FACTORS OF STUNTING IN TODDLERS: A LITERATURE REVIEW

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ABSTRACT

Stunting in toddlers is one of the health problems that has not been resolved globally, also in Indonesia. Stunting can be prevented by early detection based on the risk factors for the disease. The literature review aims to examine those articles and find out every risk factor for stunting in toddlers. This literature study used a scoping review method by searching through several search engines such as Google Scholar, ProQuest, PubMed, and EBSCO. After sorting the articles, there are 21 articles used in this literature study. The results of this literature study showed twenty-one risk factors for stunting in toddlers, such as exclusive breastfeeding and the initiation of early breastfeeding. A history of low birth weight, immunization, the number of family members, insufficient nutritional needs (energy, iron, protein, calcium, and zinc), colostrum, breastfeeds (age of administration, type, and frequency). The practice of washing hands, mothers' occupation, mothers knowledge, low family income, history of infectious disease, sanitation and cleanliness of the environment, parents' height, especially mothers, lack vitamin C and vitamin D also as risk factors for stunting. To conclude, stunting in toddlers was influenced by various factors which are child factors, parents, socio-economic, and environmental factors. Therefore, it is essential to consider all the factors to develop stunting early detection tools for toddlers ang health education materials.

Keywords: Early detection, risk factors for stunting, stunting, toddlers.

INTRODUCTION

Stunting is a condition of growth failure in children under five (body and brain) due to long-term malnutrition (Ministry of Health R.I, 2018). Toddlers who are stunted are indicated by the z-score indicator for height according to age less than -2 standard deviation (SD), the median toddler growth standard set by WHO (Ministry of Health R.I, 2018). The prevalence of stunting in the world or Indonesia is still high. In 2018 the number of children under five who are stunted in the world was 150.8 million children under five (UNICEF, 2018). Data collected by UNICEF, WHO and the World Bank Group (2018) explains that two parts of the region have the highest prevalence of stunting, namely the Asian Continent at 55 per cent and the African Continent at 39 per cent. The highest prevalence in Asia's three regions is West Asia at 15.2 per cent, followed by Southeast Asia with 25.7 per cent and the highest in South Asia at 33.3 per cent. The number of children under five years old who are stunted in Asia is 83.6 million children under five, where the highest region is in South Asia with 58.7 million children under five and Southeast Asia at 14.9 million, while in Indonesia the number of children under five who suffer from stunting is 19, 3% (Basic Health Research, 2018). The stunting problem solutions have been made to address both the world and Indonesia, such as the SDGs program in the second target or the 2019 National Mid-Term Development Plan (RPJMN 2019) not been able to reduce the prevalence of stunting significantly.

There are many harmful effects caused by stunting. According to the Indonesian Ministry of Health (2016), the short-term impacts include disruption in brain development, intelligence, physical growth disorders, and body metabolism disturbances. While the long-term impact is decreased cognitive abilities and learning achievement, decreased immunity is prone to disease, a high risk of diabetes, obesity, heart and blood vessel disease, cancer, stroke, disabilities in old age, and uncompetitive quality work.

Prevention of stunting is necessary to prevent the destructive effects of the disease. Prevention can be done by intervening in each risk factor for stunting. Based on this, it is necessary to know in advance the risk factors for stunting in toddlers. Articles that discuss these risk factors have been widely published, but no literature study has been found that aims to examine these articles to make it easier to identify risk factors for stunting in children under five. Based on this, this literature study is essential to do to prevent stunting in toddlers.

METHOD

The method used in this literature study is the scoping review. Researchers searched through several search engines, namely Google Scholar, ProQuest, EBSCO, and PubMed with keywords used are adjusted to the P (problem), E (exposure), and O (outcome) techniques. So the keywords used are "children" OR "child" AND "stunting" OR "stunted" AND "factor". By using these keywords, 2,210 articles were obtained. Furthermore, article sorting by adjusting the inclusion and exclusion criteria that had been set. The inclusion criteria in this literature study are articles discussing risk factors for stunting in children under five, the year the article was published in the last five years (2014-2019), the sample used was toddlers (aged 0-5 years), full texts articles in Indonesian or English.

Meanwhile, the exclusion criteria set were no information on the article's volume, number, and publisher. So, 64 articles matched the inclusion and exclusion criteria that have been set. Furthermore, sorting is carried out by performing a critical appraisal using the JBI (Joanna Briggs Institute) instrument. Twenty-one articles were suitable and will be used in this literature study.

No.	Title	Research Methods	Results
1.	Macro and Micro Nutrient Intake as Risk Factors for Stunting in Children aged 2-5 Years in Semarang	Case- Control	There is a significant relationship between the level of vitamin C adequacy (≥77% RDA) and the incidence of stunting in children. P -value: 0.004 (p <0.05)
2.	Children who were deficient in vitamin C were 2.97 times more likely to experience stunting.	Case- Control	Children who were deficient in vitamin C were 2.97 times more likely to experience stunting.
3.	The Effect of Protein and Zinc Consumption and History of Infectious Disease on the Incidence of Stunting in Toddlers Age 24-59 Months in the Work Area of the Nusa Penida III Health Center	Case- Control	Children who lack protein have a 10.26 times greater risk of experiencing stunting, while children who have a history of infection have a 5.41 times greater risk of experiencing stunting.
4.	Children who lack zinc (> 80% RDA) have a 9.94 times greater risk of stunting.	Cross- Sectional	The height of father and mother (<-2 SD), working mother, family income (low), number of household members (children> 4 people or living with another family at home), do not regularly visit posyandu with a frequency of 4-6 times per year and not getting exclusively breastfed increases the risk of stunting.
5.	Risk Factors for Stunting in Children Aged 6-24 Months in Penanggalan District, Subulussalam Municipality, Aceh Province	Case-Control	Birth length (<48 cm) p value: 0.045, 4.091 times greater risk of experiencing stunting, not getting exclusive breastfeeding, p value: 0.025, low family income (quintiles 1,2, and 3) p value: 0.044, maternal education , p value: 0.029, and maternal knowledge about nutrition, p value: 0.015 is a risk factor for stunting.
6.	Risk Factors for Stunting Incidents in Children 6-36 months in the Inland Region of Silat Hulu District, Kapuas Hulu, West Kalimantan	Case- Control	There is a significant relationship between the incidence of stunting with: maternal education, family income, maternal knowledge of nutrition, parenting styles (exclusive breastfeeding, the first age of complementary feeding), history of infectious diseases, adequate levels of protein, zinc, calcium, iron, and factors. genetic (short height of the parents)
7.	Factors Associated with the Incidence of Stunting in Toddlers	Cross- Sectional	There is a significant relationship between low maternal education level (p-value: 0.020), and maternal knowledge of nutrition and stunting, p-value: 0,000 on stunting incidence.
8.	The Relationship Between Feeding Practices, Health Care, and Child Hygiene and Stunting in Children aged 1-2 Years in the Oebobo Health Center, Kupang City	Case- Control	There is a significant relationship between the incidence of stunting with the practice of feeding (exclusive breastfeeding) p-value: 0.001 and hygiene practices (sanitation and environmental hygiene) p-value: 0.046.

9.	**Protein, Calcium, and Phosphorus Intake in Stunted and Non-Stunting Children aged 24-59 months**	**Cros- Sectional**	**There were significant differences in stunted and non-stunted children in the intake of protein, calcium, and phosphorus.**
10.	**Factors Associated with Stunting Among Children Aged 0 to 59 Months from the Central Region of Mozambique**	**Case- Control**	**Low birth weight (p: 0.001), number of family members (> 4 people) (p: 0.001) are factors associated with the incidence of stunting.**
11.	**Risk Factors for Stunting in Children aged 6-23 months in Jeneponto Regency**	**Cross-Sectional**	**History of low birth weight (OR = 4,018), maternal height <150cm (OR = 1,948), babysitters do not wash their hands with soap (OR = 1,785) and incomplete basic immunization (OR = 1,673) are stunting risk factors.**
12.	**Determinants of stunting among children aged 6-59 months at Kindo Didaye woreda, Wolaita Zone, Southern Ethiopia: Unmatched case-control study**	**Case- Control**	**Breastfeeds initiation practice that is carried out late (done more than one hour after birth), toddlers who do not get complete immunization, the inappropriate age for complementary feeding, lack of hygiene practices, and history of diarrhoea and ARI increases the risk of experiencing stunting.**
13.	**Low calcium and vitamin D intake, but not zinc, iron, or vitamin A, is associated with stunting in 2 to 5-year-old children.**	**Cross- Sectional**	**Children who have low vitamin D adequacy are at greater risk for stunting. There is a significant relationship between the low level of calcium adequacy and the stunting incidence where the p-value: 0.004.**
14.	**Prevalence of stunting and its associated factors among children 6-59 months of age in Libo-Kemekem district, Northwest Ethiopia; A community-based cross sectional study**	**Cross- Sectional**	**The number of family members ≥ six people and the mother who acts as the head of the family increases the greater risk of having a stunted child**
15.	**Prevalence and associated factors influencing stunting in children aged 2–5 years in the Gaza Strip-Palestine: a cross-sectional study**	**Cross- Sectional**	**Maternal height <155cm has a 6.26 times greater risk of having a stunted child**
16.	**Prevalence and determinants of child undernutrition and stunting in the semiarid region of Brazil**	**Cross- Sectional**	**A history of low birth weight (<2500 grams), a mother who lack literacy, family without a regular income, and the absence of a private toilet increase the risk of stunting.**
17.	**Malnutrition Amidst Plenty: An Assessment of Factors Responsible For Persistent High Levels of Childhood Stunting in Food Secure Western Uganda**	**Cross- Sectional**	**There is a significant relationship between the cleanliness of drinking water consumed (p: 0.01) and low family income with stunting incidence (p: 0.008).**

18.	**Study of Stunting in Children under five in terms of exclusive breastfeeding, complementary feeding, immunization status and family characteristics in the city of Banda Aceh**	**Case- Control**	**There is a significant relationship between stunting incidence with exclusive breastfeeding, immunization equipment, inappropriate complementary breastfeeding (type, texture, and frequency) and low family income.**
19.	**Socio-demographic factors and height of parents and their relationship with the incidence of stunting in toddlers aged 6-23 months**	**Case- Control**	**Maternal height <150 cm (p: 0.03) and The value of household expenditures in quartile 1 (Rp. 937,704) is more at risk of having a stunted child**
20.	**Weight Loss History with Stunting Incidents in Children Under Two Years**	**Cross-Sectional**	**There was a significant relationship between low birth weight (<2500 grams) and stunting incidence in toddlers (p: 0.015)**
21.	**The timing of complementary feeding (MP-ASI) is associated with stunting in children aged 6-23 months in Sedayu District**	**Cross-Sectional**	**Improper complementary feeding (> 6 months) has a 2.8 times greater risk of experiencing stunting.**

RESULTS

After reviewing 21 articles, 21 factors were found to be associated with the incidence of stunting in toddlers, namely exclusive breastfeeding, history of low birth weight, early initiation of breastfeeding, immunization, number of family members, malnutrition (energy, iron, protein, calcium, and zinc), colostrum, complementary feeding (age of administration, type, and frequency), hand washing practices, maternal work, maternal knowledge, low family income, history of infectious diseases, environmental sanitation and hygiene, the height of parents, as well as a deficiency of vitamin C and vitamin D.

DISCUSSION

Based on twenty-one articles, 21 risk factors for stunting in toddlers can be classified into four parts: parental factors, toddler factors, socio-economic factors, and environmental factors.

Parent Factor

Exclusive breastfeeding is a risk factor for stunting in children under five, influenced by parental factors. The results of a review of six articles indicate that breastfeeding for less than six months is a factor in the occurrence of stunting in toddlers. Research conducted in Aceh Province in 2014, showed that toddlers who do not receive exclusive breastfeeding are at risk of being 6.54 times more likely to experience stunting (W. Lestari, Margawati, & Rahfiludin, 2014). Meanwhile, one of the articles shows that breastfeeding is the most dominant factor compared to other factors such as family income, poor complementary feeding, and incomplete immunization with the incidence of stunting in children under five (Al-Rahmad, Miko, & Hadi). 2014). Several articles found that mothers who do not provide exclusive breastfeeding are having anxiety if the toddlers only have exclusively breastfed. Also, the breast milk that does not come out immediately makes the mother choose to give formula milk. Other reasons include the culture believed by mothers to immediately give honey to newborns and the existence of families who do not support exclusive breastfeeding (W. Lestari et al., 2014). According to UNICEF (2018), breast milk must be given as often as possible with a frequency of at least eight times a day during the day or night to meet the baby's nutritional needs.

Apart from exclusive breastfeeding, colostrum administration also affects the incidence of stunting in toddlers. Toddlers who get colostrum have a 5.7 times lower chance of experiencing stunting than toddlers who do not get colostrum (Batiro et al., 2017). Colostrum is the best type of breast milk because it has a high nutrient content, especially protein. The protein in colostrum is beneficial for brain development, increases intestinal growth and maturity, absorption of iron, and increases infants' immune system (IDAI, 2013). Not giving colostrum is because the mother thinks that breast milk is still dirty and not good if given to toddlers (Al-Rahmad et al., 2014).

The next factor is early initiation of breastfeeding, where there is a significant relationship between early initiation of breastfeeding practice and the incidence of stunting in children under five. It can occur because babies ingest good bacteria from the mother's skin, forming colonies in the baby's skin and intestines as self-protection so that the baby's immune system can increase (Ministry of Health, 2014). The appropriate duration for practicing breastfeeds initiation is in the first one hour (Roesli, 2012). Breastfeeds initiation practice that is carried out late (done more than one hour after birth) increases the risk of 5.16 times greater for stunting (Batiro, Demissie, Halala, & Anjulo, 2017).

Another factor that increases the risk of stunting in children under five and is influenced by parental factors is immunization. The three reviewed articles showed that immunization was a risk factor for stunting in children under five. Toddlers who do not get complete immunization have a 6.38 times greater risk of experiencing stunting (Batiro et al., 2017). Those happenned because toddlers who do not get complete immunization are more prone to various diseases so that in the end it will affect the nutritional status of these children (Vindriana, Kadir, & Askar, 2012).

The next factor that affects the incidence of stunting in children under five is the age of complementary feeding (MP-ASI). The right age for complementary feeding is when the toddler is six months or 180 days old (WHO, 2001). Toddlers who get complimentary feeding when they are less than six months have a 6.54 times greater risk of experiencing stunting (Al-Rahmad et al., 2014). These results align with research conducted by (Khasanah, Hadi, & Paramashanti, 2016). The samples used tended to get complementary foods for the first time when they were less than six months old. The age of complementary feeding, texture and type that does not match the age stage increases the risk three times greater for experiencing stunting (Al-Rahmad et al., 2014).

In addition to the behaviour of complementary feeding, hygiene practices, especially hand washing by mothers or caregivers, are risk factors for stunting in toddlers. Mothers who do not wash their hands using soap have an increased risk of 1.78 times for children under five to experience stunting (Hafid & Nasrul, 2016). The observation results showed that there were still many mothers who did not wash their hands after cleaning their toddler defecation or before feeding their toddlers (W. Lestari et al., 2014).

The height of the parents is also a factor in stunting in toddlers. There is a significant relationship between short parents and the incidence of stunting in children under five (W. Lestari et al., 2014). Mothers who have a height of <150 cm are at greater risk of having a stunting toddler (Amin & Julia, 2014) (Hafid & Nasrul, 2016). Other studies have shown that mothers with a height of <155 cm are 6.26 times more likely to have a stunted toddler (Rafiq et al., 2017). Parents, especially mothers who experience pathological disorders such as growth hormone deficiency, carry short genes in chromosomes. Therefore, toddlers who inherit these genes are more likely to experience stunting (Fitriahadi, 2018).

The next factor that affects the incidence of stunting in children under five is a mother's job. Working mothers are 2.4 times more likely to experience stunting for children under five (Wahdah et al., 2015). Mothers who act as heads of families increase the risk of children under five to experience stunting (Geberselassie et al., 2018). Mothers who tend to work for a long duration cause the parenting and dietary patterns of toddlers not to be correctly considered (Amin & Julia, 2014)

Apart from work, low maternal knowledge is a risk factor for stunting in children under five. Mothers who have insufficient knowledge of nutrition are more at risk of not meeting the nutritional needs of their toddlers (Susilowati & Himawati, 2017). These happened because inadequate knowledge and understanding of nutrition and the nutritional contribution of each type of food will increase the risk of causing nutritional problems (Wulandari, Yettik, & Indra, 2013).

Toddler factor

The results of a review of seven articles found that a history of low birth weight (LBW) or less than 2500 grams are a risk factor for stunting in children under five. Toddlers born weighing less than 2500 grams have a 1.7 times greater risk of experiencing stunting (Amin & Julia, 2014). Meanwhile, Hafid and Nasrul (2016) research show that toddlers who have a history of LBW are more likely to experience stunting 4.018 times. LBW factor is the most dominant factor compared to hygiene, immunization practices, and maternal height (<150 cm) on the incidence of stunting in children under five (Hafid & Nasrul, 2016). There are three degrees of LBW in toddlers, namely low birth weight (1500-2499 grams), low birth weight (1000-1499 grams), and low birth weight (<1000 grams) (Proverawati & Ismawati, 2010). Each degree has a different life expectancy and nutritional needs to grow naturally. The condition of LBW babies needs to be adjusted to prevent stunting.

Low energy adequacy is a risk factor for stunting in children under five. Toddlers who lack energy are three times more likely to experience stunting (N. E. Lestari, Nurhaeni, & Chodidjah, 2018). This is because energy functions as a powerful substance for metabolism, growth, temperature regulation and physical activity (Institute Of Medicine, 2005).

Another article shows that iron deficiency children are more at risk of experiencing stunting (Aridiyah, Rohmawati, & Ririanty, 2015). Iron deficiency negatively affects the intelligence, behaviour and motor skills of children under five.

The three articles reviewed showed that low protein adequacy affected the incidence of stunting in children under five. Toddlers with protein adequacy levels <80 per cent of the nutritional adequacy rate (RDA) are at risk of being 10.26 times more likely to experience stunting (Dewi & Adhi, 2016). Apart from protein, low calcium adequacy is also a risk factor for stunting in children under five (Aridiyah et al., 2015).

The next factor related to the incidence of stunting in children under five is zinc deficiency. Toddlers who are deficient in zinc have a 9.94 times greater risk of experiencing stunting (Dewi & Adhi, 2016). These are because zinc plays a role in stimulating and activating growth hormone. If toddlers have low zinc levels, there will be changes in the GH axis that interfere with toddlers' physical growth (Agustian, Sembiring, & Ariani, 2009).

The next factor that affects the incidence of stunting in toddlers is vitamin C and vitamin D deficiency. Toddlers deficient in vitamin C have a 2.97 times greater risk of experiencing stunting (Bening, Margawati, & Rosidi, 2016). Toddlers who are stunted have lower vitamin D levels than typical toddlers (Stuijvenberg et al., 2015). At the age of five, toddlers need more vitamin D to support physical growth, especially bone growth. Lack of vitamin D causes calcium and phosphorus exchange in bones to be inhibited, so that bone formation is disrupted (Peacock, 2010). Iron is one of the enzyme components that play a role in DNA synthesis and influences tissue growth, which will impact the growth of children under five (Harmatz, Butensky, & Lubin, 2003).

Toddlers who have a history of infection are more at risk for stunting. Infected toddlers (ARI or diarrhoea) have a 5.41 times greater risk of experiencing stunting (Dewi & Adhi, 2016). Toddlers who have a history of infectious diseases in the first 24 months of life tend to have a shorter body than toddlers their age (W. Lestari et al., 2014). Meanwhile, children under five who experience chronic infectious diseases are more at risk of stunting (Aridiyah et al., 2015).

Family Socio-economic Factors

The factor that affects the incidence of subsequent stunting is low family income. Families with income status are in the first, second, and third quintiles at a higher risk of having a stunted toddler (Nadhiroh & Ni'mah, 2015). Families who do not have a fixed income each month are at 9.28 times greater risk of experiencing stunting (Correia et al., 2014). Low economic status increases the chance of not being able to meet food needs. It will have an impact on the nutritional status of children under five (Septikasari, 2018).

The number of family members is a risk factor for stunting in children under five. The results of the three reviewed articles show that there is a significant relationship between the number of family members and low socio-economic conditions with the incidence of stunting in children under five. Families who have toddlers more than four people or live with other family members in one house have a higher risk of experiencing stunting (Wahdah, Juffrie, & Huriyati, 2015). Meanwhile, other research shows that if the number of family members is more than five people and has other siblings under five years of age, it increases the risk of stunting (Francisco, Ferrer, & Serra-majem, 2017). The results of other studies show that the number of family members with more than six people has a 1.77 times greater risk of experiencing stunting (Geberselassie, Abebe, Melsew, Mutuku, & Wassie, 2018).

Environmental factor

Poor sanitation and environmental hygiene are risk factors for stunting in children under five. There is a significant relationship between the cleanliness of water consumed and stunting incidence (Kikafunda, Agaba, & Bambona, 2014). Toddlers who consume unsuitable drinking water have a seven times greater risk of experiencing stunting (Batiro et al., 2017). Meanwhile, another study showed that private latrines' unavailability was 2.71 times more likely to be stunted

(Correia et al., 2014). Poor environmental sanitation increases the risk of children under five to experience ARI, which will affect these children's health status (Abeng, Ismail, & Huriyati, 2014).

CONCLUSIONS AND SUGGESTIONS

There are various factors associated with the incidence of stunting in children under five. Each factor can be divided into four parts: children under-fives, parents, and socio-economic and environmental factors. Recommendation that can be given to other researchers is to use every factor that has been obtained to form an early detection tool for stunting in toddlers. Meanwhile, suggestions for health workers, which the results of this literature study can be used as a reference for making an extension material in providing health education to the communities regarding the risk factors for stunting in children under five.

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