Brain Gym To Increase Academic Performance Of Children Aged 10-12 Years Old

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Brain Gym To Increase Academic Performance Of Children Aged 10-12 Years Old (Experimental Study in Tembalang Elementary School and Pedalangan Elementary School Semarang)

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Abstract. Academic performance becomes an important determinant of individual quality. it is determined by the function of affective, cognitive, psychomotor, and intelligence. Brain gym can improve learning processes and integrate all areas that related to the learning process. To prove the effect of brain gym towards academic performance of children aged 10-12 years. This study was a quasy experiment study with one group pre and post test design. Samples (n=18 male=7 and female=11) were taken from five and six grader and conducted in Tembalang and Pedalangan Elementary School, Semarang. Pretest were administered, followed by brain gym, and post test administered in the end of study. The measurement of Intelligence Quotient pre and post test using Culture Fair Intelligence Test Scale 2. Among the 18 subjects (male=7 and female=11) the average of academic performance and IQ score after brain gym showed improvement. The Improvement of IQ score with Culture Fair Test Scale 2 was analyzed by Dependent T test showed significant results (p=0,000). The improvement of Bahasa score was analyzed by Wilcoxon test showed significant results (p=0,001), an unsignificant result were shown in Mathematics p=0,079 and natural sciences p=0,306. Brain gym can increase academic performance of children aged 10-12 years old.

Keywords: Brain gym, affective, cognitive, psychomotor, intelligence.

1. Introduction

The middle period of children's grwoth is at the aged of 10-12 years old. In this period there is physical development and nervous system development. The period of 10-12 years old can be mentioned as operational stages to manage and to control emotional expression such as an ability to knowing their own emotion, managing mood, motivating their own self, building and maintaining relationships with others. Physical development and motorical at the age of 10-12 years old is already well coordinated. In this period their development marked by sprightful motorical activity. Therefore, this periode is an ideal time to learn skill that related to motorical activity such as writing, drawing, painting, computing, swiming, and playing athletically. Besides that emotional aspect and physical development, children in this period can react to intellectual stimulus, conduct tasks that insist intellectual ability or cognitive

ability[1]. Therefore, intellectual ability in this period is enough as a basic for giving stimulus to develop their mindset or intuition.

The quality of human brain not only depend on genetical aspect but also depend on the quality of stimulus that receives by children[2]. Stimulation is an activity to stimulate the ability of children so that children can grow and develop optimally[2,3].Stimulation is the pioneer of learning process that can support educational process[4]. The enhancement of brain quality needs spesific stimulus because the nature of stimulus is a part of learning process that related to individual's intellectual ability[2,3,4].

Brain gym is a collection of simple movements and aims to connect or to unite the body and mind[5]. Brain gym is a part of kinesiology education[5,6] . Kinesiology is a study about body's movements and the relation between brain and body's posture to brain function. All the movements of brain gym can increase learning process and integrate all areas that related to learning process[6,7].

The research about brain gym such as, Watson [8] did research about brain gym everyday to fourth grade of children in elementary school during seven to ten minutes for about three months. At the end of the research, with STAR reading test, evaluation of the comprehensive understanding about reading before brain gym and after brain gym showed a significant result[8] . While Drabben[9] did brain gym to Alzheimer's patients during eight weeks everyday. All subjects showed a significant increase in conversion numbers, the repetition of words, and the ability to remind previous objects.

Relaxation technique if perform with reguler time can help children to control stress so that they can achieve a peaceful situation. Brain gym can be expected to help children control their stress because all technique in brain gym such as massages, meditation, stretching, and abdominal respiration that can help children to achieve peaceful situation and can help the way of intelligence[10]. Because of so many factors that related to the development of academic performance on children aged 10-12 years old then it is important to do the research about the relationship of brain gym to increase academic performance of children aged 10-12 years old. By knowing the relationship of brain gym to academic performance, it can be expected all children can develop their academic performance maximally.

2. Research Method

The design of this research is quasi experimental pre and post test design without control group to know the difference academic performance before and after given brain gym. The data that be used in this research is primary data. it is contain of intelligence result and secondary data is reports of academic score. Subjects must meet the inclusion criteria, children in aged 10-12 years old at that time research and be ready to be responden in this research. The method of this research is purposive sampling. To count the sample of this research by using average test of two populations and it also estimate the drop out criteria for about 10%. The independent variable of this research is brain gym and dependent variable are academic performance and intelligence quotient (IQ). The instrument of this research are gym audio and Culture fair intelligence test. The first step of this research is giving intelligence test, measure the report score of academic performance, intervention of brain gym, and it ends with post test intelligence test and measure final score of academic performance. The treatment group was given brain gym stimulation for three times a week during two months. The duration time for every stimulation is thirty minutes.

The analysis of hypothesis to differentiate academic performance before and after intervention of brain gym using Wilcoxon test because the distribution of the data is normal (Test of Normality Shaphiro-Wilk, $p<0,05$) and after that data will be transform, after transformation of the data still the distribution of data is not normal. While analysis of hypothesis to differentiate intelligence before and after intervention of brain gym using Paired T-test because all the requirements of the data meet the normal distribution (Test of Normality Shapiro-Wilk, $p<0,05$)

3. Result and Discussion

3.1. Characteristics of Research Subject

This research involves eighteen students that come from two different elementary schools and meet the inclusion criteria of the research. The location of two elementary school are in Semarang disctricts that have the same characteristics. The students that meet all the criteria are given intelligence quotient test (IQ) and then intervention of brain gym. From all twenty students that related in this research just eighteen students that meet all criteria in this intervention research. There are two subjects that meet exclusion criteria because two of them aged thirteen years old. The average of their age is 11,67±0,485 with the youngest is eleven years old and the oldest is twelve years old. Gender of research subject is male (n=7) and female (n=11). The characteristics of both group are shown in the table 1.

Table 1. Description of subject's characteristics (n=18)

Characteristic	n(%)	Mean±SD(min-max)
Age		11,67±0,485(11-12)
Gender		-
- Male	7 (38,9%)	
- Female	11(61,1%)	
Brain defect		-
- Yes	0(0%)	
- No	18(100%)	
Brain gym		-
- Ever	0(0%)	
- Never	11(100%)	
Severe illness		
- Yes	0 (0%)	
- No	18 (100%)	

3.2. The Result of Academic Performance

3.2.1. Measurement of Intelligent Quotient (IQ)

Tabel 2. Score Pre dan Post test Intelligent Quotient

	IQ Test		**P**
	Pre Treatment	**Post Treatment**	
IQ Score mean±SD;median(min-max)	94,94±12,859 ;98,50 (64-113)	104,44±12,463 ;100 (81-128)	0,000

The result of research show there is increase in the mean of pretest score and post test score IQ, from 94,94 to 104,44. It means there is increase in intelligence of the subjects. This data using Saphiro Wilk

Test. The distribution is normal that show the increase in the ability of IQ significantly, p=0,000. Academic performance can be defined as academic achievement, the involvement that aims education, getting knowledge, skill and competency, and also perseverance in learning process[11]. Academic performance can be known with measurement and evaluation to the education that given by the teacher and can be measured through intelligence quotient (IQ) [12.13.14] .The analysis of data pretest and posttest intelligence quotient with Paired T-Test show that there is increase in posttest score of intelligence quotient, Z=-3,535 and significance level 0,000>0,05. it increases significantly. Intervention of brain gym was given three times a week during nine weeks. The increase in posttest indicate that intervention that given in the form of brain gymnastic movements to children aged 10-12 years old give the effect to the increase in children intelligence. The research by Chandra et.al to six hundred fourteen students aged 13-17 years old mentioned that intelligence affect academic performance significantly. In that research mentioned that children with high intelligence have better academic performance than children with average intelligence [15]. It is appropriate with this research that mentioned children that have good categorical of IQ have a good academic performance too. It is because the role of stimulation in the process of neurotransmitter that related to signalling dopamin receptor that produce brain derived neurotrophic factor (BDNF) through Ca^{2+} signalling process. In the brain, BDNF is found actively in hippocampus and cortex that is vital area in learning process, reminding, and thoughtful process. BDNF can increase synaps fosforilation through receptor activation that cause releasing of neurotransmitter. Not only neurotransmitter process, but also the intteligence ability to cortex function such as abstraction, logical, language, and every area that have spesific function [16].

3.1.2 Measurement of Bahasa Score

Table 3. Pretest and Posttest Bahasa Score

	Score		P
	Pre Treatment	**Post Treatment**	
Score Mean±SD;median(min-max)	43,44 ± 34,904; 60 (5-83)	46,26 ± 36,817; 60 (7-92)	0,001

The result of research show there is increase in the mean of pretest score and post test Bahasa score, from 43,44 to 46,26. It means there is increase in Bahasa score of the subjects. This data using Wilcoxon Test because the distribution is not normal. It shows the increase in the ability to solve problem significantly, p<0,001. The analysis of data pretest and posttest Bahasa score with paired T-test showed there was increase in posttest score of intelligence quotient, Z=-3,410 and significance level 0,001. It means that score increase significantly. The increase of Bahasa score is in accordance with the previous researchs about brain gym although those researchs were used other tests that differ with this research. Andrea (2014) with percent academic engagement found the significant increase in the ability to understand the text.[17] Thompson (2007) with STAR reading test found there was increase in the understanding comprhensively about text compare before practice brain gym.[18] This case relates to the effect of brain gym to cerebri cortex function to assosiation of parieto-occipitotemporal that include the understanding of language, called Wernicke area and area that include reading process, called angular gyrus that interpretate words that receive visually and then it will continue to wernicke area.

3.1.3. Measurement of Mathematic Score

The result of research show there is increase in the mean of pretest score and post test Mathematic score, from 41,85 to 44,82. It means there is increase in Mathematic score of the subjects. This data using Wilcoxon Test because the distribution is not normal. However, It does not increase logical ability significantly, p>0,05 (p=0,079)

Table 4. Pretest and Posttest Mathematic Score

	Score		P
	Pre Treatment	**Post Treatment**	
Score Mean±SD;median(min -max)	41,85 ± 32,843; 60 (6-90)	44,82 ± 36,324; 60 (5-100)	0,079

Sutoro [19] did research about brain gym to evaluate mathematical ability during four weeks and there was an increase in arithmetic and counting ability. However, in this research there is no significant increase to mathematic (p=0,079) and Natural Science (p=0,306) although still show the increase in the mean of pretest and posttest Mathemathic and Natural Science. This could be any factors that affect daily score of children such as the ability of teacher, how to teach, even the interest of children in that subjects. Other causes could related to research method, with different method the increase of mean Mathemathic and Natural Science could be significant.

3.1.4. Measurement of Natural Science

Table 5. Pretest and Posttest Natural Science Score

	Score		P
	Pre Treatment	**Post Treatment**	
Score Mean±SD;median(min -maks)	44,69 ± 35,86; 60 (7-92)	51,39 ± 41,802; 68 (6-100)	0,306

The result of research show there is increase in the mean of pretest score and post test Natural Science score, from 44,69 to 51,39. It means there is increase in cognitive ability of Natural Science of the subjects. But statistically using Wilcoxon Test The distribution data is not normal show the increase in logical ability of Natural Science is unsignificant, p>0,05 (p=0,306)

The unsignificant result in Mathemathic and Natural Science could be caused by other factors that has not been evaluate strictly in this research. Other factors could be stress factor because most of elementary students do not like mathematic because too complicated and often makes children become bored.

4. Conclusion and Recommendation

Conclusion

There is a significant increase in intelligence quotient (IQ) after intervention of brain gym three times a week during nine weeks with duration time thirty minutes every intervention in children aged 10-12 years old. There is a significant increase in Bahasa score after Intervention of brain gym three times a week during nine weeks with duration time thirty minutes every intervention in children aged 10-12 years old. There is no significant increase in Mathematic and natural science score after Intervention of brain gym three times a week during nine weeks with duration time thirty minutes every intervention in children aged 10-12 years' old

Recommendation

In this research, intervention of brain gym during nine weeks, three times a week with thirty minutes duration time. How long brain gym can withstand in order to remain effective without repetition is still unknown. Therefore, researcher propose the next research to analyze how long brain gym can withstand without the repetition of brain gym itself. Require further research to further anaylze the discipline of research's subject when they are doing brain gym in terms of time, frequency, concentration, and environmental factors that can related to confounding variables of the research. Require further research about brain gym on various pupulations not only children aged 10-12 years old but also all school-age children so that it can be expected all achool age children will be able to develop ther academic performance maximally. Require further research about braun gym in elementary school to increase academic performance.

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References

1. Reber M. Development during Middle Childhood 1986 *The Years from Six to Twelve*. (Washington: National Academy Press) p137-8.
2. Jääskeläinen IP, Sams M, Andermann ML 2012 *Brain stat-triggered stimulis delivery: An efficient tool for probing ongoing brain activity* Open J Neurscience [Internet] [cited 2015 Nov 11];**18**(2):1–19 Available from: Ross Science
3. Raine A, Reynolds C, Venables PH, Mednick S a 2002 *Stimulation seeking and intelligence: A prospective longitudinal study*. J Pers Soc Psychol [Internet] [cited 2015 Nov 11];**82**(4):663–74 Available from: http://doi.apa.org/getdoi.cfm?doi=10.1037/0022-3514.82.4.663
4. Jeng-Fung Hung, Jen-Chin Lin 2002 *The Development of the Simulation Modeling System and Modeling Ability Evaluation* Int J U- E-Service, Sci Technol [Internet]. 2009 [cited 2015 Nov 11];**2**(4):1–16 Available from: www.sersc.org/journals/IJUNESST/vol2_no4/1.pdf
5. Official Brain gym ® Website. 2002 [cited 2015 Nov 11] Available from: http://www.braingym.org
6. Spaulding LS, Mostert MP, Beam AP 2010 *Is Brain Gym® an Effective Educational Intervention? Exceptionality* [Internet] [cited 2015 Nov 11];**18**(1):18–30 Available from : http://digitalcommons.liberty.edu/cgi/viewcontent.cgi?article=1167&context=educ_fac_pubs
7. Hoffman SJ, Harris JC, Hoffman SJ. Introduction to Kinesiology 2009 *Studying Physical Activity* (United States of America:*Human Kinetic Press*) p570
8. Watson A, Ginger L Kelso 2014 *The Effect of Brain Gym ® on Academic Engagement For Children with Developmental Disabilities*. International Journal of Special Education [Internet] [cited 2015 Nov 11];**29**(2): 7. Available from : Proquest
9. Drabben-Thiemann, D. Hedwig, M. Kenklies, A. Von Blomberg, G. Marahrens, A. Marahrens, K. Hager 2002 *The effect of Brain Gym® on the cognitive performance of Alzheimer's patients* Brain Gym Journal [Internet] [cited 2015 Nov 11] Available from : www.braingym.org/brochures/BG_Research.pdf
10. *Brain Gym; Learning Empowered by Movement; Brain Gym Exercises Wake Up Brain and Body* 2009 Pediatrics Week.
11. Sukardi 1985 *Neuroanatomia Medica* (Jakarta: Universitas Indonesia Press) p232-255.
12. Crede M, Kuncel NR 2008 *Study habits skills and attitudes* Psychological Journal [Internet] [cited 2015 Nov 16];**3**(6):425–54. Available from : Psychological Science
13. Wolf PJ 2007 *Academic Improvement Through Regular Assessment* Peabody J Educ [Internet] [cited 2015 Nov 16];**82**(4):690–702. Available from : https://www.researchgate.net/publication/254310132_Academic_Improvement_Through_Regular_Assessment

14. Official Wisconsin Department of Public Instruction Website 2004 [cited 2015 Nov 16]. Available from : http://dpi.wi.gov/dpi/oea/kce.html
15. Nuraeni 2012 *Inteligence test* (Yogyakarta: Purwokerto Press) p23-85.
16. Berg DA, Belnoue L, Song H, Simon A 2013 *Neurotransmitter-mediated control of neurogenesis in the adult vertebrate brain* Development (Cambridge, England) [cited 2016 Jan 19];**140**(12):2548-61. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3666382/
17. Andrea Watson, Ginger L Kelso 2014 *The Effect of Brain Gym ® on Academic Engagement For Children with Developmental Disabilities* International Journal of Special Education [Internet] [cited 2015 Nov 11];**29**(2): 7. Available from : Proquest
18. Thompson, H.L 2007 *Impacts of Educational Kinesiology Activities on Fourth Graders Reading Comprehension Achievement* [dissertation] (Washington : United States Walden University)
19. Sutoro 2014 *Influence of brain gym on mathematical achievement of children* Asian Soc Sci;**10**(5):114–7.

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