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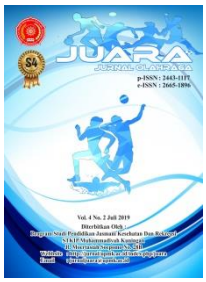

The Effect of Traditional Games Bebentengan on Aerobic Capacity and Agility

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Abstract

Some types of traditional games, such as bebentengan, have the same movements as some physical activities commonly carried out by individuals. Several studies on the effect of bebentengan on performance are still limited, so it is necessary to research the impact of bebentengan game treatment on aerobic capacity and agility. The research method used is an experimental method with one group pretest and posttest design without a control group, involving 20 teenagers from Serang City, Banten Province. The results showed that the bebetengan game treatment for three months increased the proportion of aerobic capacity by 5.27% and agility aspects by 3.28%. This study concludes that bebentengan games positively affect aerobic capacity and agility aspects in research subjects and can be used as an alternative to physical activity exercises.

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INTRODUCTION

Several types of physical activity generally carried out by people in Indonesia are jogging in public sports facilities or in city parks, leisurely cycling, and exercising at the fitness center or gym. Performing some of these physical activities regularly has been shown to provide many health benefits such as reducing the risk of chronic disease, premature death rate, limitation of body function (Tomioka et al. 2011), increasing aerobic and respiratory capacity (Bahri et al. 2017), and the benefits other body health (Park et al. 2014).

Traditional games are one type of physical activity that the community can do as

an alternative to other kinds of physical activity that have been carried out so far. Previous research concluded that traditional games have many benefits for physical development so that a person's character and traditional players can touch various aspects of development such as motor, cognitive, emotional, social, ecological, and moral values (Hasanah 2016; Irfansyah 2015; Nurdiansyah 2018; Nuriman, Kusmaedi, and Yanto 2016).

Several previous studies have stated that traditional games such as the obstacle course have been proven to benefit the agility of adolescent Pencak silat athletes (Hasanah 2016; Irfansyah 2015; Nurdiansyah 2018).

For other types of traditional games, such as fortifications, which are beneficial for children's motor movements (Hasanah 2016), and fortification games can increase children's agility, speed, and flexibility (Irfansyah 2015; Nuriman et al. 2016).

Based on the explanation that has been presented in the previous paragraph and the findings in the field, until now, research on the game of fortifications is still limited. It is essential to know that in addition to being preserved and maintained, there are many aspects of physical activity carried out in the game of fortifications.

Therefore, in addition to preserving traditional games that are increasingly forgotten, our research aims to see the effect of fortification games on the aerobic capacity and agility aspects of teenagers in Serang City. This is done so that the fort, which has only been known as a traditional Indonesian game, can be used as an alternative to physical activity to improve people's health status.

METHODS

This study used an experimental method with a one-group pretest and posttest research design without a control group. The first measurement of the sample is carried out before being given treatment, while the second is carried out after the sample is given treatment. The criteria for respondents are students with an age range of 18-20 years, then a total of 20 students from universities in Serang City have been collected who have become respondents.

The results in this study are presented in the form of the average and standard deviation. Before the significance analysis, the Shapiro Wilk test was used to test for normality and homogeneity. Agility parameters before and after treatment used paired T-test analysis. All analyzes were performed using SPSS (version 22, IBM Corp, Somers, NY). Statistical significance was accepted at the alpha level $p < 0.05$.

Before the treatment, all research subjects' anthropometric data, aerobic capacity, and agility aspects were measured. The study topics were treated in the form of fortification games for 30 minutes three times a week for three consecutive months.

Information about the technical aspects of the fortification game is informed to the research subjects before conducting research

and is constantly reminded before the fortification game.

Each time playing fortification, the research subjects were divided into two groups with ten players from each group. Both groups chose objects in the form of cones that had to be protected from their opponents to be used as forts with a distance between the defenses of the two groups of 20 meters.

Cones, in this case as a fortress, has a function as a giver of strength. Players out of the fort longer have weaker power than opposing players who have just come out of the defense, so players must continue to renew their strength by returning to the fort. Players caught or touched by the opponent will automatically be imprisoned next to the opponent's fortress with a distance of 3 meters. Players will be released and can return to the game if any player from their group touches it.

Measurement of weight using the OMRON Karada Scan HBF-375 tool, while for height using a stadiometer. In measuring aerobic capacity using a bleep test and agility aspects using a 4x10 m shuttle run test.

FINDINGS AND DISCUSSION

Finding

In this study, the age, height, weight, and BMI of the research subjects were 18.40 (± 1.80) years, 169.28 (± 4.56) cm, 59.18 (± 4.85) kg, and 20.66, respectively.

Table 1 presents data on the average aerobic capacity and agility before and after treatment in fortification games for 30 minutes before core training is carried out twice a week for one month in a row.

Table 1. Comparison of the value of aerobic capacity and agility pretest and posttest

Variabel	*Pretest*	*Posttest*
VO_2max (mL/kg/min)	36.42 ± 2.76	38.33 ± 3.19*
Kelincahan (second)	13.48 ± 2.18	13.03 ± .2.43*

Table 1 shows the increase in aerobic capacity and agility after treatment in the form of fortification games. In the two variables in the form of aerobic capacity and agility, there are significant differences after treatment in fortification games.

Discussion

The research that we have done focuses on assessing the effect of the traditional game of Bebentengan treatment three times a week for three consecutive months on aerobic capacity and agility aspects. In this study, the research subjects had an average age of 19 years, according to data released by the ministry of health, that age was included in the category of teenagers or late teens (Population et al. 2016; World Health Organization 2018)

In the height variable, the research subjects have an average height of 169 cm. The data we produce is different from the average size of Indonesian male teenagers who

have an average elevation of 157 cm (Population et al., 2016). In the body mass index (BMI) variable, the research subjects were at an average of 20.66 so that with these data, the research subjects were in the normal category according to data released by the World Health Organization (WHO) and the Ministry of Health (Population et al. 2016; Soediono 2014; World Health Organization 2018).

The research we have done shows a significant difference at the post-test compared to the pretest on the aerobic capacity variable. The aerobic capacity of the research subjects before the fortification game treatment was at an average value of 36.42 (mL/kg/min), which according to data released by ACMS, was in the poor category (Fortes García et al. 2019; Kwilasz 2016), whereas after the game treatment was applied, forts are at an average value of 38.33 (mL/kg/min) which according to data released by ACMS is in the fair category (Fortes García et al. 2019; Kwilasz 2016)

The results of our study showed that there was an increase in the value of aerobic capacity in research subjects as much as 5.27% after receiving treatment in the form of fortification games for 30 minutes three times a week for two consecutive months and increasing the category of aerobic capacity which was initially in the poor class be fair.

Our results show that fortification games have a positive influence on the development of aerobic capacity. In fortification games, there are elements of physical activity such as walking, running, and sprinting or sprinting. The increase in aerobic capacity is due to physiological changes in the body of research subjects after treatment. The heart muscle contracts more efficiently to pump blood and circulate it throughout the body, increasing stroke volume, thereby increasing cardiac output (Guyton, 2013; Wilmore, 2007).

Furthermore, there is vasodilation to meet the oxygen demand to the tissues in the muscles and heart. There is also an increase in capillaries in the forces due to ongoing physical activity (Hoofman et al., 2017; Bouchard et al., 2007). In addition, an increase in pulmonary tidal volume and the number of capillaries in skeletal muscle can increase the difference in the amount of oxygen in the arteries and veins, which causes an increase in the amount of maximal oxygen consumption (Hoofman et al., 2017; Bouchard et al., 2007). The results of our study are not much different from the results of several previous studies, which stated that the aerobic capacity of untrained individuals increased after doing regular physical exercise (Bahri et al., 2017; Barene et al., 2014).

In the agility aspect in this study, there were significant differences at the posttest compared to the pretest in the research subjects. Our study showed an increase in the agility aspect of the research subject as much as 3.28% after receiving treatment in the form of a fortification game for 30 minutes three times a week for two consecutive months.

Our results show that fortification games have a positive influence on the development of aerobic capacity. This happens because, in the fortification game, all research subjects do sprints or sprints several times. Several conclusions from previous studies stated that sprint training in a certain period would positively affect the speed and agility of trained or untrained individuals and also occurs in athletes (Mathisen & Pettersen 2018; Anggita et al. 2019).

During sprint training, the body experiences a physiological response. It has a transient or acute effect on the neuromuscular system that can increase agility in trained or untrained individuals and occurs in athletes (Mathisen and Pettersen 2018).

The conclusion of another study states that by doing sprint exercises regularly, the lower body muscles experience hypertrophy caused by an increase in the number of myofibrils in muscle fibers, an increase in capillary density in muscle fibers, and an increase in the number of muscle fibers. However, only white muscle fibers or fast-twitch have increased, causing an increase in muscle reaction speed and resulting in increased agility (Mathisen and Pettersen 2018).

The limitation in this study is that during treatment in the form of fortification games, the research subjects were not paired with a heart rate monitor. Additional data such as average heart rate, maximum heart rate, and energy expenditure could not be collected. However, in our study, treatment in the form of fortification with a duration of thirty minutes three times a week for three consecutive months had a positive effect on the performance of research subjects.

CONCLUSION

Based on the results and discussion of the research that we have done, it can be concluded that the treatment in the form of fortification games for three months can increase the aerobic capacity and agility aspects of the research subjects.

The results of our research are expected to be a reference so that fortification games can be included as an alternative or additional exercise program for individuals who want to increase their fitness level. There is a need for further research using research samples including athletes in various sports and heart rate monitors so that the results can be objectively known the characteristics of fortification games.

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