

**The Effect of Fort Games on Physical Fitness**Haykal Ibham Hilmi^{1*}, Hijrah Maulidiah Afifah²¹²Department of Elementary Physical Education, Faculty of Sports Science, Universitas Negeri Semarang, Indonesia**Keywords**

Bentengan game;
physical fitness;
traditional games;
TKPN

Abstract

This study aimed to examine the effect of the traditional Bentengan (fort) game on improving the physical fitness of fourth-grade students at Pakintelan 02 State Elementary School. The research employed a quantitative approach with a quasi-experimental design using a one-group pretest-posttest model. The sample consisted of 21 students selected through total sampling. Data were collected using the Nusantara Student Fitness Test (TKPN), which includes sit-up, V-sit reach, squat thrust, and pacer test components. The data were analyzed using descriptive statistics and inferential analysis, including normality, homogeneity, and paired sample t-test at a significance level of 0.05. The results showed that students' physical fitness improved after the treatment, as indicated by increased mean scores across all test components and a shift in fitness categories from predominantly poor and very poor in the pretest to fair and good in the posttest. The paired sample t-test revealed a significant difference between pretest and posttest results ($p < 0.05$), confirming the effectiveness of the Bentengan game in enhancing students' physical fitness. In conclusion, the traditional Bentengan game can be used as an innovative, engaging, and effective learning method to improve physical fitness among elementary school students.

✉ Corresponding author :

E-mail: haykalibhm@students.unnes.ac.id

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INTRODUCTION

Physical Education and Sports is an integral part of the national education system, playing a vital role in developing students' physical fitness, motor skills, knowledge, sportsmanship, and social values through planned and systematic physical activity (Hasan, 2025; Sari et al. 2024). Physical education is not solely oriented toward physical activity but also an educational process that contributes to the holistic development of individuals, encompassing physical, mental, emotional, and social aspects (Kurniawan 2023; Islam, 2025). Physical fitness is a key asset that every individual, both adults and children, should possess. Physical fitness can be achieved through regular, measurable physical activity, in both quality and quantity. Therefore, the learning process for Physical Education needs to be designed in an engaging, varied manner, and in accordance with the developmental characteristics of elementary school students to optimally achieve learning objectives (Hutomo & Kurniawan 2025).

One relevant learning medium in Physical Education is traditional games. Traditional games are part of the nation's cultural heritage, possessing educational, social, and health value. Through traditional games, students not only engage in physical activity but also learn to cooperate, obey rules, develop social skills, and instill character values (Afifah et al. 2025; Cahyani et al. 2023). However, technological advancements and lifestyle changes have led to traditional games being increasingly replaced by passive, low-physical-activity digital games, potentially reducing the physical fitness levels of elementary school-aged children (Rachman et al. 2025).

Traditional games are a form of physical activity that significantly contributes to children's growth, development, and physical fitness (Afifah & Maheswari 2025; Muti et al. 2025). Outdoor play allows children to explore their surroundings directly, thus helping them understand the world more concretely and contextually (Nafa., 2025). Furthermore, traditional games have rules that must be followed by each player, so through play, children learn to respect rules, develop discipline, and prepare themselves to play responsible roles in society (Rezki, Anugrah, and Ikhsan 2024). Children's involvement in traditional games can stimulate both the right and left hemispheres in a balanced way and develop their cognitive, emotional, and social skills. One such traditional game is bantengan.

Bantengan is a group game that involves complex movement elements such as running, chasing, dodging, and teamwork (Nisa et al., 2025). This activity requires cardio-respiratory endurance, speed, agility, and muscle strength, thus having great potential to improve students' physical fitness. Furthermore, the competitive and enjoyable nature of the fortification game motivates students to be active without feeling burdened by monotonous physical exercise. Therefore, the fortification game not only serves as a learning tool but can also be used as an alternative natural measure of students' physical fitness (Octavia, 2024). Fortification is a traditional game in which teams are divided into two teams, each consisting of 4-8 players. Each team selects a location, such as a pole, stone, or house pillar, to serve as a fort. The game involves attacking and capturing the opponent's fort by shouting the word "fortification" (Sholehatun, Zain, and Angga 2023). Meanwhile, according to Saputri (2021), fortification is a type of game in which players capture the opponent's fort by touching their body parts. Each member has their own role, including a player who acts as a spy, a distractor who lures the opponent out, a fort guard, and an attacker.

Based on the results of initial observations at Pakintelan 02 State Elementary School, Physical Education learning, especially in training physical fitness for fourth-grade students, is still dominated by conventional exercises such as running and gymnastics, and rarely utilizes traditional games, so that learning tends to be monotonous and less interesting, which has an impact on low motivation and student activity in moving. Physical fitness is an important factor that supports the growth, development, health, and concentration abilities of elementary school students (Hanif Taufiqurrahman, Amiruddin, and Masyitah 2025). The urgency of this research lies in the condition of Physical Education learning in elementary schools, which still does not utilize a variety of fun, activity-based learning methods. Minimal use of traditional games leads to low enthusiasm and student participation, ultimately affecting physical fitness. Therefore, this research is important for providing innovative, contextually appropriate

solutions for Physical Education learning that align with the developmental characteristics of elementary school students. The novelty of this research lies in the focus of the study, which specifically examines the influence of the traditional fort game on the physical fitness of fourth-grade students, by emphasizing comprehensive measurements through a comparison of the initial and final conditions of students after being given treatment, in contrast to previous studies, which generally examine traditional games in general or compare several types of games. This study aims to objectively analyze the effectiveness of the traditional fort game in improving the physical fitness of fourth-grade students at Pakintelan 02 State Elementary School. The urgency of this research arises from the declining level of students' physical activity and the growing need for innovative, enjoyable, and culturally based physical education approaches that can effectively enhance students' physical fitness while preserving traditional games as part of local cultural heritage. Therefore, the findings of this study are expected to contribute to the development of more contextual, effective, and engaging Physical Education learning methods, as well as provide practical insights for PE teachers in improving both the quality of instruction and students' physical fitness.

METHODS

This study used a quantitative, quasi-experimental design to determine the effect of the traditional Bentengan game on students' physical fitness. The research design used a one-group pretest–posttest design. One group was given a pretest, followed by a treatment involving the traditional Bentengan game, and then a posttest. This design was chosen because it enabled the researcher to objectively compare students' physical fitness before and after the treatment, facilitating analysis of any changes in the treatment's impact.

The population of this study was all students at Pakintelan 02 State Elementary School, Gunungpati District, Semarang City, for the 2025/2026 academic year. The sample consisted of all fourth-grade students (20), selected using a total sampling technique. The study was conducted at Pakintelan 02 State Elementary School and the Sitrombo field for one month, with eight learning sessions using the traditional Bentengan game.

The research instrument used was the Nusantara Student Fitness Test (TKPN) issued by the Ministry of Youth and Sports of the Republic of Indonesia. The TKPN consists of five test components: Body Mass Index (BMI), V-Sit Reach for flexibility, Sit-Ups for abdominal muscle endurance, Squat Thrust for leg muscle strength and endurance, and the PACER Test for cardiopulmonary endurance. This instrument was chosen because it has good validity and reliability and is used nationally as a standard measure of student physical fitness.

Data collection was conducted through physical fitness tests and measurements. All study subjects first took a TKPN pretest to determine their baseline physical fitness level. Next, students received a treatment in the form of physical education learning using the traditional game Bentengan for 8 sessions. After the treatment, students took the TKPN posttest. The raw scores for each test item were converted to standard TKPN scores based on age and gender norms, and these scores were summed to obtain each student's total physical fitness score. The TKPN norms are as follows:

Table 1. TKPN Norms

Category	Achievement Results
Excellent	> 4
Good	3 - 3,9
Fair	2 - 2,9
Poor	1 - 1,9
Very Poor	< 1

Data analysis used prerequisite analysis tests, including normality and homogeneity tests. The normality test assesses whether the data are normally distributed, while the homogeneity test checks whether the variances in the pretest and posttest data are equal. After the prerequisite tests were met, a paired-samples t-test was conducted to determine differences in students' physical fitness levels before and after receiving the traditional fort

game treatment. All data analysis was conducted using the SPSS program with a significance level of 0.05.

RESULTS AND DISCUSSION

Based on anthropometric measurements of 21 students, the distribution of research subjects by gender was 10 males and 11 females. This is shown in **Table 2** below.

Table 2. Anthropometric Measurements

Gender	N	Height	Weight	BMI
Male	10	132,6 ± 10,05	28,2 ± 6,75	15,83 ± 1,91
Female	11	134,82 ± 6,38	34 ± 8,46	18,54 ± 3,68

The average height of male students was 132.6 ± 10.05 cm, while female students had a slightly higher average height of 134.82 ± 6.38 cm. Regarding weight, female students showed a higher average (34 ± 8.46 kg) than male students (28.2 ± 6.75 kg). This condition affected Body Mass Index (BMI), with female students' BMI (18.54 ± 3.68 kg/m²) higher than male students' (15.83 ± 1.91 kg/m²).

Table 3. Body Mass Index

Category	Range	Frequency	Percentage
Underweight	< 18,5	14	66,7
Normal	18,5 – 22,9	5	23,8
Overweight	23 – 24,9	2	9,5
Obese	≥ 25	0	0
Total		21	100

The table shows the distribution of Body Mass Index (BMI) categories among the study subjects. The majority of students were underweight (14, 66.7%). Five (23.8%) were in the normal weight category, while two (9.5%) were overweight. No obese students were found. These results indicate that the majority of study subjects had below-normal nutritional status.

Table 4. TKPN Test Results

	Item Test	Min	Max	Mean	Stdev
Pretest	Sit Up	11	39	23,9	8,84
	V Sit Reach	-5	6	2,70	2,50
	Squat Thrust	5	10	7,62	1,75
	Pacer	11	37	23,38	9,57
Posttest	Sit Up	16	49	29,52	10,27
	V Sit Reach	1,2	9	5,18	1,82
	Squat Thrust	7	13	9,67	1,96
	Pacer	15	40	29,29	9,03

Table 4 shows the results of the TKPN measurement, which includes four test items: sit-up, V-sit reach, squat thrust, and pacer. In the initial measurement (pretest), the sit-up score ranged from 11 to 39, with an average of 23.9 and a standard deviation of 8.84, while the V sit reach ranged from -5 to 6, with an average of 2.70 and a standard deviation of 2.50. The squat thrust test had a minimum score of 5 and a maximum of 10, with an average of 7.62 and a standard deviation of 1.75, while the pacer test ranged from 11 to 37, with an average of 23.38 and a standard deviation of 9.57. In the final measurement (posttest), the sit up score increased with a range of 16–49 and an average of 29.52 and a standard deviation of 10.27, V sit reach was in the range of 1.2–9 with an average of 5.18 and a standard deviation of 1.82, squat thrust showed a range of 7–13 with an average of 9.67 and a standard deviation of 1.96, and the pacer test was in the range of 15–40 with an average of 29.29 and a standard deviation of 9.03.

Table 5. Results of physical fitness measurements

Category	PreTest		Posttest	
	Frequency	Percentage	Frequency	Percentage
Excellent	0	0	0	0
Good	0	0	9	42,86
Fair	4	19.05	10	47,62
Poor	14	66,67	2	9,52
Very Poor	3	14,28	0	0
Total	21	100	21	100

Based on students' physical fitness measurements, there was an increase in fitness categories after receiving the traditional fort game treatment. In the pretest, the majority of students were in the poor category (14 students, 66.67%), followed by the very poor category (3 students, 14.28%) and the sufficient category (4 students, 19.05%). At the same time, no students were in the good or very good categories. Meanwhile, in the posttest, there was a significant shift: no students were in the very poor category, and the poor category decreased to 2 students (9.52%). In contrast, the number of students in the sufficient category increased to 10 (47.62%), and the good category had 9 students (42.86%), although the very good category had not yet been achieved. These results indicate that implementing the traditional fort game has a positive impact on students' physical fitness.

Table 6. Normality Test

Variable	Statistic	df	Sig.	Description
PreTest	.948	21	.313	Normal
PostTest	.932	21	.149	Normal

The results of the Shapiro-Wilk normality test showed that the pretest data had a p-value of 0.313, while the posttest data had a p-value of 0.149. The significance values for both data groups were greater than 0.05, indicating that the data were normally distributed.

Tabel 7. Test of Homogeneity

Test of Homogeneity of Variance		Levene Statistic	df1	df2	Sig.	Description
Physical Fitness	Based on Mean	0.061	1	40	.806	Homogeneous

The homogeneity of variance test using Levene's Test showed a significance value of 0.806 (>0.05). This indicates that the physical fitness data had a homogeneous variance, thus meeting the requirements for further testing using the paired t-test.

Table 8. Paired Sample T-Test

Pretest - Posttest	Mean	Std. Deviation	Std. Error Mean	t	df	Sig.	Description
	-86.905	0.576	0.562	-15.459	20	0.000	Significant

The results of the paired-samples t-test showed a significance value of 0.000 ($p < 0.05$) with a t-value of -15.459. These findings indicate a significant difference between the pretest and posttest results in students' physical fitness. The results of this study indicate that implementing the traditional fort game significantly improves physical fitness. The fort game offers an alternative teaching approach that presents physical activity in an engaging, developmentally appropriate way for elementary school students, encouraging active participation and improving physical fitness through enjoyable, meaningful movement experiences.

DISCUSSION

The study found that implementing the traditional game of Bentengan significantly improved the physical fitness of fourth-grade students at Pakintelan 02 State Elementary School. This can be seen from the increase in scores on all components of the Nusantara Student Fitness Test (TKPN), namely sit-ups, V-sit reach, squat thrust, and pacer test. This increase indicates that the physical activity in the Bentengan game can train various components of fitness, including muscle strength, flexibility, and cardiorespiratory endurance. These results align with previous research indicating that traditional games improve the physical fitness of elementary school students (Rudiyanto and Hadi 2022). The Bentengan game involves complex basic movements and a fairly high level of activity intensity, making it effective for increasing endurance and muscle strength (Rijal, Mujriah, and Susilawati 2025). In addition to improving physical fitness, the Bentengan game also has a positive impact on students' social and emotional aspects. This game requires teamwork, communication between members, and adherence to game rules. This aligns with the opinion of Nuryanti et al. (2025), who stated that traditional games not only serve as a means of physical activity but also as a medium for character development, fostering social values, discipline, and responsibility in children.

Traditional games are a form of physical activity that involves active movement and can influence a person's physical fitness. Physical fitness is a very important aspect of physical education in schools because it supports the achievement of learning objectives, namely optimal student development (Fitrianto 2023). Students with good levels of physical fitness can carry out various activities in the school environment without easily becoming tired, whereas students with low levels of physical fitness tend to tire quickly and lack enthusiasm for physical activity.

The results of the inferential statistical test also showed a significant difference between the pretest and posttest, with a significance value of 0.000 ($p < 0.05$). This confirms that the increase in physical fitness was not merely coincidental but rather a result of the treatment provided. Thus, the fortification game has been empirically proven to be an effective learning method for improving students' physical fitness. This finding aligns with previous research that found that a game-based learning approach can significantly improve learning outcomes (Chan et al. 2021).

The fortification game also has high social value because it involves teamwork, communication, and strategy. In this game, students learn to coordinate with one another, share roles, and respect the game's rules. This aligns with the opinion of Nuryanti et al. (2025), who stated that traditional games can be an effective medium for character learning. Thus, the benefits of the fortification game extend beyond physical aspects to include students' social and emotional development.

However, several studies have yielded conflicting results, with structured exercise-based activities such as circuit training considered more effective at improving physical fitness than games (Simbolon et al. 2025). Fortress games are not simply used as play activities but are designed as part of a structured learning strategy. Teachers play a role in managing the game to ensure clear learning objectives. According to Sari et al. (2024), the success of physical education learning is greatly influenced by the teacher's ability to manage activities to align with the desired objectives.

This study has limitations, namely its short treatment duration, which means the long-term impact of fortress games on students' physical fitness has not yet been demonstrated. Furthermore, this study used only one type of traditional game and one measurement instrument (TKPN), so it does not provide a more comprehensive picture than other methods or variables.

CONCLUSION

Based on the research conducted, it can be concluded that the implementation of the traditional fort game improves the physical fitness of fourth-grade students at Pakintelan 02 State Elementary School. This is evidenced by an increase in the average score on all components of the fitness test, as well as a shift in the fitness category from predominantly

"less" and "very less" in the pretest to "sufficient" and "good" in the posttest. The results of the paired-samples t-test, with a significance value of $p < 0.05$, further strengthen the conclusion that the treatment is effective in improving students' physical fitness. In addition, the fort game has been proven to increase student participation, motivation, and active involvement in Physical Education learning. Thus, the traditional fort game can be recommended as an innovative, fun, and effective alternative learning method for improving the physical fitness of elementary school students.

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