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Comparison of Anthropometry and cognitive performance in children aged 6-12 years before and after being educated by Integrated Health Care Centre (Posyandu) Cadres

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Abstract

 Growth and development is a process of change that occurs at the age of children. Growth shows the meaning of quantitative changes, increases in size and structure, while development is a continuous progress, as well as coherent changes. Malnourished children have tissue damage, body growth retardation, and global brain development disorders that will affect children's cognitive function, especially the frontal cortex. This research was a quasi-experimental study with a non-equivalent control group pretest posttest design where the researcher provided interventions in the form of formation and training of cadres who care about growth and development and use of growth and development applications. This research was conducted on posyandu health cadres and mothers with children aged 6 to 12 years in the working area of the public health centrein Deli Serdang Regency, North Sumatra. The aim of the study was determine the growth of children used certain parameters, one of them is anthropometric measurements and cognitive performance.. Most simple growth appraisal and frequently used are body weight (BW), height (H), head circumference (HC), and body mass index (BMI). There was no relationship between anthropometry and MMSE scores. There is a significant relationship between anthropometry and Mini Mental Stage Examination (MMSE) based on age.

<u>Key words</u>: Anthropometry, Cognitive performance, MMSE, 6-12 years old

INTRODUCTION

 Growth and development is a process of change that occurs at the age of children. Growth shows the meaning of quantitative change, increase in size and structure, while development is a continuous progress, as well as coherent changes.[1,2,3]

World Health Organization (WHO) states that 5-25% of preschool-aged children in the world suffer from minor brain dysfunction, including impaired fine motor development. Research conducted by Rizki (2016) found that 0.4 million (16%) Indonesian toddlers experience developmental disorders,

both fine and gross motor development, hearing loss, low intelligence and speech delays. One of the factors that influenced the growth and development of children was parents, especially mothers. Parents need to do early monitoring and screening of children's growth and development according to their age. Parental knowledge is needed about early detection to prevent growth deviations such as stunting, speech delays and other behavioral problems. Old age or the elderly is a final stage of life that is important for health, because it is a stage that is vulnerable to disease.[1] Increasing the health of the elderly continues to be pursued with promotive and preventive approaches that can be done by themselves, by and for the community itself. These efforts in the community are carried out by organizing the Integrated Service Post (Posyandu) for the elderly.[1,2] Old age or the elderly is a final stage of life that is important for health attention, because it is a stage that is vulnerable to disease and prevention that can be done by themselves, by and for the community itself. These efforts in the community are carried out by organizing Integrated Service Posts (Posyandu) for the elderly.[2,3,4,5]

To determine the growth of children used certain parameters, one of them is anthropometric measurements. Most simple growth appraisaland frequently used are body weight (BW), height (H), head circumference (HC), and body mass index (BMI). Body weight gives a picture of current (acute) nutritional problems, while height shows a picture of chronic nutrition. Deficits in anthropometry cause delays in cognitive and intellectual performance in children. [6-9]

This study aims to compare the implementation of the empowerment of cadres caring for growth and development and the use of growth and development applications through anthropometric examinations and the level of knowledge of posyandu cadres through the Mini Mental State Examination (MMSE) in an effort to improve the health quality of school children and Posyandu cadres in Deli Serdang Regency.

METHOD

This research is a quasi-experimental study with a non-equivalent control group pretest posttest design where the researcher provide interventions such as forming and training cadres who care about growth and development and use of growth and development applications. This research was conducted on posyandu health cadres and mothers with children aged 6 to 12 years in the working area of the Puskesmas in Deli Serdang Regency, North Sumatra. Then an examination of the knowledge of Posyandu Cadres was carried out by going through the MMSE examination. Children who met the inclusion criteria were then interviewed and filled out research questionnaires; followed by anthropometric measurements using the WHO standard and the MMSE examination to assess cognitive function

RESULTS AND DISCUSSION

There were 60 subjects with a gender proportion consisting of 37(58.7%) boys and 23 (36.5%) girls. The most maternal ethnicity in the assisted group of cadres who were educated were Javanese, consisted 46 (76.7%) mothers. Majority of mother's education in the assisted group of cadres who were given the most education was high school education as much as 35 (58.3%) and mostly, the occupation were housewives, consisted 48 (80%).

Average weight were 46.3 ± 24.5 kg, height 127.3 ± 12.3 cm, and BMI 28.8 ± 9.3 kg/m^2. This study is different from that conducted by Sandjajaet al. (2013) about anthropometric measurements in Indonesia, where age 8.6 ± 1.7 years, weight 23.7 ±7.1 kg, height 122.5 ±10.7, and BMI 15.5 ±2.7

kg/m ^{2}. Another study, on school children 10-12 years old in West Java, Serly, et al (2013), found body weight was 29±27.3 kg, height was 131.68 ±1.32, and BMI was 16.63 ±15.9 kg/m ^{2} for 10 years old. In addition, the body weight was 31.3±30 kg, height was 136.01±1.36, and BMI was 16.94 ±16.3 kg/m ^{2} for 11 years old. And weight 33.6 ±31.9 kg, height 138.4 ±1.39, and BMI 17.54 ±16.7 kg/m ^{2} for 12 years old. [8]

Based on the nutritional assessment standards from WHO, in 2006 and 2007, the average body height of the subjects was in the range above -2SD to the median for both males and females. The mean weight and BMI and head circumference was in the range -2 SD to +1 SD, for both boys and girls.

Table 1. Basic Characteristics of Research Subjects

Characteristics	n=60, %
Gender, n (%)	
Boy	37 (58.7)
Girl	23 (36.5%)
Child's age, n (%)	
< 6 years old	1 (1.6)
7-9 years	26 (41.3)
10-12 years	33 (52.4)
Child's weight, average (SD), kg	46.3 (24.5)
Children's height, average (SD), cm	127.3 (12.3)
Body Mass Index (BMI), mean (SD), kg / m ^{2}	28.8 (9.3)
Head circumference, mean (SD), cm	50.4 (7.1)
Arm circumference, mean (SD), cm	24.4 (7.4)
Child hand dexterity	
Right	60 (100%)
Left	0 (0.0)
Ethnic group	
Javaness	46 (76.7)
Mandailingness	4 (6.7)
Batakness	3 (5.0)
Bantenness	2 (3,3)
Minangness	2 (3,3)
Malayness	2 (3,3)
Palembangness	1 (1.7)

In table 2, the group assisted by cadres who were given education, the highest maternal education was SMA 58.3%, followed by junior high school and kindegarten 16.7% each. Research by Sandjaja, et al (2013) found that the highest number of mothers' education was from junior high school as much as 47.2 ± 65.6 [8]

Table 2. Education of Mothers in the Assisted Group of Cadres who were given education

Mother's Education	n%
Kindegarten	10 (16.7)
Junior high school	10 (16.7)
Senior High School	35 (58.3)
College	5 (8.3)
Total	60

Table 3. MMSE Examination Results by Age

| Variable | Age < 6 years | 7-9 years old | 10-12 years old | P value |
	Mean ±SD	Mean ±SD	Mean ± SD	
MMSE	23 ± 0	22.1 ±3.5	23.1 ±2.4	0.02
orientation	3 ±0	3.5 ±0.9	2.6 ±0.5	0.14
registration	5 ± 0	3.5 ±0.9	4 ±1.0	0.71
Attention and calculation	5 ±0	2.7 ±0.4	2.8 ± 0.3	0.08
Recalling	3 ±0	2.7 ±0.4	2.8 ± 0.3	0.49
Language	9 ±0	6.1 ±2.9	7.4 ±2.2	0.117

*ANOVA test

In table 3, there is a significant relationship between anthropometry and MMSE, where p value < 0.05. This is in accordance with research conducted by Johnson (2005) which stated that there is a linear proportional relationship between height and cognitive scores using the intelligence quotient (IQ). Research by Broekman (2008) about birth weight, head circumference, gestational age and IQ of children aged 7 to 9 years in Singapore showed that children with normal birth weight, body length and head circumference had higher IQs.[11]

Table 4, Comparison of Anthropometry and MMSE before and after Posyandu staff education

Anthropometry	Before	After	p value
Weight	46.11	47.99	0.56
Body Mass Index	26.87	27.0	0.33
Height	126.88	130.83	0.59
Head circle	50.64	50.79	0.92

*Independent T Test

In table 4, anthropometric examinations were carried out in the form of weight, BMI, height and head circumference with the MMSE examination in a period of 3 months before and after the education of posyandu staff to mothers of children who were included in this study. In this study, there was no significant difference between anthropometry and MMSE before and after education. Heinonn studied the relationship between growth and cognitive abilities in early infancy and adolescence, with the result that children with low birth weight showed lower cognitive outcomes.[10]

Research conducted by Serlyet al, statistically did not find a significant relationship between head circle and MMSE.[11] Research conducted by Gunstad, J, reported a study of Body Mass Index with neurocognition in children aged 6 to 19 years, and there was no significant relationship between BMI and cognitive function in children and adults.[11]

CONCLUSION

Based on data analysis obtained in this study, concluded as follows:There was no relationship between anthropometry and MMSE scores. There is a significant relationship between anthropometry and MMSE based on age.

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