



Factors Related to Nutritional Status of School-Age Cerebral Palsy Children

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ABSTRACT

Introduction: Cerebral palsy (CP) is one of the most common causes of chronic disability in children, nutritional disorders in children with CP can manifest as malnutrition or more nutrition. The percentage of CP in children under 18 years is 65.4% of the total CP people in Indonesia. **Methods:** The type of research is observational with a cross-sectional research design. Samples of 45 school-age school-age children who meet the criteria with total sampling. The instruments used are a 24-hour recall form, a food photo book, and a parenting questionnaire. Bivariate analysis in this study uses a chi-square test to determine the relationship between food intake and parenting with the nutritional status of CP children. **Results:** The results of the study are the relationship between energy intake and the nutritional status of CP children with the value of $P=0.003$. There is no relationship between protein intake and the nutritional status of CP children with the value of $P=0,462$. There is no relationship between parenting with the nutritional status of CP children, the value of $P=0.97$. There is a relationship between food consistency and the nutritional status of CP children obtained with the value of $P=0.017$. There is a relationship between oromotoric disorders and the nutritional status of CP children obtained P value= 0.013 Based on the results of research on energy intake and food consistency has a significant relationship with the nutritional status of children CP. **Conclusion:** So, it is expected that parents or caregivers of CP children can provide nutritious food, train children to eat with solid food consistency, and check the oromotoric disorder of CP children.

Keywords: Cerebral palsy, Nutritional Status, Food Intake, Parenting, Oromotor Disorder

INTRODUCTION

Basic Health Research Data (Riskesdas) 2018 shows that 3.3% of the total children aged 5-17 years in Indonesia have disabilities. Based on research conducted by Faezal F (2016), the percentage of *cerebral palsy* (CP) in children under 18 years is 65.4% of the total CP sufferers in Indonesia (Triwidiyanti et al., 2016). *Cerebral palsy* is one of the most common causes of chronic disability in children, nutritional disorders in CP children can manifest as undernutrition or overnutrition. This can be influenced by nutritional and non-nutritional factors. Several studies show that *children with cerebral palsy* are malnourished (Pujasari et al., 2020). Semarang City provides physiotherapy rooms at Semar Cakep Disability House located in West Semarang District. This space is used for children with disabilities, especially those with *cerebral palsy*. Although the community has been established since May 2018, no research and data collection of CP children has been conducted before. Based on the results of a preliminary study conducted on seven CP

children in the community, six children were malnourished, three children were very thin, one child was obese and two children were stunted.

Children with CP experience feeding problems because of the effects on the anatomical and functional structures involved in eating function. This results in reduced energy and nutrient intake which can result in malnutrition, decreased body fat reserves, reduced muscle mass, and immune dysfunction (Caramico-Favero et al., 2018). CP children have difficulty in moving and need the help of those around them. Children with CP have a dependence on meeting self-care needs in daily activities. This condition has an impact on increasing financial, psychological, physical, and social burdens compared to caregivers on healthy children. The fulfillment of CP children's dietary intake is very dependent on their parenting and family diet. The inability of the child to communicate hunger and satiety causes caregivers to have responsibility for monitoring the child's food intake (Rajikan et al., 2017). Seeing such conditions, mothers or caregivers of CP children need to provide good nursing care with an individual approach (Wuyaningsih & Larasati, 2018). Based on the description above, this study aims to determine the relationship between food intake and parenting style with the nutritional status of *cerebral palsy children* in the Semar Cakep Community (Semarang People with Disabilities Concern).

METHODS

This is observational research with a cross-sectional study design. A sample of 45 school-age CP children who met the criteria with total sampling. Data analysis was performed univariately and bivariately using *Statistical Package for Service Solution (SPSS) 16 for Windows*. Data on the characteristics of the subject are presented descriptively. The subjects' meal intake data in units of Household Size (URT) were converted into grams. The data obtained was then converted into energy intake, protein, fat, carbohydrates, and other micronutrients using the *Nutrisurvey 2016* program. The calculation of nutritional intake levels was carried out using a comparison of the subject's nutrient intake with the energy needs that should be based on age and sex. The calculation of parenting based on the results of questionnaires filled out by parents or caregivers of CP children is categorized as good or not good. The nutritional status of subjects was calculated with the WHO *Antro Plus* application due to the age of all subjects over 5 years. Bivariate analysis in this study used the *Chi-Square test* to determine the relationship between food intake and parenting with the nutritional status of CP children meaning $p \leq 0.05$ with a confidence degree of 95%.

RESULTS AND DISCUSSION

Relationship of Energy Intake with Nutritional Status of CP Children

Table 1. Relationship of Energy Intake with Nutritional Status of CP Children

Energy Intake	Nutritional Status						Total	p-value
	Poor Nutrition		Normal Nutrition		Excessive Nutrition			
	f	%	f	%	f	%		
Poor	14	31,1	5	11,1	1	2,2	20	44,4
Normal	4	8,9	19	42,2	2	4,5	25	55,6
Total	18	40	24	53,3	3	6,7	45	100

Based on the results of the 3x24-hour recall and the calculation of children's energy needs using the Schofield formula, the results are obtained as in Table 1. Bivariate analysis of the relationship between food intake and nutritional status in CP children is not eligible to use the Chi-Square Test with the 2xK table because *the expected value* of less than 5 is more than 20%. Therefore, data analysis was carried out using the Kolmogorov-Smirnov test with the calculation of p value 0.003 which can be interpreted that there is a relationship between energy intake and nutritional status of CP children.

Causes of feeding problems in CP children found in this study include oral and pharyngeal dysphagia, vomiting, dental caries, long mealtimes, early satiety, and communication disorders. This condition causes children to be unable to express conditions of hunger, thirst, and fullness. The results showed that most CP children with good nutrition had a normal energy intake of 42.2%. In this study, several CP children were found who had experienced malnutrition and were recommended by doctors to consume F100 every three hours so that the food intake data was normal. Most CP children eat soft textured foods and gravy such as porridge, puree, and team rice. This is because most CP children have oromotor disorders and dysphagia so it is difficult to digest ordinary food.

This research is in line with the research of Fadillah et al., (2020) on the relationship between nutritional intake and physical activity with the nutritional status of children with intellectual disabilities in Semarang City. This study is also in line with the research of Diniyyah & Nindya (2017) obtained results with a p value of 0.007 which means there is a relationship between energy intake and poor nutritional status in toddlers in Gresik.

Relationship of Protein Intake with Nutritional Status of CP Children

Table 2. Relationship of Protein Intake with Nutritional Status of CP Children

Protein Intake	Nutritional Status						Total	p-value	
	Poor Nutrition		Normal Nutrition		Excessive Nutrition				
	f	%	f	%	f	%			
Poor	10	22,2	6	13,3	2	4,5	18	40	0,462
Normal	8	17,8	18	40	1	2,2	27	60	
Total	18	40	24	53,3	3	6,7	45	100	

Data were obtained based on the results of a 3x24-hour recall and the calculation of children's protein needs using the Schofield formula. Data analysis of the relationship between protein intake and nutritional status in CP children has an expected value of <5 of more than 20%, so it does not meet the requirements of the Chi-Square test. So, data analysis with the Kolmogorov-Smirnov test obtained results as in Table 2 with a p-value calculation result of 0.462 which can be interpreted that there is no relationship between protein intake and the nutritional status of CP children.

This is in line with research in Jakarta conducted by Tiyani (2013). The study reported no association between protein intake and nutritional status of children with intellectual disabilities. This study is also in accordance with Hayatti's (2015) research on the relationship between the level of nutritional adequacy, physical activity, and consumption patterns of gluten and casein-free foods with the nutritional status of children with autism in the city of Bogor. Adequate protein consumption helps the child's growth process (Sulastri, 2012 in Farliyanti et al., 2020). The incompatibility of research results with theory is caused because most CP children have dysphagia and oromotor disorders. Limitations to eating ordinary food, so vegetable and animal proteins that need to be processed into soft. This causes CP children to consume the same type and frequency of eating every day. With these conditions, research respondents ate foods with a less varied menu. This shows that good protein intake in CP children needs to be balanced with other macro and micronutrients.

In the study of Fadillah et al. (2020), results were obtained ($p = 0.001$, $r_s = 0.53$) which showed a moderate correlation with the direction of a positive correlation between protein intake and the nutritional status of children with intellectual disabilities. The difference in the results of this study can be caused by the absence of calculation of protein needs in accordance with the protein needs of children with disabilities, especially cerebral palsy. In addition, CP children in this study had mostly consumed protein well or even more. CP children who get normal protein intake and more have almost the same percentage.

The Relationship between Parenting and the Nutritional Status of Children with Cerebral Palsy

Table 3. The Relationship between Parenting and the Nutritional Status of CP Children

Parenting	Nutritional Status						Total	p-value	
	Poor Nutrition		Normal Nutrition		Excessive Nutrition				
	f	%	f	%	f	%	f	%	
Less	8	17,8	15	33,3	1	2,2	24	53,3	0,976
Normal	10	22,2	9	20	2	4,5	21	46,7	
Total	18	40	24	53,3	3	6,7	45	100	

Analysis of bivariate data on the relationship between parenting and nutritional status in CP children did not qualify for the Chi-Square test. Due to the 2xK table, data analysis was carried out with the Kolmogorov-Smirnov test. The results of the Kolmogorov-Smirnov test show a p-value calculation of 0.976. This can be interpreted that there is no relationship between parenting style and the nutritional status of CP children. Based on the results of the study, most CP children in this study experienced level V cerebral palsy, where children are unable to mobilize on their own so they need the help of people around them for activities. Of the 45 CP children, only a few were able to move actively, most were confined to wheelchairs and slept on their backs.

The results of bivariate data analysis with the Kolmogorov-Smirnov test showed a p-value of 0.976. This shows no relationship between parenting style and nutritional status of CP children. This is the same as the research of Farliyanti et al. (2020) which reported no relationship between eating parenting and the nutritional status of children in Banjarbaru City SLB with a p-value of 0.380. The results of this study are also in line with the research of Syahrir et al. (2021) at the Special School (SLB) Makassar which states that there is no relationship between the type of parenting style and the nutritional status of children with disabilities with a p-value of 0.649.

This research is not in accordance with Sutadi's (2016) research in Wonosobo on the relationship between parenting style and the nutritional status of children with intellectual disabilities. The study reported a significant relationship between parenting style and nutritional status of children with intellectual disabilities with a p-value of 0.022. The difference in the results of this study was obtained because most parents or caregivers of CP children provide good parenting for their children, but the nutritional status of children is still lacking. This is because parenting is not a direct factor causing nutritional status. Parenting is an indirect cause that has an impact on food intake and infectious diseases in children. In this study, some parents of CP children worked during the day so that CP child care both feeding, child psychosocial care, and hygiene was not fully carried out by the parents of CP children.

Relationship of Food Consistency with Nutritional Status of Children with Cerebral Palsy

Table 4. Relationship of Food Consistency with Nutritional Status of CP Children

Food Consistency	Nutritional Value						Total	p-value
	Poor Nutrition		Normal Nutrition		Excessive Nutrition			
	f	%	f	%	f	%		
Soft	11	24,4	4	8,9	1	2,2	16	35,6
Solid	6	13,3	21	46,7	2	4,4	29	64,4
Total	17	37,7	25	55,6	3	6,7	45	100

Data analysis of the relationship between food consistency and nutritional status in CP children has an expected value of <5 of more than 20%, so it does not meet the requirements of the Chi-Square test. Data analysis was carried out with *the* Kolmogorov-Smirnov *test* and obtained results as in the table with a p-value calculation result of 0.017. This can be interpreted that there is a relationship between food consistency and the nutritional status of CP children. This is by research in Klaten Regency, which stated that there is a relationship between the texture of MP-ASI and the nutritional status of infants. Feeding to children should be given gradually, both from the type of food, consistency, texture, frequency, and number of portions (Pibriyanti & Atmojo, 2017). This is in line with research in Malang Regency in 2019. It is known that there is a significant relationship between nutritional status and the initial age of administration, consistency of MP-ASI, number of MP-ASI administrations, and frequency of MP-ASI (Hasanah et al., 2019).

Food consistency must be adjusted to the readiness and ability of children to receive food. In this study, most CP children who ate foods with soft consistency experienced poor nutritional status. On the other hand, CP children who eat foods with solid consistency have good nutritional status. Feeding with a soft consistency adjusts to the condition of CP children who have oromotor disorders and are unable to chew so the food to be consumed needs to be mashed or soft.

Relationship of Oromotoric Disorders with Nutritional Status of Children with Cerebral Palsy

Table 5. Relationship of Oromotoric Disorders with Nutritional Status of CP Children

Oromotoric Disorders	Nutritional Status						Total	p-value
	Poor Nutrition		Normal Nutrition		Excessive Nutrition			
	f	%	f	%	f	%		
Level II	5	11,1	20	44,4	2	4,5	27	60
Level III	12	26,7	5	11,1	1	2,2	18	40
Total	17	37,8	25	55,5	3	6,7	45	100

Based on the results of the study, 44.4% of CP children have oromotor disorders at level II, which can eat ordinary or solid food but requires a long time. As many as 35.6% of CP children have level III oromotor disorders. CP children tend to have limited eating with a dense texture. The results of the bivariate analysis with the Kolmogorov-Smirnov test between oromotor disorders and nutritional status obtained a p-value of 0.013. There is a relationship between oromotor disorders and the nutritional status of CP children. The presence of this oromotor disorder will interfere with the child's eating and speech process. This is in line with research by Tamin et al. (2018) which states that anatomical abnormalities in Down syndrome children play a role in the occurrence of eating disorders and dysphagia (Tamin et al., 2018).

CP children with severe oromotor disorders tend to have greater feeding difficulties, while CP children with mild to moderate oromotor disorders can demonstrate adequate eating skills. In this study, many CP children had not been trained and introduced to food textures according to their age. So, this makes it difficult for children to switch to denser food textures.

CONCLUSION

Based on the results of the study, it can be concluded that there is a relationship between energy intake, food consistency, and oromotor disorders with the nutritional status of school-age cerebral palsy children and there is no relationship between protein intake and parenting style with the nutritional status of school-age cerebral palsy children. This shows the need for nutritious and high-calorie feeding and exercise in children to try new foods with varied consistency. CP children with severe oromotor disorders have a poor nutritional status, so there is a need for assistance in children to maintain oral hygiene, perform movements, training children's movement muscles, and need routine oromotoric therapy in children.

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