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Research Article

Effect of Rope Skipping Training on Cardiovascular Endurance of School Students

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Abstract

The purpose of the study was to investigate the effect of rope skipping training on cardiovascular endurance among school students. Thirty (N = 30) school students participated in the study. A single-group pre-test and post-test experimental design was employed. Cardiovascular endurance was assessed using the 1 Mile Run/Walk Test before and after the rope skipping training programme. The collected data were analysed using descriptive statistics (Mean and Standard Deviation) and a paired sample t-test. The pre-test mean score was 10.19 ± 1.57 minutes, while the post-test mean score was 8.53 ± 1.43 minutes. The calculated t-value was 15.99, which exceeded the tabulated value of 2.045 at the 0.05 level of significance. The findings revealed a significant improvement in cardiovascular endurance following the rope skipping training programme. It was concluded that rope skipping training is an effective exercise intervention for enhancing cardiovascular endurance among school students.

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KEYWORDS: Rope Skipping Training, Cardiovascular Endurance, School Students, 1 Mile Run/Walk Test, Physical Fitness.

1. INTRODUCTION

Physical fitness is an essential component of overall health and well-being among school students. It enables individuals to perform daily activities effectively without undue fatigue and contributes to maintaining a healthy lifestyle. Physical fitness consists of several components, including muscular strength, muscular endurance, flexibility, body composition, and cardiovascular endurance. Among these components, cardiovascular endurance is considered one of the most important indicators of health-related fitness because it reflects the ability of the heart, lungs, and circulatory system to supply oxygen-rich blood to working muscles during prolonged physical activity. A high level of cardiovascular endurance allows individuals to perform physical tasks efficiently, delay fatigue, and recover more quickly after exercise.

In recent years, the lifestyle of school-going children has undergone significant changes due to technological advancements and increased academic demands. Many students spend a considerable amount of time using electronic devices, resulting in reduced participation in physical activities. This sedentary lifestyle has led to declining levels of physical fitness and increased risks of obesity, cardiovascular disorders, and other health-related problems among children and adolescents. Consequently, physical education programmes in schools play a crucial role in promoting regular physical activity and improving the overall fitness levels of students.

Cardiovascular endurance is particularly important during the developmental years because it contributes to healthy growth, improved physiological functioning, and enhanced physical performance. Children with higher cardiovascular endurance tend to exhibit better concentration, greater participation in sports and recreational activities, and improved academic achievement. Furthermore, maintaining adequate cardiovascular fitness during childhood may reduce the risk of developing chronic diseases such as hypertension, diabetes, and coronary heart disease later in life. Therefore, identifying effective and enjoyable training methods to improve cardiovascular endurance among school students has become a priority for physical educators and researchers.

Among the various forms of aerobic exercise, rope skipping has gained considerable popularity due to its simplicity, effectiveness, and accessibility. Rope skipping is a dynamic physical activity that involves rhythmic jumping movements performed with the aid of a rope. It is widely recognized as an excellent cardiovascular exercise because it requires continuous movement of both the upper and lower limbs while maintaining a consistent rhythm. The activity elevates heart rate, increases oxygen consumption, and stimulates the cardiovascular and respiratory systems, thereby promoting improvements in aerobic fitness.

One of the major advantages of rope skipping is that it requires minimal equipment, limited space, and low financial investment, making it suitable for implementation in school settings. Unlike many specialized fitness programmes that require expensive facilities or equipment, rope skipping can be easily incorporated into regular physical education classes. In

addition, it is an enjoyable activity that encourages active participation among students. The versatility of rope skipping allows for variations in intensity, duration, and movement patterns, making it appropriate for individuals with different fitness levels.

Scientific evidence suggests that regular participation in aerobic exercises such as rope skipping leads to numerous physiological adaptations. These adaptations include increased stroke volume of the heart, enhanced cardiac output, improved lung capacity, greater efficiency in oxygen transportation, and improved utilization of oxygen by working muscles. Such changes contribute significantly to the development of cardiovascular endurance. Moreover, rope skipping enhances coordination, balance, agility, and lower-body muscular endurance, providing additional fitness benefits beyond cardiovascular improvement.

Several researchers have reported positive effects of aerobic training programmes on the cardiovascular fitness of children and adolescents. Studies have demonstrated that regular participation in structured aerobic activities results in significant improvements in endurance performance and overall health-related fitness. However, despite the growing popularity of rope skipping as a fitness activity, limited research has specifically examined its effectiveness in improving cardiovascular endurance among school students within the educational setting. This gap in the literature highlights the need for further investigation into the potential benefits of rope skipping training for young populations.

Considering the importance of cardiovascular endurance for health and physical performance and the practical advantages of rope skipping as an exercise modality, the present study was undertaken to examine the effectiveness of a structured rope skipping training programme on cardiovascular endurance among school students. The findings of this study may provide valuable information for physical education teachers, coaches, and fitness professionals seeking effective and economical methods to improve the cardiovascular fitness of school-going children.

Therefore, the primary objective of the present study was to determine the effect of rope skipping training on cardiovascular endurance of school students as measured through the 1 Mile Run/Walk Test.

2. METHODOLOGY

The present study was conducted to examine the effect of rope skipping training on cardiovascular endurance among school students. For this purpose, the researcher adopted a single-group pre-test and post-test experimental design, which is one of the most used experimental designs in physical education and sports science research.

In this design, a single group of subjects was selected and assessed on the dependent variable before the administration of the training programme. The initial assessment, known as the pre-test, was conducted to determine the baseline level of cardiovascular endurance of the participants. Following the pre-test, the subjects underwent a structured rope skipping training

programme for a specified period under the supervision of the researcher. Upon completion of the training programme, the participants were again assessed using the same testing procedure. This assessment was referred to as the post-test. The purpose of employing the pre-test and post-test experimental design was to determine whether any significant changes occurred in the cardiovascular endurance of the subjects as a result of the rope skipping training programme. By comparing the pre-test and post-test scores, the effectiveness of the training intervention could be accurately evaluated.

The independent variable of the study was rope skipping training, whereas the dependent variable was cardiovascular endurance, which was measured through the 1 Mile Run/Walk Test. The differences between pre-test and post-test scores were statistically analyzed using the paired sample t-test to determine the significance of the improvement achieved through the training programme.

The schematic representation of the research design is presented below:

Group	Pre-Test	Experimental Treatment	Post-Test
Experimental Group (N=30)	O ₁	Rope Skipping Training Programme	O ₂

Where:

- O₁ = Pre-Test Measurement of Cardiovascular Endurance
- X = Rope Skipping Training Programme
- O₂ = Post-Test Measurement of Cardiovascular Endurance

Thus, the single-group pre-test and post-test experimental design enabled the researcher to assess the effectiveness of rope skipping training in improving the cardiovascular endurance of school students by comparing their performance before and after the training intervention. This design was considered appropriate for the present investigation because it provided a direct measure of the impact of the training programme on the selected variable.

Subject and sampling

For the purpose of the present study, thirty (N = 30) school students were selected as subjects from a recognized school. The age of the participants ranged between 13 and 15 years.

The subjects were selected through the purposive sampling technique, considering their regular attendance, willingness to participate, and medical fitness to undergo the training programme. All selected students were free from any physical disability, injury, or medical condition that could adversely affect their participation in the rope skipping training programme. Prior to the commencement of the study, permission was obtained from the school authorities, and the participants were informed about the objectives and procedures of the investigation. The selected subjects constituted a single experimental group and participated in the rope skipping training programme for the prescribed training period. Cardiovascular endurance was assessed before and after the training intervention using the 1 Mile Run/Walk Test to determine the effectiveness of the rope skipping training programme.

Table 2.1 Distribution of Subjects

Particulars	Details
Population	School Students
Sample Size	30
Age Group	13–15 Years
Sampling Technique	Purposive Sampling
Gender	Boys and girls
Research Design	Single-Group Pre-Test and Post-Test Experimental Design
Variable Selected	Cardiovascular Endurance
Criterion Measure	1 Mile Run/Walk Test

Training Protocol

The selected students underwent a structured rope skipping training programme for a specified training period under the

supervision of the investigator. The training sessions were conducted regularly with progressive increases in intensity and duration.

Table 1 Statistical analysis

Variable	N	Pre-Test Mean	SD	Post-Test Mean	SD	MD	df	Calculated t	Tabulated t
1 Mile Run/Walk Test (Minutes)	30	10.19	1.57	8.53	1.43	1.67	29	15.99*	2.045

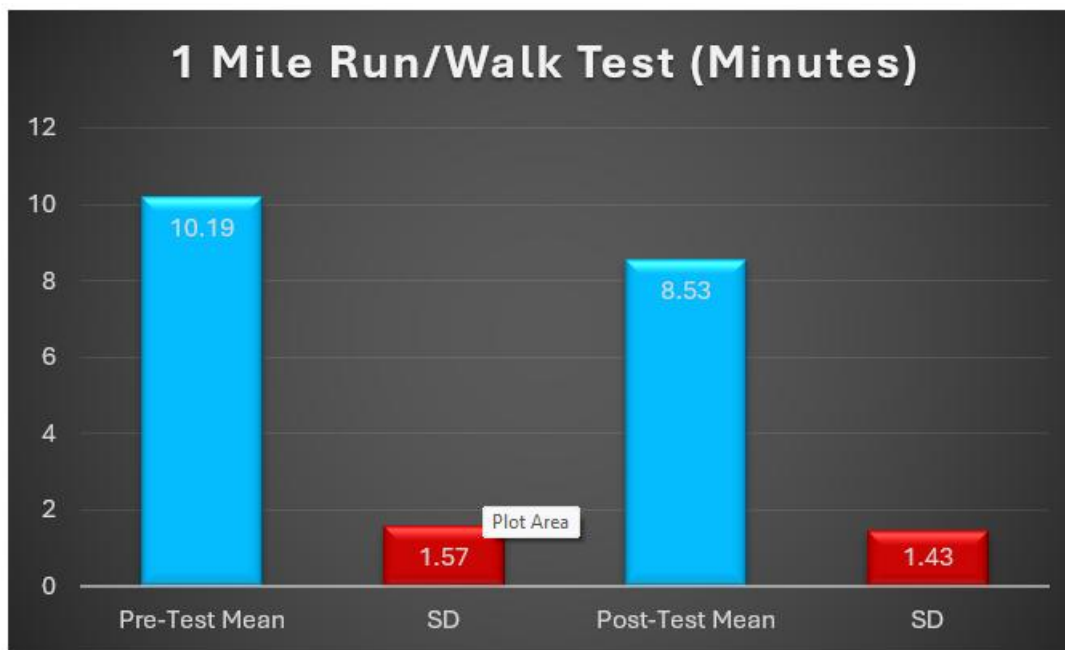
*Significant at 0.05 level of significance.

Statistical Interpretation

Table 1 presents the pre-test and post-test scores of cardiovascular endurance measured through the 1 Mile Run/Walk Test. The pre-test mean score was 10.19 ± 1.57 minutes, whereas the post-test mean score was 8.53 ± 1.43 minutes. The mean difference between pre-test and post-test was 1.67 minutes. The calculated t-value of 15.99 was found to be greater than the tabulated t-value of 2.045 at the 0.05 level

of significance with 29 degrees of freedom. Therefore, the difference between pre-test and post-test scores was statistically significant. The findings indicate that rope skipping training significantly improved cardiovascular endurance among school students. The reduction in completion time during the post-test suggests enhanced aerobic efficiency and improved cardiovascular functioning.

Graph no.1



Graph No. 1: Graphical representation of mean and S.D. of 1 mile run walk

3. DISCUSSION

The results of the study demonstrated that rope skipping training produced a significant improvement in cardiovascular endurance among school students. The observed improvement may be attributed to the aerobic nature of rope skipping, which increases heart rate, enhances oxygen transportation, and improves the efficiency of the cardiovascular and respiratory systems.

Regular rope skipping activities stimulate continuous muscular contractions that require increased oxygen delivery to working muscles. This physiological adaptation improves stroke volume, cardiac output, and aerobic capacity, thereby enhancing cardiovascular endurance. The significant decrease in the time required to complete the 1 Mile Run/Walk Test after the training programme confirms the effectiveness of rope skipping as an aerobic conditioning exercise.

Furthermore, rope skipping training places continuous demands on the cardiorespiratory system, leading to adaptations such as increased maximal oxygen uptake (VO_{2max}), improved circulation, enhanced pulmonary efficiency, and better utilization of oxygen by the working muscles. These physiological adaptations collectively contribute to improved

endurance performance and reduced fatigue during prolonged physical activity.

The findings of the present study are supported by several previous investigations. **Baquet, Van Praagh, and Berthoin (2003)** reported that regular aerobic training significantly improves cardiovascular fitness and aerobic capacity in children and adolescents. Their findings indicated that structured endurance-oriented activities enhance the efficiency of the cardiovascular system and improve overall endurance performance.

Similarly, **Strong et al. (2005)** concluded that regular participation in moderate-to-vigorous physical activities contributes significantly to improvements in cardiorespiratory fitness among school-aged children. The authors emphasized that aerobic exercise interventions are effective in promoting cardiovascular health and physical fitness during childhood and adolescence.

The findings are also consistent with those of **Faigenbaum and Myer (2010)**, who reported that structured physical activity programmes improve health-related fitness components, including cardiovascular endurance, among youth populations. Their study highlighted the importance of regular exercise

participation for enhancing physiological functioning and reducing health risks associated with sedentary lifestyles. Further support for the present findings is provided by **Pate et al. (2006)**, who observed that aerobic activities performed regularly in school settings significantly improved cardiovascular fitness and physical performance among children. The authors recommended incorporating enjoyable aerobic exercises into physical education programmes to promote long-term health benefits.

In addition, **Malina, Bouchard, and Bar-Or (2004)** emphasized that endurance-based physical activities during the developmental years contribute to significant improvements in cardiovascular efficiency, oxygen utilization, and overall physical fitness. Their findings suggest that consistent aerobic exercise is essential for healthy growth and physical development.

The significant improvement observed in the present study may therefore be attributed to the cumulative physiological adaptations induced by the rope skipping training programme. Since rope skipping is a rhythmic and continuous aerobic activity involving large muscle groups, it effectively stimulates the cardiovascular system and promotes enhanced endurance capacity. Consequently, the results of the present investigation support the view that rope skipping training is an effective and practical method for improving cardiovascular endurance among school students.

4. CONCLUSION

Based on the findings of the study, it was concluded that rope skipping training significantly improved cardiovascular endurance among school students. The calculated t-value (15.99) was greater than the tabulated value (2.045), indicating a statistically significant improvement following the training programme. Therefore, rope skipping training can be recommended as an effective and practical exercise strategy for enhancing cardiovascular endurance in school-going children.

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