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The Effect of Skipping Exercises in Increasing Cardiovascular Endurance of Running Athletes in Bone Bolango Regency

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ABSTRACT

This study aims to analyze the effect of skipping exercises on improving cardiovascular endurance among running athletes in Bone Bolango Regency. The research employs a quasi-experimental design with a pretest-posttest approach. The study involved nine athletic athletes as participants, who were subjected to skipping exercises over a specified training period. The cardiovascular endurance of the athletes was measured using the Bleep Test before and after the intervention. Data analysis included normality tests, homogeneity tests, and t-tests to determine the statistical significance of the results. The findings indicate a significant improvement in the athletes' cardiovascular endurance, as demonstrated by increased VO_2 max values after the skipping exercise program. The t-test results showed that skipping exercises have a statistically significant impact on cardiovascular endurance ($T_{count} = 23.263 > T_{table} = 2.306$, P-Value = 0.00 < 0.05). These results suggest that skipping exercises can serve as an effective and practical training method to enhance cardiovascular endurance in running athletes.

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1. INTRODUCTION

Cardiovascular endurance is an important component of athletic performance, especially for runners who rely on aerobic capacity to support their performance (Predel, 2014; Scheer et al., 2022; Wang & Jin, 2022). Good cardiovascular endurance allows an athlete to maintain the intensity of training and competition for a longer duration without experiencing excessive fatigue (Sukal-Moulton et al., 2022; Zhou, 2021). Therefore, increasing cardiovascular endurance is the main focus of a runner's training program.

One of the training methods often used to improve cardiovascular endurance is skipping training (Danubisma & Dewi, 2023; Pujianto, 2019). Skipping or jumping rope is a form of plyometric training that is effective in increasing heart and lung capacity, as well as improving the efficiency of the circulatory system (Mozolev et al., 2021; Veena Kirthika et al., 2019). This exercise also has the added benefit of improving coordination, leg muscle strength, and agility, all of which contribute to running performance.

Bone Bolango Regency has a community of runners who are active in various competitions, both at the regional and national levels. However, there are still challenges in optimizing training methods that can improve the cardiovascular endurance of athletes. Therefore, research is needed that aims to analyze the effect of skipping training on improving the cardiovascular endurance of runners in Bone Bolango Regency.

This research is expected to contribute to the development of more effective and efficient training methods for runners. By understanding the impact of skipping training on cardiovascular endurance, coaches and athletes can design more optimal training programs to improve overall athlete performance.

2. METHODS

This research is quantitative research with a quasi-experimental method located at the Harapan Prestasi Sports Field located in Bulotalangi Timur Village, Bulango Timur District, Bone Bolango Regency. The reason for choosing this location is because the Harapan Prestasi Sports Field is the athlete's training ground, allowing athletes to attend and participate in this research. The research instrument used to determine the cardiovascular endurance of athletes in the athletics branch uses the Bleep Test instrument with the following classification:

Table 1. Classification of Cardiorespiratory Function Fitness

No	13-19 Years		Classification
	Male	Female	
1	>55.9	>41.9	Excellent
2	51-55.9	39-41.9	Very Good
3	45.2-50.9	35-38.9	Good
4	38.4-45.1	31-34.9	Fair
5	35-38.3	25-30.9	Poor
6	<35	<25	Very Poor

Source: (Sepdanius et al., 2019)

Data collection was carried out by conducting an initial test on Bone Bolango Regency athletes who were used as samples to determine the athlete's VO_2Max value. Before testing, the athletes were first collected and given instructions on how to carry out the test, then the athletes were given treatment in the form of basic skipping and alternating foot skipping exercises. After that, a final test was given to determine the increase in VO_2Max values in athletes after being given treatment. After the research was conducted, the data obtained would be analyzed to test the distribution of data that measures one variable. In this study, there are several steps to analyze the research data, namely frequency distribution, Analysis Prerequisites test (Normality and Homogeneity) and finally Hypothesis test (t test).

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2.1. Participants

The population in this study was all athletic athletes in Bone Bolango Regency with a total of 9 athletes, all of whom were samples of this study.

2.2. Procedures

Data collection was conducted by conducting an initial test on Bone Bolango Regency athletes who were used as samples to determine the athlete's VO_2Max value. Before testing, the athletes were first collected and given instructions on how to carry out the test, then the athletes were given treatment in the form of skipping exercises. After that, a final test was given to determine the increase in VO_2max values in athletes after being given treatment.

3. RESULTS

Skipping exercise on cardiovascular endurance in Bone Bolango Regency running athletes, which is the result of measurements of all research subjects. Based on the experimental research design conducted, there are 2 (two) groups of members whose cardiovascular endurance ability scores of Bone Bolango Regency running athletes are as follows:

Table 2. Frequency Distribution Before and After Treatment

No	Skipping	
	Pretest (P1)	Posttest (P2)
1	45.9	48.7
2	48.7	51.9
3	50.8	53.3
4	31	34.3
5	41.8	44.2
6	43.9	47.1
7	31.4	34.6
8	43.6	46.2
9	47.4	50.8

The table shows the frequency distribution of the pretest and posttest results of the cardiovascular endurance of athletes after being given skipping training treatment. Data were obtained from nine research subjects who underwent tests before (pretest) and after (posttest) the training intervention.

The pretest value (P1) ranged from 31 to 50.8, while the posttest value (P2) increased with a range of 34.3 to 53.3.

These results indicate that skipping training contributes to increasing the cardiovascular endurance of athletes. The summary of the classification in the cardiovascular endurance pretest is as follows:

Table 3. Pretest and Posttest Classification

Classification	Pretest		Posttest	
	Male	Female	Male	Female
Excellent	0	0	0	0
Very Good	0	0	2	0
Good	4	0	4	0
Faif	3	2	1	2
Poor	0	0	0	0
Very Poor	0	0	0	0
Amount	9		9	

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Table presents the classification of male and female participants based on their performance in the pretest and posttest. The classification categories include Excellent, Very Good, Good, Fair, Poor, and Very Poor.

In the pretest, no participants (male or female) were classified as Excellent, Very Good, Poor, or Very Poor. Four male participants were classified as Good, while three males and two females fell into the Fair category. In the posttest, there was an improvement in performance among male participants. Two males advanced to the Very Good category, while four remained in the Good category. The number of males in the Fair category decreased from three to one, indicating progress. Female participants, however, showed no changes in classification, with two remaining in the Fair category. Overall, the results suggest an improvement in the performance of male participants, particularly with the emergence of the Very Good category in the posttest. However, no significant changes were observed among female participants.

The next stage is the prerequisite test of the t-test analysis (t-test). As a requirement for this, a normality test and a variance homogeneity test are required as follows:

Table 5. Normality Test

Variable Group	n	L_{Count}	L_{table}	Conclusion
(P1) Cardiovascular Endurance Ability Group Before Given Treatment in the Form of Skipping Exercise	9	0,167	0,271	Normal
(P2) Cardiovascular Endurance Ability Group After Given Treatment in the Form of Skipping Exercise	9	0,166	0,271	Normal

Based on the results of the normality test calculations for the two research design groups above, it was found that the L_{count} value obtained was smaller than the L_{table} value at a significance level of 5%, namely 0.05. With the L_{count} value in each group, namely (P1): 0.167, (P2): 0.166. While the L_{table} value is 0.271. Thus, it can be concluded that all data groups in this study were taken from a normally distributed population so that they can be used for testing research hypotheses.

Table 6. Homogeneity Test of Variance of Groups P1 and P2

Summary of Homogeneity of Variance Test				
Variable Group	Variance	L_{Count}	L_{table}	Conclusion
P1	50,20	1,03	3.44	Homogeneous
P2	48,60			

The results of the F Calculation compared to the F Table show that the F Calculation value for all pairs of groups is below the F Table value (3.44). Because F Calculation < F Table, all groups are declared homogeneous. This conclusion shows that the variation of data between groups is quite uniform, so that it is possible to carry out further statistical analysis, such as a difference test (t test), assuming homogeneity is met.

Table 7. Hypothesis that states that skipping exercises have an effect on cardiovascular endurance

t-Test: Paired Two Sample for Means		
	P1	P2
Mean	42.722	45.678
Variance	50.197	48.604
Observations	9	9
Pearson Correlation	0.999	
Hypothesized Mean Difference	0	
df	8	
t Stat	-23.263	
P(T<=t) one-tail	0.000	

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t Critical one-tail	1.860
P(T<=t) two-tail	0.00
t Critical two-tail	2.306

The hypothesis stating the effect of basic skipping exercise on cardiovascular endurance is accepted, because the calculation results show that Tcount = 23.263 > Ttable = 2.306 and P-Value = 0.00 <alpha 0.05. So it can be concluded that H0 is rejected and Ha is accepted in other words there is a significant difference between the values before and after treatment, indicating that skipping exercise is effective in increasing cardiovascular endurance.

4. DISCUSSION

Based on the results of this study, it was revealed that there was a significant increase in cardiovascular endurance for athletes running in Bone Bolango Regency. Previous research revealed that skipping training can affect the endurance of fourth semester Penjaskesrek students in badminton courses (Hidayat & Syahriadi, 2023). The results of previous studies indicate that skipping training is not only beneficial for endurance-based sports such as running, but can also increase cardiovascular endurance in other sports that require aerobic endurance, such as badminton. This is in line with the findings in this study, where skipping training has a positive impact on increasing the aerobic capacity of athletes running in Bone Bolango Regency.

The significant increase in cardiovascular endurance after implementing the skipping training program can be explained through its physiological mechanisms. Skipping training that is carried out regularly helps increase the efficiency of heart work, increases maximum oxygen consumption (VO_2 Max), and improves the oxygen transport system to the working muscles (Raudah, 2024). Thus, athletes are able to maintain optimal performance for a longer time, reduce fatigue, and increase overall endurance.

In addition, when compared to previous studies, the skipping training method can be categorized as a form of training that is practical and easy to apply in various conditions. This exercise does not require complex facilities, but still has a positive impact on the development of athlete endurance. This makes skipping an effective alternative exercise, especially for athletes who have limited access to running training facilities in open fields.

However, although the results of this study show a significant increase, there are several factors that can affect the effectiveness of skipping exercises in improving cardiovascular endurance. Factors such as exercise intensity, duration, frequency, and the athlete's initial physical condition need to be taken into account in implementing the training program (Susanti et al., 2022). Therefore, further research can explore more deeply the optimal variation of skipping intensity to improve cardiovascular endurance in athletes with various levels of ability and different sports specializations.

Overall, this study strengthens the evidence that skipping exercises are an effective training method in improving cardiovascular endurance. These findings can be the basis for coaches and athletes in compiling more varied and efficient training programs to improve athlete performance, especially in running sports.

5. CONCLUSIONS

The results of this study confirm that skipping exercises have a significant positive impact on cardiovascular endurance among running athletes in Bone Bolango Regency. The statistical analysis demonstrated a notable improvement in VO_2 max levels after the skipping training intervention. This indicates that skipping can be an effective alternative training method, particularly for athletes who may have limited access to extensive running facilities. Given its simplicity and effectiveness, skipping exercises can be incorporated into training programs to enhance cardiovascular endurance and overall athletic performance. Future research may explore variations in skipping intensity, duration, and frequency to optimize its benefits for different sports and athlete profiles.

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6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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