International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 05, 2020
ISSN: 1475-7192

Elementary School Children's IQ Levels Due to the Prevalence of Stunting

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Abstract--- *The study aims to analyse the IQ levels due to the prevalence of stunting on primary school students. It is a cross-sectional research approach covering 50 elementary school students chosen by purposive sampling technique. The data were collected by measuring students' height and applying the* Wechsler Intelligence Scale for Children *(WISC) method. The independent samples t-test was used to analyse the data. The results of this research showed that the mean of students' age was between 7.81+0.9 years old, the mean of students' weight was between 19.81 + 4.3 kg, and the mean of students' height was between 116.71 + 7.1 cm. Besides, 24 students suffered from stunting, and other 26 students were typical. For students with stunting, the mean of students' IQ level was 79.31+14.7. For typical students, the mean of students' IQ was 81.41+12.5. Therefore, it can be concluded that stunting students and non-stunting students do not differ in term of IQ levels.*

Keywords--- *Stunting, IQ Levels, Children.*

I. BACKGROUND OF STUDY

Indonesia is still experiencing problems with malnutrition until now. Malnutrition causes stunting and abnormalities in motor development. Stunting is generated by chronic malnutrition due to the lack of nutrition since the fetus is inside the belly. Malnutrition at a young age raises mortality rates in youth leading to quickly getting sick, abnormal motor abilities, minimum body posture as an adult, as well as a decreased ability to think (cognitive) of sufferers. The 2013 Basic Health Research [1] recorded a national stunting prevalence of 37.2 per cent, an increase from 2010 (35.6%) and 2007 (36.8%). It means that one in three Indonesian children out of eight million Indonesian children suffered stunting.

Stunting may occur when the fetus is still in the womb and noticed when the child is two years old. Besides increasing the mortality rates and leading to minimum posture, stunting also decreases the cognitive abilities of sufferers, resulting in long-term economic losses for Indonesia. Indonesia draws the world' fifth-largest number of children with stunting.

The prevalence of stunting children in Padang Pariaman Regency is relatively high. According to data from the Basic Health Research in 2007, the stunting rate for children under five in Padang Pariaman District was 12.9% of a very short toddler and 22.1% of a short toddler. Stunting is one of factors of increase in mortality, low school performance and motor development, and unbalance physical ability functions [2]. The significant cognitive impairment will cause a decrease in children's learning outcomes when they enter school age.

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DOI: 10.37200/IJPR/V24I5/PR201730
Received: 08 Feb 2020 | Revised: 03 Mar 2020 | Accepted: 18 Mar 2020

II. RESEARCH OBJECTIVES

The study aims to analyse the IQ levels based on the incidence of stunting on elementary school children.

III. METHODOLOGY

It is a cross-sectional research approach for exploring cross-section information, to find out the IQ levels due to the prevalence of stunting on primary school students. A Camry® portable electronic scale measured the children's weight and their height was measured with a microtoise. The United States Centers for Disease Control and Prevention (CDC) charts in 2000 were adapted as the nutritional indicators [3]. The Wechsler Intelligence Scale for Children (WISC-IV) measure the children's' level of intelligence. The t-test using the SPSS Program was applied to analyse the data.

IV. FINDINGS

The results of this research showed that the mean of students' age was between 7.81+0.9 years old, the mean of students' weight was between 19.81 + 4.3 kg, and the mean of students' children's height was between 116.71 + 7.1 cm. Twenty-four students suffered from stunting, and other 26 students were typical. In the group of stunting, the average of children's IQ level was 79.31+14.7. For students with stunting, the mean of students' IQ level was 79.31+14.7. For typical students, the mean of students' IQ was 81.41+12.5. Overall, the subject's mean of IQ was 80.41 + 13.5, which was below the average. Characteristics of research subjects can be seen in the table.

Tabel 1: Samples Attribute

Characteristic	Mean	SD	Min	Max
Age (year)	7.81	0.9	6.1	12.8
Height (m)	116.71	7.1	103.9	131.1
Weight (kg)	19.81	4.3	13.9	32.2
BMI (kg/m^2)	14.61	2.0	10.2	21.5
IQ	80.41	13.6	46.0	115.0

The results showed that female and male subjects were similar in term of stunting incidence. It is not in line with Vilda's research (2018) claims that there is a tendency for the incidence of stunting in the group of boys compared to girls (table 2).

Tabel 2: Distribution of Respondents based on Stunting Incidence

Variable	Boys (n=27)	Girls (n=23)	Total (n=50)
Non Stunting	15 (30.0%)	11 (22.0%)	26 (52.0%)
Stunting	12 (24.0%)	12 (24.0%)	24 (48.0%)

The results also showed that the majority of subjects classified as stunting, their IQ levels are in borderline groups. Subjects classified as non-stunting have higher average group IQ abilities compared to stunting subjects. It shows that the IQ ability of subjects in the stunting group is lower than in the non-stunting group.

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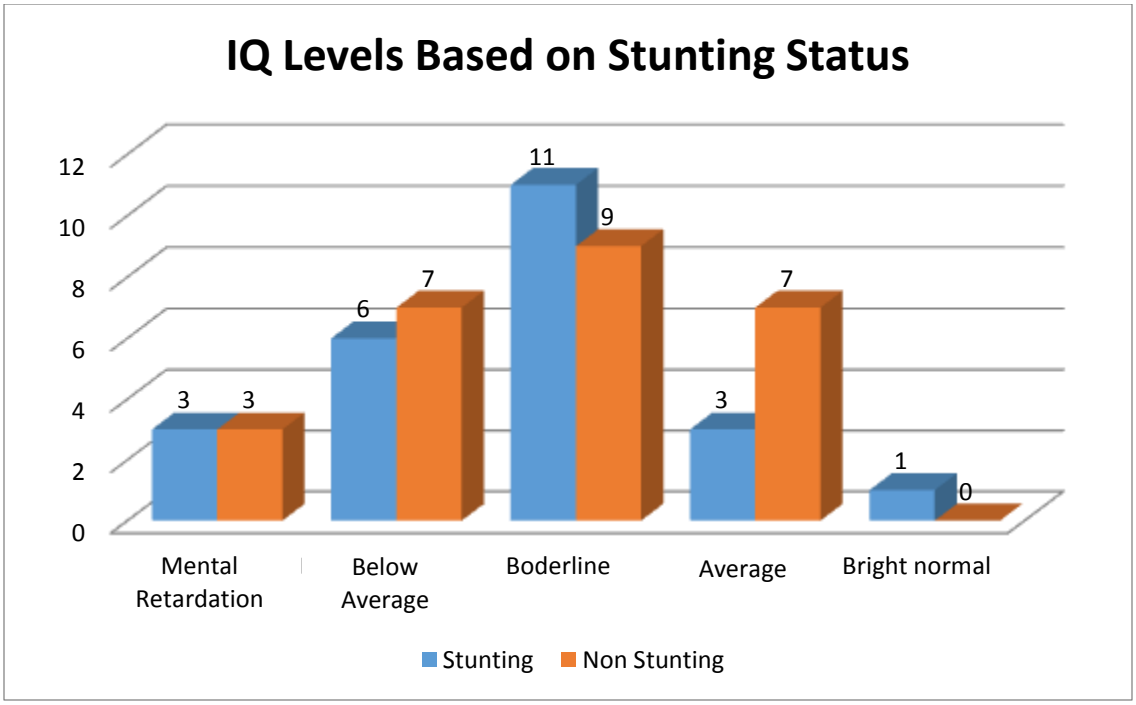

V. DISCUSSION

Stunting is a condition of children who experience growth slower than they should. Various factors influence the incidence of stunting, including the direct factor of low intake of food sources of protein and low birth weight. Indirectly, stunting is influenced by family socioeconomic factors, maternal nutrition knowledge, availability of family for food and other factors. The incidence of stunting at the age of five will affect the child's growth and development, one of which affects the IQ score or the level of intelligence of children. In developing countries, stunting may be occurred by several factors, including slow advancement in youth and postponed neurosensory integration, low IQ and school performance. Moreover, a late development in young children can also be caused by stunting. Therefore, inadequate development in children who suffer from stunting is probably due to poor nutrition [4].

The results showed that the incidence of stunting could occur in boys and girls. The incidence of stunting has an impact on the IQ scores of school students, seen in the results of the study that the number of students with low IQ scores tends to be more in stunting children than non-stunting children. Although statistically, it was found that there was no difference in IQ ability between subjects in the stunting group and the non-stunting group (pvalue> 0.05). The results of this study are different from the results of the study of Opoola et al. and Berkman et al. propose that two-year-old children with severe stunting scored 10 points lower on the WISC-R test (95% Cl 2·4–17·5) than children without severe stunting [5-6]. The low level of students' nutritional status is one of the risk factors of poor academic achievement and capacity in primary education. It may be harmful to the physical and cognitive development for students during their childhood [7].

A person who is suffering from malnutrition from the womb until the age of five will be at risk of experiencing growth and development disorders, including brain growth. Brain growth and volume will be disrupted. According

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to Wickett et al., IQ at 0.35 (P<0.01) is correlated with brain volume, thus replicating the results of past studies [8]. They propose that the correlation value between brain volume and IQ level is closer to 0.50. The head size also revealed definite correlations with IQ. Intelligence can also be inherited through genes in chromosomes. Therefore, it is not surprising that intelligent parents will also inherit intelligent children [9].

VI. CONCLUSION

The results of this study found that the IQ ability of non-stunting subjects on average is higher than the stunting group. It also shows that the IQ ability of subjects in the stunting group is lower than in the non-stunting group. Although, statistically, it was found that there was no difference in IQ ability between subjects in the stunting group and the non-stunting group (pvalue> 0.05).

ACKNOWLEDGEMENT

Conflict of Interest: No

Source of Funding: Self source

Ethical Clearance: Done research committee

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