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Mother and Child Nutrition; (A Review of Stunting Studies)

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Abstract

Stunting is still remains a global problem and one of the main problems of malnutrition often found in under-five children. The impacts include delayed growth, low endurance, lack of intelligence and low productivity. The incidence of stunting is related to environmental factors, low birth weight (LBW), socioeconomic factor, lack of nutrition, maternal education, low family income and number of family members. The data of WHO showed that the prevalence of stunting among children under five is 32% in developing countries. Indonesia is also known as the country with the number of children under five short height (stunted) and become a fifth country that have children stunted in the world after India, China, Nigeria, and Pakistan. Prevalence of stunting in Indonesia in 2010 was 35.6% and is still above the set threshold (20%). North Sumatera Province had the higher prevalence of stunting in Sumatera island (42,3%) and followed by three other province, South Sumatera (40,4%), Aceh (39%), and Lampung (36,2%). The purpose of this article is to provide an overview of Stunting in North Sumatera Province and the relevant epidemiologic characteristics. Most of the literatures in these reviews were journal and previous academic research results (i.e. thesis and final academic paper). Factors related to the stunting were birth weight, energy intake, protein intake, sex, maternal education, area of residence and economic status of families, history of rearing eating pattern (OR=16,7), family economic (OR=15,9) and frequency of diarrhea (OR=3,9), Exclusive breast feed babies, complementary feeding, the food consumption pattern of the children, and lack of nutritious food.

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Mother's education, father's and mother's occupation, energy intake iodine and protein intake are predictors to the height of school age children. There was a significant association between intensity of a single or mixed Soil Transmitted Helminths (STH) infection, multi micronutrients fortified supplementary food in pregnant mother had significant effect on nutritional status. The effect of iron showed no effect on increasing weight and height in children. No association between the incidences of underweight with STH. There is no correlation between the level of parental income toward the children's nutritional status. There was association between baby birth condition, parent's characteristic, nutritional intake and prevalence of stunting. Monitoring and intervention are needed to be given continuously by competent authority in promoting and providing information for prevention of stunting, and improving the quality of the surveillance data.

Keywords: epidemiology; stunting; North Sumatera.

1. Introduction

In developing countries, most deaths in children are among the under-five children. As a result, there is extensive literature on under-five children compared to dearth of information on the health of school children. Moreover, children who are stunted are likely to remain stunted into adulthood [1]. Stunting is known to be highly prevalent in environments that are characterized by a high prevalence of infectious diseases [2].

Diarrhea has been implicated in the causal pathway to stunting but, possibly because children frequently show catch-up growth between diarrheal episodes, the association has been surprisingly weak in many studies. The role of the gut in mediating stunting has been relatively overlooked until recently, when attention has refocused on the possible contribution of enteropathy to poor growth in early life [3].

Socio-economic differences in morbidity and mortality rates across the world have received its due attention in the recent years. Such differentials in health status in-fact are found pervasive across nations cross-cutting stages of development. Studies have identified poverty as the chief determinant of malnutrition in developing countries that perpetuates into intergenerational transfer of poor nutritional status among children and prevents social improvement and equity. Nutritional status of under-five children in particular is often considered as one of the most important indicator of a household's living standard and also an important determinant of child survival. The deterministic studies in India while exploring the impact of covariates on the degree of childhood malnutrition suggests an important nexus shared with household socioeconomic status. The two-way causality of poverty and under nutrition seems to pose a very significant pretext for malnutrition in India like other developing nations, where poverty and economic insecurity, coupled by constrained access to economic resources permeate malnourishment among the children. Thus, economic inequality constitutes the focal point of discussion while studying malnutrition and deserves suitable analytical treatment to examine its interplay with other dimensions of malnutrition and to prioritize appropriate programme intervention. Such attempt to the best of our knowledge is still awaited, using recent nationwide survey data in India [4].

The data of WHO showed that the prevalence of stunting among children under five is 32% in developing countries. Indonesia is also known as the country with the number of children under five short height (stunted)

and become a fifth country that have children stunted in the world after India, China, Nigeria, and Pakistan. Prevalence of stunting in Indonesia in 2010 was 35.6% and is still above the set threshold (20%). North Sumatera province had the higher prevalence of stunting in Sumatera island (42,3%) and followed by three other province, South Sumatera (40,4%), Aceh (39%), and Lampung (36,2%).

2. Material and Method

The purpose of this article is to provide an overview stunting and the relevant epidemiologic characteristics. The data was obtained from student's research which is published on the internet. Most of the literatures used in these review were journals and previous academic research results (i.e. thesis and final academic papers).

Based on these data, the trend of stunting was analyzed; further, the effect of stunting. The data on the number of cases of stunting was used for the epidemiological analyses and stratified by sex, age, and cause of stunting. Proportional analyses were done for each journal and for the other source. The statistical analysis is showing trends of the epidemiological of stunting.

3. Result and Discussions

Based on the review of the literature of stunting in North Sumatera, the results are:

3.1 Determinant of Stunting

The study uses cross sectional research design and quantitative method with 3126 toddlers sample was conducted. The research was carried out by processing the Riskesdas 2010 was held in May-August 2010. Variables are used i.e. stunting, birth weight, energy intake, protein intake, age, sex toddler, maternal education, number of household members, area residence and economic status of families. The analysis showed that based on the index TB/U, stunting toddlers as much as 37,5% and 62,5% of normal. There was significant relationship between stunting with birth weight, energy intake, protein intake, sex, maternal education, area of residence and economic status of families. The birth weight variable was the most dominant factor associated with stunting after being controlled with sex, area of residence and economic status [5].

The observational study with case control design of first grade of primary school children with Samples of cases amounted to 78 people of children who are stunted and control samples amounted to 78 people with normal nutritional status as used similar characteristic on sex, age, and the school found that the history of rearing eating pattern (OR=16,7), family economic (OR=15,9) and frequency of diarrhea (OR=3,9) were the dominant risk factor for stunting [6]. Survey was conducted with case control approach is to analyze the relationship of socio-economy and nutrient intake with the body height of school age children in Parbuluan Sub-district. The population was the families which have children in grade 1 of Primary School and have lived in study area for at least 6 months. Of the 444 children, 62 of the children (31 for case group and 31 for control group) are selected to be samples for this study. The data obtained were analyzed through Chi-square and multiple logistic regression. The result shows that there are significant relationship between the variables of mother's education, father's occupation, mother's occupation, energy intake, protein intake and iodine intake with the height of

school age children. The result of multiple logistic regression test shows that the variables energy intake iodine and protein intake are predictors to the height of school age children [7].

Observational study with case control study design was conducted to examine the influence of positive deviance in the mother of poor family on the nutrient status of the child of 12-24 months old in Sidikalang Sub-district, Dairi District including food-giving habits, rearing patterns, self-hygiene and health service access. This study is descriptive by looking at the data of nutritional status of primary school children at Sunggal Health Centers from 2007 to 2010. The samples were taken from 833 students of SD Negeri 064020 and SD Darma Pala. The results of the research showed the trend of nutrition status according to the normal weight for age (BB/U) index for boys are increasing and girls are decreasing, the underweight category for boys increases from 25% to 26%, and for girls increases from 30% to 39.6%, whereas for severe underweight category the trend was decreasing for boys as well as girls, nutritional status according to normal height for age (TB/U) category for boys and girls tends to increase, for stunted category, boys decrease from 24.1% to 22.6%, girls increases from 17.3% to 17.6%, whereas the trend for severe stunted category was decreasing for boys and girls [8].

The study was conducted to determine differences in body weight and length of infants aged 0-6 months who were given breast milk and complementary feeding at Health centre of Medan Deli, Medan Deli District. The study included a comparative study with *cross sectional* method. The sampling technique using a *purposive sampling*. The samples were infants aged 6-12 months, with totally of 44 infants, 22 exclusive breast fed babies and 22 infants who were not given exclusive breast. The statistical test used independent t-test with level of significance ($p < 0.05$). The results based on total weight gain there are significant differences between weight gain exclusive breast fed babies with weight babies fed on complementary feeding $p = 0.001$ ($p < 0.05$), whereas on the basis of body weight every month after five month old baby there are significant differences between weight gain exclusive breast fed babies with weight babies fed on complementary feeding $p = 0.011$ ($p < 0.05$) [9].

A randomized placebo-controlled clinical trial study was conducted at Bilah Hulu, a sub district of Labuhan Batu on November 2006-Februari 2007. Iron deficiency anemia was diagnosed if there were anemia, MCHC $< 31\%$, RDW index > 220 and Mentzer index > 13 . Elementary school children (8 to 12 years old) with IDA were randomly assigned to a daily therapy of 6 mg iron/kg/day or placebo groups for 3 months. The nutritional status were evaluated with anthropometric assessment before and after intervention. There were 111 children (37,2%) among 300 children who recruited suffered from IDA. After intervention, 108 children completed the therapy, the iron and placebo groups had difference on mean of hemoglobin concentration ($P < 0,05$) but no significantly different on mean of weight and height gain. The conclusion was the effect of iron showed no effect on increasing weight and height in children [10].

Observational survey study with pre-test and post-test design was to find out the implementation of nutrition management and to evaluate the success of health center in improving the nutritional status in the children under five years old with malnutrition by looking at the data of the result of anthropometric measurement (Body Weight/Body Height) by the nutritionists before and after the nutrition management was done to the children with malnutrition. The result of this study showed that of the variables of management factor there were 3 influencing variables such as procedures with ($p = 0,024$), follow-up with ($p = 0,043$) and monitoring with

($p=0,044$). The most dominant variable influencing the success of health centers in improving the nutritional status of the children under five years old was procedure. This showed that the variable had a significant influence on the success of health centre in improving the nutritional status of the children under five years old with malnutrition at all of the health centers in Medan. Even though the organization and knowledge of the Nutritionists did not have influence on the success of health centre in improving the nutritional status of the children under five years old with malnutrition, a team of nutritionists care still need to be established at each health centre to establish an accurate diagnosis and to improve the knowledge of nutritionists through training on malnutrition management that a standard result can be optimally achieved in handling a malnutrition case [11].

The cross sectional study was conducted to determinate the relationship of soil-transmitted helminthes infections with the incidence of underweight. Examination of a stool sample done by the method of Kato and direct measurement of weight and height in studies using scales and gauges as well as body mass index with graphs CDC BMI-for-age growth charts. The results showed no association between the incidence of underweight with Soil Transmitted Helminthes. This may occur because of anti-helminthes on students has been going well [12].

Descriptive study with cross-sectional design was conducted. The feeding pattern includes the type, amount, and frequency of meal. Nutritional status of the infants was measured by antropometric method. The samples for this study were all of the 40 infants of 0-24 months old in Ginolat Village. The result showed that 55.0% of the kind of meal in the infants of 0-24 months old in Ginolat Village belonged to good category and 45.0% belonged to poor category, in terms of amount of meal, 55.0% belonged to good category and 45.0% belonged to poor category, and in terms of meal frequency, 90.0% belonged to good category and 10.0% belonged to poor category. 7.5% of the infants of 0-24 months old in Ginolat Village were administered exclusive breastfeeding while the remaining 92.5% were not. Based on nutritional (body weight/length of body), 17.5% of the infants of 0-24 months old in Ginolat Village were heavy, 20.0% were at risk of obesity, 52.5% normal, 2.5% thin, and 7.5% very thin. Based on nutritional (body weight/age), 85.0% of the infants of 0-24 months old in Minolta Village were normal, 10.0% were less heavy and 5.0% were very thin. Based on nutritional (length of body/age), 55.0% of the infants of 0-24 months old in Ginolat Village were normal and 45.0% were short. Some cases of malnutrition of 0-24 infants with the categories of wasting, very wasting, underweight, very underweight and stunted were found in infants with lack of nutritious food [13].

The study method was descriptive analytic studies. The sampling technique was consecutive sampling. Total sample were sixty respondents. Analysis of data was conducted by the SPSS's correlation test in 95 % significance level ($p \leq 0.05$). The results showed that the number of pre -school children aged from three to five years with a very thin nutritional status is one (1.7 %), thin category is three (5.0 %), normal category is fifty-four (90.0 %) as well the obese is two (3.3 %). The correlation test obtained that the coefficient correlation (r) is 0.252 with a probability of 5 %. The Conclusion showed that the level of nutritional status of pre-school children aged from three to five years on the riverside of Sungai Deli based on the indicators of BB / TB belong to the normal category, while the number of children suffer from stunted-nutritional status is still quite high and there is no correlation between the level of parental income toward the children's nutritional status [14].

The descriptive study with the samples was taken by total sampling method. The data of meal pattern included food type, frequency of meal, and the total consumed energy and protein collected by interview with the mothers of children. The body weights were found by weighting the child's body, including their body heights by measuring their body heights. The collected data were then analyzed descriptively. The result showed that the food consumption pattern of the children in the inadequate, in which there were 17,5% have adequate energy consumption pattern, and 27.5% of them in the inadequate. Similarly in the case of protein consumption, there were only 15.0% of them in the adequate and even there were some 5.5% of them in the deficit. Majority of the types of food such as carbohydrate in spite of rice usually consumed every day included noodles and bread, whereas the most main source of protein as consumed every day included tofu, tempeh, egg and tiny sea fish. Much as 25.0% of them with malnutrition of nutritional status, 22.55% stunted, and 27.5% thin [15].

A cross sectional study was done on June 2010 in 3 schools in district of Kabanjahe, Karo Regency. Faecal examination by Kato-Katz method was done to diagnose STH infection. We divided participants into two groups (positive and negative helminthes). Data was collected with consecutive sampling. Classification of nutritional status determined by measurement of body weight and body height based on WHO NCHS CDC 2000. All statistical analyses were conducted with SPSS (Version 14.0 for Windows). All categorical data were analyzed by using chi-square test. We also used chi-square test to assess the association between intensity of STH infection and nutritional status of STH infected children. Two hundred and eighty children enrolled in this study (140 infected children and 140 uninfected children). Statistically, there was a significant association between nutritional status and STH infection. We also found a significant difference between intensity of a single or mixed STH infection and nutritional status. There was a significant difference on nutritional status between STH infected and uninfected children [16].

The study in tree sub-districts of Bogor Districts namely: Leuwiliang, Leuwisadeng and Ciampea was conducted. Total of infants that this study has followed up were 120 with prospective cohort. From 120 infants this study selected 40 infants as fortified groups (pregnant mothers was received fortified food (vermicelli, milk and biscuit) with multi nutrition's i.e. iron, iodine, zinc, folic acid, vitamin C and vitamin A), 40 infants as unfortified groups (pregnant mothers was received non fortified foods) and 40 infants as control groups (pregnant mother did not receive any experiment food). Z-score were calculated for the length for-age (HAZ) and weight-for age (WAZ), using WHO 2006 growth references. The result showed multi micronutrients fortified supplementary food in pregnant mother had significant effect on nutritional status (HAZ) at 6 months. Stunting (5.0%) and underweight (2.5%) finding at two months of infants age in control group. The mean of infants morbidity 0 up to 6 months higher in control group compared with unfortified and unfortified higher than fortified groups. Infants morbidity had negative associated with nutritional status and hematocrit [17].

4. Conclusion

According to the research, conclusions of this literature review are:

1. Most of variables in this review were food intake and mother education.
2. Reducing of stunting case is needed by exploring protective factors of stunting.

3. Research with literature review is useful to look at several studies simultaneously so that it brings new findings on a particular topic that has been researched.

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