball FIKK UNM athletes. Above obtained a difference or difference of 10.3 in other words, there is an increase in the effect of increasing blood sugar in BKMF Volleyball FIKK UNM athletes.

Physical activity contained in sports activities will consist of a combination of two types of activities, namely aerobic activities and anaerobic activities, but the portions of the two systems are different in each sport (Isa & others, 2010). In sports that require high-intensity physical activity and a relatively short time, such as running a 100 m sprint, the predominant energy system is anaerobic. For sports that require physical activity with moderate intensity and last relatively long, for example, aerobic gymnastics, the predominant system is aerobics. The energy formed from aerobic and anaerobic metabolism in the cell is a continuous process of energy formation for physical activity that is also continuous. Energy is generally defined as the ability to do work (Mubarok & Kharisma, 2022).

Regular physical activity has a significant protective effect against the possibility of contracting several diseases. A lifestyle without physical activity that is less well known, on the contrary, is at risk of these things occurring. Physical activity is seen epidemiologically which shows that physical activity is very beneficial for health (Alkhurilina & others, 2017). The more intense the physical activity, the more blood sugar is produced during activity, blood sugar itself is used by the liver, heart, and kidneys as a source of energy. The liver converts blood sugar into glucose, which is then released into the bloodstream for use by the muscles. The benefits that are influenced by the benefits of doing physical activity, the activities we do will also have a positive impact on the body.

Aerobic exercise is an activity that depends on the availability of oxygen to help the process of burning energy sources, so it also depends on the optimal work of the body's organs, such as the heart, lungs, and blood vessels to transport oxygen so that the process of burning energy sources can run perfectly. (Bompa & Buzzichelli, 2019) Aerobic exercise is a low-to-moderate intensity sports activity that is carried out continuously, such as: walking, running, cycling and jogging while anaerobic exercise is a high-intensity activity that requires energy quickly in a short time, but cannot be done continuously for a long duration. Before planning to do aerobic exercise, it is necessary to pay attention to the criteria related to the exercise dose.

Blood sugar is the main fuel for the body's tissues which are ultimately used to form ATP. Although many body cells use fat as a source of energy, nerves and red blood cells need it. This assumption is clarified by (Akbar et al., 2024). Glucose is the basic form of carbohydrate fuel used in the body. Blood gala is one of the most important carbohydrates

Wahyudin[1A-E*], Muslim Bin Ilyas[2B-D], Atssam Mappanyukki[3B-D]
wahyuddin@unm.ac.id[1*]

used as a source of energy in the body. Blood gala is a precursor to the synthesis of all other carbohydrates in the body such as glycogen, ribose and deoxyribose in nucleic acids, galactose in milk lactose in glycolipids and glycoproteins and proteoglycans (Hardjanti, 2011). In submaximal exercises that lasted more than 20 minutes, ATP production was dominated by anaerobic glycolysis. Anaerobic glycolysis is the main source of glycogen or glucose, so glucose will decrease. However, the results of the research (Hanafi & Prastyana, 2020), that 30 minutes of high-intensity exercise can significantly lower blood sugar levels. However, when compared to moderate-intensity exercise, the decrease in blood sugar was more significant than high-intensity exercise. Blood sugar levels are a term that refers to the level of glucose in the blood. Blood sugar concentration, or serum glucose levels, is tightly regulated in the body. Generally, blood sugar levels stay within narrow limits throughout the day (70-150 mg/dl). This level increases after meals and is usually at its lowest level in the morning after a person eats and the normal blood glucose standard is 70-110 mg/dl.

CONCLUSION

The results of the analysis showed that the average blood sugar level before aerobic activity (pre-test) was 93.1500, while after aerobic activity (post-test) decreased to 82.8500. Statistical tests showed a significance value (sig. 2-tailed) of 0.000 ($p<0.05$), which indicated a significant difference between blood sugar levels before and after aerobic activity. The average difference in blood sugar levels between the initial test and the final test was 10.3, which showed the influence of aerobic activity on the decrease in blood sugar levels in BKMF Volleyball FIKK UNM athletes. Thus, it can be concluded that aerobic activity contributes to lowering blood sugar levels in volleyball athletes.

ACKNOWLEDGMENT

First and foremost, I would like to express my deepest gratitude to the Rector of Universitas Negeri Makassar for the continuous support and encouragement toward the development of research and sports excellence at our institution. Your leadership has been instrumental in fostering an environment that allows us to grow academically and athletically. My heartfelt appreciation also goes to the Dean of the Faculty of Sports and Health Sciences (FIKK) UNM for the invaluable guidance and facilitation provided throughout this research process. Your unwavering support has played a significant role in making this study possible.

A special thank you to the volleyball Athletes of FIKK UNM who have dedicated their time and effort to participate in this research. Your commitment and enthusiasm have greatly contributed to the success of this study, and I truly appreciate your willingness to be a part of this journey. Lastly, I would like to extend my sincere thanks to my fellow researchers who have been involved in this study. Your hard work, dedication, and insightful contributions have made this research meaningful and impactful. It has been a privilege to collaborate with such passionate and committed individuals. Once again, thank you all for your invaluable support. May this research bring positive contributions to the field of sports science and benefit future athletes.

REFERENCES

Akbar, A. H., Ginting, A. P., Tobing, B. M. L., Hardiansyah, M., Situmorang, M. D., & Nurkadri, N. (2024). The Role of Nutrition in Improving the Performance of Court Tennis Players. *Jumper: Journal of Sports Education Students*, *5*(2), 614–622.

Alkhurilina, A., & others. (2017). *Differences in Macronutrient Intake and Physical Activity Between Obese and Non-Obese Students at the Faculty of Medicine, University of Muhammadiyah Semarang*. UNIMUS.

Aprilianto, K. (n.d.). *The Effect Of Multilateral Exercise On Aerobic Endurance Of Children Aged 9--12 Years At The Nusantara Sport Climbing (NSC) Yogyakarta Rock Climbing Club*.

Bompa, T. O., & Buzzichelli, C. (2019). *Periodization-: theory and methodology of training*. Human kinetics.

Hanafi, M., & Prastyana, B. R. (2020). *Stages of sports coaching methodology & preparation of training programs*. Jakad Media Publishing.

Hardjanti, E. S. (2011). *Differences in the Effect of Interval and Gender Exercise on Blood Sugar Levels in Prediabetic Patients Experimental Study of Aerobic and Anaerobic Interval Exercise in Manahan Solo Healthy Heart Exercise Participants*. UNS (Sebelas Maret University).

Isa, A., & others. (2010). The effectiveness of multimedia-assisted learning using guided inquiry methods to increase students' interest and understanding. *Indonesian Journal of Physics Education*, *6*(1).

Lengkana, A. S., & Muhtar, T. (2021). *Physical Fitness Learning*. CV Greetings Insan Mulia.

Mubarok, M. Z., & Kharisma, Y. (2021). Comparison of Extensive and Intensive Interval Training Methods to Improve Aerobic Endurance. *Physical Activity Journal (PAJU)*, *3*(1), 77–90.

Mubarok, M. Z., & Kharisma, Y. (2022). Effect of interval training method on increasing aerobic endurance (VO2Max). *Biometrics: Scientific Journal of the Faculty of Teacher Training and Education*, *8*(1), 128–136.

Mulyana, A., Susilawati, E., Fransisca, Y., Arismawati, M., Madrapriya, F., Phety, D. T. O., Putranto, A. H., Fajriyah, E., Kurniawan, R., Asri, Y. N., & others. (2024). *Metode penelitian kuantitatif*. Tohar Media.

Personal, A. (2015). Aerobic Training for cardiopulmonary fitness for the elderly. *Jorpres (Journal of Achievement Sports)*, *11*(2).

Siagian, J., Barus, C. A., Pakpahan, T. A. A., Ritonga, S. M., Sitohang, T., & others. (2024). Study On The Effect Of Nutritional Intake On The Performance Of Field Tennis Athletes. *Scientific Journal of Multidisciplinary Studies*, *8*(12).

Sukron Abdi, P. (2024). *Analysis Of Basic Volleyball Skills Of Athletes Of SMA Negeri 2 Muko-Muko*. Dehasen University of Bengkulu.