

Obstacle Game About Gross Motor Skills Among Preschool Obese Children

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Abstract—Aim. Gross motor development becomes important because by mastering the ability to move children will be able to interact with their environment. The purpose of this study was to determine the effectiveness of the obstacle game against gross motoric children. The effectiveness of the obstacle game was evaluated by designing learning activities conducted by quasi-experimental method for 15 children. Two variables: the obstacle course and gross motor development. The results show that there is a significant increase in gross motoric development of early childhood by 66.7%.

Keywords—*obstacle game, gross motor skill, childhood obesity.*

I. INTRODUCTION

In recent years, the prevalence of childhood obesity has increased significantly [1],[2]. Then the problem of overweight in children is often associated with poor motor development, especially in rough motor skills [3]. The mastery of rough motor skills in children is very important in helping children's activities such as sports, games, and recreational activities [4]. Obesity is an abnormal or excessive condition of fat accumulation in adipose tissue. Obesity in children is a health problem because the prevalence of child obesity in the world is increasing [5]. In Indonesia, based on *Riskesmas* data by the Ministry of Health of the Republic of Indonesia in 2013, the prevalence of overweight and obesity in children aged 5-12 years reached 18.8%. Provinces that have prevalence above the national average one of them is East Java Ministry of Health RI, 2013.

Obesity in children can be a comorbid disease such as asthma, diabetes, and cardiovascular disease [6]. Although the mechanism of occurrence is not fully understood, it has been confirmed that obesity occurs because energy intake exceeds energy expenditure [7]. The causes of obesity are influenced by genetics and the environment [8]. In addition to energy intake, energy expenditure also affects the incidence of obesity such as physical activity. Other children's activities such as playing should not just be a regular physical activity, but a fun learning tool and exercise indirectly. Playing by a child is expected to play a useful game of muscular and physical strength, communication skills, socialization, so as to nourish the child [9].

Motor development is the development of control of body movement through coordinated movement between nervous system, muscle, brain and spinal cord [10]. Motor ability is divided into two that is motoric coarse and fine motor but here writer focuses on rough motor child. Rough motor has a very important role in health. The development of fine motor can

be defined as the development of proper movement, which uses small muscles to control the small movements of the hands, wrists, fingers, feet, toes, lips, and tongue [11]. Rough motor development is defined as the development of movements that use large muscles such as walking, kicking and throwing [12].

The first five years of growth and development of children is called the golden age because at that time the physical situation and all the abilities of children is growing fast. The rapid development experienced by the physical child becomes a marker that the child is an active individual that we should as parents should know how to direct the motor activity of the child. Children acquire the most successful new rugged motor skills during preschool and elementary school [13] and able to master these skills more easily during this period than any other point in their lives [14].

The development of motor ability of children requires physical activity to grow and develop well [15]. Form of play activities that spur the use of large muscles, simple games, try, develop cooperation, using the means of playing with large sizes vary. The game is a tool for the child to explore his world, from what he does not recognize to what he knows and from what he cannot do to it.

The game is an educational tool because it gives a sense of satisfaction, excitement, and happiness game is an educational tool because it gives a sense of satisfaction, joy, and happiness [16], through the game, the child can reap the benefits for the development of physical-motor aspects, and emotional social. One of the games that can be used to improve a child's gross motor is a game of obstacle course. The game of obstacles is an effective experience of early childhood with or without game tools that can generate understanding or information, give pleasure, and develop children's imagination [17]. obstacles are physical activities in the form of motion run or run through obstacles [18]. Obstacles come from cross-country running, and obstacles are a combination of long-distance running, hurdles, hurdles, and water jumps [19].

In the development of a child, the physical state of the motor is very concerned and become a discussion, because the process of growing children will affect their lives in the future. Several studies have examined the development of obsessive pre-school motorcycles of obese children. However, previous studies have only discussed rough motor differences between obese children and normal-sex children, although in this study will provide a solution how to improve motor gross especially for obese children with a fun activity that is through the game obstacle course.

The rest of this paper is organized as follow: Section II describes the material and proposed methodology. Section III presents the obtained results and following by discussion. Finally, Section IV concludes this work.

II. MATERIAL & METHODOLOGY

This section presents the material used and the proposed methodology.

A. Data

The type of research conducted is quantitative with the quasi experiment method. Research subjects were 15 children who were obese. The purpose of this study is to improve the gross motor skills of early childhood who are obese. Observation sheets are designed to measure cognitive abilities of early childhood before and after treatment. Pre-test and post-test were conducted to determine the effect of obstacle play on children's motor skills.

In this study, observation sheets were adjusted to the research needs that had been made by adjusting to the Government Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 137 in 2014. All items on the question sheet were measured by a 3-point Likert scale in Table I.

TABLE I. INSTRUMENT OF MOTOR ABILITY OF CHILDREN AGED 5-6 YEARS

Aspect	Indicator	Good	Sufficient	Less
Gross motoric	Run fast with 20 meters			
	Running back and forth with a distance of 4 meters			
	Walking on catwalks all beam 4 meters			
	Jump using two legs			

B. Method

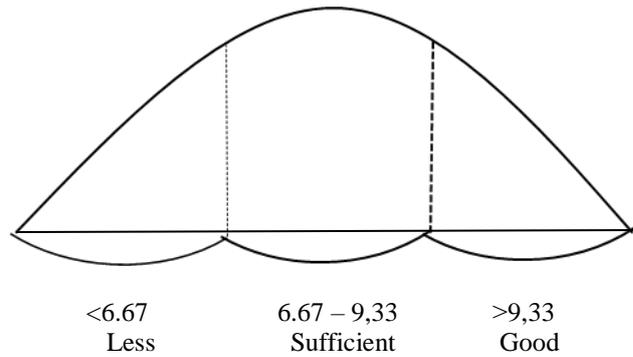
The study used a quasi-experimental method. Before being treated for children aged 5-6 years, a pre-test was first performed to determine the child's gross motor skills. Then the children were given treatment by applying the obstacle game in the learning process after being given the child's treatment then post-test was done again to find out the effect of the obstacle game on the child's motor skills.

Assessment criteria are obtained through the calculation below:

$$\text{Mean} = \frac{N_{max} - N_{min}}{2} + N_{min}$$

$$\begin{aligned} SD &= \frac{mean}{6} \\ &= \frac{12-4}{2} + 4 \\ &= \frac{8}{6} \\ &= 8 + 8 \\ &= 1,33 \\ &= 16 \end{aligned}$$

Category:	Good	= > 9.33
	Sufficient	= 6.67 – 9.33
	Less	= < 6.67



C. Experiment design

Before the obstacle game is performed, a pre-test is performed for the child to find out the child's motor skills beforehand. Then, after applying the obstacle game the post-test was carried out again to find out the differences in motor skills before and after the treatment was carried out. Nature-based learning embodies the learning done in the environment because it requires a large yard.

This learning is designed using games that are performed outdoors. The game used in this study is in the form of several activity posts. In one activity post there is one obstacle that must be passed by the child.

III. RESULTS AND DISCUSSION

In this study, researchers test assumptions before testing hypotheses. The assumption test is normality test, homogeneity test, linearity test. Test assumptions or hypotheses are used to verify the research hypothesis and when Asym results. Sig test reaches $p < 0.05$, this shows that the hypothesis is accepted. So it is concluded that natural learning can significantly improve motor skills of early childhood.

Description of gross motor development results

From the research conducted, the average pre-test scores for children aged 5-6 years were 5.53 and after the natural-based learning was obtained the post-test score was 9.86 therefore there were significant changes between gross motor skills. in children before and after the application of obstacle games.

TABLE II. DESCRIPTION OF THE RESULTS OF GROSS MOTOR DEVELOPMENT Descriptive Statistics

	N	Min	Max	Sum	Mean	Std. Dev
Pre-test	15	4.00	8.00	82.00	5.4667	1.12546
Post-test	15	7.00	12.00	150.00	10.0000	1.55839
Valid (listwise)	N 15					

From the Table II, to find out to test the hypothesis or relationship, the researcher first tested the assumption in the form of normality test, homogeneity test and linearity test as a requirement in the use of t-test analysis.

a) Normality test

Normality tests are carried out to determine whether the distribution of data is normal or not. The results of the normality test can be seen in the following Table III:

TABLE III. NORMALITY TEST

One-Sample Kolmogorov-Smirnov Test			
		pre-test	post-test
N		15	15
Normal Parameters ^{a,b}	Mean	5.4667	10.0000
	Std. Deviation	1.12546	1.55839
Most Extreme Differences	Absolute	.194	.167
	Positive	.194	.100
	Negative	-.149	-.167
Test Statistic		.194	.167
Asymp. Sig. (2-tailed)		.133 ^c	.200 ^{c,d}

It is known that the sig value before treatment is 0.133 and the sig value after treatment is 0.200 which means that the value of Sig > 0.05 then the data is normally distributed..

b) Homogeneity Test

The homogeneity test aims to provide confidence that a set of manipulated data in a series of analyzes comes from a population that is not much different in diversity. The results of the Homogeneity Test can be seen in the following Table IV:

TABLE IV. HOMOGENEITY TEST
Test Statistics

	pre-test	post-test
Chi-Square	5,333 ^a	2,200 ^b
df	4	5
Asymp. Sig.	,255	,821

Based on the Table IV above, the value of Asymp sig obtained before treatment 0.255 and after treatment 0.821 the value is greater than 0.05. So it can be concluded that both groups are homogeneous or have the same variance.

c) Linearity Test

Linearity testing aims to determine whether the data has a linear line or not (is the relationship between variables to be analyzed follow a straight line or not). Linearity test results can be seen in the following Table V:

TABLE V. LINEARITY TEST

ANOVA					
pre-test					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.150	5	2.630	5.164	.016
Linear Term	Unweighted	5,471	1	5,471	.010
	Weighted	9,529	1	9,529	.002
	Deviation	3,621	4	,905	1.777
Within Groups	4,583	9	,509		
Total	17.733	14			

In linearity testing, the provisions apply if at deviation sig > 0.05, the relationship between variables is linear. Conversely, if the deviation sig is < 0.05 then the relationship between variables is not linear. Table data shows that the sig is 0.217,

the value is greater than 0.05 (0.217 > 0.05) therefore it is concluded that the relationship between variables is linear.

d) Hypothesis Test

After testing the assumption, the next step is to test the hypothesis. Hypothesis testing is done to see the gross motor development of children aged 5-6 years after being given treatment by applying the obstacle game, so it is necessary to see the relationship between pre-test and post-test data like the Table VI.

TABLE VI. HYPOTHESIS TEST

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Paired Sample 1	pre-test - post-test	4,53333	1,06010	,27372	5,12040	3,94627	16,562	14	.000

With provisions if the value of P < 0.05, there is a difference between the results of the pre-test and post-test. And if P > 0.05, there is no difference between the pre-test and post-test results. Based on the table above shows the average difference of 4.53 and the value of P (2 tailed) of 0.000 means that the value of sig < 0.05 so it is concluded that there are differences in values after treatment and experience a significant increase and indicate that there is a difference between the results of the pre-test and post-test.

Comparison of the recapitulation of the pre-test-post-test results can be seen in the Table VII and Figure 1 below:

TABLE VII. PRE-TEST-POST-TEST TABLE

No	Category	Category	Score Range	Pre-test		Post-test	
				F	%	F	%
1.	Good	66.7%-100%	>9,33	0	0	10	66.7%
2.	Sufficient	33,4%-66,6%	6,67-9,33	2	13,3%	5	33,3%
3.	Less	0,5% - 33,3%	<6,67	13	86,7%	0	0%

Based on the Table VII, it is known that all children experienced an improvement in the first cognitive development: this can be seen in children in the good category 0% to 66.7%, just 13.3% to 33.3% and less than 86.7% to 0%. The description of the results of the comparison before and after treatment can be seen in the following graph:

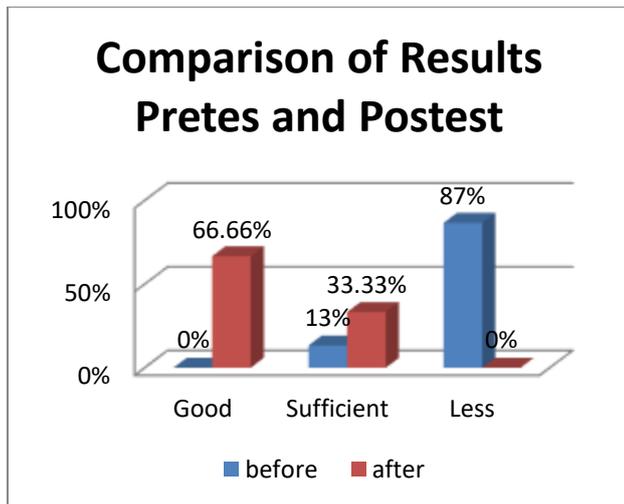


Fig 1. Comparison of children's cognitive development before and after nature-based learning

Based on the Figure 1 above, comparison before and after it is known that all children experience an increase in gross motor development. This means that the obstacle game influences significantly on gross motor development.

Childhood is a critical period that must be considered to support the development of gross motor skills. Pre-schoolers certainly love playing and exploring the surrounding environment; thus, they can develop motor skills very easily [21]. At this critical time, gross motoric development is very appropriate for children to move, stabilize the body, maintain balance and explore the surrounding environment.

This study applies a barrier game to improve children's gross motor skills because this learning is believed to be able to optimize all aspects of development in early childhood. The results of the pre-test showed that 86.7% of children were in the poor category and there were no children in the good category. Children aged 5-6 years should already have good gross motor knowledge. Various factors, both internal and external, cause the low gross motoric of children.

After observation, which is a low cause of gross motoric, children are the implementation process in learning that tends to be verbalistic and rarely performs physical activities outside the room. Then, the researcher applied the obstacle game as a fun learning model, the child as an active learner and carried out by playing. This study involved 2 kindergarten teachers, the treatment was carried out 4 times to prove that the obstacle game can improve the gross motoric of children. The results of the study showed that gross motoric children increased significantly to 66.7% which was in the good category. Within a period of 1 month, this research was said to be successful because it increased the gross motoric development of children. Apart from being a fun learning and children as active learners and having good gross motor skills.

In recent years, the assessment of the performance of children's gross motor skills has increased significantly, especially the relationship between child obesity and gross motor development. Evidence of obese children has poorer gross motor skills than normal weight children [20]. A recent study assessed motor skills among obese children, and reported that motor skills were poorly related to childhood obesity only for skills most directly related to weight gain,

such as jumping and jumping [20]. In contrast to our findings, the performance of gross motor skills of preschool children who are obese can increase by using obstacle game activities that make children enthusiastic to do gross motor movements because it is packaged in an interesting game.

IV. CONCLUSION

Rough motor skills are closely related to exercise and physical activity. In fact, the focus on gross motor development has implications for the development of highly skilled sports people. Obesity in childhood is one factor that negatively affects the development and performance of gross motor skills, so it must be considered as a serious problem. In this case identifying the problem of gross motoric development of children is very important especially for children who are obese, because obese children are identical to weak gross motor development. The more often given stimulus by doing physical activity will certainly help overcome the problem of motor development of children who are obese.

This study investigates the influence of nature-based learning to improve the gross motor skills of early childhood. The results of experimental studies showed that the obstacle game significantly affected gross motor skills in early childhood. Learning objectives are not only to develop gross motor skills but also tolerance and cooperative attitudes.

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