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by

Submission date: 09-Jun-2021 09:37AM (UTC+0700)

Submission ID: 1603182185

File name: I_Internasional_Correlation_between_nutritional_status....pdf (140.69K)

Word count: 2418

Character count: 14617

Correlation between nutritional status and participation in the growth and development of cognitive ability in children aged 2-5 years in Makassar, Indonesia

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Abstract

This study aimed to determine the correlation between of nutrition status and participation on child's growth development services on cognitive abilities of children aged 2-5 years in Makassar. This study design used Cross Sectional Study in Biringkanaya Sub-District of Makassar. 55 children aged 2-5 years were chosen as samples in the study. Data were processed and analyzed by SPSS, using Chi-Square. The results showed that 58.2% of respondents did not follow the complete development of the service; 60% had underweight and 58.9% had low cognitive abilities. There was no significant correlation between participation in the child's growth development services and nutritional status on the cognitive ability of the respondents ($p > 0.05$). Since there was high nutritional status of underweight children, there should be programs to help improve the nutritional status of children, especially children aged less than 5 years such as counseling and coaching for mother, teacher and officer of Posyandu.

Introduction

Intelligence is one of the indicators for individuals' quality. Cognitive ability as one aspect of intelligence is influenced by internal factors (genetic) and external factors (environment).¹ In order for cognitive abilities to develop, child need to get stimulation from an early age from families and surrounding environment.

Theoretically the role of nutrients on child development goes through two pathways. Firstly, the conditions of inadequate nutrition affect nutritional problems in children. It can cause brain disorders which eventually affect the development. Second, inadequate nutrition intake will

cause children to feel tired due to lack of energy, so they will get socially isolated and lack of exploration. Thus, it might cause developmental disorders.^{2,3}

Various studies have found that nutrition has correlation on intelligence and motoric development. If a child who is under five years old is malnourished, he will have a lower IQ of 13-15 points than other children when entering school. Children with poor nutritional status will be difficult to experience gross motoric improvement compared to children with good nutritional status.⁴ Levitsky and Strupp (1984) in their research on mice revealed that malnutrition causes functional isolationism or self-isolation which is to maintain not to spend a lot of energy (conserve energy) by reducing activities of social interaction, activity, exploratory behavior, attention and motivation. The application of this theory to humans is that in a lack of energy and protein (KEP), children become inactive, passive and unable to concentrate. As a result the child with poor nutritional status will be less in exploring their surrounding environment compared to children who are well-nourished, who are able to do so for a longer time.⁵

The prevalence of malnutrition in children under five years old from year to year shows significant reduction, until in 2000 the prevalence of underweight children under five years old of age was 24.7%. However, after 2000 when Indonesia experienced a multi-dimensional crisis, the prevalence of malnutrition start to increase again and categorized as one of the highest. (20-29%), respectively became 26.1% (2001), 27.3% (2002), 27.5% (2003) and 28.47% (2004).

The results of Riskesdas (2007) stated that the prevalence of malnutrition in West Sumatra was 2.8% and malnutrition was 14.4%, and become a public health problem because it has passed the threshold of > 10%. Stunting conditions in West Sumatra is also high at 32.8% and exceeded the nutritional problem threshold of > 20%. Likewise, the prevalence of very thin toddlers (8.2%) has passed the threshold > 5%.

The results of monitoring the nutritional status of Makassar City showed that the prevalence of children malnutrition was 2.2%, malnutrition was 14% (indicator of weight /age), 10% of children under five years old were very short, 16.2% of children under five years old (indicators of height / age), 1.5 % of toddlers are very thin, and 7.4% of underweight children (weight / height indicator).⁶

Efforts to improve the growth and development of Indonesian children have been carried out through various development

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Key words: nutritional status, cognitive ability, child's growth development

Acknowledgments: the authors would like to thank Indonesia Ministry of Research and Technology, and Research Institute and Community Service Hasanuddin University.

Contributions: the authors contributed equally.

Conflict of interest: the authors declare no potential conflict of interest.

Funding: the work was supported by Superior College Basic Research Grant, Indonesia Ministry of Research and Technology

Clinical trials: this research has been approved by research ethics committee of Public Health Faculty, Hasanuddin University.

Conference presentation: part of this paper presented at the 3rd International Symposium of Public Health, 2018 October 31 - November 1, Universitas Airlangga, Surabaya, Indonesia.

Dedication: the article is dedicated to Public Health Study Program, Public Health Faculty, Hasanuddin University.

Received for publication: 28 July 2019.

Revision received: 9 September 2019.

Accepted for publication: 15 October 2019.

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Journal of Public Health in Africa 2019, 10(s1):1181

doi:10.4081/jphia.2019.1181

sectors, especially health, nutrition, and education provided in the form of services for early childhood, and supported by services for mothers or substitute caregivers. The types of services available include: Posyandu organized by the community and fostered by the Ministry of Health and the Regional Government through the PKK; Bina Keluarga Balita (BKB) fostered by BKKBN; Child Care and Protection is carried out by the Ministry of Social and Early Childhood Education (PAUD) which is fostered by the Ministry of National Education.⁷

Materials and Methods

This study used a cross sectional design, held in May-June 2018 in Biringkanaya District, Makassar City. The sample in this study were children aged 2-5 years old who received complete child development services (integrated Posyandu PAUD) and those who did not get complete child development services (Posyandu). As many as 55 people become the samples of the research who were taken randomly. The data collected consisted of primary data about the characteristics of the children and families of the respondents, participation in growth and development services, children's cognitive development and children's nutritional status. The Secondary data is about toddlers in Biringkanaya District. Nutritional status data was collected by doing anthropometric measurements to assess body weight with digital scales at 0.1 kg accuracy and using microtoise to measure height. Data collection on children's cognitive development was carried out using a questionnaire that indicate the ability of children aged 2-5 years by using several questions that are appropriate to the stage of child development based on age, which grouped into 3, namely indicators of the ability of children aged 2-3.4 years; 3.5-4.4 years and 4.5-5.4 years with a score of 0-3 from not able until able to do instructions from each indicator. Data was analyzed using univariate analysis and bivariate characteristics to determine the relationship of nutritional status and participation in child development services with cognitive abilities of children, using Chi-Square with a significance level $p < 0.05$.

Results and Discussion

Characteristics of respondents

Respondents in this study on average were 3.91 ± 1.041 years old with the youngest age of 2 years and the highest age was 5 years, of which 50.9% were female.

The occupation of the respondent's father in this research are civil servants, mechanics, drivers, laborers and private / self-employed with the most occupation are laborers and private sector workers as much as 40% for each of them. Respondent's mother's occupation does not vary widely, because 92.7% of the respondents' mothers are only housewives. Only 5.5% worked as civil servants and 1.8% works in private sector.

Cognitive ability of children age 2-5 years old

The results showed that more than half

of respondents (58.9%) had low cognitive abilities as shown in Table 1. Result shows that in the group of respondents with ages 2-3.4 years as much as 72.2% could not mention 4 colors, and 66.7% could not mention gender. From 18 people, only 11.1% had cognitive abilities that were in the high category and none of these age groups attended the integrated PAUD program. In the age group of 3.5 to 4.4 years as much as 63.6% of the respondents could not draw people with their parts, 45.5% were unaware of the future (what they want to be), and 36.4% could not mention 5-9 colors or more. As much as 55% of the respondents participated in the integrated PAUD pro-

gram and only 63.6% had the ability in the high category. Meanwhile in the age group of 4.5-5.4 years 46.2% of the respondents were unable to answer the questions.

Participation in children growth and development service

Table 2. shows that more than half (58.2%) of respondents did not have complete growth and development services (integrated PAUD posyandu). Efforts to improve Indonesian children's growth can be done through integrated PAUD posyandu so that children can reach each stage of growth and development optimally. The

Table 1. Distribution of respondents based on cognitive ability.

Cognitive ability	n	%
High	22	39.3
Low	33	58.9
Total	55	100.0

Table 2. Distribution of respondents based on participation in children growth and development service.

Children growth and development service	n	%
Integrated PAUD	23	41.8
Posyandu	32	58.2
Total	55	100

Table 3. Correlation between participation in growth and development service and cognitive ability of respondents.

Participation in growth and development service	Cognitive ability				Total		p value
	High		Low		n	%	
Integrated PAUD	11	47.82	12	52.17	23	100	0.468
Posyandu	11	34.38	21	65.63	32	100	
Total	22	100	33	100	55	100	

Table 4. Distribution of respondents based on nutritional status.

Nutritional status	n	%
Thin	33	60
Normal	22	40
Total	55	100

Table 5. Correlation of nutritional status with respondents cognitive ability.

Nutritional Status	Cognitive ability				Total		p value
	High		Low		n	%	
Normal	10	43.47	12	52.17	23	100	0.694
Thin	12	37.5	21	65.63	33	100	
Total	22	100	33	100	55	100	

role of integrated PAUD posyandu seeks a safe environment, improves health and nutritional status, strives for an atmosphere, facility and environment that lead to interest, a sense of security and fun so as to stimulate children to play, explore and learn so that their developmental needs are optimally achieved.⁸

The results of statistical analysis showed that there was no significant relationship between participation in growth and cognitive abilities of respondents ($p > 0.05$) as seen in Table 3. However, this study shows that low cognitive abilities were higher in respondents who only attended the posyandu service program (65.63%) compared to those who attended integrated PAUD (52.17%). This happens because there were no differences between cognitive abilities in children who attend integrated PAUD and only posyandu. This is presumably due to the lack of availability of learning aids and facilities available in integrated PAUD where respondents receive growth and development services that will affect the optimization of stimulation in the development of children who participate in PAUD.

Previous study found that 54.4% of kindergarten students in Salimpaung District who did not attend PAUD, 12.1% of them experienced overall developmental deviations, 5.06% experienced gross motoric development delay, 37.3% fine motoric delay, 49.4% experienced delay in the development of language speech and 44.6% experience delays in the development of socialization and independence compared to those who attend PAUD.⁹

Nutritional status

The results showed that more than half of the respondents (60%) were thin (Table 4). Nutritional status is a manifestation of the state of the body that can reflect the results of food consumed every day. Good nutritional status occurs when body gets enough nutrients that are used efficiently for enabling optimal physical growth, brain development, work ability and general health.¹⁰

Malnutrition in children can cause a decrease in physical development. Lack of intake in infants and toddlers leads to

disruption of growth in physical, mental and spiritual development.¹¹ In this study there was no correlation between nutritional status and cognitive abilities of respondents with the results of statistical analysis ($p > 0.05$) as seen in Table 5. Even so, it was seen that cognitive abilities were lower in respondents with underweight nutritional status (65.63%) compared to normal. Jalal (2009) said that lack of nutrition might affect social behavior low attention, low learning ability and low learning outcomes. The impact of malnutrition on cognitive abilities does not only occur in children who have no nutrition but are also absent or short.⁷

Inappropriate development of children (lower) was higher in children with underweight nutritional status compared to children with normal nutritional status (<12). Children with poor nutritional status tend to experience more problems with their motoric development and were 8 times more likely to experience physical motoric development delays than children with normal nutritional status.¹²

Conclusions

Based on the results of the study, it can be concluded that only 41.8% of children aged 2-5 years in the Biringkanaya District participated in the Posyandu program, 60% had underweight nutritional status and 58.9% had low cognitive abilities. There is no significant correlation between participation in growth services and nutritional status with cognitive abilities of children aged 2-5 years. Considering the high level of underweight children cases, therefore it needs a program such as family counseling about children's nutrition to improve children's health.

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