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THE INFLUENCE OF INTERVAL TRAINING AND CIRCUIT TRAINING ON THE PHYSICAL FITNESS OF TAEKWONDO ATHLETES IN THE AGE GROUP OF 9-13 YEARS

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Abstract
This study aims to determine and compare the effects of interval training and circuit training on the physical fitness improvement of Taekwondo athletes aged 9 to 13 years in Batang Regency. The research employed a quasi-experimental method with a pretest-posttest group design. Subjects were divided into two treatment groups, each undergoing a structured training program consisting of 12 sessions over a period of 4 weeks. The training focused on enhancing physical fitness, measured using the bleep test which covers endurance, strength, agility, and aerobic capacity. The results showed that the interval training group experienced an average improvement of approximately 31.1%, while the circuit training group showed a higher increase of around 35.5%. The paired sample t-test indicated a significant difference between the pretest and posttest results in both groups (t count > t table). However, the circuit training group demonstrated slightly higher t values and percentage gains than the interval group, suggesting that while both methods are effective, circuit training may offer a more optimal approach to improving physical fitness in young athletes. This research is expected to serve as a valuable reference for coaches and trainers in selecting appropriate training methods, and to help athletes better understand the importance of structured physical fitness development.
***Keywords**: Interval Training, sirkuit Training, Physical Fitnes, Taekwondo, Young Athletes*

INTRODUCTION

Physical condition is a fundamental element and serves as the foundation for improving technique, strategy, and mental development. Optimal physical condition can be achieved if training begins at an early age, is carried out continuously throughout the year, progresses in stages, and adheres to proper training principles (Bafirman & Wahyuri, 2019).

Sport activities are essential for both physical and mental health. Through regular and structured body movements, exercise enhances physical fitness, strengthens brain function, and supports achievements in both academic and non-academic fields. Not only children and adults, but even the elderly can engage in physical activities suited to their abilities. For some, exercise has become a lifestyle. One sport that demands a high level of physical fitness is martial arts, such as taekwondo. Taekwondo emphasizes leg strength and is divided into two main competition categories: kyorugi and poomsae (Hidant Rachman Gusti, 2022).

To perform optimally, athletes must possess strength, agility, flexibility, and good endurance. Interval training and circuit training are effective methods to improve the physical fitness of taekwondo athletes. Interval training involves high-intensity physical exercises interspersed with rest periods, which help improve cardiovascular endurance and the body's oxygen capacity (VO_2Max). Meanwhile, circuit training combines light resistance exercises with high repetitions and short rest intervals, contributing to improved muscular endurance, flexibility, and cardiovascular health.

Taekwondo originated in Korea during the Koguryo Dynasty (37 AD) and was historically known by various names such as subak, taekkyon, and taeyon. In Indonesia, taekwondo began to develop in 1975 through two organizations: one affiliated with the International Taekwondo Federation (ITF) and the other with the World Taekwondo Federation (WTF). Due to organizational dualism, its growth was initially hindered. However, since the unification under Taekwondo Indonesia (PBTI) in 1981, the sport has progressed rapidly and gained both national and international recognition (DISPORA SUMATRA UTARA, 2013).

One of the fitness evaluation methods commonly used is the bleep test (Multistage Fitness Test/MFT), which measures aerobic endurance through shuttle runs paced by audio beeps. This test provides an overview of an athlete's VO_2Max capacity and assists coaches in designing training programs that are appropriate for the athlete's age and physical condition (Quninn Casteel, 2024).

Based on the initial observation, it was found that nearly 90% of BRB athletes aged 9–13 years did not yet possess good physical fitness. Therefore, the researcher aims to investigate whether interval training and circuit training significantly influence physical fitness performance. By implementing these training methods, the study will assess whether there is a significant difference between the two approaches.

This research has several limitations to maintain a clear and focused scope. The subjects are limited to taekwondo athletes in Batang Regency, aged between 9 and 13 years. The study compares only two training methods: interval training and

circuit training. Moreover, the analysis of physical fitness is concentrated on four main components: endurance, strength, agility, and aerobic capacity.

Based on the background described earlier, this study focuses on five main research questions formulated into a single framework. First, it seeks to explore how interval training influences the physical fitness of Taekwondo athletes within the 9–13 age group in Batang Regency. Second, it examines the extent to which circuit training can enhance the physical condition of athletes in the same age group. Third, the study investigates whether there is a significant difference in physical fitness improvement between athletes who undergo interval training and those who engage in circuit training. Fourth, it aims to identify the factors that affect the effectiveness of each training method in improving athletes' physical fitness. Lastly, it analyzes how both training methods impact key components of physical fitness such as endurance, strength, and agility among young Taekwondo athletes in Batang Regency. This study aims to examine and compare the effects of interval training and circuit training on improving the physical fitness of Taekwondo athletes aged 9–13 years in Batang Regency.

The results of this study are expected to provide valuable insights and information for coaches, athletes, and Taekwondo trainers in selecting the most effective training method to enhance physical fitness. In addition, this research offers a scientific foundation for developing training programs in preparation for upcoming competitions.

METHOD

This study employs a quantitative approach using an experimental method, specifically the pre-test–posttest design. The purpose of this research is to determine the extent of the influence of two types of training Interval Training and Circuit Training on the physical fitness of Taekwondo athletes. The main focus of measurement is the change in the athletes' bleep test levels, which are compared before and after they undergo the designated training program (Wahyudi 2018).

In this study, the athletes are divided into two groups. The first group receives treatment in the form of Interval Training, while the second group undergoes Circuit Training. The research design falls under the category of quasi-

experimental**,** specifically using a matching-only design, in which participants are grouped based on certain similar characteristics before the treatment is administered (Wahyudi 2018). This study was conducted on May 27, 2025, in Blado Subdistrict, Batang Regency. The location was chosen because Batang Regency has a large number of athletes with varying levels of physical fitness. One of the notable sites is the BRB Taekwondo Club dojang, located in Blado, which is a newly established training center in the region.

According to Sugiyono (2017), a population is the entire set of research objects or individuals that possess specific characteristics and become the main focus of a study. This population may include individuals, groups, or objects relevant to the research objectives. In this study, the population consists of 100 Taekwondo athletes. The population is dynamic and may change each year due to the addition of new athletes, relocation, or inactivity.

From this population, 20 athletes were selected as the research sample. The selection was carried out through several stages based on specific criteria: athletes aged 9–13 year**s**, active participants, having relatively low physical fitness, and showing varying levels of fitness to allow for measurable changes. After the initial selection, 37 athletes qualified for the next phase, which involved a pre-test using the bleep test to assess their fitness levels. From this test, only 23 athletes met the fitness criteria. The next step was a random draw using numbers 1 to 23, and only the athletes assigned numbers 1 to 20 were selected as the final research sample. These 20 athletes were then divided into two groups using the ABBA method. The grouping was carried out by ranking the athletes' fitness test results from the lowest to the highest, then assigning them alternately to ensure that both groups had a balanced level of initial physical fitness. Each group consisted of 10 athletes, with one group undergoing interval training and the other participating **in** circuit training. This division aimed to examine the effect of each training method on improving the physical fitness of Taekwondo athletes aged 9–13 years.

This research employs a quantitative experimental method using a pre-test–posttest design. The aim of this experimental study is to determine the effect of two types of training Interval Training and Circuit Training on the physical fitness of

Taekwondo athletes. The study measures the changes in the athletes' fitness levels before and after receiving the treatment (intervention). The research compares two different training variations: the first group follows Interval Training, while the second group undergoes Circuit Training. The design used in this study is **a** quasi-experimental approach, specifically a matching-only design (Wahyudi, 2018). The sample consists of athletes aged 9 to 13 years from the BRB Fighter dojang in Blado Subdistrict, Batang Regency, who received 12 training sessions divided into three phases: sessions 1–4, 5–8, and 9–12. Each phase involved a gradual increase in training intensity. Before undergoing these treatments, all athletes completed a pre-test using the bleep test to assess their initial level of physical fitness.

In this study, the process begins with a pre-test and ends with a post-test. However, before that, the researcher will provide a series of treatments over 12 sessions, namely interval training and circuit training. The instrument used in this research involves a t-test, presenting a percentage comparison between the two variables, X and Y. The independent variables in this study are interval training and circuit training, while the dependent variable is the improvement in physical fitness, measured by the level of the bleep test after the treatments are administered.

RESULT AND DISCUSSION

The pre-test and post-test were conducted to determine the extent to which the treatments administered by the researcher affected the physical fitness of BRB Fighter athletes in Blado District, Batang Regency.

The following is a table of the pre-test and post-test results of the two independent variables:

Table 1. Pre-test and Post-test Results of Interval Training

Name	Pre-test	Post-test	Improvement
RN	1,7	2,3	0,6
DY	2	2,8	0,8
SN	2	3	1,0
ST	2,9	3,7	0,8
AB	3	4	1,0
SL	3	4,6	1,6
HZ	3,1	3,8	0,7
VS	4	5,1	1,1
HN	4,5	5,6	1,1
MD	5	6	1,0

Referring to the data table previously presented, the group that underwent Interval Training showed an improvement in physical fitness performance based on the bleep test results. The average score before the training was recorded at 3.12, which increased to 4.09 after the treatment, with an average improvement of 0.97 points. The percentage increase reached approximately 31.1%.

Table 2. Pre-test and Post-test Results of Circuit Training

Name	Pre-test	Post-test	Improvement
AL	1,9	2,5	0,6
LB	2	2,7	0,7
RJ	2,1	3,3	1,2
AX	2,4	3,5	1,1
CN	3	4	1,0
QS	3	3,8	0,8
IL	3,3	4,6	1,3
ML	4	5,2	1,2
LK	4,6	5,6	1,0
RN	1,9	3	1,1

The group that participated in Circuit Training also recorded a significant improvement in physical fitness. The average bleep test score increased from 2.82 to 3.82, with an average difference of 1.00, equivalent to a 35.5% improvement.

According to Sujarweni (2019), the t-test is used to examine the effect of each independent variable (X1, X2, X3) on the dependent variable (Y). The decision rule is based on the significance value: if the significance value is greater than 0.05, then H_0 is accepted; whereas if the significance value is less than 0.05, then H_0 is rejected (Amelia et al. 2020)

This study, a paired t-test was used. The paired t-test is applied to determine whether there is a significant difference between the values before and after the treatment within the same group. This test was conducted on two groups: the Interval Training group and the Circuit Training group. Based on the analysis of the pre-test and post-test data from both groups, it was found that Interval Training resulted in an average improvement in physical fitness of approximately 31.1%. Meanwhile, the group that participated in Circuit Training showed a higher increase, around 35.5%. These findings indicate that both types of training are effective in enhancing physical fitness, particularly among Taekwondo athletes aged 9 to 13 years.

This improvement indicates that a structured training program tailored to children's age characteristics can have a positive impact on the development of their physical abilities. Although both methods proved effective, the analysis revealed that Circuit Training had a slightly greater impact compared to Interval Training. This difference in improvement is evident not only from the average increase in scores but also supported by the results of the paired t-test. Both the interval and circuit training groups showed significant improvements after the treatment. This is indicated by the calculated t-value being greater than the critical t-table value, suggesting that the difference is statistically significant and not due to chance, but rather a direct result of the training programs provided.

This study is in line with and reinforces previous research, which found that interval training had a significant impact on improving VO_2Max among members of the Running Loka running community in Ciamis Regency (Rustiawan 2020). Circuit training was also found to have a significant effect on improving aerobic endurance among students at the Briliant Study Center course institution (Aryatama 2022). This study is in line with and reinforces previous research, which found that interval training had a significant impact on improving VO_2Max among members of the Running Loka running community in Ciamis Regency. Circuit training was also found to have a significant effect on improving aerobic endurance among students at the Briliant Study Center course institution. Additionally, circuit training was shown to have an effect on physical fitness, with a significance value of 0.000 ($p < 0.05$) (Aristiyanto et al. 2021).

CONCLUSION

Based on the research that has been conducted, it is evident that both training methods interval training and circuit training are effective in improving physical fitness. This improvement plays an important role in supporting the physical development of young athletes. As such, the findings of this study can serve as a valuable reference for coaches in designing and implementing structured training programs. By selecting training models that are appropriate for the athletes' age and physical condition, coaches can enhance the effectiveness of the training process. Ultimately, this contributes to the improvement of performance development at

BRB Fighter, helping athletes reach the desired level of achievement in a more targeted and systematic manner.

SUGGESTIONS

This study was conducted over only 12 sessions, with training held three times a week, and it still resulted in a significant improvement. If this program is implemented continuously, the physical fitness of BRB Fighter athletes is expected to consistently improve, which in turn could enhance their performance in future competitions.

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