

Circuit Game-Based Traditional Sports Therapy: Can It Improve the Physical Fitness of Elementary School Students?

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Abstract Playing games can also help primary school pupils become more physically healthy. Conventional games are owned by a collective group and maintain their traditions and customs throughout generations. Furthermore, circuit play is an educational strategy tailored to children's needs through conventional play, with five posts created using a game model. Finding out how Madrasah Ibtidayah Muhammadiyah Wonorejo students in Indonesia select their physical fitness components in response to traditional sports treatment based on circuit games was the main objective of this study. This study used a quantitative approach using a pretest-posttest control group experimental design. For the study, fifty pupils between the ages of ten and twelve were selected at random. There were twenty-five students in the experimental group and twenty-five in the control group. The control group did not get circuit game-based exercise therapy, whereas the experimental group did. The three components of traditional exercise treatment with circuit games consist of forty-minute weekly sessions. Over twelve weeks, tests, including dangling bent elbows, 600-meter sprints, vertical jumps, and 30-second sits, were given. The data for the study were analyzed using SPSS Version 26. The investigation employed an independent,

paired sample difference test with a significance value of 0.05. This exam is conducted twice, once before and once after. Traditional sports therapy with circuit games improved physical fitness for twelve weeks. These results could help PE teachers create traditional exercise therapy that allows students to become healthier using circuit games. The study suggests that students in elementary school may be healthier with traditional sports therapy that uses circuit games. Since the study involved only male respondents, care must be considered. A more significant sample number should be used for research, and more research should be done on students' physical health, social environment, and other elements.

Keywords Traditional Sports, Circuit Games, Physical Fitness, Elementary School Students

1. Introduction

Physical education learning in schools depends on its application; high-quality learning can ensure that students are healthier and fitter [1]. When physical education

programs are well implemented, students' health and fitness improve [2]. This is in line with Maratusholihah's opinion that character is an essential component in human life because it shapes how a person acts and behaves daily [3]. In addition, character formation in the millennial era shows that children will experience hypokinetic diseases, which cause long-term diseases [4]. Infectious or chronic diseases affect many people and financially challenge global health [5].

Considering the prevalence of obesity and inactivity among contemporary adolescents, high-quality physical education is essential [6]. For all children to continue being physically active, they must participate in a top-notch physical education program [7]. The program should be designed to improve physical skills, health-related fitness, self-responsibility, and satisfaction from exercise [8]. If carefully designed and implemented, physical education programs can only produce these benefits [9].

Every academic subject, including physical education, should be taught humanistically. This approach will keep students happy and increase class participation [10]. High-intensity resistance and aerobic exercise are combined in circuit training, a type of conditioning [11]. Improving endurance and muscle strength is the goal of this program, which is very easy to follow [12]. Once every activity the software recommends has been performed, an exercise "circuit" is made [13]. To improve this, plyometric exercises should be incorporated [14].

Strength, endurance, and mobility can all be enhanced by circuit training [15]. The practice circuit consists of six to ten strength exercises performed one after the other [16]. Before going on to the following exercise, each must be finished with multiple repetitions or in the allotted time [17]. Every drill is done one at a time during a circuit practice session without stopping. The circuit usually consists of eight to ten exercises, but the exact number may differ depending on time constraints [18].

Circuit training is a type of training program that consists of several stations or stations where the athlete completes specific exercises at each station [19]. Game-based training uses twelve to twelve posts or workstations [20]. Traditional game-based exercise therapy can provide many benefits to a person, which can be made easier by doing the following: increase strength and endurance; this is a training method suitable for most sports; it can be adjusted to a person's gender and age, fitness level, and health. The practice is easy so everyone feels accomplished afterward [21]. According to Asqarov et al., [22] all children must take part in school sports lessons in compliance with guidelines set forth by the Ministry of Education. Students can express their emotions, grow mentally, form wholesome connections, and participate in physical activity in a safe and encouraging setting throughout the physical education curriculum [23]. Determining if the experimental and control groups' levels of fitness differed statistically significantly was the goal of the study. Learning efficiently and rapidly requires

students to be in good physical and mental health. For the purpose of strengthening endurance, flexibility, and agility in the upper and lower bodies, traditional circuit-based exercise therapy is the best option.

Traditional games exist in the culture of every country [24]. Before the existence of advanced technology, children could play this game with makeshift tools. In addition, traditional games encourage the child's emotional development and instill his history. Traditional games teach social skills to children compared to modern games, which are more individualistic and reduce interaction between children [25]. Conventional games have cultural value somewhere [26]. Most people agree that traditional games are an excellent way to get students moving during physical education classes [27].

One of the cultural gems that our forefathers left behind is traditional gaming, which has a lengthy history [28]. Playing classic games can enhance psychomotor, emotional, and cognitive development [29]. Among the old games are Gobak Sodor, Engklek, Betengan, Kasti, Bentik, Dakon, Jump rope, Klereng, and Bekelan [30]. Playing with an emphasis on physical exercise has an effect on balance, speed, agility, psychomotor growth, and physical fitness [31]. Children who are physically fit will be less likely to suffer from injuries or have back problems [32]. In physical education, traditional games are a kind of physical activity that can be utilized to help students improve their physical fitness while they are in class [33]. Students that are physically fit can better demonstrate their superior abilities [34]. Children can improve in terms of cognitive, emotional, and psychomotor development if traditional games are taught as physical activity exercises in physical education. This will assist the kids to get in good physical shape [35].

Games improve mental, social, and physical health and provide skills and information needed for an active lifestyle, among other benefits of integrating them into physical education classes [36]. Playing sports lowers the risk of obesity, overweight, and cardiovascular disease while also improving many areas of physical fitness [37]. Today, students attend classes for longer periods each day and spend at least thirty minutes on physical education [38]. In addition to traditional activities and recess, students can study outside the classroom and exercise while at school [39]. Students' opportunities for physical activity are also increasing through programs offered before and after school [40]. However, adolescents and students spend more time playing video games on their mobile phones and become less engaged in the real world.

In addition, of course there are benefits from playing traditional games, one of which is the sport of fortification, such as fostering social values in students and preserving local culture, especially in Indonesia, a country with a diverse population. The fortification game or Rerebonan is a game played by two groups of captors and captives. Each group consists of four to eight people. Then, have one place as a headquarters.

This study is significant since it actively advances traditional game education. This timeless game improves students' learning experience. Students will benefit from this research by becoming more familiar with the traditional game of fortification and being more physically fit. It is expected that this research will also be important for elementary schools. Considering the nature, knowledge, and understanding of students for assessment and evaluation activities will be useful for educators. This study's main goal was to determine how traditional sports therapy, which uses circuit games as its basis, affected the physical fitness of Indonesian students at Madrasah Ibtidayah Muhammadiyah Wonorejo.

2. Materials and Methods

2.1. Research Area and Duration

A twelve-week quasi-experimental study was carried out to introduce circuit exercise to elementary school kids at Madrasah Ibtidayah Muhammadiyah Wonorejo, Central Java, Indonesia. This circuit training focused on certain aspects of physical health. All 50 students were regarded as a randomly selected sample for this investigation. Out of the fifty pupils, twenty-five were assigned to the experimental group and the remaining twenty-five to the control group. The sample was made up of people who were ten to twelve years old. The experimental group received both circuit training and regular exercise treatment for twelve weeks, three days a week. The researcher and his helper randomised participants to a circuit training program and provided instructions. In this study, the control group received typical instruction in a physical education program. Tests were administered twice to the experimental and control groups: once prior to training and once subsequent to it. The study was conducted at Madrasah Ibtidayah Muhammadiyah Wonorejo in the Indonesian province of Central Java, in the Karanganyar District.

2.2. Research Design

One pretest control group and one post-test control group were used in the pseudo-experimental design of the study. The control or experimental class was randomly selected. Consequently, the pre- and post-test control group designs used in this investigation. Two groups were divided into two groups namely the experimental group and the control group for this quasi-experimental investigation. The teacher provided circuit training through the traditional game of Betengan to the experimental group.

This circuit-based fortification game is carried out in stages, namely the first and second weeks: level 1 fortification with a playing field distance of 10 meters; the

third and fourth weeks level 2 fortification with a playing field distance of 20 meters; the fifth and sixth weeks level 3 fortification with a playing field distance of 30 meters; the seventh and eighth weeks level 4 fortification with a playing field distance of 40 meters; the ninth and tenth weeks level 5 fortification with a playing field distance of 50 meters; and the eleventh and twelfth weeks level 6 fortification with a playing field distance of 60 meters.

Here's how to play the Fort game: Before beginning the game, the students are split into two groups; (b) Each group must select a post, such as a tree, fort, pole, or other items that can serve as a base; (c) Players are assigned to capture the opponent's fort and guard part of their respective forts; (d) Each player must attach their hand to their fort before attacking; (e) Players will lose strength when the opposing player has just updated the strength of their fort or base; (f) The losing player will be captured by being taken prisoner in the enemy's fort; a group of his friends can save this prisoner by touching his body; (g) The group wins the game if they can touch the opponent's fort.

A control group, on the other hand, received either no therapy at all or none at all the help of this control group allowed for the discovery of variations between the experimental and control groups. While the first test results are known before to treatment, positive test findings are known after therapy. This approach was selected because it enables us to compare changes in physical fitness levels between before and after getting circuit-based exercise therapy.

Table 1. The study design

Type	Activities
Treatment	Traditional Betengan exercise therapy based on circuit training
Frequency	Three days per week
Total amount of time	12 weeks
The period of training	60 min
Exercises' level of difficulty	Low to High
Time of instruction	Morning

2.3. Participants

Students from Madrasah Ibtidayah Muhammadiyah Wonorejo in the Indonesian state of Central Java made up the fifty responders. Every male elementary school student in grades 5 through 6 was selected via purposeful sampling. Following that, the participants were divided into two study groups—the experimental group and the control group, each consisting of twenty-five people. The investigation was conducted from October 2023 to January 2024.

2.4. Instrument

Five physical fitness tests are administered to children

between the ages of ten and twelve: the forty-meter run, the bent elbow hang, the thirty-second sitting position, the upright jump, and the 600-meter run (adopted from [41]).

2.5. Procedure

For eight weeks, the subjects went to circuit training sessions three times a week. Moreover, between 30 and 60 minutes were spent on circuit training during the study, with an intensity range of 60 to 90%. Following that, five physical fitness tests were employed by the researchers, including:

1. Testicle assumes a standing start stance, ready to run, on the "ready" cue; on the "yes" signal, the testicle continues; this is the 40-meter running test. Test raced as quickly as they could to the finish line;
2. Bending elbow hanging test: (a) On the "ready" cue, both testicles' hands hold on to a single shoulder-width bar, with palms facing backward or pinkies inside; (b) On the "yes" cue, the testicle lifts the body until it reaches a bent elbow-dependent posture, where the chin is above the Single bar; and (c) the attitude is maintained for as long as possible;
3. The lying down test sits 30 seconds: (a) On the "ready" cue, the testicles lie down, both knees bent at about 90, the fingers of both hands slipping alternately behind the upper head. The officer holds both ankles so that the legs are not raised when performing a sitting lying motion; and (b) At the "yes" point, the testicle moves in a sitting posture so that both elbows touch both thighs, then to the starting posture repeatedly for 30 seconds;
4. Vertical jumping test: (a) Testicle stands upright with the side of the body close to the wall. The hand close

to the wall is raised straight up by attaching eight hands to the scale board, leaving finger marks; (b) The test takes the prefix with a knee-bending posture, and both arms are swung backward. Then, the testicle jumps as high as possible while tapping the scale board with the fingertips so that it leaves a finger grab. Performed three times;

5. 600-meter test: (a) On the "ready" signal, the testicle takes a starting stance standing behind the line; and (b) On the "yes" signal, the testicle runs towards the finish line, following the test guide table. The values and criteria for physical fitness of children aged 11-12 years can be seen in Table 2.

2.6. Statistical Analysis

Quantitative methodologies were used to gather physical fitness tests for the study both prior to and following circuit-based traditional exercise therapy. The findings of the pre- and post-tests are recorded. Analysis of the study's results was done with a 95% confidence interval and a t-test with $p < 0.05$. After the Shapiro-Wilk method normality test, the data must be regarded as normal for the t-test precondition test. The data is considered normal if $P < \alpha 0.05$, and extraordinary if $P > \alpha 0.05$. To assess the variations in each group's influence prior to and following therapy, t-tests were also employed. By comparing the average values of groups 1 and 2, this ensures that a two-group pre-test-post-test design is used. Acceptance of H_a occurs when the t-count number is more than the t-table. The t-test, mean, and standard deviation are more instruments for analysing and deciphering the data. The researchers utilised the statistical software SPSS Version 26 to analyse the data.

Table 2. Physical Fitness Values for children aged 10-12 years

Value	40 m run (second)	Hang elbow bend(pull-up) (Second)	Lying down sitting (sit-up) repetition	Vertical jump (cm)	600-meter run (minute)
5	< 06.7	> 40"	> 20	> 42	< 2'32"
4	06.8 – 07.4	20" – 39"	14 – 19	34 – 41	2'10" – 2'54"
3	07.5 – 08.3	8" – 19"	7 – 13	28 – 33	2'55" – 3'28"
2	08.4 – 09.6	5" – 7"	2 – 6	21 – 27	3'29" – 4'22"
1	> 09.7	0 – 1"	0 – 1	< 20	> 3'45" etc.

3. Result

This study's selected fitness tests included a forty-meter run, a bent elbow hanging test, lying down sitting for thirty seconds, jumping upright, and a 600-meter run. The data analysis is displayed in the table before and after the twelve-week circuit exercise. As previously said, this study sought to determine how circuit training and traditional exercise therapy affected the improvement of physical fitness.

Table 3 lists the age, weight, height, and Body Mass Index (BMI) of each research participant. These results demonstrate that the kids' starting weight, age, and height were nearly identical. Using data from the experimental, control, and pre- and post-test groups, descriptive statistics (mean and standard deviation) were calculated to assess the impact of a conventional exercise program based on circuit training on enhancing particular physical fitness components.

The physical fitness components of the pretest and post-test findings for the experimental and control groups were analysed before and after they participated in traditional exercise therapy based on circuit training. The results are shown in Table 4. After twelve weeks of traditional exercise-based exercise therapy, the mean and

standard deviations of each physical fitness component for the experimental pretest are shown in this table. These values changed and improved significantly for the post-test. The control group's average and standard deviation after testing for all four components of physical fitness muscular endurance, upper and lower body strength, and strength remained relatively close to the values acquired both before and after the test.

In addition to the normality of the analytical data for the pretest and post-test findings before and after their conventional exercise therapy treatment based on circuit training, Table 5 displays the physical fitness components of the experimental and control groups. There are five factors in the modified motor ability test: (1) a 40-meter run; (2) hanging bent elbows; (3) lying for 30 seconds; (4) jumping upright; and (5) running 600 meters. The data collection techniques used for these tests and measurements are indicated by values greater than 0.05 ($p > 0.05$). The Kolmogorov-Smirnov Z (KS-Z) test findings from the normalcy test serve as the foundation for these conclusions. Consequently, the study's samples and variables are displayed as populations with a typical distribution. Consequently, the study's variables and samples are shown as typically distributed populations.

Table 3. Participant demographics

Variables	Number of students	Sex	Age	Height	Weight	BMI
			Mean \pm SD	Mean \pm SD	Mean \pm SD	Mean \pm SD
Experiment group	25	Male	11.04 \pm 0.73	136.88 \pm 8.02	30.43 \pm 7.66	16.61 \pm 5.18
Control Group	25	Male	11.08 \pm 0.70	136.40 \pm 8.02	34.54 \pm 8.25	18.69 \pm 4.74

Note: SD – Standard Deviation

Table 4. Descriptive Statistics of Physical Fitness

Physical fitness	Groups			
	Experimental group (25) (Mean \pm SD)		Control group (25) (Mean \pm SD)	
	Pretest	Post-test	Pretest	Post-test
40-meter run	08.30 \pm 1.11	06.93 \pm 1.11	08.49 \pm 1.66	07.62 \pm 1.63
hang bent elbows (pull-up)	3.42 \pm 1.74	5.24 \pm 1.74	3.44 \pm 1.61	11.44 \pm 1.61
Lie sitting (sit-up) for 30 seconds	8.88 \pm 3.93	12.88 \pm 3.93	7.68 \pm 4.04	9.68 \pm 4.04
Vertical jump	37.12 \pm 10.95	42.12 \pm 10.92	32.16 \pm 8.50	34.16 \pm 8.50
600 meters run	4' .32" \pm 0.86	2'40" \pm 0.86	4'36" \pm 0.77	3' .41" \pm 0.77

Table 5. The Normality of physical fitness of elementary school students

Physical fitness	Groups			
	Experimental group (25)		Control group (25)	
	Significance (p>0.05)		Significance (p>0.05)	
	Pretest	Post-test	Pretest	Post-test
40-meter run	0.200*	0.172	0.179	0.153
hang bent elbows (pull-up)	0.200*	0.200*	0.159	0.200*
Lie sitting (sit-up) for 30 seconds	0.200*	0.200*	0.121	0.200*
Vertical jump	0.200*	0.200*	0.135	0.200*
600 meters run	0.152	0.200*	0.153	0.200*

*Significance (p >0.05)

Statistical Analysis

The variable's values were measured before and after manipulation using a paired sample T-test in order to see whether there were any differences in values between the two research groups. The result is displayed in the table below.

Table 6. Paired T-Test

Physical fitness	Groups	MD	T	DF	Sig. (2-tailed)
40-meter run	Exp. Pre-post	7.61	34.40	48	0.000
	Cont. Pre-post	8.05	24.77	48	0.000
hang bent elbows (pull-up)	Exp. Pre-post	9.76	33.62	48	0.000
	Cont. Pre-post	7.44	23.12	48	0.000
Lie sitting (sit-up) for 30 seconds	Exp. Pre-post	10.88	13.84	48	0.000
	Cont. Pre-post	8.68	10.75	48	0.000
Vertical jump	Exp. Pre-post	39.62	18.10	48	0.000
	Cont. Pre-post	33.16	19.51	48	0.000
600 meters run	Exp. Pre-post	3.36	19.64	48	0.000
	Cont. Pre-post	3.88	25.30	48	0.000

Notes: Exp. - experimental group, Cont. - control group, MD: mean differences between the pre-and post-test, T - calculated differences, DF: degree of freedom

Thus, Table 6 shows the significant value of the physical fitness of the experimental group compared to controls using conventional circuit exercise therapy. Pretest and post-test significance values for (1) 40-meter run, (2) bent elbow hang, (3) lying sitting for 30 seconds, (4) jumping upright, and (5) 600-meter run were significantly less than 0.05 (p <0.05). Thus, there is scientific evidence of differences in physical fitness. Research can also be extrapolated or applied to other sample groups in different populations.

4. Discussion

The study's results corroborate earlier assertions that conventional exercise training based on circuit training considerably increased primary school pupils' physical fitness. The results of an inferential and descriptive

analysis in Madrasah Ibtidayah Wonorejo, Central Java, Indonesia, provide additional credence to this conclusion. Elementary school students aged 10 to 12 benefit most from traditional exercise therapy based on circuit training if their physical fitness is considered a key component. Research Extensive body parts need to be involved in children's movement activities to develop physical fitness [21]. While children with exceptional needs frequently experience motor challenges, these issues are not always evident from birth [42]. Children with unique challenges generally develop physical fitness within a reasonable period [43]. The corpus callosum is connected with motor performance, relying heavily on the myelination of the nerves as a whole [24]. Students' interests and abilities in teaching and learning can be developed using this classic marble-based game-based learning approach [44].

The traditional circuit-based betengan game was the lesson plan for the first physical education class during the

intervention stage. Diverse experiences among students result in varying degrees of physical fitness [45]. The surrounding environment, the availability of structured physical education, the socioeconomic level, parental influence, participation, and climate all have an impact on the program's performance [46]. There is no doubt that the different degrees of fitness demonstrated have an impact on early involvement when students use the traditional betengan game-based physical education learning technique. Less fit people tend to feel that they could be fitter, exercise less, and think that life is more complicated [47].

Conversely, kids who are in better health feel more capable and find it simpler to do their schoolwork. They worked harder to prove they were better [48]. This suggests that students who engage in regular physical activity, particularly if they enjoy it, are more likely to maintain their commitment and advance their level of physical fitness [49].

When they grow older, children go through a delicate period when their interests in activities change from early to middle childhood. Interventions can persuade children to sign up for physical education classes, but motivation alone will get them there [50]. This activity doesn't have a vulnerability phase. This is due to the fact that retro gaming applications offer endless hours of entertainment [51]. People's opinions about the importance of playing traditional games and their level of fitness vary from early childhood to middle adulthood during this critical developmental time. At this stage, students may compare themselves to their classmates more precisely because they often have higher levels of mental development and more developed cognitive abilities [52].

Because traditional games involve play elements that can be enjoyable for students and educate the synchronization of the five senses and other physical body parts, using them in physical education will relieve students from the regulations connected to competencies [53]. Playing retro video games is one type of physical exercise that students enjoy performing [54]. Traditional games provide several instructional benefits for students [55]. The favourable social effects of higher fitness levels on various dimensions, including participation rates in physical education programs, are demonstrated in Table 6. The usage of classic games based on circuit games in physical education programs has a substantial impact on students' fitness. Participation in sports and extracurricular activities during college is a reliable predictor of future levels of physical activity [56].

Students engage with one another more, and gamers get better at the games. Because the game's action has progressed beyond comprehension, players are motivated to excel and become well-known. Because they did not want to lose to the other group, the children at this level were driven to play the game again; this demonstrates how groups compete with one another to win. Children are therefore motivated to collaborate with others and take part

in more physical education activities.

This study clearly explores the various relationships between traditional games and physical health, which is the goal of physical education in relation to learning outcomes [57]. Students are playing more physical activities and traditional video games for more extended periods [58]. Effective implementation of game-based physical education exercises can enhance students' physical fitness, particularly their running endurance [59]. Running is easy to train for and prepare for because it is a part of practically every physical activity.

Students that participate in the traditional game of betengan improve their ability to move indirectly rather than jumping and hopping horizontally. This exercise provides further chances to enhance neuromotor development in addition to promoting the growth of Fundamental Movement Skills (FMS) [60].

Students can learn the basic motions of object control by playing this game. They have to keep possession of the ball the whole game to advance it in the right direction [49]. It is possible to acquire the three fundamental object-handling skills: the two-handed catch, the overhand throw, and the underhanded throw. They need to aim the ball if they want to win. They are compelled to exercise digitally so long as the investigation's findings extend beyond the principles of FMS [61]. FMS is not the last aim; it is only the start of learning. Pupils in good physical health also progress mentally, socially, and physically. Living an active lifestyle is facilitated by this [62]. FMS is a movement pattern that serves as the foundation for more complex physical activity and training despite the fact that it is a necessary movement that starts the process of achieving more advanced physical fitness [63]. Traditional circuit-based training approaches need the exercises adequately supported by other supporting aspects, such as individual mobility and the sort of training technique or approach employed, to be appropriately applied. Consequently, it is essential to distinguish exercise approaches from the collection of instructional or practice procedures that involve specific exercises to accomplish particular objectives. Developing physical fitness requires understanding the topic, potential reactions, feedback, and reinforcement. Therefore, an essential awareness of how specific abilities can be acquired or learned and any elements that promote the mastery of such talents are required to achieve a degree above physical fitness. Particularly for pupils in primary school between the ages of ten and twelve, physical fitness is a skill that can only be acquired under particular conditions; it needs to be constantly practiced over a set amount of time. This demonstrates that physical fitness development and sports instruction take time and should be approached consistently and deliberately. This study was novel in that it found a relationship between physical fitness and circuit exercise-based exercise therapy. This is the case even though other research indicates that being physically fit aids in accurately identifying healthy individuals. More

investigation is required using larger samples and more minor factors to determine the association between these characteristics and the physical fitness of elementary school pupils.

5. Conclusions

The results showed that physical fitness was different before and after traditional circuit-based exercise therapy. However, to determine whether sports learning according to gender characteristics is successful, further examination of students' physical conditions, social environment, and psychology is needed.

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Conflict of Interest Declaration

This study did not contain any conflicts of interest.

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