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Association between sugary beverage and unhealthy food consumption and stunting among children under five

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Abstract

Background: Stunting is a condition of growth failure in children under five caused by chronic malnutrition, resulting in children being too short for their age. Malnutrition occurs during the first one thousand (1000) days of life, starting from conception until the child reaches two years of age; however, the condition of stunting becomes visible after the child was two years old. The risk factors contributing to stunting are consumption of sweetened beverage and unhealthy foods, such as snacks high in sugar, salt, and fat, as well as sweetened and carbonated drinks that are low in nutrients. Such dietary patterns can lead to an imbalance in the intake of macro- and micronutrients that play an important role in a child's growth.

Purpose: To analyze the relationship between the consumption of unhealthy foods and beverages and the incidence of stunting.

Method: This study was an analytic observational with a retrospective case control design. The sample in this study were mothers who had toddlers aged 24-48 months with case and control groups. The total sample in this study was 138 with an unpaired categorical comparative formula. The sampling method in the case group was directly carried out by consecutive sampling, while in the control group it was carried out by proportional sampling first and then taken by consecutive sampling.

Results: The results of this study show that there were no relationship between the consumption of sweetened beverage ($p = 0.232$) and the consumption of unhealthy foods ($p = 0.086$) with the incidence of stunting in the working area of Pagambiran Public Health Center, Padang City ($p\text{-value} < 0.05$).

Conclusion: The conclusion of this study are that there are no relationship between the consumption of sweetened beverage consumption and the incidence of stunting in the working area of Pagambiran Public Health Center, as well as no relationship between the consumption of unhealthy foods and the incidence of stunting in the same area

Keywords: Stunting; Sweetened Beverage; Unhealthy Food Consumption.

INTRODUCTION

Stunting remains a major child health problem in Indonesia. Stunting occurs as a result of chronic malnutrition, causing children to have height below the WHO growth standards. This condition arises due to nutritional deficiencies during the first 1.000 days of life (the first 1.000 HPK). Globally, the prevalence of stunting remains high, reaching 22% in 2020 (World Health Organization, 2023). In Indonesia, the stunting rate in 2022 reached 21.6%, while in West Sumatra it

increased to 25.6%. Padang City also experienced an increase to 19.5% in 2022 (Ministry of Health of the Republic of Indonesia, 2023). This situation hinders the achievement of the national target of 14% by 2024. Stunting has long-term impacts such as cognitive impairment, low productivity, and increased vulnerability to disease. Inappropriate dietary patterns, including the consumption of sugary beverages and low-nutrient foods, can worsen the risk of stunting. The

WHO recommends that toddlers should not consume sugary drinks because they can replace nutritious foods, trigger obesity, and establish long-term preferences for sweet tastes. Puskesmas Pagambiran was selected as the research location because it recorded an increase in stunting from 6.9% to 9.6% in 2022 (Padang City Health Office, 2022).

Stunting can cause long-term effects such as delayed growth, decreased cognitive and mental abilities, vulnerability to disease, low economic productivity, and poor reproductive quality. Stunting is caused by infants and toddlers not being fed appropriately. In the WHO guidelines for complementary feeding, the provision of sugary drinks such as soft drinks is not recommended, as these beverages provide no nutrients other than energy and may replace more nutritious foods. High intake of sugary beverages is strongly associated with an increased risk of obesity in children of all ages. Early introduction of sugary drinks before the age of 12 months is associated with obesity at six years of age. Sugary drinks referred to in the WHO guidelines include commercially packaged or homemade beverages such as soda, fruit-flavored drinks, sports drinks, chocolate drinks, flavored milk drinks, fruit juice with added sugar, syrups, and others (World Health Organization, 2021). Consumption of unhealthy snacks and beverages is associated with a higher risk of undernutrition and shorter body length/height (stunting) in children aged one year (Ministry of Health of the Republic of Indonesia, 2023).

Repeated exposure to sugary foods and beverages during childhood can increase innate preferences for sweet tastes, thereby increasing future consumption of sugary foods and drinks as a learned preference. Such practices, if continued through adolescence and adulthood, may increase the risk of overweight or obesity and chronic diseases later in life (World Health Organization, 2021). Consumption of sugary beverages among toddlers can double the risk of stunting, and sugary drink consumption in child feeding practices is associated with stunting due to its negative impact on health and

unhealthy eating habits resulting from routine consumption.

A study conducted in Mexico found a positive association between an "Unhealthy/Western" dietary pattern (high in sugar and salt, fast food, processed meat, poultry and fish, packaged snacks, and foods with added fats and oils) and higher income levels as well as overweight, but not with stunting (Fernández-Gaxiola, Neufeld, & García-Guerra, 2024).

RESEARCH METHOD

This study employed an analytic observational design with a retrospective case-control approach. The study population consisted of children aged 24–48 months. The sample size was calculated using an unpaired categorical comparative formula, resulting in a total of 138 participants, comprising 69 stunted children (case group) and 69 non-stunted children (control group).

Cases were selected using consecutive sampling, while controls were selected through proportional sampling followed by consecutive sampling to ensure representativeness. Stunting status was determined based on height-for-age Z-scores (HAZ) according to World Health Organization (WHO) growth standards, with stunting defined as $HAZ < -2$ SD. The independent variables were the consumption of sugary beverages and unhealthy foods, while the dependent variable was stunting status. Data were collected through face-to-face interviews with caregivers using a structured and validated questionnaire. Statistical analysis was conducted using statistical software. Univariate analysis was performed to describe the characteristics of study participants. Bivariate analysis was carried out using the chi-square test to examine the association between consumption of sugary beverages, unhealthy food intake, and stunting status. The strength of associations was expressed as odds ratios (ORs) with 95% confidence intervals (CIs). Variables with a p -value < 0.25 in bivariate analysis were included in multivariate analysis using binary logistic regression to identify factors independently associated with stunting. Statistical significance was set at $p < 0.05$.

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RESEARCH RESULT

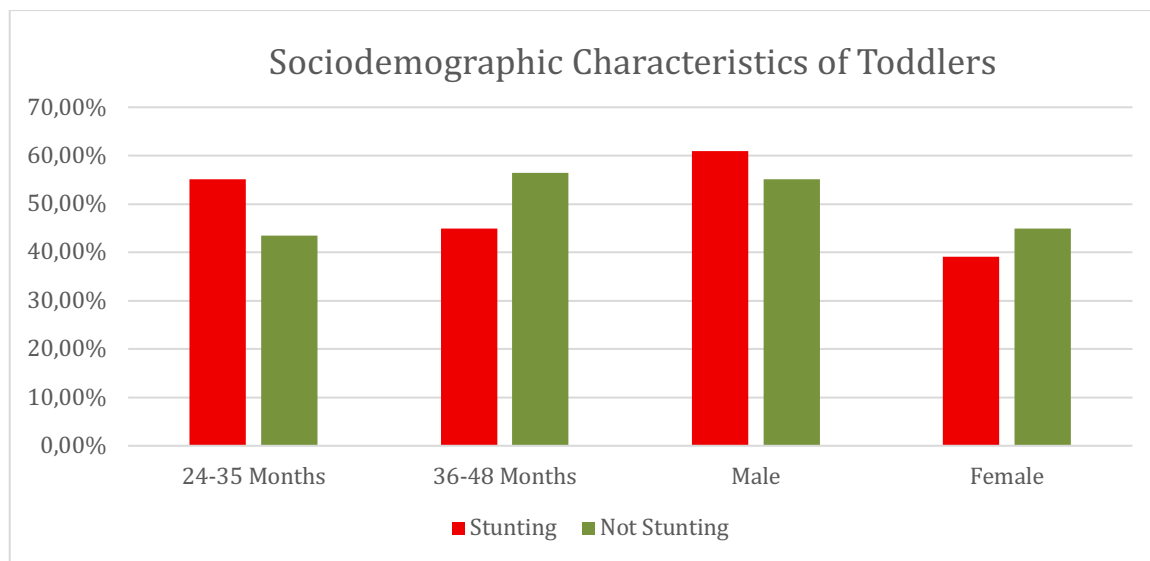


Figure 1. Sociodemographic Characteristics of Toddlers

Based on the collected data, respondent characteristics were analyzed according to toddler age and sex. The majority of participants were aged 36–48 months, totaling 70 toddlers (53.7%), with the proportion of stunted children (44.9%) being lower than that of non-stunted children (56.5%) in this age group. In terms of sex, 80 toddlers (58.0%) were male, and the proportion of stunted male toddlers (60.9%) was higher than that of non-stunted male toddlers.

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Table 1. Distribution of Sugary Beverage and Unhealthy Food Consumption Among Stunted and Non-Stunted Toddlers

Variable	Stunting (N=69)	Non-Stunting (N=69)	OR	95% CI	p-value
Sugary Beverage Consumption (n/%)					
Yes	41/59.4	33/48.0			
No	28/40.6	36/52.0	1.597	0.814–3.134	0.232
Unhealthy Food Consumption (n/%)					
Yes	60/87.0	51/74.0			
No	9/13.0	18/26.0	2.353	0.973–5.689	0.086

Based on the results of the univariate analysis, a higher proportion of stunted toddlers consumed unhealthy beverages (59.4%) compared with non-stunted toddlers. This study found that 87% of toddlers who consumed unhealthy foods were stunted. The high prevalence of unhealthy food consumption in this study may be attributed to parental permissiveness, allowing children to consume such foods without clear limits. In some cases, unhealthy foods were consumed prior to main meals. Poor feeding practices and inappropriate dietary intake often begin in the early days of a child's life. The consumption of sugary beverages and unhealthy foods was higher among stunted toddlers compared with non-stunted toddlers. However, bivariate analysis showed no statistically significant association between sugary beverage consumption and stunting ($p = 0.232$; $OR = 1.597$), nor between unhealthy food consumption and stunting ($p = 0.086$; $OR = 2.353$).

DISCUSSION

A study conducted in rural Lucknow, India, reported that 20% of children aged 6–23 months had consumed sugary beverages within the previous 24 hours (Varghese, Agarwal, & Singh, 2023). Consumption of sugary beverages has been shown to have adverse effects on child health, including dental caries, obesity, type 2 diabetes mellitus, and non-alcoholic fatty liver disease. In the present study, more than half of the children consumed sugary beverages, such as sweetened tea and commercially packaged canned or boxed drinks. The habit of consuming tea or coffee among children in this study was influenced by parental behavior, as children tend to imitate their parents' drinking habits. Tea is one of the most commonly consumed beverages in daily life in Indonesia, and both children and adults favor it. Indonesia ranks 22nd among 54 countries in tea consumption, with an average intake of approximately

0.5 kg per capita per year (Prasetya, Setiawan, Bardant, Muryanto, Randy, Haq, & Sulaswatty, 2020).

A study conducted in Chatmohar, Bangladesh, reported that 62% of toddlers consumed unhealthy foods, with prevalence increasing by age group: 55% among children aged 6–12 months, 66% among those aged 12–18 months, and 72% among those aged 18–24 months. One of the most influential factors identified was maternal consumption of foods containing added sugars (Hassan, Hossain, Mahbub, Amin, & Saha, 2025).

Based on the results of the univariate analysis, a higher proportion of stunted toddlers consumed unhealthy beverages (59.4%) compared with non-stunted toddlers. A study conducted in rural Lucknow, India, reported that 20% of children aged 6–23 months had consumed sugary beverages within the previous 24 hours (Varghese et al., 20203). Consumption of

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Furthermore, this study found that 87% of toddlers who consumed unhealthy foods were stunted. The high prevalence of unhealthy food consumption in this study may be attributed to parental permissiveness, allowing children to consume such foods without clear limits. In some cases, unhealthy foods were consumed prior to main meals. Poor feeding practices and inappropriate dietary intake often begin in the early days of a child's life. A study conducted in Chatmohar, Bangladesh, reported that 62% of toddlers consumed unhealthy foods, with prevalence increasing by age group: 55% among children aged 6–12 months, 66% among those aged 12–18 months, and 72% among those aged 18–24 months. One of the most influential factors identified was maternal consumption of foods containing added sugars (Hassan et al., 2025).

Although the consumption of sugary beverages was more frequently observed among stunted toddlers, it was not found to be significantly associated with stunting in this study. Nevertheless, sugary beverage consumption may indirectly affect nutritional status by reducing appetite, causing dental caries, and displacing nutrient-dense foods. In addition, tea consumption commonly given to toddlers in this study may inhibit iron absorption due to its polyphenol and phytate content, thereby increasing the risk of anemia. Anemia, particularly iron-deficiency anemia, can suppress appetite through reduced ghrelin levels, a hormone involved in energy homeostasis, which in turn increases the risk of chronic undernutrition and stunting.

Similarly, consumption of unhealthy foods was not significantly associated with stunting in the present study. However, ultra-processed foods that are high in sugar, salt, and fat remain detrimental to child health and may contribute to the development of unhealthy dietary patterns from an early age. Poor feeding practices in early childhood can shape long-term food preferences, potentially limiting the intake of essential nutrients required for optimal growth and development.

Consistent with the findings of this study, several previous studies have reported no direct association between sugary beverage consumption and stunting. However, these beverages may contribute indirectly to stunting by promoting dental caries and suppressing appetite, which over time can lead to chronic undernutrition (Alkarimi, Watt, Pikhart, Jawadi, Sheiham, & Tsakos, 2012). Sugary beverage consumption among toddlers doubled the risk of stunting. The limited and inconsistent evidence highlights the need for further research to clarify the relationship between sugary beverage intake and linear growth, as well as the importance of caregiver education to promote appropriate infant and young child feeding practices (Brown, 2017).

In Indonesia, sugary beverages are commonly introduced at an early age. The 2014 Total Diet Study reported that 42.6% of children under five years consumed sugary beverages, with the highest consumption (59.8%) observed among children aged 36–59 months (Ministry of Health of the Republic of Indonesia 2014).

Ready-to-drink beverages such as coffee, milk coffee, tea, and chocolate milk were among the most frequently purchased and consumed (Daeli & Nurwahyuni, 2019). Sugary beverage consumption has been linked to numerous adverse health outcomes, including overweight, obesity, non-alcoholic fatty liver disease, cardiometabolic syndrome, type 2 diabetes mellitus, dental caries, kidney disease, micronutrient deficiencies, cancer, stroke, psychological disorders (such as anxiety and sleep disturbances), and behavioral problems in preschool children (Sartika, Atmarita, Duki, Bardosono, Wibowo, & Lukito, 2022).

In this study, tea consumption was the most common form of sugary beverage intake and was more prevalent among stunted toddlers. Tea is not recommended for children under two years of age, as

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it provides no nutritional value and inhibits iron absorption. Reduced iron absorption can lead to anemia, which negatively affects appetite and increases the risk of malnutrition. Children with poor appetite are particularly vulnerable to chronic undernutrition and subsequent growth faltering.

Regarding unhealthy food consumption, a higher proportion of stunted toddlers consumed unhealthy foods (87%) compared with non-stunted toddlers (73.9%). However, statistical analysis showed no significant association between unhealthy food consumption and stunting ($p = 0.086$; OR = 2.353; 95% CI: 0.973–5.689). Similar findings were reported in a study conducted in Senegal, which found no significant association between healthy or unhealthy food consumption and linear growth indicators such as height-for-age or weight-for-age (Vanderkooy, Diatta, & Dossou, 2023). A study in Mexico also reported that a Western dietary pattern characterized by high sugar and salt intake, fast food, processed meats, packaged snacks, and foods high in added fats was associated with higher income levels and overweight, but not with stunting (Morales-Ruán, Villalpando, García-Guerra, Shamah-Levy, Robledo-Pérez, Ávila-Arcos, & Rivera, 2012).

Dietary patterns in children are largely established between the ages of one and two years (Berti & Socha, 2023). Foods high in sugar, salt, and trans fats are not recommended for infants and young children (World Health Organization, 2023). Studies conducted in low- and middle-income countries have raised concerns about the increasing consumption of unhealthy snacks among children and emphasized the need to further investigate their relationship with stunting (Huffman, Piwoz, Vosti, & Dewey, 2014). Although evidence linking unhealthy food consumption directly to stunting remains limited, UNICEF has emphasized that poor dietary choices contribute to unhealthy eating patterns, which negatively impact child health globally (UNICEF, 2019).

In this study, most stunted toddlers consumed commercially packaged ultra-processed foods such as biscuits, wafers, snacks, and ice cream. These foods are typically high in sugar and salt but low in essential nutrients. Easy access and widespread availability of such foods may contribute to their high consumption among young children. Unhealthy foods that are not recommended for infants and young

children include honey (before 12 months), ice cream, donuts, biscuits, candies, jelly products, potato chips, popcorn, cakes, and other packaged or ultra-processed foods (Newfoundland and Labrador, 2020).

Therefore, it is essential to limit the consumption of sugary beverages and unhealthy foods among toddlers and to promote healthy eating and drinking habits. Such efforts are crucial to support optimal growth and development and to reduce the risk of nutritional problems and other health issues during early childhood and later in life.

CONCLUSION

No statistically significant association was observed between the consumption of sugary beverages or unhealthy foods and stunting among toddlers. Nevertheless, these dietary practices remain a public health concern due to their potential contribution to adverse long-term health outcomes, including obesity and metabolic disorders.

REFERENCES

- Alkarimi, H. A., Watt, R. G., Pikhart, H., Jawadi, A. H., Sheiham, A., & Tsakos, G. (2012). Impact of treating dental caries on schoolchildren's anthropometric, dental, satisfaction and appetite outcomes: a randomized controlled trial. *BMC public health*, 12(1), 706.
- Berti, C., & Socha, P. (2023). Infant and young child feeding practices and health. *Nutrients*, 15(5), 1184.
- Brown, A. L. (2017). Sugary drinks consumption and stunting among under-five children: Evidence from developing countries. *Public Health Nutrition*, 20(11), 2000–2008
- Daeli, W. A. C., & Nurwahyuni, A. (2019). Determinan sosial ekonomi konsumsi minuman berpemanis di Indonesia: analisis data susenas 2017. *Jurnal Ekonomi Kesehatan Indonesia*, 4(1), 2.
- Fernández-Gaxiola, A. C., Neufeld, L. M., & García-Guerra, A. (2024). Considerations for correction of micronutrient deficiencies through supplementation in pregnant women and children

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- under-5 in Latin America. Food and Nutrition Bulletin, 45(2_suppl), S47-S54.
- Ghrayeb, H. (2020). Iron deficiency anemia and ghrelin: The role of appetite regulation. Journal of Clinical Endocrinology and Metabolism, 105(8), 2504–2511
- Hassan, R., Hossain, M. S., Mahbub, M. J., Amin, M. R., & Saha, S. (2025). Unhealthy food consumption and its determinants among children aged 6–23 months in Bangladesh: insights from the Demographic and Health Survey 2022. BMC Public Health, 25(1), 2498.
- Huffman, S. L., Piwoz, E. G., Vosti, S. A., & Dewey, K. G. (2014). Babies, soft drinks and snacks: a concern in low-and middle-income countries?. Maternal & child nutrition, 10(4), 562-574.
- Marshall, T. A. (2013). Preventing dental caries associated with sugar-sweetened beverages. The Journal of the American Dental Association, 144(10), 1148-1152.
- Ministry of Health of the Republic of Indonesia. (2014). Buku Studi Diet Total : Survei Konsumsi Makanan Individu Indonesia 2014. Retrieved from: <https://repository.badankebijakan.kemkes.go.id/id/eprint/4741/>
- Ministry of Health of the Republic of Indonesia. (2023). Laporan Studi Status Gizi Indonesia Tahun 2022. Retrieved from: <https://kemkes.go.id/id/indonesia-health-profile-2022>
- Morales-Ruán, M. D. C., Villalpando, S., García-Guerra, A., Shamah-Levy, T., Robledo-Pérez, R., Ávila-Arcos, M. A., & Rivera, J. A. (2012). Iron, zinc, copper and magnesium nutritional status in Mexican children aged 1 to 11 years. salud pública de méxico, 54(2), 125-134.
- Newfoundland & Labrador. (2020). Feeding your baby: A guide to healthy eating for infants and young children. Department of Health and Community Services. Retrieved from: <https://www.gov.nl.ca/health/>
- Padang City Health Office. (2022). Laporan Tahunan Tahun 2021 Edisi 2022. Padang: Dinas Kesehatan Kota Padang. Retrieved from: <https://drive.google.com/file/d/1yLSOBuRwlp4l8FQn56d8-rfVJngVYYKD/view>
- Prasetya, H., Setiawan, A. A. R., Bardant, T. B., Muryanto, M., Randy, A., Haq, M. S., & Sulaswatty, A. (2020). Studi Pola Konsumsi Teh di Indonesia untuk Mendukung Diversifikasi Produk yang Berkelanjutan (A Study of Tea Consumption Pattern in Indonesia Toward Sustainable Product Diversification). Biopropal Industri, 11(2), 107-118.
- Sartika, A. D., Atmarita, A., Duki, M. Z., Bardosono, S., Wibowo, L., & Lukito, W. (2022). Consumption of sugar-sweetened beverages and its potential health implications in Indonesia.
- UNICEF. (2019). The State of the World's Children 2019: Children, Food and Nutrition. Retrieved from: <https://www.unicef.org/reports/state-of-worlds-children-2019>
- Vanderkooy, A., Diatta, D., & Dossou, A. (2023). Dietary quality and growth outcomes among children in Senegal. Journal of Global Health, 13, 04009.
- Varghese, A., Agarwal, M., & Singh, V. K. (2023). Complementary feeding practices in children aged 6–23 months in rural Lucknow: A cross-sectional study. Clinical Epidemiology and Global Health, 22, 101331.
- World Health Organization. (2021). Levels and trends in child malnutrition: UNICEF/WHO/World Bank Group Joint Child Malnutrition Estimates. Retrieved from: <https://www.who.int/publications/i/item/9789240025257>
- World Health Organization. (2023). Guideline: Complementary Feeding of Infants and Young Children 6–23 Months of Age. <https://www.who.int/publications/i/item/9789240081864>

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