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Maternal perception of sickness as a risk factor of stunting in children aged 2-5 years

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ABSTRACT

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BACKGROUND
Stunting in children is caused by past nutritional problems, adversely affects the physical and mental characteristics of children and is a well-established child-health indicator of chronic malnutrition. Socio-cultural factors can affect parenting, thereby indirectly affecting child growth. The objective of this study was to determine socio-cultural factors and parental short stature as risk factors of stunting in children aged 2 to 5 years.

METHODS
The study used a quantitative approach with case control design and a qualitative approach with in-depth interview. The study subjects were children aged 2-5 years, consisting of 45 cases of stunting and 45 controls (normal subjects). Socio-cultural data were obtained through interviews with the mothers, while height was measured with a stadiometer. Data were analyzed using chi square and logistic regression tests to calculate the odds ratio (OR).

RESULTS
The logistic regression test showed that maternal perception of sickness as a curse (OR=7.43; 95% CI: 2.37-23.21), stopping breastfeeding at <24 months (OR=6.01;95% CI: 1.83-19.69) and low household expenditure for food (OR=5.78;95% CI: 1.28-26.01) were risk factors of stunting incidence with a probability of 73.8%. The most dominant risk factor of stunting was maternal perception of sickness (OR=7.43 95% CI: 2.37-23.21).

CONCLUSION
Maternal perception of sickness was the most dominant risk factor of stunting in children 2-5 years of age. A multidisciplinary approach is needed to address the range of raised issues and so combat stunting in children.

Keywords: Stunting, socio-cultural, parental short stature, children aged 2-5 years

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INTRODUCTION

Stunting or short stature is the condition in which the height-for-age index is less than -2 standard deviations (SD). A child with stunting will be shorter than a normal child of the same age.[1] The condition of stunting in children shows the presence of nutritional deficiencies and disease that occurred in their growth and development early in life.[2]

The global prevalence of stunting to date is still relatively high, since in several countries more than half of children under 5 years of age are recorded as having retarded growth.[2] Data from the Indonesian Basic Health Research (Riskesdas) for the year 2013 showed that up to 37.2% of Indonesian underfives suffered from stunting. The highest prevalence of stunting of 58% was found in the province of East Nusa Tenggara (Nusa Tenggara Timur, NTT).[3] In this province, South Central Timor (Timor Tengah Selatan, TTS) district has in recent years had the highest prevalence of stunting among the underfives. The Riskesdas for 2007 showed that the prevalence of stunting in the underfives in TTS district was 57%, increasing up to 70.5% in 2013, with Amanuban subdistrict as one of the subdistricts with the highest prevalence of stunting, i.e. 66.25%.[4]

Previous studies have concluded that the prevalence of stunting in children is caused by various factors. The study of Nabuasa et al.[5] in children aged 24-59 months found a significant association between culture and the prevalence of stunting. This differs from a study in the Medan Area district, which found no relationship between family tradition/beliefs and nutritional status in children.[6]

Parental genetics, in this case parental height, is also of influence on the problem of stunting in children. Parental height and growth pattern are the key to the growth pattern of their children. Mothers with a height of <145 cm are at higher risk of having children with stunting compared with mothers with a height of >145 cm.[7] The study by Solihin et al.[8] stated that maternal height is significantly associated with nutritional status (height-for-age index) of the underfives. However, this differs from the study by Hanum [9] and Kusuma [10] who found that maternal height is not associated with the nutritional status of the children.

The present study focuses on the socio-cultural variables of the local community and parental short stature, in this case the height of both parents. Previous studies investigating the influence of socio-economic and socio-cultural variables on the nutritional status of the children, focused only on maternal height in relation to the prevalence of stunting in children. On the other hand, the present study used the height of both parents in relation to the prevalence of stunting, with the aim to determine socio-cultural factors and parental short stature as risk factors for the prevalence of stunting in children aged 2-5 years.

METHODS

Design of the study

The study design used a quantitative approach with an analytic-observational unmatched case-control design and a qualitative approach with in-depth interview and focus group disscusion (FGD). The study location was Amanuban Selatan subdistrict, Timor Tengah Selatan district, Nusa Tenggara Timur province. The study was conducted from February to April 2016.

Study subjects

The subjects of this study were 90 children aged 2-5 years, consisting of 45 cases of stunting and 45 normal controls. The required sample size was calculated using the formula for analytic unmatched case-control studies with categorical variables. Recruitment of the study subjects was by the simple random type of probability sampling. The subjects were selected from the intended study population of 415 children, who were then stratified into cases and controls, in accordance with the exclusion and inclusion criteria that had been decided upon. The inclusion

criteria in this study were children with stunting and normal children, living with their own parents, having a record of their birth weight, born at term with a weight of >2500 grams, and their parents agreeing for their children to be included in the study sample. Categorization into children with stunting and normal children was based on the children's height-for-age index expressed as z-scores. The children were considered to have stunting if the height-for-age z-score was ≤-2 standard deviations (SD) and not to have stunting (or to be of normal height) if the height-for-age z-score was >-2 SD.[4]

Anthropometric measurements

Measurement of height was performed in the children who were the subjects of this study and in both of their parents, using a stadiometer with an accuracy of 0.1 cm. The measurement procedure was as follows: the subjects without footwear and headgear stood upright in contact with the measuring device and looked straight ahead, with the eyes parallel to the vertex. The operator moved the paddle of the measuring device downwards so that it rested lightly on the subject's head, then read the result off the device.

The evaluation of parental short stature was performed by measuring the height of both parents, then using the formula of midparental height (MPH) to project the development of the height of their children based on the genetics of both parents. The calculated result was then plotted on a curve generated by the WHO Anthro program.[11]

Data collection

Data on community socio-cultural characteristics were obtained by in-depth interviews with the respondents, i.e. the mothers of the subjects. Data on individual perception about sickness and the customs for pregnant mothers were obtained by interviews using questionnaires. The investigators asked whether the parents, in this case the mothers of the subjects, believed that the sickness suffered by their children was or was not a curse, through a number of questions. Maternal perception about sickness was categorized as perception of sickness as a curse and perception of sickness not as a curse.

On the custom of food taboos for pregnant mothers, the investigators asked the mothers about their dietary habits during pregnancy, such as whether they did or did not observe taboos on certain foods or dishes that are forbidden by culture. The dietary habit of the pregnant mothers was categorized as observing food taboos and not observing food taboos.

With regard to the custom of stopping breastfeeding, the investigators asked the mothers whether they believed or not that breastfeeding the children until the age of 24 months will interfere with the growth of the children. The custom of stopping breastfeeding was categorized as stopping breastfeeding at <24 months and stopping breastfeeding at ≥24 months.

The question posed to the mothers about the custom of administering food to the newborn was whether or not there were certain foods that according to culture must be given to newborn infants. Administration of foods to newborn infants was categorized as administering the foods and not administering the foods.

Data on the maternal educational level were obtained by asking the mothers about their level of formal education up to the time of interview. The educational level was categorized as low if the respondents did not have any education or received education up to primary school or junior high school, and as high if the respondents went from senior high school to tertiary education, either at diploma level or higher.

As to household expenditure, the parents were asked about their weekly expenditure for food for consumption by all family members. The weekly expenditure was then multiplied by four to obtain the total monthly expenditure. The cut-off point was determined on the basis of the mean total expenditure. The level of household expenditure was categorized as low (<Rp.921.250) and high (≥Rp.921.250).

Data on maternal outdoor activity were also obtained by interviews using questionnaires. The

investigators asked the mothers whether they were involved in certain activities so that they had less time to care for their children. Maternal outdoor activity was categorized as present and absent.

Statistical analysis

Bivariate analysis was performed using the chi square test with 95% confidence interval (95% CI) ($p<0.05$) to find the p value and the odds ratio (OR). Multivariate analysis was by means of the logistic regression test.

Ethical clearance

This study obtained ethical clearance No.008/EC/FK-RSDK/2016 from the Ethics Commission.

RESULTS

The proportions of males in the group of cases and controls were 68.9% and 51.1%), respectively. There were more farmers among the subjects' fathers in the group of cases (91.1%) than in the group of controls (86.7%). The number of mothers who were housewifes or unemployed was greater in the group of cases (73.3%) than in the group of controls (51.1%). There was no difference in paternal height between the group of cases and the group of controls, with mean heights of 160.1 cm and 160.8 cm, respectively. On the other hand, there was a difference in maternal height between the group of cases and controls, with mean heights of 149.2 cm and 152.4 cm, respectively.

The results of the analysis showed that the risk factors for the prevalence of stunting in children were maternal perception about sickness, with sickness being considered a curse (OR=8.94;95% CI 3.26-24.46), the custom of stopping breastfeeding at <24 months (OR=6.20; 95% CI 2.29-16.80), and low level of expenditure (OR=6.22;95% CI 1.89-20.46) (Table 1).

Table 1. Relationship between several risk variables and incidence of stunting

Variable	Cases (n= 45)	Controls (n=45)	p	OR (95%CI)
Maternal perception about sickness				
Sickness as curse	38	17	0.001*	8.94
Sickness not as curse	7	28		(3.26 - 24.46)
Custom of food taboos for pregnant mothers				
Observing food taboos	11	14	0.480	0.71
Not observing food taboos	34	31		(0.28 - 1.81)
Custom of administering food to newborn infants				
Administered	29	25	0.389	1.45
Not administered	16	20		(0.62 - 3.38)
Custom of stopping breastfeeding				
Stopped at <24 months	38	21	0.001*	6.20
Stopped at =24 months	7	24		(2.29 - 16.80)
Maternal educational level				
Low	37	39	0.561	0.71
High	8	6		(0.22 - 2.24)
Level of household expenditure				
Low	41	28	0.001*	6.22
High	4	17		(1.89 - 20.46)
Maternal outdoor activity				
Present	30	21	0.056	2.28
Absent	15	24		(0.97 - 5.32)
Parental stature				
Short	31	27	0.379	1.47
Not short	14	18		(0.61 - 3.51)

*Significant ($p<0.05$)

Table 2. Results of logistic regression of factors influencing incidence of stunting in children aged 2-5 years

Variable	OR	95% CI	p
Maternal perception about sickness	7.43	2.37 - 23.21	0.001*
Custom of stopping breastfeeding	6.01	1.83 - 19.69	0.003*
Level of family expenditure	5.77	1.28 - 26.01	0.022*
Maternal outdoor activity	2.66	0.87 - 8.13	0.084

*Significant ($p<0.05$), $R^2=0.49=49\%$

On the basis of the results of bivariate analysis, the variables included in the multivariate analysis were individual perception, i.e. maternal perception about sickness, custom of stopping breastfeeding at <24 months, low level of household expenditure, and maternal outdoor activity ($p<0.25$).

The results of the multivariate analysis showed that maternal perception about sickness, custom of stopping breastfeeding and level of household expenditure were risk factors for the prevalence of stunting. The variable of maternal outdoor activity was not a risk factor for the prevalence of stunting. The variable with the greatest influence or the dominant variable for the prevalence of stunting with highest OR value was maternal perception about sickness (OR=7.43;95% CI 2.37-23.21). This signifies that children whose mothers perceive sickness as a curse have a 7.43-fold greater probability to experience stunting than do children whose mothers do not perceive sickness as a curse (Table 2).

DISCUSSION

Maternal perception about sickness is the most dominant risk factor for the prevalence of stunting in children. The results of this study are in line with a study on underfives among the Dawan clan in TTS district, in which it was found that family beliefs in traditional ceremonies are a risk factor for the prevalence of short stature in children.[3] This study is also in line with the study of Nabuasa who demonstrated a significant relationship between culture and the prevalence of stunting.[5] However, a study conducted in Medan Area district found no relationship between family traditions/beliefs and nutritional status of the children.[6]

The perception of the community about the causes of a disease differred between regions, depending on the culture prevailing and developing in the community in question. The community of the TTS district in general still believes in various traditional ceremonies, such as the ceremony of confession of sins, called *naketi* in the local language, which is a ceremony for the healing of sick persons. It is usually performed by the parents of sick children in the hope that after performing the ceremony, the children will recover. The results of the present study are supported by the results of in-depth interviews with principal informants and triangulation informants. These informants said that the care of sick children consists in bringing them to a doctor or healthcare facility, but if they do not recover, the cause of the sickness is sought on the basis of local beliefs, i.e. through the *naketi* ceremony. However, the children are frequently not brought to a hospital or medical facility, since the community is of the opinion that bringing the children to a medical facility is useless, because this will not heal the children, but on the other hand will worsen their sickness. Sickness is caused not only by a disease but is according to them is also attributable to bad winds or parental obstruction.

The custom of food taboos for pregnant mothers is not a risk factor for the prevalence of stunting. Food taboo is the prohibition of consuming certain types of food, since their consumption will endanger the consumer. Initially food taboos were meant to protect the health of

the children and their mothers, but may actually become detrimental to the children's health and nutrition, since the food taboos usually concern foods that are sources of essential nutrients for both the mothers and the children. The absence of a relationship between the custom of food taboos for pregnant mothers and the prevalence of stunting is caused by the higher total proportion of mothers in the group of cases and controls who did observe the food taboos when pregnant, in comparison with those who did not. These results show the occurrence of behavioral changes associated with food taboos.

The custom of administering food to newborn infants is not a risk factor for the prevalence of stunting. This study agrees with that of Aguayo et al.[12] who state that administering food to newborn infants had a significant but negative association with the prevalence of stunting. The custom of administering food to newborn infants is in principle associated with exclusive breastfeeding. The period of exclusive breastfeeding recommended by the WHO is the first 6 months. This recommendation was issued based on the results of a study revealing that exclusive breastfeeding up to 6 months has several benefits, such as a decrease in gastrointestinal and respiratory infections, that does not occur in exclusive breastfeeding up to 3 or 4 months.[13] The present study did not agree with the studies conducted by Nadiyah and by Muchina, who showed that children with prelacteal feeding were more at risk of stunting.[14,15] The absence of such a relationship in our study was caused by the greater total proportion (60.0%) of respondents who administered food to their newborn infants, both in the group of cases and the group of controls, in comparison with those who did not (40.0%). This signifies that among the subjects in the groups of cases and controls, there were still many who had received food as newborns or under the age of 6 months.

The custom of stopping breastfeeding before the children are 2 years old (<24 months) is a risk factor for the prevalence of stunting in children. The present study is in agreement with previous studies stating that children who were breastfed for less than 24 months were more at risk for stunting, as compared to children who were breastfed for at least 24 months.[16,17] However, the present study is not in line with the study by Kamal which showed that breastfeeding for less than 24 months is not a risk factor for the prevalence of stunting.[18]

Weaning is a term used to refer to the transition period in which infants still receive liquid food, either breast milk or formula milk, but are also gradually introduced to solid food. In England, the term weaning signifies the introduction of solid food along with milk (breast or formula milk), and not the process of separating the infants from their mother's breasts.[19] The weaning process in children may start at different times. The WHO and UNICEF recommend that infants be breastfed up to the age of two years. In Indonesia, there are certain cultural communities that wean the children before the age of 6 months or even after the age of 2 years. Between the experts' concept of weaning and weaning as understood by the community in TTS district, there is a difference in definition. The community of TTS district understands by weaning the definitive cessation of breastfeeding. When the children are able to consume the family foods or foods other than breast milk, they are not breastfed any longer and this weaning is called *sole* in the local language. In this process the infants are clearly separated from their mothers' breasts. This is supported by in-depth interviews with the informants, who stated that if the children are able to consume family foods, they are not breastfed anymore, since this will impair their appetite. In addition, according to the informants, the longer the children are breastfed, the more dumb they become and the larger their buttocks. The custom of *sole* is one of the cultural traditions of the local community that up to the present time are still adhered to. The lack of breastfeeding or even the absence of breastfeeding up to 24 months has a profound impact, such as increased prevalence of diarrhea from unhygienic complementary foods or formula milk, poor nutrient adequacy for

children under the age of two years *(baduta)*, allergic reactions in some of the children as a result of administration of formula milk or complementary feeding that is not suited to the condition of the children, and the increased household expenditure resulting from the purchase of formula milk. All these factors increase the probability of stunting in the children.

Maternal educational level is not a risk factor for the prevalence of stunting in children. This study is in line with the study of Nasikah and Margawati [20] who found that maternal educational level was not significantly associated with the prevalence of stunting. However, our study is not in line with previous studies showing that mothers with a low educational level are at risk for stunting in their children.[7,20] In fact, a higher maternal educational level will contribute to total family income and better social status, and will ultimately influence the nutritional status.[1]

The level of household expenditure for food may be used to determine economic status. The results of this study showed that a low level of household expenditure for food is a risk factor for stunting in children. This study is in line with the study by Yasmin, who state that lower household expenditure increases the risk of stunting.[7] Households with low socio-economic status are more susceptible to food shortages because of their low food consumption and their limited access to food.[22]

Materrnal outdoor activity is associated with the length of time the mothers spend with their children, thereby providing good parenting for their children. Our study showed that maternal outdoor activity is not a risk factor for the prevalence of stunting in children. This is in line with the study by Lestari who found that maternal employment status had no significant relationship with the prevalence of stunting in children.[23] Maternal outdoor activity may influence parenting pattern, either because the mothers are busy earning a living or are involved in time-consuming social activities. Among mothers with an occupation, the probability of stunting in children is greater than among those without occupation.[20]

Parental short stature is not a risk factor for the prevalence of stunting in children. The results of this study is in line with the study of Hanum[9] who found no relationship between parental height and prevalence of stunting. Parental short stature, in this case parental height and growth pattern, was not a determinant of stunting in their children. Parents of short stature do not automatically have children of short stature and vice versa. According to the Hardy-Weinberg law of equilibrium,[24] height is hereditary and is transmitted continously from one generation to the next. However, this herediatry trait may also be influenced by changes in diverse environmental factors such as socio-economic status, dietary pattern and physical activity of the children. The absence in this analysis of a relationship between the stature of parents and stunting in their children was caused by the almost identical parental growth patterns in the group of cases as well as the controls, so that in the analysis no association was found.

According to the WHO, the prevalence of stunting in children is the result of a complex interaction of various factors, among others household condition, environmental influence, socio-economics and culture.[25] The risk factors that were investigated in this study were only socio-cultural factors, namely factors that only indirectly cause stunting. On the other hand, there are still many other factors with a direct influence on stunting, such as dietary intake and infectious disease. In this study no in-depth investigation was carried out on parental short stature in relation to genetic factors. Determination of parental stature was based only on measurement of parental height during the study, while no research was done on the height of the preceding generations.

The occurrence of a relationship between maternal perception about sickness and the prevalence of stunting in children aged 2–5 years, show the need for intensive education to improve culture-related community concepts that tend to be detrimental to the community, particularly the underfives. Further in-depth studies should be

conducted on the relation of parental genetic factors with the prevalence of stunting in children, since height is the product of interaction between genetic and environmental factors.

CONCLUSION

Maternal perception of sickness was the most dominant risk factor of stunting in children 2-5 years of age. A multidisciplinary approach is needed to address the range of raised issues and so combat stunting in children.

CONFLICT OF INTEREST

There were no conflicts of interest in this study , which was entirly self-financed.

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