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Pressure to eat is the most determinant factor of stunting in children under 5 years of age in Kerinci region, Indonesia☆

Atika Dranesia, Dessie Wanda*, Happy Hayati

Faculty of Nursing, Universitas Indonesia, Depok, West Java, Indonesia

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Abstract
Objective: This multivariate study was conducted to identify the determining factors of the stunting incidence in the Kerinci region.
Method: The study design was cross-sectional. The sample comprised 290 children selected by the cluster random sampling method. Data analysis was conducted through chi-square, Mann–Whitney, and logistic regression.
Results: The prevalence of stunting in the Kerinci region was 46.9%. Bivariate analysis showed a relationship between the incidence of stunting and gender ($p = 0.019$), history of exclusive breastfeeding ($p = 0.038$), eating restriction ($p = 0.038$), pressure to eat ($p = 0.009$), and desire to drink ($p = 0.049$). Somewhat similarly, the results of multivariate logistic regression analysis showed that the factors related to the incidence of stunting in children under five were gender, history of exclusive breastfeeding, economic status, eating restriction, and pressure to eat. That said, the factor most associated with the incidence of stunting was the pressure to eat.
Conclusion: The provision of a nursing care plan for reducing stunting in children can be accomplished by increasing exclusive breastfeeding efforts as well as by focusing on the feeding efforts of parents and improving good eating behaviors in children.

Introduction

Stunting is a marker of long-term, chronic nutritional deficiency.[1] However, it is often not recognized by families and health workers.[2,3] Unresolved stunting in children will have a sustained, adverse impact on the next generation,[4,5] causing cognitive impairment, learning

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* Corresponding author.
E-mail address: dessie@ui.ac.id (D. Wanda).

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difficulties, psychosocial dysfunction, and health ailments.[2,4,6,7] In adulthood, stunting can result in weak work productivity and thereby adversely affect family welfare and the national economy.[8,9]

The prevalence of stunting in Indonesia has increased 1.2%,[10,11] yet it has decreased in other Southeast Asian countries and the world at large.[10] Currently, 8.9 million Indonesian children (about 1 in 3) suffer from stunting.[12] In the Kerinci region, located in Sumatra Island, childhood stunting has increased by about 14.5%, affecting more than one-half of the under-five population (55.5%) in 2017[13] and exceeding the overall prevalence rate in Indonesia.[11,14] The Kerinci region has thus been designated a priority area for handling stunting.

Appropriate interventions and strategies are absolutely necessary considering the high incidence and severity of effects caused by stunting. Specific interventions in accordance with regional characteristics are expected to support successful efforts and promotion.[15] In several studies, stunting determinants were classified into child, family, and environmental variables.[16,17] In addition, the importance of feeding and eating behaviors also needs to be considered, because they can affect children's nutrition as well as the incidence of stunting.[18–20]

Therefore, the researchers sought to identify the determinants of stunting in the Kerinci region by considering the demographic characteristics and behaviors of parents and children in terms of feeding and eating behaviors. It was expected that this study would help governmental efforts to reduce the stunting incidence. Meanwhile, in terms of nursing, it was expected that knowing the determinants of stunting would yield a comprehensive nursing intervention that considered these factors. In addition, such knowledge can improve interactions between nurses and clients, which is also beneficial for reducing the stunting incidence.

Method

The study design was cross-sectional. Data collection methods comprised measuring anthropometrics, conducting observations, distributing questionnaires, and gathering secondary data from the maternal and child health records of each child under five. The Child Feeding Questionnaire (CFQ), which assesses domain monitoring, eating restrictions, and the pressure to eat, was used, as was the Child Eating Behavior Questionnaire (CEBQ), which centers on the food approach and food avoidance domains. In the CEBQ, the food approach domain, which assesses food interest, is divided into the following sub-domains: food responsiveness, emotional overeating, enjoyment of food, and desire to drink. In contrast, the food avoidance domain, which assesses lack of interest in food, is divided into the following sub-domains: satiety responsiveness, slowness in eating, emotional undereating, and fussiness in eating. The samples comprised 290 children selected via the cluster random sampling method. The inclusion criteria for mothers were that they were native to Kerinci or had lived there for 10 years or longer, were able to read and write, and owned a book on maternal and child health. The exclusion criterion for mothers was that they could not continue filling out the questionnaire due to illness or pain after caring the child and the house. The choice of time and place was agreed upon with the relevant officer according to the schedule planned by the researchers. The study was conducted in the integrated health service center room and a meeting room provided by the villagers. Bivariate analysis used the chi-square test, Spearman test, and Mann–Whitney test. Multivariate analysis used logistic regression through software applications. This study was approved by the Faculty of Nursing Universitas Indonesia Ethics Commitee.

Results

The analysis showed that the proportion of stunting prevalence in the study sample was 136 children (46.9%). Based on Table 1, it was found that the median age of children affected by stunting was 32 months, and that most of these children were male and had no history of exclusive breastfeeding, IMD??, complete immunization, or infectious disease; moreover, most of the children's mothers did not have primary education (elementary or junior high school), had no access to clean water, became pregnant between the age of 25 and 34, and lacked a complete ante natal care (ANC). There was a significant relationship between sex ($p = 0.019$) and history of exclusive breastfeeding ($p = 0.038$) and the incidence of stunting.

The results in Table 2 showed that the scores of most of the variables of feeding and eating behaviors are only slightly lower than the high score. The eating restriction ($p = 0.038$), pressure to eat ($p = 0.009$), and desire to drink ($p = 0.049$) domains had a significant relationship with the incidence of stunting in this study.

Based on Table 3, it can be seen that the variables of infectious disease history, maternal education, family economic status, the supervision domain, and the emotional domain of insufficient food do not have a significant relationship with the incidence of stunting in children under five, although they were included in the multivariate analysis process ($p < 0.25$). The final results from multivariate modeling are described in Table 3.

Based on Table 3, it can be seen that the factors related to the stunting incidence in children under five are sex, history of exclusive breastfeeding, economic status, eating restriction, and pressure to eat. Meanwhile, the factor most related to the incidence of stunting in children aged 12–59 months in the Kerinci region was pressure to eat, with a *B* value of 0.714.

Discussion

Characteristics of children and families and the incidence of stunting

In this study, sex had a significant relationship with the incidence of stunting. Boys tended to experience stunting more frequently than girls.[17,21] One of the causes of this discrepancy are the eating behavior patterns of various foods by males, which are fewer than those of females.[22] A healthy and diverse diet is necessary to fulfill the optimal nutritional needs of children. In addition, other studies have mentioned that girls at older ages are often more involved in preparing food with their mothers, meaning that girls are also more

Table 1 Demographic characteristics and their relationship to the incidence of stunting in the Kerinci region, April-May 2018 ($n = 290$).

Variable	*n* (%)	Stunting classification		*p*	OR (IK95%)
		No stunting [*n* (%)]	Stunting [*n* (%)]		
Sex					
Female	131 (45.2)	80 (61.1)	51 (38.9)	0.019	1.8 (1.12–2.89)
Male	159 (54.8)	74 (46.5)	85 (53.5)		
History of exclusive breastfeeding					
Exclusive	119 (41.0)	54 (45.4)	65 (54.6)	0.038	0.59 (0.37–0.95)
No exclusive	171 (59.0)	100 (5.5)	71 (41.5)		
History of IMD					
EIBF	211 (72.8)	113 (53.6)	98 (46.4)	0.905	1.07 (0.64–1.79)
No EIBF	79 (27.2)	41 (51.9)	38 (48.1)		
History of basic immunization					
Complete	257 (88.6)	139 (54.1)	118 (45.9)	0.453	1.41 (0.68–2.93)
Incomplete	33 (11.4)	15 (45.5)	18 (54.5)		
History of infectious diseases					
Seldom	161 (55.5)	91 (56.5)	70 (43.5)	0.236	1.36 (0.86–2.17)
Often	129 (44.5)	63 (48.8)	66 (51.2)		
Mothers' level of education					
High	68 (23.4)	38 (55.9)	30 (44.1)	0.076	3.17 (0.57–17.48)
Secondary	106 (36.6)	63 (59.4)	43 (40.6)		3.66 (0.68–19.75)
Elementary	109 (37.6)	51 (46.8)	58 (53.2)		2.20 (0.41–11.82)
Don't go to school	7 (2.4)	2 (28.6)	5 (71.4)		Comparison
Economic status of family					
>Rp 1,906,650	78 (26.9)	48 (61.5)	30 (38.5)	0.107	1.6 (0.94–2.72)
≤Rp 1,906,650	212 (73.1)	106 (50)	106 (50)		
Age of pregnant mother					
At risk (>34 yrs.)	55 (18.97)	28 (50.9)	27 (49.1)	0.541	0.82 (0.42–0.62)
Mature (25–34 yrs.)	149 (51.38)	78 (52.3)	71 (47.7)		0.87 (0.51–1.48)
Not mature (<25 yrs.)	86 (29.65)	48 (55.8)	38 (44.2)		Comparison
Availability of clean water					
Available	254 (87.6)	134 (52.8)	120 (47.2)	0.891	0.89 (0.44–1.8)
Not available	36 (12.4)	20 (55.6)	16 (44.4)		
History of ANC					
Complete	257 (88.6%)	127 (52.3)	116 (47.7)	0.623	0.81 (0.43–1.52)
Incomplete	33 (11.4%)	27 (57.4)	20 (42.6)		

involved in diet choices that will increase their satisfaction with eating.[23] This can in turn increase girls' appetite for healthier home foods more than boys, who are often more involved in outdoor activities.

Exclusive breastfeeding was also shown to have a significant relationship with stunting in this study. In line with several previous studies, a decreased risk of stunting was experienced by children under five who were receiving exclusive breastfeeding.[24–26] The content of nutrients and bio-actives in breast milk can prevent infection and boost a child's immune system.[27] Strong immunity can in turn support children's optimal growth and reduce the risk of disease, thereby decreasing the incidence of stunting in children receiving breastfeeding exclusively.

In this study, no correlation was found between child age, history of early breastfeeding, history of basic immunization, history of infectious diseases, maternal education, family economic status, maternal age during pregnancy, availability of clean water, or ANC history.

Child feeding and child eating behavior related to stunting

Some domains, such as eating restriction, pressure to eat, and desire to drink, have been demonstrated to have a significant relationship with the incidence of stunting in children under five. The eating restriction domain from the CFQ contains questions covering how parents prevent their children from eating excessively, or from eating fast food, sweet foods, or their favorite foods. A study[28] about snacking pattern in children states that fruits and vegetables should be

Table 2 Child feeding and child eating behavior and their association with stunting in the Kerinci region, April-May 2018 ($n = 290$).

Variable	*n* (%)	Stunting classification		*p*	OR (IK95%)
		Not stunting [n (%)]	Stunting [*n* (%)]		
Child feeding domains					
Low	154 (53.1)	74 (48.1)	80 (51.9)	0.763	1.104 (0.695–1.753)
High	136 (46.9)	62 (45.6)	74 (54.4)		
Monitoring					
Low	170 (58.6)	86 (50.6)	84 (49.4)	0.168	1.433 (0.895–2.296)
High	120 (41.4)	50 (41.7)	70 (58.3)		
Eating restriction					
Low	173 (59.7)	72 (5.6)	101 (54.8)	0.038	0.590 (0.368–0.948)
High	117 (40.3)	64 (54.7)	53 (45.3)		
Pressure to eat					
Low	146 (49.7)	80 (54.8)	66 (45.2)	0.009	1.905 (1.94–3.040)
High	144 (50.3)	56 (38.9)	88 (61.1)		
Child eating domains					
Food approach					
High	153 (52.8)	70 (45.8)	83 (54.2)	0.768	0.907 (0.572–1.440)
Low	137 (47.2)	66 (48.2)	71 (51.8)		
Food responsiveness					
Low	173 (59.7)	81 (46.8)	92 (53.2)	1.000	0.992 (0.620–1.588)
High	117 (40.3)	55 (47.0)	62 (53.0)		
Emotional overeating					
Low	176 (60.7)	83 (47.2)	93 (52.8)	1.000	1.027 (0.641–1.647)
High	114 (39.3)	53 (46.5)	61 (53.5)		
Enjoyment of food					
Low	148 (51.0)	73 (49.3)	75 (50.7)	0.467	1.221 (0.769–1.937)
High	142 (49.0)	63 (44.4)	79 (55.6)		
Desire to drink					
Low	156 (53.8)	82 (5.6)	74 (47.4)	0.049	1.642 (1.029–2.618)
High	134 (46.2)	54 (40.3)	80 (59.7)		
Food avoidance					
Low	170 (58.6)	64 (44.8)	79 (55.2)	0.546	0.844 (0.532–1.339)
High	120 (51.4)	72 (49.0)	75 (51.0)		
Satiety responsiveness					
Low	198 (68.3)	92 (46.5)	106 (53.5)	0.928	0.947 (0.577–1.554)
High	92 (31.7)	44 (47.8)	48 (52.2)		
Slowness in eating					
Low	203 (70)	92 (45.3)	111 (54.7)	0.488	0.810 (0.490–1.339)
High	87 (30)	44 (50.6)	43 (49.4)		
Emotional undereating					
Low	189 (65.2)	83 (43.9)	106 (56.1)	0.205	0.709 (0.437–1.152)
High	101 (34.8)	53 (52.5)	48 (47.5)		
Fussiness in eating					
Low	149 (51.4)	75 (50.3)	74 (49.7)	0.276	1.329 (0.837–2.111)
High	141 (48.6)	61 (43.3)	80 (56.7)		

given by parents to their children during mealtime, while snacks that contain high concentrations of saturated fat and added sugars must be consumed limitedly. By imposing such eating restrictions, parents can help their children avoid excessive food intake, especially of unhealthy foods. However, excessive restriction may lead to eat things not allowed by their parents.[29] Restriction on eating unsafe food is one way to prevent insecure food in the household,

Table 3 Multivariate modeling of stunting determinants in children under five in the Kerinci region, April–May 2018 ($n = 290$).

Model	*B*	Sig.	OR
Sex	0.612	0.015	1.843
History of exclusive breastfeeding	−0.621	0.014	0.537
Economic status	0.595	0.036	1.813
Eating restriction	−0.545	0.030	0.580
Pressure to eat	0.714	0.004	2.042
Constant	−1.331	0.149	0.264

which is not good for child's health that can lead to stunting.[30]

The pressure to eat domain on the CFQ demonstrated a significant relationship with the incidence of stunting in children under five. This indicates that there is indeed a relationship between parental control in feeding children and children's nutrition. This is in line with one study that explained the relationship between the pressure to eat domain and nutrition in children.[31] The pressure to eat domain contains questions covering how parents determine how much food is enough for their children.[32] Understanding parental behavior in this regard would be useful for helping parents determine when their children feel full. Parents who have high control over the pressure to eat can help their children obtain enough food in accordance with their needs. The ability of parents to recognize needs and limit food for children expressed in the pressure to eat. The pressure to overindulge children also tends to make them refuse to eat.[29] This, too, can affect the incidence of stunting due to lack of food intake. This is in line with research that has stated that parents who are able to recognize their children's eating needs can prevent the risk of nutritional deficiencies and support their growth, thereby preventing stunting.[33,34]

The results of this study showed a significant relationship between the desire to drink and the incidence of stunting. An excessive desire to drink will affect children's appetite because of the water intoxication. Water intoxication happened when the intake of the water exceeds the kidneys ability. This disturbance could make the electrolyte disorder which can effect the hypothalamus to control the appetite.[35] A low appetite will, accordingly, decrease food intake and thereby fail to satisfy nutritional needs. This in turn will have an indirect impact on the children's height and growth, and the incidence of stunting.

The factors most associated with the incidence of stunting in children under five

History of exclusive breastfeeding was the factor most related to the incidence of stunting in this study. Mothers play an important role in the successful implementation of exclusive breastfeeding in children. Therefore, efforts to increase exclusive breastfeeding need the support of mothers.[36] In this study, male sex has a significant relationship with stunting incidence. Male toddler tend to be more active than female, while they have bad eating behaviors, for example buy unsafe snack to fulfill their hunger that could not bear their growth. Furthermore, male toddler usually have bigger appetite that makes family concern to give earlier complementary food as addition.[21–23,37] The domains of eating restriction, pressure to eat, and desire to drink were shown to have a meaningful relationship. In line with other research, an influence of eating behaviors and feeding on the nutrition of children was observed.[33]

This study showed that there was a significant association between stunting incidence in children under five and the children's sex and their history of exclusive breastfeeding. Moreover, eating restriction, pressure to eat, and desire to drink also has a significant association with the incidence of stunting in children. Meanwhile, the pressure to eat was found to be the factor most related to the incidence of stunting. Further research is needed to continue the discussion on food safety.

Conflict of interests

The authors declare no conflict of interest.

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