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The role of stimulation, affection, and parenting patterns in stunting among children aged 24-59 months

Peran pola asah, asih, asuh pada anak stunting usia 24-59 bulan

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Abstract

Stunting remains a chronic nutritional issue in Indonesia. The prevalence of stunting has decreased from 30,8% in 2018 to 21,5% in 2023; this rate is still above the WHO threshold of less than 20%. Proper stimulation, affection, and parenting patterns influenced optimal growth in terms of height and weight. This study aimed to analyze the association between stimulation, affection, and parenting practices in stunting among children aged 24–59 months. This case-control study was conducted from March to April 2024 at the Made Health Center, Surabaya City, which consists of 50 toddlers, both stunting and non-stunting, selected using purposive sampling. Stimulation patterns were measured using the Home Observation of Measurement and Environment Inventory (HOME), affection patterns using the Child Adult Relational Experimental (CARE), parenting patterns using the parenting feeding style questionnaire, and nutritional status using anthropometric measurements. Data analysis was performed using the chi-squared test. The results showed that the stimulation patterns were significantly correlated with stunting (p= 0,000; OR= 5,90). Affection patterns were also significantly correlated with stunting (p= 0,000; OR= 13,75). Parenting patterns were significantly correlated with stunting (p= 0,000; OR= 26,35). In conclusion, stimulation, affection, and parenting patterns were significantly correlated with stunting among children aged 24-59 months.

Keywords: Affection, nutritional status, parenting, stimulation

Abstrak

Stunting di Indonesia merupakan permasalahan gizi kronis. Prevalensi stunting menurun dari 30,8% pada tahun 2018 menjadi 21,5% pada tahun 2023, persentase ini masih diatas ambang batas WHO yang kurang dari 20%. Pola asah, asih dan asuh yang baik mempengaruhi pertumbuhan meliputi tinggi dan berat yang optimal. Penelitian bertujuan untuk menganalisis peran pola asah, asih, asuh pada anak stunting usia 24 - 59 bulan. Penelitian ini menggunakan desain *case-control study.* Penelitian ini dilakukan pada bulan Maret – April 2024 di Puskesmas Made, Kota Surabaya. Penelitian ini memiliki jumlah sampel sebanyak 100 orang tua/ pengasuh balita. Sampel penelitian ini terdiri dari 50 balita yang mengalami *stunting* maupun tidak *stunting* dengan metode *purposive sampling*. Pola asah diukur menggunakan *Home Observation of Measurement and Environment Inventory* (HOME), pola asih diukur menggunakan *Child Adult Relational Experimental* (CARE), pola asuh diukur menggunakan *parenting feeding styles questionnaire*, dan status gizi diukur menggunakan pengukuran antropometri. Analisis data menggunakan uji *chi square*. Hasil penelitian menunjukkan pola asah berkorelasi secara signifikan dengan *stunting* (p= 0,000; OR= 5,90). Pola asih berkorelasi secara signifikan dengan *stunting* (p= 0,000; OR= 13,75). Pola asuh berkorelasi secara signifikan dengan *stunting* (p=0,000; OR= 26,35). Kesimpulan, penelitian menunjukkan pola asah, asih, dan asuh berkorelasi secara signifikan dengan *stunting* pada anak usia 24-59 bulan.

Kata Kunci: Kasih sayang, pengasuhan anak, status gizi, stimulasi

Introduction

The toddler phase is a critical period for children's growth and development and is marked by rapid physical, cognitive, social, and emotional progress. In the first two years of life, significant brain development occurs, with over one million new neural connections forming every second (Wijeakumar et al., 2023). Adequate nutrition during this period is essential to support brain and physical development and prevent issues like stunting, which can impair a child's future health and intelligence (Khomsan et al., 2024).

Stunting remains a chronic nutritional issue in Indonesia. Although the prevalence of stunting has decrease from 30,8% in 2018 to 21,5% in 2023, this prevalence is still above the WHO recommendation, which is less than 20% (Kemenkes, 2024). This reduction may be attributed to various government initiatives, including enhanced nutritional intervention programs, education on healthy eating practices, and improved access to maternal and child health care services. Nevertheless, Indonesia ranks 115th out of 151 countries with the highest stunting prevalence according to the *Joint Malnutrition Estimates* (JME) by UNICEF (Vinci et al., 2022).

In 2024, East Java Province ranked third in the number of stunted children, with a total of 99,776 cases (Kementerian Dalam Negeri, 2024). In Surabaya, the prevalence of stunting is reported at 8,54% (Dinas Kesehatan Kota Surabaya, 2019). Challenges in addressing stunting in Surabaya remain significant. Local government initiatives, such as supplementary feeding programs and improved access to maternal and child health services, are being implemented to reduce stunting rates. However, barriers such as unequal access to balanced nutrition and health education in certain areas continue to impede progress towards stunting reduction targets.

Previous studies have highlighted the critical roles of parents and caregivers in the growth and development of toddlers. Early stimulation, affection, and appropriate parenting practices significantly contribute to optimal growth, including achieving age-appropriate height and weight (Ulfah et al., 2018; Al Rahmad et al., 2024). Nugrahmi & Haninda (2020) highlight that early developmental stimulation and a supportive environment during the first year of life not only enhance height and IQ but also positively influence academic performance, social behavior, and future earning potential. Similarly, Yoshida & Funato (2021) explain that affectionate mother-child interactions foster a sense of security, which is crucial for emotional and personality development. Emotional security also influences parenting patterns, particularly feeding practices, which directly affects children's nutritional intake. These three factors—stimulation, affection, and parenting — play a vital role in preventing stunting as a combination of emotional and physical support, and adequate nutrition is essential for ensuring optimal child growth.

Parenting refers to parents' abilities to nurture, support, educate, and guide their children, including providing quality meals to meet their nutritional needs for optimal growth and development. Stunting can be minimized if dietary intake meets nutritional requirements and appropriate feeding practices are implemented. This study aimed to identify the specific influence of stimulation, affection, and parenting patterns on the risk of stunting among children aged 24–59 months in Surabaya. Furthermore, this research uniquely incorporates an analysis of children's developmental conditions, an aspect often underexplored in previous studies despite its critical role in understanding the multifactorial nature of stunting. The findings of this study are expected to inform targeted policies for the prevention and reduction of stunting among children in Surabaya.

Methods

This study employed a case-control study was conducted in the Made Health Center work area of Surabaya City from March to April 2024. The study population included toddlers residing in the working area of the Made Public Health Center. Purposive sampling was performed using the calculation formula by Lameshow et al. (1997), resulting in 50 toddlers with stunting and 50 in the non-stunted toddlers. Samples were selected based on predefined criteria: toddlers who underwent height and weight measurements at the time of the study and had a height-for-age (HAZ) score of <-2SD with developmental delays for the stunting group, and HAZ scores of >-2SD to +3SD with appropriate development for the control group.

Research variables included participant characteristics, stimulation patterns, affection patterns, parenting patterns, and stunting. Data on participants' characteristics, stimulation, affection, and parenting patterns were collected through direct interviews. This instrument has been validated for local populations to ensure its cultural and linguistic appropriateness. Stimulation patterns were measured using the Home Observation of Measurement and Environment Inventory (HOME) questionnaire with a Cronbach's alpha of 0,766 (Novitasari, 2013). Affective patterns were measured using the Child Adult Relational Experimental (CARE) questionnaire with a Cronbach's alpha of 0,862 (Nurmalasari, 2011). Parenting patterns were assessed using the Parenting Feeding Styles questionnaire, which produced Cronbach's alpha scores of 0,85 for demandingness and 0,82 for responsiveness (Hughes et al., 2005). Nutritional status regarding stunting was determined by measuring height using a wireless height meter, weight using a digital scale, and age at the time of measurement.

Data were analyzed using IBM SPSS Statistics for Windows (version 21.0) as the primary software, with additional support from Microsoft Excel 2019, WHO Anthro, and NutriSurvey 2007. The analysis included participant characteristics, food consumption, parental feeding patterns, and stunting status. Univariate analysis was conducted to describe the distribution of each variable, whereas bivariate analysis was used to examine the relationships among food consumption, parenting feeding patterns, and stunting. The chi-square test was used for bivariate analysis to assess the associations between categorical variables. Before conducting the analysis, key assumptions of the chi-squared test were verified, including ensuring an adequate sample size in each category (with a minimum expected frequency of five per cell) and the independence of observations, to validate the results. Because all variables were categorical, a normality test was not required.

Ethical clearance for this study was granted by the Ethics Committee for Research Involving Human Participants, Airlangga University under EC No.1247/HRECC. FODM/XI/2023. Informed consent was obtained from the parents or legal guardians of the child participants to ensure that they were fully informed of the study's purpose, procedures, and potential risks. Additionally, measures were implemented to protect the privacy and confidentiality of the participants' data, including the use of coded identifiers and secure data-storage protocols.

Result and Discussion

Based on the results of data collection and analysis that have been carried out, the following research results are obtained:

Table 1, General characteristic of respondents

Characteristics	Stunting		Non-stunting		Total	
	n	%	n	%	n	%
Toddler's age						
24-36 months (toddler)	15	30,00	21	42,00	36	36,00
37-59 months (pre-school)	35	70,00	29	58,00	64	64,00
Mean ±SD (months)	40,64±11,51		42,90±9,78		41,77±10,69	
Toddler's gender						
Male	22	44,00	22	44,00	44	44,00
Female	28	56,00	28	56,00	56	56,00
Mother's age						
At risk	19	38,00	8	16,00	27	27,00
Not at risk	31	62,00	42	84,00	73	73,00
Mean ±SD (years)	23,16±5,09		25,30±4,90		24,23±5,09	
Mother's education level						
Didn't complete elementary school	5	10,00	5	10,00	10	10,00
Graduated from elementary school	11	22,00	8	16,00	19	19,00
Graduated from junior high school	15	30,00	3	6,00	18	18,00
Graduated from high school	19	38,00	34	68,00	53	53,00

Mother's Job						
Housewife	45	90,00	46	92,00	91	91,00
Labor	5	10,00	4	8,00	9	9,00
Family's Income						
<CMW Surabaya	4	8,00	16	32,00	20	20,00
≥CMW Surabaya	46	92,00	34	68,00	80	80,00
Mean ±SD (IDR)	1,498,000± 1,229,151		1,974,000± 1,338,718		1,736,000± 1,300,778	

SD=Standard Deviation; CMW= The city minimum wage

As presented in Table 1, the study involved 100 participants, most of whom were children aged 37–59 months (64%). The average age of participants in the stunting and non-stunting groups showed little difference: 40,64 ± 11,51 months for stunting children and 42,90 ± 9,78 months for non-stunting children. Children aged 37–59 months are more susceptible to stunting due to developing food preferences influenced by their peers or initial experiences with food (Astuti et al., 2024). Another contributing factor is that children in this age group are less frequently monitored, leading to undetected health issues compared to children aged 24–36 months (Siramaneerat et al., 2024).

The percentage of female participants was higher in both stunting and non-stunting groups (56% in each group). This is because, biologically, female children tend to grow at a slower rate. Girls generally have a higher body fat ratio than boys, which can influence their energy balance and growth (Jackson & Short, 2018).

Mothers in the non-risk category comprised 62% and 84% of the stunting and non-stunting groups, respectively. All mothers in this study had a formal education, with only 10% not completing elementary school. Among mothers of non-stunting children, 68% had completed high school compared to 38% in the stunting group. Overall, the majority of the mothers (53%) had completed high school. Higher educational levels provide mothers with better access to and discernment of information, particularly regarding their child's health and nutrition (Yorke et al., 2023). Additionally, most of the mothers in this study were housewives (91%). However, the percentage of working mothers was higher in the stunting group (10%) than in the non-stunting group (8%), because non-working mothers were considered to have more time to care for their children (Pilarz & Awkward-Rich, 2023).

Family income refers to the total monthly earnings of all the family members residing in the respondent's household. Based on the East Java Governor's Regulation of 2022, the city's minimum wage in Surabaya (CMW) is Rp. 4,525,479. Table 1 indicates that families with an income below Surabaya CMW were more common in the non-stunting group (32%) than in the stunting group (8%), whereas families with an income above Surabaya CMW were more prevalent in the stunting group (92%) than in the non-stunting group (68%). This may occur because the calculation considers the income of all household members. Additionally, this could reflect that families with income below the CMW allocate a greater proportion of their earnings to food and nutritional needs than to other expenses. Average family income showed a significant gap, with stunting households earning Rp. 1,498,000 ± 1,229,151 compared to Rp. 1,974,000 ± 1,338,718 for non-stunted households.

Stimulation refers to engaging children in communication, thinking, or playing activities to hone their abilities according to their developmental stage (Nugrahmi & Haninda 2020). Stimulation patterns were divided into eight categories: learning stimulation, language stimulation, physical environment, warmth/acceptance, academic stimulation, role modelling, stimulus variation, and punishment variation. The distribution of participants based on stimulation scores is presented in Table 2.

The results of this study show that parents practicing stimulation patterns in the "good" and "moderate" categories for stunting toddlers (16% and 18%, respectively) are lower than those in the control group (60% and 22%). The percentage of stunting toddlers with insufficient stimulation patterns (66%) was significantly higher than that of the control group (18%). These findings indicate that many mothers still apply stimulation patterns in the "moderate" and "not enough" categories in daily life. The average stimulation pattern score for mothers of stunting toddlers was 27,9 ± 11,3, compared to 41,0 ± 11,5 for non-stunting toddlers, showing a

difference of 13 points, with the scores for stunting toddlers being lower.

Table 2. Analysis of the relationship between stimulation and affection patterns with stunting

Category score	Stunting		Non-stunting		p-value	OR (CI 95%)
	n	%	n	%		
Stimulation pattern						
Not enough	33	66,00	9	18,00		5,90 (1,37 – 25,43)
Moderate	9	18,00	11	22,00	0,000*	1,95 (1,24-3,66)
Good	8	16,00	30	60,00		1
Mean ±SD (score)	27,9±11,3		41,0±11,5			
Affection pattern						
Not enough	7	14,00	4	8,00		13,75 (4,70-40,21)
Moderate	35	70,00	19	38,00	0,000*	4,48 (1,42-14,13)
Good	8	16,00	27	54,00		1
Mean ±SD (score)	70,7±9,7		81,0±10,9			

SD = Standar Deviasi. P-value= Chi-square. OR: odds ratio. *Significant at P < 0,05.

The stimulation pattern was significantly associated with stunting. Children with a poor stimulation pattern had a 5,90 times higher risk of experiencing stunting compared to those with a good stimulation pattern (p= 0,000, aOR= 5,90 [1,37–25,43]). Additionally, children with a moderate stimulation pattern had a 1,95 times higher risk of stunting than those with a good stimulation pattern (p= 0,000, aOR = 1,95 [1,24–3,66]).

Stimulation patterns in the "moderate" and "not enough" categories among mothers/caregivers may result from their lack of knowledge about the stages of child development according to age (Meral et al., 2023). An accurate initial assessment of development can cause uncertainty among mothers and caregivers in advancing to the next stage of development (Burchinal, 2018). Additionally, insufficient skills among mothers/caregivers can lead to boredom or fatigue in children, discouraging them from engaging in stimulatory activities (Burchinal, 2018; Yang et al., 2023).

Stimulation patterns were significantly correlated with stunting and development (P = 0,001). Scientific research directly linking stimulation patterns with stunting and development remains limited. A study Jeong et al. (2016) involving 87,236 children aged 3–4 years in Low- and Middle-Income Countries (LMICs) used data from the Multiple Indicator Cluster Surveys 4 and 5. Stimulation was measured using six play and learning activities over three days. Regression models estimated differences in average height-for-age z-scores (HAZ) and Early Childhood Development Index (ECDI) scores across three levels of parental stimulation, controlling for confounding factors. The results revealed that fathers who did not engage in five or six stimulation activities had lower ECDI scores than those who did. Increased parental involvement, particularly paternal involvement in stimulation, has been associated with improved child development and growth in LMICs.

Affection refers to parenting that emphasizes love, attention, and emotional involvement between parents and their children through warm, caring interactions (Mountain et al., 2017). His study focuses on expressions such as facial and verbal communication, physical contact, displays of affection, and discipline control. The distribution of the affection scores is presented in Table 2. The study results indicated that parents implementing "good" affection patterns for stunting toddlers (16%) were lower than those in the control group (54%). In contrast, the percentages of "moderate" and "not enough" affection patterns for stunting toddlers (70% and 14%) are higher than for the control group (38% and 8%). Most mothers in the study applied "moderate" affection patterns (58%), which was higher than the percentages for "good" (33%) and "not enough" (9%) patterns. The average affection pattern score for mothers of stunting toddlers was 70,7 ± 9,7, compared to 8,0 ± 10,9 for non-stunting toddlers, showing a difference of 11 points, with lower scores for stunting toddlers.

The affect pattern was significantly associated with stunting. Children with a poor affection pattern had a 13,75 times higher risk of experiencing stunting compared to children with

a good affection pattern (p= 0,000, AOR= 13,75 [4,70–40,21]). Additionally, children with a moderate affection pattern had a 4,48 times higher risk of stunting compared to those with a good affection pattern (p= 0,000, AOR= 4,48 [1,42–14,13]).

"Moderate" and "not enough" affection patterns among mothers/caregivers may result from high stress levels and workload, reducing the optimal delivery of affection (Pilarz & Awkward-Rich, 2023). Daily responsibilities limit the time and energy available for quality interactions with children, highlighting the importance of fathers supporting household tasks and building meaningful interactions with their children (Yogman et al., 2016). A lack of education on the importance of consistent and high-quality affection, combined with social and cultural influences that devalue emotional expressions, can also hinder optimal affection practices (Pekel-Uludağlı, 2024). Affection patterns were significantly correlated with stunting and development (P <0,001). Research Kidder & King (2022) on the link between parental affection and child life satisfaction has found that children with less affection are more prone to illness and have weaker immune systems, negatively affecting their growth and development.

Meutia & Yulianti (2019) emphasize that although modern education is generally guaranteed, children still require parental affection and a sense of security at home. Parental involvement, particularly by fathers, positively influences every stage of a child's life by creating an environment that fosters growth and development. Affection and stimulation not only elicit positive emotions such as love, interest, and satisfaction, but also promote social interaction and play. Biologically, such stimulation can enhance brain neuroplasticity and the production of essential neurotransmitters for cognitive development, and consistent attention and interaction contribute to improved dietary patterns and nutritional intake, thereby playing a crucial role in preventing stunting in children.

Bivariate analysis of the relationship between parenting feeding patterns and stunting is presented in Table 3.

Table 3. Analysis of the relationship between parenting patterns and stunting

Parenting Pattern	Stunting		Non-stunting		p-value	OR (CI 95%)
	n	%	n	%		
Democratic	17	17,00	5	10,00	0,000*	26,35 (6,23-111,40)
Authoritarian	17	34,00	6	12,00		2,26 (0,59-8,65)
Permissive	12	24,00	8	16,00		1,20 (0,30-4,69)
Neglectful	4	8,00	31	62,00		1
Mean ±SD *demandingness*	30,8±6,8		40,0±7,1			
Mean ±SD *responsiveness*	25,1±7,0		29,3±7,6			
Mean	D<34; R<26 Neglectful		D>34; R>26 Democratic			

SD = standard deviation, D = demandingness, R = responsiveness, P-value= Chi-square. OR: odds ratio. *significant if p< 0,05

As shown in Table 3, parents applying democratic parenting feeding patterns for stunting toddlers (8%) were fewer in number than those in the non-stunting group (62%). Conversely, authoritarian, permissive, and neglectful parenting patterns for stunting toddlers (24%, 34%, and 34%, respectively) were more prevalent than those in the non-stunting group (16%, 12%, and 10%, respectively). Most mothers applied democratic parenting feeding patterns (35%) compared to authoritarian (20%), permissive (23%), or neglectful (22%) patterns. The average parenting feeding pattern score of stunting toddlers was lower than that of non-stunting toddlers. Stunting toddlers belonged to the neglectful parenting category, whereas non-stunting toddlers belonged to the democratic category.

Many mothers apply democratic feeding patterns due to increased education and awareness, which is largely influenced by the abundance of information on social media, highlighting the importance of communication and child participation (Miko & Al-Rahmad, 2017; Burchinal, 2018). Hifting social norms and values concerning children's rights also aligns democratic parenting feeding patterns with modern values (Pinquart & Ebeling, 2020).

Parental feeding patterns were significantly correlated with stunting (p-value 0,000). Children raised under neglectful feeding patterns had a 26,35 times higher risk of stunting than those with democratic feeding patterns. Similarly, permissive and authoritarian feeding patterns increased the risk of stunting by 2,26 and 1,20 times, respectively, compared with democratic feeding patterns.

A qualitative study using partial least squares structural equation Modelling (PLS-SEM) also found democratic feeding patterns to be the most effective in addressing stunting, with a 91% effectiveness rating and a T-statistic value of 12,003 (p= 0,000) (Kania et al., 2023). Another study focusing on children aged 1–3 years similarly identified significant effects of good parenting on stunting, with a p-value of 0,025 (Nita et al., 2023).

Parents who employ authoritarian, permissive, or neglectful parenting patterns frequently experience stunting and developmental delays in their children. Authoritarian parenting often imposes strict food rules without considering children's preferences or needs, leading to nutritional deficiencies owing to limited food variety. Authoritarian approaches can also induce stress in children by negatively affecting their appetite and metabolism (Sari & Hartoyo, 2016). Permissive parents fail to establish clear rules to ensure that their children consume nutritious food, often resulting in the frequent consumption of low-nutrition fast food (Mahmood et al., 2021). Neglectful parenting is considered the most harmful category because it fails to address children's nutritional needs, leading to skipped meals and inadequate nutrition (Black & Drennen, 2014).

Conversely, children raised in democratic feeding patterns generally do not experience stunting and do not have age-appropriate development. This pattern encourages active participation by children in choosing healthy foods, thus fostering their understanding of the importance of nutrition (Hughes & Power, 2021). Parents guide food choices while allowing children to decide what they will eat, balancing structure and autonomy (Douglas et al., 2024). Open communication between parents and their children ensures that their dietary needs and preferences are met, resulting in sufficient and balanced nutrition (Douglas et al., 2024; Jansen, 2020).

This study has several limitations, including potential bias in interviews and observations. Additionally, other factors, such as access to healthcare services, infectious diseases, and fathers' education level, may also influence the outcomes of research on stimulation, affection, and parenting patterns in stunting among children aged 24-59 months. To address these limitations, future research should implement more objective data collection methods and incorporate additional variables through a more comprehensive study design and multivariate analysis. This approach is expected to minimize bias and provide a more holistic understanding of the factors contributing to stunting.

Conclusion

This study revealed that the quality of stimulation, affection, and parenting patterns plays a crucial role in child development. Children who receive suboptimal levels of stimulation and affection as well as less supportive parenting patterns are more likely to experience stunting. These results emphasize the need for holistic interventions that focus not only on health aspects, but also on enhancing the quality of parenting patterns.

Implementing supportive parenting strategies, emphasizing improved stimulation, affection, and democratic parenting, should be considered an integral component of efforts to reduce stunting and promote comprehensive growth and development in children.

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