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Relationship between Caries Experience and Food Intake with Stunting Among 6-8-Years Old of Elementary School at Pantai Labu District in 2018

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Abstract:
Stunting is one of major problem in the world, including Indonesia. Its prevalence 30.8% in 2018. It is a chronic growth faltering caused by low food intake and long-term disease makes child shorter than the average of the same age. The objective of the research was to assess the relationship of caries experience and food intake with stunting in 6-8 years-old elementary school children in Pantai Labu District in 2018.The research used a cross-sectional approach. The samples were 144 aged 6-8 years-old, taken by using a cluster sampling technique. Stunting was assessed by measure the value of height to age, caries experience was measured by using the def-t index and food intake were calculated by using food recall 24 hours. The data were analyzed by using the Chi-square test and multiple logistic regression tests. The result of this study indicated that stunting children occurred due to high caries experience (52.4%) and low protein intake (54%). The result of Chi-square test showed that there was the relationship of caries experience (p=0.004; PR=2.150, CI=1.216-3.799), and protein intake (p=0.001; PR=2.376, CI=1.338-4.219) with stunting. The result of multiple logistic regression tests indicated that low protein intake the most dominant correlate with stunting (p=0.001; PR=3,950, CI=1.725-9.405). The conclusion was high caries experience and low protein intake was risk factor for stunting. Stunting in children is 3 times comes from low protein intake and have a chance about 89% causing stunting compared to good protein intake.
Keywords:
stunting; caries experience; carbohydrate; protein

I. Introduction

Nutrition problems in various developing countries including Indonesia are quite a concern of the world. Economic improvement is not always able to overcome the problem of malnutrition, in fact the level of under nutrition in children still remains high (WHO, 2012). 12 Stunting is nutritional status based on height or body length ratio by age with a z-score of less than -2 elementary school.

Stunting or short nutritional status is a chronic nutritional problem that arises as a result of a state of malnutrition in a long time and is influenced by the condition of the mother / prospective mother, fetal period and infancy / toddler, including illnesses suffered during infancy.10,13,14 The highest percentage of stunting children under the WHO according to WHO, 2012 occurred in Asia 56% and in Asia and 36% and the percentage of stunting (stunting and very stunting) in Indonesia in 2018 was 30.8%, although it had decreased from 2013 (37.2 %) but still above WHO cut of point (20%), whereas in North Sumatra the percentage of stunting toddlers is 33.2% consisting of stunting toddlers (17.8%) and very stunting (15.4%).

Based on data from the North Sumatra Health Service Profile 2013, Deli Serdang Regency the percentage of stunted children is 19% and very stunted children is 18.7%. The high stunting rate in Indonesia in school age children (6-12 years) is 35.6% while the stunting rate is children aged 5-12 years in North Sumatra Province reached 36%.

Entering pre-school age and school age, many children suffer from dental caries, this is because children are able to choose foods according to their taste. The dental and mouth function to chew reduce size and produce amylase enzymes that are very useful in subsequent digestive processes. According to Indrati, 2014 that a good dental and oral condition will determine the course of good food, if the dental and mouth are in pain will affect one's food intake.8 Dental caries left or not treated / treated will cause pain accompanied by stabbing pain, loss teeth, chewing disorders and infections.

Research conducted by Kartikasari, et al (2014) states that the main cause of caries in school-aged children is the habit of eating food / snacks that is sticky or cariogenic in nature. This study aims to determine the relationship of caries experience and food intake with stunting in elementary school children aged 6-8 years in Pantai Labu District.

II. Research Method

This type of research is an observational study with cross-sectional design. The population of this study was all elementary school children aged 6-8 years in Pantai Labu District-Deli Serdang Regency with a sample of 144 children and had approved an informed concern sheet. The sampling technique was using the cluster sampling technique (sampling area) and three public elementary school were selected purposively.

Data collection was obtained by conducting direct interviews. Stunting data is obtained by taking anthropometric measurements which include weighing with digital scales and measuring height with microcopies and rising the children's age based on birth date then the measurement results are entered into the 2007 anthrop-plus application to see the z-score. The category of a child stunting if z-score <-2 SD, otherwise if z-score >-2 SD, the children's nutritional status is not stunting. Data on caries experience was calculated by the def-t index by conducting a direct examination that is if a dental sonde device is stuck to the dental. Decayed (d) is milk teeth that have caries and can still be patched, if the caries is clearly visible with eyes with a very large hole and cannot be patched and has an indication to be removed then marked as extractive (e) while filled (f)) is a milk tooth that has already been patched and is still in good condition. Each children is added to the score d, e and f then the score is totaled to become a def-t index. The def-t index category consists of two categories, low and high. Low category with def-t score ≤ 4 consists of merging very low categories (0.0-1.1), low (1.2-2.6) and moderate (2.7-4.4), while high categories with a def-t index> 4 consisting of a combination of high categories (4.5-6.5) and very high (> 6.5).

Data on food intake was obtained using a food recall form which was asked of respondents accompanied by their parents. Food recall measurement results will be compared with the 2013 of Recommended Dietary Allowances (RDA) rate. The amount of intake in the URT obtained is then converted to gram size. The measurement results are the total of carbohydrate and protein intake consumed for 24 hours and then converted to the 2013 Recommended Dietary Allowances (RDA). The intake category is less (<80%) and good 80% - 120%.

III. Discussion

The study was conducted on 144 students and their mothers, obtained a frequency distribution of caries experience with a def-t average index and stunting by sex as shown in table 1.

Table.1 Frequency Distribution of Caries Experience with Average def-t Index and Stunting Based on Sex

Sex	Caries Experience (*def-t*)				Stunting			No Stunting	
	d (X±SD)	*e* (X±SD)	*f* (X±SD)	*def-t* (X±SD)	n	n	%	n	%
Male	3,09±1,43	2,71±2,28	0,0±0,0	5,77±2,71	79	32	22,2	47	32,6
Female	3,06±1,61	3,66±1,89	0,0±0,0	6,71±2,39	65	32	22,2	33	22,9
Total	3,08±1,51	3,14±2,61	0,0±0,0	6,15±2,61	144	62	44,4	82	56,6

The results of the analysis showed the average def-t index in male (5.77 ± 2.17) was lower than female (6.71 ± 2.396). The average def-t score was 6.15 ± 2.61, mean decay = 3.08 dental and extractive = 3.14 dental while no dental fillings were found and the standard deviation for def-t was 2.61. Stunting in male and female had the same number of 32 children (22.4%), while the total stunting prevalence was 64 children (44.4%).

The category of less food intake is <80% of the 2013 Recommended Dietary Allowances (RDA) while the category is sufficient if carbohydrate and protein intake is ≥ 80% -120% of the Recommended Dietary Allowances (RDA) in 2013. Data on the distribution of carbohydrate and protein intake is presented in Table 2.

Table 2. Distribution of Carbohydrate and Protein Intake in Elementary Schools in Pantai Labu District Ages 6-8 Years

Category	Carbohydrate (n=144)		Protein (n=144)	
	n	**%**	**n**	**%**
Less	131	91	100	69,4
Enough	13	9	44	30,6

Table 2 shows that children who experienced less carbohydrate intake were 131 children (91%) and children who experienced less protein intake were 100 children (69.4%). Stunting nutritional status is calculated by measuring the height ratio according to the children's age according to the z-score less than -2 elementary school.

The caries experience was calculated by the def-t index score with the def-t index category divided into 2 namely high and low. High def-t index is> 4 and low is ≤ 4. Cross tabulation of caries experience with stunting can be seen through Table 3.

Table 3. Relationship of caries experience and food intake with stunting

Variable	*Stunting*				*P*	PR	95% CI
	Yes		No				
	n	**%**	**n**	**%**			
High caries	54	52,4	49	47,6	0,004*	2,150	1,216-3,799
Low caries	10	24,4	31	75,6			
Less carbohydrates	62	47,3	69	52,7	0,055	3,076	0,849-11,149

Good carbohydrates	2	15,4	11	84,6	0,001	2,376	1,338-4,219
Less protein	54	54	46	46			
Good protein	10	22,7	34	77,3			

* Significant p <0.05

Table 3 shows the children with high caries experience who suffered from stunting as many as 54 children (52.4%) while those who did not stunting were 49 (47.6%) children. Children with low caries experience who suffered from stunting were 10 children (24.4%) but 31 children were not stunted (75.6%). Static test results with Chi-Square test showed that there was a significant relationship between caries experience with stunting with a p score of 0.004 (p <0.05). The test results obtained PR = 2.15> 1 with a CI score of 1.216-3.799, meaning that children with high caries experience are 2.15 times more likely to be stunted children compared to children who have low caries experience.

There are 62 children with less carbohydrate intake suffered stunting (47.3%) and no stunting 69 (52.7%) while children with good carbohydrate intake were found in 2 stunting children (15.4%) and 11 non-stunting children (84.6%). The results of the static test with the Chi-Square test showed no significant relationship between carbohydrate intake with stunting with a p score of 0.055 (p> 0.05).

Children with less protein intake suffered from stunting as many as 54 children (54%) and did not stunting 46 children (46%), while children with good protein intake suffered stunting as many as 10 children (22.7%) and not stunting as many as 34 children (77, 3%). Static test results with Chi-Square test showed a significant relationship between protein intake and stunting with a p score of 0.001 (p <0.05). The test results obtained PR = 2.337> 1 with a CI score of 1.338-4.219, meaning that children with intake less protein is 2,376 times more likely to be a stunted child than a child with good protein intake.

Table 4. Multivariate Analysis Results

Variable	B	*P*	PR	95% CI	
				Lower	*Upper*
Protein intake	1,374	0,001	3,950	1,725	9,045
Caries experience	1,216	0,005	3,375	1,457	7,815
Constant	0,474	0,042			

The final model test results show that protein intake is the most dominant risk factor, with a risk value / Exp (B) of 3,950. The equation of the multiple logistic regression in this study is as follows:

$Y = \text{Constant} + a_1x_1 + a_2x_2 + \ldots a_ix_i$

$Y = -0{,}474 + 1{,}374 + 1{,}216$

$Y = 2{,}116$

The estimated probabilities are:

$$P = \frac{1}{(1 + e^{-y})}$$

$$P = \frac{1}{(1 + 2{,}718^{-2{,}116})}$$

$$P = \frac{1}{(1 + 0{,}12)} = 0{,}89 = 89\%$$

IV. Discussion

Dental and oral health play an important role in the process of growth and development of children. Teeth and mouth as a means of digestion function to cut bite and chew food into small and smooth and provide amylase enzymes for further digestive activity. If the tooth is problematic or sick / perforated then the child will have difficulty masticating.

Pain in a child's teeth can cause infection and often the child becomes fever so it can reduce the presence of children at school, reduce the concentration of children while studying and will reduce hours of sleep in children. Untreated dental caries can interfere with mastication so that the amount of nutrient intake is disrupted which causes a low body mass index of the child, anemia, lack of sleep and leads to decreased quality of life of the child which can affect the child's cognitive development.

In this study, high caries experience was found in stunting children with a high def-t index (def-t> 4) of 54 children (54%) while children who had low caries experience category (def-t ≤ 4) were 10 children (24 , 4%) and none of the children had filled their teeth. This means that caries experience in this area is quite high. Children with caries will have difficulty chewing food so that children will avoid hard foods such as fish and meat, this will reduce food intake for children's growth and development. Children with severe caries have lower protein intake and also have lower average meat consumption (Worotitjan, Mintjelungan, Gunawan, 2013) .16 This study was supported by Leuangpiansamut, et al (2012) in 6-year-old school children in Thailand that as many as 59.5% of students have caries and eating difficulties because of the pain caused by these caries. Someone with a bad chewing tool will choose food according to the strength of chewing so that it can cause malnutrition.

Habits of children who rarely brush their teeth after breakfast and before going to sleep will aggravate the condition of the child's caries because the rest of the food will stay longer in the oral cavity which is the best food for growth and development of bacteria in the oral cavity.

Food habits that are obtained by children often consume sweet snacks after school (64.9%) and there are 82% of children who do not brush their teeth before going to sleep. Children with high caries experience are 2.15 times more likely to develop stunting than children with adequate protein intake.

Carbohydrate intake in this study shows that there is no relationship between carbohydrate intake and stunting because the p score of 0.055 (p> 0.05), less carbohydrate intake does not necessarily make the child suffer from stunting. Based on the results of data of children with less carbohydrate intake did not suffer stunting (62 children) compared to children who stunted. This is due to the main function of carbohydrates as a producer of energy rather than the formation of bone and new tissue. Besides stunting is not a picture of the child's eating patterns now but a manifestation of the accumulation of previous food intake.

Variation of foods containing carbohydrates is important to complete the body's intake of carbohydrate needs the more varied the food, the more complete the nutritional content the body needs that is why it is very important to apply a balanced nutritional diet such as the nutrition cone.

Children in Indonesia still consume less fish, both marine fish and freshwater fish, even though the easiest protein intake is from fish (Sudaryati, 2013). Pantai Labu District is surrounded by the sea and produces fresh fish but the consumption of children's protein per day according to the 2013 of Recommended Dietary Allowances (RDA) is still very lacking.

The results showed that there was a significant correlation between protein intake and stunting where p score = 0.001 (p <0.05) that 52 children with less protein intake suffered from stunting (52%) while more children with good protein intake did not stunting. namely 34 children (77.3%). Children with low protein intake tend to have the potential 2,376 times more likely to occur in stunted children compared to children whose protein intake is sufficient. This is due to the function of protein as a building block that functions in the child's growth and development process is still lacking in terms of the quality, amount and frequency they consume. Children who experience a deficiency of protein intake that lasts a long time despite adequate energy intake will experience stunted height growth.

Based on the results of 24-hour food recall, children tend to prefer processed protein intake such as foods that have extreme taste or are very tasty in the form of roasted / fried meatballs, grilled sausages / fried, nuggets, and so on, so that when they are full they will skip hours eat it. Not infrequently, they also choose to eat rice with miesop, instant noodles without eggs and meatball soup where they no longer need protein in their food intake so that the carbohydrate content is more dominant while in terms of fulfilling nutrition in the process of child growth and development it needs balanced nutrition according to Recommended Dietary Allowances (RDA) 2013.

In the study of Nabusa, et al (2013) in Toddlers in Biboki, NTT that there is a significant relationship between protein intake and stunting with a p score = 0,000 (p <0.05) .7 This is due to lack of food availability in the area which is usually when there is fish so the child will eat with fish without vegetables, and vice versa if there are only vegetables, the fish will be ignored. According to Lawson in Fitri's study (2012) that the increased increase in protein requirement to pursue growth is proportionally greater than the increase in energy that depends on age and speed of growth. Protein intake was the most dominant risk factor for stunting, which was 89%.

Conclusion

The result of this study indicated that stunting children occurred due to high caries experience (52.4%) and low protein intake (54%). The result of Chi-square test showed that there was the relationship of caries experience (p=0.004; PR=2.150, CI=1.216-3.799), and protein intake (p=0.001; PR=2.376, CI=1.338-4.219) with stunting. The result of multiple logistic regression tests indicated that low protein intake the most dominant correlate with stunting (p=0.001; PR=3,950, CI=1.725-9.405). The conclusion was high caries experience and low protein intake was risk factor for stunting. Stunting in children is 3 times comes from low protein intake and have a chance about 89% causing stunting compared to good protein intake.

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