Jurnal Buana Pedagogi Olahraga
Vol: 1, No: 1, Maret 2025

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

The Influence of Night Long Run on the Endurance of Martial Arts Athletes of Pagar Nusa Branch Kebraon Surabaya

Muhammad Naufal Raja Patahala[1abc], Angga Indra Kusuma[2cd]
Pendidikan Jasmani, Universitas PGRI Adi Buana Surabaya[12]
e-mail: rajapatahala@gmail.com[1], anggaindrakusuma@unipasby.ac.id[2]

Received 25 Januari 2025; Accepted 23 Februari 2025; Published 29 Maret 2025

OPEN ACCESS

ABSTRACT

This study aims to determine the effect of night long run training on the endurance of martial arts athletes from Pagar Nusa, Kebraon, Surabaya. The research method used was a quasi-experimental with a one-group pre-test and post-test design. The subjects of the study consisted of 30 martial arts athletes aged 14–19 years. The training was carried out for 8 weeks, three times a week at night, with endurance measurements using the Bleep Test to calculate VO_2 MAX. The results showed a significant increase in endurance of athletes in the experimental group after treatment. The average VO_2 MAX increased from the "fair" category to "good". For example, one athlete, Habban Dzakiy PA, experienced an increase in VO_2 MAX from 47.4 ml/kg/minute to 50.2 ml/kg/minute after treatment, while the control group only experienced slight changes. Statistical tests showed a significant difference between the experimental and control groups with a significance value of <0.05. Night long run training has been proven to be effective in increasing the aerobic capacity of athletes, which supports their performance in martial arts matches. This study proves that night long run training is effective in increasing the endurance of martial arts athletes, especially in facing the physical demands of the match. Based on the results of this study, night long run training is recommended as an endurance training method for martial arts athletes to improve performance in matches.

Keywords: Martial Arts; *Night Long Run*; Endurance; *VO_2 MAX; Beep Test*

***Corresponding Author**
Email: anggaindrakusuma@unipasby.ac.id
Authors' Contribution: a – Study Design; b – Data Collection; c – Statistical Analysis; d – Manuscript Preparation; e – Funds Collection

Introduction

Martial arts is estimated to have begun to spread in the Indonesian archipelago around the 7th century AD. This martial art has become part of the culture of the Malay tribe, including the people on the coast of Sumatra, the Malay Peninsula, and various ethnic groups who use Malay as a lingua franca, which are spread across many areas around Java Island such as Bali, Kalimantan, Sulawesi, and other areas, developing according to the character of their respective tribes and races (Malau, 2023).

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

During the Dutch colonial period, martial arts was considered a threat and was banned, forcing people to study it in secret. People made martial arts a performing art, through its flexible and beautiful movements so that it could continue to be studied by the next generation. While during the Japanese colonial period, martial arts was allowed and given facilities to preserve it. Because at that time, the Japanese government intended to use the Indonesian people to strengthen their defenses against the Allies.

Based on my research in Martial arts Pagar Nusa Kebraon branch, Surabaya, most athletes still experience defeat when participating in competitions. This problem occurs due to decreased ability and physical fitness which is the cause, especially during KEJURCAB Pagar Nusa. For example, out of five athletes, none won the championship, one athlete felt optimistic but the lack of athlete fitness during training could reduce his ability. From the problems experienced by athletes, it is related to their low endurance when competing.

Endurance is an important element in Pagar Nusa martial arts. Athletes need good endurance to survive long matches and require more energy. Long run training is believed to increase athletes' aerobic and anaerobic capacity, but there has been no specific research on its effects. This study aims to provide a clear picture of the effectiveness of long runs to increase the endurance of Pagar Nusa martial arts athletes.

According to Fajriyudin et al., (2021) with the title "The Effect of Continuous Running Method on Increasing the Endurance of Martial arts Extracurricular Students at the Nurussalam Modern Islamic Boarding School" This study assessed the maximum aerobic capacity of Pagar Nusa athletes through a descriptive survey method. The Bleep Test technique was used to measure the aerobic capacity of athletes by asking them to run back and forth with the sound signal "TuT" at a distance of 20 meters. Among the 30 respondents tested, 15 athletes showed very low aerobic capacity, highlighting the pressing problem of physical endurance in this sport. Meanwhile, based on initial observation data from martial arts at the Kebraon branch, Surabaya before further research was conducted, researchers conducted observations using the Bleep Test on 30 athletes aged between 14-19 years. From these results, the average value obtained was 37.2, which in the VO_2 MAX Level Classification Norm (male) is stated as low (poor).

According to Irawan (2023) VO_2 MAX is an indication of the maximum capacity of oxygen that can be absorbed by a person during exercise, often used to assess the optimality of an athlete's aerobic endurance and cardiovascular fitness, both before and after a training program. VO_2 MAX is a person's ability to absorb large amounts of oxygen when involved in intense physical activity such as exercise, the higher the level of VO_2 MAX, the greater the ability to carry out activities without feeling tired quickly. Measuring VO_2 MAX can help determine the body's ability to provide oxygen to active muscles and increase the ability of muscles to use it. There are various ways to measure VO_2 MAX, including the multistage fitness test, the Balke test, the Cooper test, the bleep test, or the

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

shuttle run. Some factors that affect the increase in VO_2 MAX include gender, age, physical exercise, cardiovascular and pulmonary function, hemoglobin levels in red blood cells, body composition, and altitude (Nurkamila, 2015). And the higher the VO_2 MAX, the lower the risk of fatigue when doing activities (Nohan & Wahyudi, 2021).

This research uses a test in the form of *Long Run* is a type of running that is done with a long duration and a fairly long distance, but with a constant and unchanging speed. Long runs are not exercises to increase speed, so it is important to do it at a relaxed and stable tempo. The distance traveled during a long run can vary, depending on the level of training and the desired running goal, whether to prepare for a marathon, half marathon, or other running goal. Based on information from Runner's World, usually the distance traveled during a long run should range from 25 to 30 percent of the total weekly distance that is usually done. For example, if you usually run a total of 20 miles per week or around 32 kilometers, then the recommended distance for a long run is around 6 miles, or around 9.6 kilometers (News et al., 2023). In this study, a long run was used but it was done at night, namely the night long run, the name almost has similarities with other research titles, namely from (Kartono et al., 2022). The researcher applied the Pagar Nusa martial arts training from Kebraon, Surabaya, which consists of approximately 30 martial arts athletes who have different ages or from various backgrounds, not only male athletes but there are female athletes in the training.

In practice *night long run* this study was used to determine the endurance of martial arts athletes, because if the athlete's endurance is still not enough to compete, they will experience injury, illness, or loss of focus due to decreased immunity or decreased body immunity (Ilyasa Muhammad Diaz & Efendi Yasin, 2024). Therefore, endurance is important for us to know how to maintain endurance so that it is always healthy, because if endurance decreases, we will be more susceptible to disease (Alifah, 2023). The purpose of having good endurance is so that we can have high immunity. One way to improve the immune system is by exercising. Through exercise, blood flow and the lymphatic system increase, which contributes to increasing the circulation of important immune cells in the body, maintaining body health (Alifah, 2023).

There are several studies that are in line or relevant regarding the same thing in this study, namely first Fajriyudin et al., (2021) with the title "The Effect of Continuous Running Method on Increasing the Endurance of Martial arts Extracurricular Students at the Modern Islamic Boarding School of Nurussalam" This study focuses on measuring the maximum aerobic capacity of athletes from Pagar Nusa through a descriptive survey method. This study uses the Bleep Test technique to assess the aerobic capacity of athletes by asking them to run back and forth with the voice command "TuT" at a distance of 20 meters. Surprisingly, among the 30 respondents tested, 15 athletes showed very poor aerobic capacity results, highlighting the pressing problem of physical endurance in this sport. The second is written by (Busyairi & Ray, 2018) with the title "Comparison of

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

Interval Training and Continuous Run Methods on Increasing VO_2 MAX" This study focuses on interval training found to have a significant impact on increasing VO_2 MAX, while according to the results of this study indicate that interval training is more effective in increasing VO_2 MAX compared to continuous training. Individuals with higher VO_2 MAX not only show better endurance but also experience faster physical recovery compared to those with lower VO_2 MAX. The design of this research study using the Two Group Pre-Test Post-Test Design and bleep test as a research instrument provides valuable insight into the effectiveness of different training methods on increasing VO_2 MAX. And the third is written by (Malau, 2023) with the title Differences in the Effects Between Circuit Training and Fartlek Training on Increasing VO_2 MAX and Agility of Jujitsu Athletes at Puslatda Yogyakarta" This study focuses on circuit training that has been found to have a significant effect on increasing VO_2 MAX in athletes participating in Jujitsu, the results of the study indicate that engaging in circuit training can lead to significant increases in VO_2 MAX levels among Jujitsu athletes, which is very important for their overall performance and endurance. This study emphasizes that circuit training is a beneficial approach to increasing VO_2 MAX levels in athletes, providing them with the physiological adaptations needed to excel in their sport.

Method

This research is a type of quantitative research, quantitative research is a systematic scientific study of parts and phenomena and their causal relationships. Quantitative research is defined as the systematic investigation of phenomena by collecting data that can be measured by performing statistical, mathematical or computational techniques (Abdullah et al., 2022). This research using the *Quasi Experiment method*. The design of this research is *One-Group pre-test and post-test*, with the characteristic that the group used cannot be selected randomly. Before receiving treatment, this group undergoes a pre-test up to three times to evaluate the stability and clarity of the group's condition before the treatment is given. If the results of the pre-test for four times turn out to have different values, it means that the group is in an unstable and inconsistent condition. After the condition is not unstable, the treatment can begin to be given (Hidayat, 2012).

The following is the One Group Pre-test and Post-test scheme:

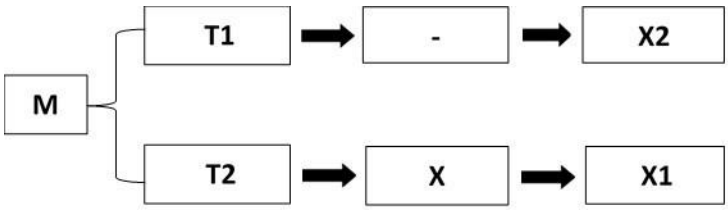

Figure 1. One Group Pre-test and Post-test Scheme

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

Information:

M	: Matching
T1 & T2	: Pre-test
X	: Treatment
-	: Without treatment
X1 & X2	: Post-test

Schematic explanation:

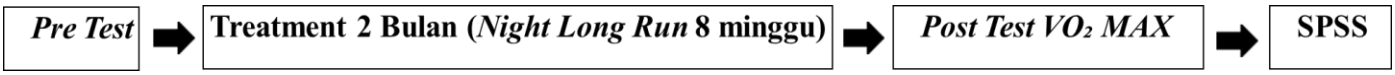

Figure 2. Explanation of One Group Pre-test and Post-test Scheme

1. Week 1
   Selection of research athlete subjects in the Pagar Nusa training, Kebraon Surabaya branch and Pre-Test
2. Week 2
   Division of control and experimental groups and treatment, 3-day treatment (Monday, Wednesday and Friday)
3. Week 3 (treatment)
4. Week 4 (treatment)
5. Week 5 (treatment)
6. Week 6 (treatment)
7. Week 7 (treatment)
8. Week 8
   Final calculation of VO_2 MAX test (Post-Test) for all groups from the control and experimental groups

Based on the research design, the study used a night long run with the Test Bleep Test to measure the endurance of martial arts athletes during training at night for 8 weeks which was carried out 3 times a week every Monday, Wednesday and Friday, until the test results showed that the endurance of martial arts athletes had increased.

The research location used was at the Martial arts Pagar Nusa Kebraon branch, Surabaya, which is located on Jl. Griya Kebraon Selatan V RT 01 / RW 12 Kebraon Village, Karangpilang District, Surabaya City. This research was conducted during 24 meetings during martial arts training, training started from October to December 2024, carried out 3 times a week on Monday, Wednesday and Friday at 19.30-00.00.

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

Population is the entire entity that is the focus of researchers in a certain context that has been determined, both in terms of space and time. Population is related to data, if someone provides data, then the size or number of the population will be the same as the number of people (Amin et al., 2021). As a population, a group of subjects must have the same individual traits or characteristics that distinguish them from other groups of subjects. The population in this study were the Pagar Nusa martial arts athletes from the Kebraon branch, Surabaya, totaling 30 Martial arts athletes. The sample according to Amin et al., (2021) interpreted as a portion of the population that is the actual source of data in a study. In other words, a sample is a representative of the population to describe the entire population. So, this sample is a group of individuals whose numbers are smaller than the main population, but represent the population as a whole. This study used a sample of 30 male Martial arts athletes from the Kebraon branch, Surabaya.

The technique used is the Purposive Sampling technique, according to (Sitanggang, 2022) Purposive sampling technique is a sampling method where researchers select samples based on research knowledge about the samples to be selected. There are several requirements that must be met in taking this sample, namely as follows:

a. Martial arts athletes from Pagar Nusa, Kebraon branch, Surabaya
b. Aged 14-19 years
c. Minimum of 8 weeks of training
d. Willing to participate in training during the research

All samples were subjected to a pre-test to find the treatment group. Conducting a pre-test at the first meeting, then the results were sorted from highest to lowest, then grouped into two groups. Group one for athletes who are still not good and group two for athletes who are not good at doing the bleep test.

Data collection techniques and instruments were carried out during the pre-test, implementation, and post-test, the type of test used was a multistage fitness test (bleep test) while for recording the results of the test using the formula from the VO_2 MAX estimation calculation. In the data analysis technique there are three tests, namely the prerequisite test (normality test), homogeneity test and hypothesis test, prerequisite test (normality test). The following is the Night Long Run research schedule for Pagar Nusa martial arts athletes, Kebraon branch, Surabaya, namely:

Table 1. Night Long Run Research Schedule

No	Agenda	October				November				December			
		1	2	3	4	1	2	3	4	1	2	3	4
1	Site Survey												
2	Pre-Test												
3	Treatment												
4	Post-Test												

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

No	Agenda	October				November				December			
		1	2	3	4	1	2	3	4	1	2	3	4
5	Analysis												
6	Compiling a report												
7	Publication												

Results and Discussion

The following data was obtained from the results of the study on the Effect of Night Long Run on the Endurance of Martial arts Athletes in Pagar Nusa Ranting Kebraon Surabaya. Results of the Experiment group and the Control group:

Table 2. Pre-Test Post-Test Results of Experimental Groups

EXPERIMENTAL GROUP				
No	**Name**	**Age (Year)**	***Pre-Test (Ml,Kg,Min)***	***Post-Test (Ml,Kg,Min)***
1	Habban Dzakiy P.A.	17	47.4	50.2
2	Riyo Fadhilah Bayu	18	47.4	49.3
3	Hafiz Himawan P.	16	45.8	47.4
4	Naufal Kahfi Surya D.	16	45.2	47.4
5	Much. Jodi Kusuma	16	43.9	45.8
6	M. Ariyan Lutfi	19	42.4	45.8
7	M. Falah Ibrahim	17	41.8	44.5
8	Ahmad Darussalam	16	39.9	43.3
9	A. Miftah Alghifary	16	39.9	42.4
10	M. Hafidz Nur Falah	18	39.2	42.4
11	Jeffry Febriansyah	17	38.5	41.1
12	Dariswara Rahman	16	37.8	41.1
13	M. Nasil Jamil	16	37.8	40.5
14	Fiandra Eka Wahyu	16	37.8	39.9
15	Dimas Galih K.	16	37.1	39.2

Table 3. Pre-Test Post-Test Results of Control Groups

CONTROL GROUP				
No	**Name**	**Age (Year)**	***Pre-Test (Ml,Kg,Min)***	***Post-Test (Ml,Kg,Min)***
1	Ahmad Ardiansyah	19	37.8	39.2
2	Ahmad Abrori	19	37.8	38.5
3	Aries toto Patria Sabil	19	37.1	37.8

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

4	Muhammad Alvin A.	16	37.1	37.8
5	Aswi Rasya Nazril	16	37.8	37.8
6	Rendy Bayu Setiaji	16	37.8	37.8
7	Luqmanul Hakim H.	19	36.4	37.1
8	Reyhans Ksatria	19	35.7	36.4
9	Arga Rival Dinata	16	35.7	36.4
10	Ahmad Tyo Listianto	16	35	36.4
11	Lucky Adji Kusuma	19	35.7	35.7
12	Barron Andrianto	19	35	35.7
13	Putra Bagus Atta F.	18	34.3	35
14	Abud Musafak	19	32.9	32.9
15	Nico Pratama S.	18	31	31.8

The results of the pre-test and post-test in this study provide a quantitative picture of the changes in endurance of martial arts athletes who are members of the experimental group and the control group. In the experimental group, the average endurance score showed a significant increase after the treatment in the form of a night long run. For example, Habban Dzakiy PA experienced an increase from a pre-test score of 47.4 (ml, kg, minutes) to a post-test of 50.2 (ml, kg, minutes), and Ahmad Darussalam from 39.9 (ml, kg, minutes) to 43.3 (ml, kg, minutes). Overall, there was an increase in scores in all participants in the experimental group, which reflects the effectiveness of the training method provided.

In contrast, the control group that did not receive similar treatment only showed small or insignificant changes. For example, Ahmad Ardiansyah had a pre-test score of 37.8 and only increased to 39.2 (ml, kg, min) in the post-test. In fact, some participants such as Abud Musafak maintained the same score between the pre-test 32.9 (ml, kg, min) and post-test 32.9 (ml, kg, min). The following are the results of the normality test:

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

Table 3. SPSS Results Normality Test

Tests of Normality

KELAS		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
HASIL	Pretest eksperimen	.198	15	.117	.892	15	.072
	postest eksperimen	.145	15	.200*	.944	15	.441
	pretest kontrol	.157	15	.200*	.885	15	.056
	posttest kontrol	.163	15	.200*	.909	15	.131

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the output table, the pre-test results of the experimental class show sig 0.117 and the post-test results of the experimental class show 0.200 while the pre-test results of the control class show sig 0.200 and the post-test shows sig 0.200, so it can be stated that sig > 0.05. This shows that the research data meets the assumption of normality, which is one of the prerequisites in advanced statistical testing such as the t-test.

After conducting a normality test, then continue with a homogeneity test to ensure the data is normally distributed, the results of the homogeneity test are as follows:

Table 4. Levene's Test for Equality of Variances results

Test of Homogeneity of Variances

HASIL

Levene Statistic	df1	df2	Sig.
5.718	3	56	.252

Homogeneity test was conducted to ensure that the variance between the experimental and control groups was homogeneous. Based on the analysis of Levene's Test for Equality of Variances, the results showed a significance value of 0.252 based on the mean, which is greater than 0.05. This indicates that the research sample is homogeneous.

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

And for the final test of this study, namely the hypothesis test using the independent t-test to compare changes in endurance scores between the experimental and control groups in both the pre-test and post-test, the following are the results of the hypothesis test in this study as follows:

Information:

1. If the Significance value (Sig.) < 0.05, then H0 is rejected and H1 is accepted. This shows that there is an "Effect of Night Long Run on the Endurance of Pagar Nusa Martial arts Athletes".
2. If the Significance value (Sig.) > 0.05, then H1 is rejected and H0 is accepted. This shows that there is no influence of "The Effect of Night Long Run on the Endurance of Pagar Nusa Martial arts Athletes".

Table 5. SPSS Results of Independent Samples Test Hypothesis Test

Independent Samples Test

		Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Interval of the Lower	Interval of the Upper
HASIL	Equal variances assumed	.097	.758	-1.957	28	.000	-2.5600	1.3078	-5.2389	.1189
	Equal variances not assumed			-1.957	27.935	.000	-2.5600	1.3078	-5.2392	.1192

Based on the output table, the Sig value (2-tailed) is known to be 0.000 < 0.05. Then *H*0 rejected and *H*1 is accepted, so it can be concluded that there is an influence of "The Effect of Night Long Run on the Endurance of Pagar Nusa Martial arts Athletes".

From the results of this study, it can be seen that night long run training has advantages in increasing athlete endurance with training time for 3 times a week in 8 weeks of training. Based on the results of the pre-test and post-test, most athletes experienced an increase in their anaerobic endurance, after participating in night long run training. Before training, the average anaerobic endurance score of athletes was in the fair category, and after training, the average score increased to the good category. Night long run training that emphasizes maximum effort in a short duration, trains the body to use anaerobic energy more efficiently, increases muscle strength, and increases endurance.

This study focuses on the experimental group because they were trained from the beginning of the test to the end of the test, while the control group did not receive routine training, only the beginning of the training test and the end of the test. There are other factors that can hinder training, namely the lack of training portions, and different athlete fitness conditions. By considering these factors, it can be improved by increasing the duration or portion of night long run training, and increasing training according to the fitness level of each martial arts athlete at the beginning of training so that the athlete's

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

fitness condition can be given training according to their fitness condition. Based on the results of the calculations, this study shows a significant change between the pre-test and post-test values of anaerobic endurance of martial arts athletes after the implementation of the night long run training method for 8 weeks.

With a training duration of 8 weeks, there can be changes in improving the physical condition of martial arts athletes. This training can be recommended as one method to prepare athletes to face matches with heavy physical demands. Based on the results of the experimental group, it has shown a significant increase in average endurance after eight weeks of training, with a higher VO_2 MAX score compared to the pre-test results, while the control group without similar treatment only experienced slight changes in average endurance, even some members showed no change in them. The results of statistical data from the t-test showed that night long run training had a significant effect on the aerobic endurance of athletes.

The statistical data results from the t-test show that night long run training has a significant effect on the aerobic endurance of athletes. This indicates that this method is effective in increasing the physical endurance needed in the sport of martial arts. This study is in line with previous studies according to Fajriyudin et al., (2021) stateabout Continuous Running shows a significant influence in increasing the aerobic endurance of martial arts students, and Busyairi & Ray, (2018) stated about comparing interval and continuous running methods, where interval training provides a more effective increase in VO_2 MAX. Based on their research, they showed that endurance-based physical training, such as continuous running, intervals, or long runs, play an important role in increasing the aerobic capacity and endurance of athletes.

The difference between the research "The Effect of Night Long Run on the Endurance of Martial arts Athletes in Kebraon Surabaya Branch" and current research that has the same title is the use of different training methods, and focuses on the martial arts sport branch in increasing athlete endurance compared to normal training, and aims to increase endurance during matches between athletes, and in the training using long run training using the bleep test, in general the test is carried out in the morning/afternoon, but in this study it was carried out at night when martial arts training was carried out.

Conclusion

Based on the results of the study conducted on the effect of the Night Long Run training method on the endurance of Pagar Nusa martial arts athletes in Kebraon, Surabaya, it can be concluded that there is a significant positive effect of the training program on increasing the anaerobic endurance of athletes. This study was conducted for 8 weeks with training three times a week, involving 30 athletes who were divided into experimental and control groups. Endurance measurements were carried out using the Bleep Test to assess VO_2 MAX before and after treatment. The results of the data analysis

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

showed that the experimental group that underwent Night Long Run training experienced a significant increase in endurance. For example, athlete Habban Dzakiy PA experienced an increase from a pre-test score of 47.4 ml/kg/minute to a post-test of 50.2 ml/kg/minute. Meanwhile, the control group only showed a small increase, such as that experienced by Ahmad Ardiansyah who had a pre-test score of 37.8 ml/kg/minute and increased to 39.2 ml/kg/minute in the post-test.

It is suggested that further researchers or sports coaches can consider integrating the night long run method routinely to find out or show significant improvements in athlete endurance through anaerobic and the importance of doing this variation can also help athletes adapt to various physical conditions that they may face in competition. Then often conducting periodic evaluations of athlete progress such as routine anaerobic endurance measurements, for example using the Bleep Test, can provide a clear picture of the athlete's physical development. Thus, coaches can adjust the training program according to the needs and abilities of each athlete. Coaches and athletes also need to pay attention to aspects of nutrition and recovery. Increasing physical endurance depends not only on training, but also on proper nutritional intake and sufficient recovery time. Therefore, a balanced diet program and effective recovery strategies should be an integral part of the training program. And for further research it is recommended to explore other training methods that can contribute to increasing the endurance of martial arts athletes. This research can include a comparison between various training methods and analysis of other factors that affect athlete performance, such as sports psychology and competition techniques.

Conflict of Interest

No conflict of interest.

References

Abdullah, K., Jannah, M., Ummul, A., Hasda, S., Fadilla, Z., Taqwin, N. ., Masita;, Ardiawan, K. N., & Sari, M. E. (2022). Metodologi Penelitian Kuantitatif. In *Yayasan Penerbit Muhammad Zaini*.

Alifah, J. Q. (2023). *Pengertian Daya Tahan: Tujuan, Manfaat, dan Contohnya*. Health.Okezone.Com.

Amin, N. F., Garancang, S., & Abunawas, K. (2021). Populasi dan Sampel. *Metode Penelitian Pendekatan Kuantitatif*, *14*(1), 103–116.

Busyairi, B. &, & Ray, H. R. D. (2018). Perbandingan Metode Interval Training dan Continuous Run terhadap Peningkatan Vo2max. *Jurnal Terapan Ilmu Keolahragaan*, *3*(1), 76. https://doi.org/10.17509/jtikor.v3i1.10128

Fajriyudin, M., Aminudin, R., & Fahrudin. (2021). Pengaruh Metode Continuous Running Terhadap Peningktan Daya Tahan Siswa Ekstrakurikuler Pencak Silat di Pondok

ISSN: 2614-4182 (Print)
http://jurnal.unipasby.ac.id/index.php/bio

Pesantren Modern Nurussalam. *Jurnal Literasi Olahraga*, *2*(1), 51–59. https://doi.org/10.35706/jlo.v2i1.4435

Hidayat, A. (2012). *Penelitian Eksperimen*. Statistikian.Com. https://www.statistikian.com/2012/10/penelitian-experimen.html

Ilyasa Muhammad Diaz, & Efendi Yasin. (2024). Implementasi Program Latihan Kebugaran Jasmani Meningkatkan Kekuatan dan Daya Tahan Siswa di SMP Dharma Karya UT. *Jurnal.Umj.Ac.Id*. https://jurnal.umj.ac.id/index.php/SEMNASFIP/article/view/23592

Irawan, J. (2023). *Mengenal VO2 Max dan Cara Efektif Meningkatkannya*. SAC Indonesia. https://www.sacindonesia.com/r/953/mengenal-vo2-max-dan-cara-efektif-meningkatkannya

Kartono, Ferrari Valentino Ward, R., & Achmad Nurzenis, R. (2022). The Impact of Running at Night on Physical Fitness. *Journal of Physical and Outdoor Education*, *4*(2), 115–121. https://doi.org/10.37742/jpoe.v4i2.152

Malau, B. L. (2023). *Perbedaan Pengaruh Antara Circuit Training dan Fartlek Training Terhadap Peningkatan VO2Max dan Kelincahan Atlet Jujitsu Puslatda Yogyakarta*.

News, B., Story, V., Penulis, P., & Sama, I. K. (2023). *Pengertian Long Run dan Tips Melakukannya bagi Pemula*. 5–9.

Nohan, A., & Wahyudi, achmad rizanul. (2021). VO2 Max atlet pencak silat usia 14-17 tahun di golden silat club. *Jurnal Prestasi Olahraga*, *4*(11), 110–117.

Nurkamila, M. (2015). *DAMPAK PENERAPAN LATIHAN TABATA TERHADAP PENINGKATAN KEMAMPUAN KECEPATAN (SPEED)*. 1–9.

Sitanggang, D. D. K. P. (2022). *Purposive Sampling adalah: Berikut Contoh, Tujuan, dan Rumusnya*. DetikJabar.Com. https://www.detik.com/jabar/berita/d-6212440/purposive-sampling-adalah-berikut-contoh-tujuan-dan-rumusnya