an idea health journal
ISSN (online): 2797-0604

Volume 6 No 4, Page 701-711
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OPEN ACCESS

Association Between Picky Eating and Stunting Among Children Aged 12–24 Months: A Case - Control Study

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Article Info:
Received: 01 May, 2026
Revised: 10 August, 2026
Accepted: 11 August, 2026
Available online: 25August 2026

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How to Cite:
Suyami, Setianingsih, Khayati, et al.. Association Between Picky Eating and Stunting Among Children Aged 12–24 Months: A Case - Control Study.An Idea Health Journal.2026; 6(04): 701-711. https://doi.org/10.53690/ihj.v6i04.803

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Abstract

Background: Stunting remains a major public health concern in Indonesia. Evidence regarding the association between picky eating behavior and stunting remains limited. This study aimed to examine the association between picky eating behavior and stunting.

Methods: A quantitative case–control study was conducted from July 7 to August 31, 2025. The study included 76 children aged 12–24 months, comprising 38 stunted cases and 38 non-stunted controls matched by age and sex. Picky eating behavior was assessed using the Indonesian version of the Children's Eating Behaviour Questionnaire (CEBQ), specifically the Food Fussiness subscale. Stunting status was determined using the length-for-age z-score (LAZ) based on the Indonesian Child Anthropometry Standards. Data were analyzed using the Chi-square test, and the strength of the association was expressed as an odds ratio (OR) with a 95% confidence interval (CI).

Result: Picky eating behavior was more common among stunted children (92.1%) than among non-stunted children (65.8%). Chi-square analysis showed a statistically significant association between picky eating behavior and stunting (p = 0.005). Children with picky eating behavior had higher odds of being stunted than those without picky eating behavior (OR = 6.067; 95% CI: 1.563–23.548; p = 0.009).

Conclusion: Picky eating behavior was significantly associated with stunting among children aged 12–24 months in the study population. Given the case–control design, these findings indicate an association rather than a causal relationship. Further prospective studies that account for important confounding factors are needed to clarify the temporal relationship between picky eating behavior and stunting.

Keywords: Stunting, Picky Eating, Children.

BACKGROUND

Stunting remains a major nutritional and public health concern in many countries, including Indonesia. It is a condition of impaired linear growth resulting from chronic malnutrition, particularly during the first 1,000 days of life, and has substantial implications for the quality of future human resources (1). Despite various interventions, stunting remains a significant public health challenge in Indonesia. According to the 2024 Indonesian Nutritional Status Survey (SSGI), the prevalence of stunting among children under five declined to 19.8% from 21.5% reported in the 2023 Indonesian Health Survey (SKI). Although this decline indicates progress, the prevalence remains above the threshold established by the World Health Organization (WHO) for a public health concern, highlighting the need for strengthened prevention strategies (2).

Because this study was conducted in 2025, the 2024 SSGI data provide the most relevant epidemiological context for describing the stunting situation during the study period. Earlier SSGI data remain useful for illustrating changes in stunting prevalence and monitoring the progress of national programs to accelerate stunting reduction (3). Toddlerhood represents a critical period of growth and development, during which adequate nutrition is essential for optimal physical and cognitive development. Growth disturbances during this period may result in children having a shorter height than expected for their age (4).

At the local level, stunting prevention remains a priority in Klaten Regency. In Polanharjo Sub-district, the stunting rate in 2024 was reported to be approximately 19%. Consequently, local authorities, in collaboration with multiple sectors, have intensified efforts to accelerate stunting reduction through various programs and coordination activities (5).

The consequences of stunting extend beyond impaired physical growth. Stunting may adversely affect cognitive development, learning ability, long-term health, and productivity in adulthood. Therefore, the continuing burden of stunting in Indonesia emphasizes the need for comprehensive preventive interventions addressing both nutritional and behavioral risk factors (6).

Among the factors potentially contributing to stunting, children's eating behavior has received increasing attention. One such behavior is picky eating (7). Picky eating is characterized by excessive food selectivity, refusal to try new foods, and preferences for a limited variety of foods (8). This behavior commonly occurs during toddlerhood and may result in an unbalanced dietary intake, particularly inadequate intake of protein, iron, zinc, vitamins, and other essential nutrients required for optimal linear growth (9). If picky eating persists without appropriate intervention, inadequate nutrient intake may increase the risk of chronic malnutrition and potentially contribute to stunting (10).

Picky eating is also closely related to feeding practices. Feeding practices refer to the efforts and approaches used by parents, particularly mothers, to plan, prepare, present, and provide food to ensure that children's nutritional needs are adequately met in terms of variety, quantity, and quality (11). Picky eating is often perceived by parents as a common childhood eating behavior and may therefore be overlooked. However, persistent poor eating habits can lead to inadequate energy and essential nutrient intake and may subsequently affect children's growth. The relationship between picky eating and nutritional outcomes may also be influenced by parenting practices, parental nutritional knowledge, feeding habits, and family socioeconomic conditions (12).

In Indonesia, stunting research has predominantly focused on socioeconomic conditions, infectious diseases, sanitation, and other environmental factors, whereas children's eating behaviors, including picky eating, remain relatively underexplored. Understanding this behavioral factor is important for early identification of children at nutritional risk and for developing appropriate preventive strategies. Parental knowledge and skills in preparing nutritionally balanced meals and providing age-appropriate food portions are also essential to support adequate nutritional intake during toddlerhood (13).

Existing studies on the relationship between picky eating and stunting in Indonesia have produced inconsistent findings. A study involving preschool-aged children in Surabaya reported that children exhibiting picky eating behavior had a higher risk of stunting than those without picky eating behavior (14). In contrast, a case-control study among children aged 12–24 months in the Bandarharjo Community Health Center service area found no statistically significant association between picky eating and stunting ($p = 0.154$) (15). These contrasting findings suggest that the relationship between picky eating and stunting among Indonesian children has not yet been clearly established.

Furthermore, picky eating can be influenced by various individual and environmental factors, including parental eating habits, because children may imitate the eating behaviors of their parents. Persistent difficulties in eating may result in inadequate nutritional intake, which can interfere with children's physical growth and development (16). Nevertheless, evidence specifically examining the relationship between picky eating and stunting among children aged 12–24 months remains limited.

Most previous studies in Indonesia have focused on preschool-aged children or children aged 24–59 months. Although one previous study specifically investigated children aged 12–24 months, research focusing on this age group remains relatively scarce. This represents an important research gap because the age of 12–24 months is a critical period within the first 1,000 days of life, characterized by rapid linear growth and increasing dependence on complementary feeding. In addition, limited scientific evidence is available regarding the relationship between picky eating and stunting among children in Polanharjo District, Klaten Regency. The novelty of this study therefore lies in its specific focus on children aged 12–24 months during a critical period of growth and complementary feeding and in providing local evidence regarding picky eating as a potentially modifiable behavioral factor associated with stunting.

Therefore, this study aimed to examine the association between picky eating behavior and stunting among children aged 12–24 months in Polanharjo District, Klaten Regency.

METHODS

Study Design

A quantitative case-control study was conducted to examine the association between picky eating behavior and stunting among children aged 12–24 months. As this was an observational study, no intervention was administered to the participants.

Participants /Sample

The study population included all children aged 12–24 months registered in the service area of the Polanharjo Community Health Center. The case group comprised children classified as stunted based on the length-for-age z-score (LAZ), defined as LAZ < –2 standard deviations (SD) according to the Indonesian Child Anthropometry Standards.

Community Health Center records identified 42 children who met the case definition. After eligibility screening, 38 children met the inclusion criteria and whose parents or caregivers provided consent to participate. Four children were excluded: two because their parents declined participation, one because of incomplete anthropometric data, and one because of a chronic illness or congenital anomaly affecting growth. The control group consisted of 38 non-stunted children aged 12–24 months (LAZ ≥ –2 SD), matched to the case group by age and sex at a 1:1 ratio. Thus, the final sample consisted of 76 children, including 38 cases and 38 controls.

The inclusion criteria for the case group were: (1) children aged 12–24 months; (2) residence within the study area; (3) confirmed stunting based on anthropometric measurements; and (4) parental or caregiver consent to participate. The control group had the same inclusion criteria, except that children were required to be non-stunted based on the LAZ index. Exclusion criteria included congenital

abnormalities or chronic diseases affecting growth, incomplete or invalid anthropometric data, and inability of parents or caregivers to complete the questionnaire.

Instruments

Picky eating behavior was assessed using the Indonesian version of the Children's Eating Behaviour Questionnaire (CEBQ), specifically the Food Fussiness subscale, which was completed by parents or caregivers. The subscale consists of six items assessing behaviors such as refusal to try new foods, difficulty accepting certain types of food, and having a limited range of food preferences. Each item was rated on a 5-point Likert scale ranging from 1 (never) to 5 (always). Items reflecting positive attitudes toward food acceptance were reverse-scored according to the original CEBQ guidelines before calculating the score. The Food Fussiness score was calculated as the mean of the six items, resulting in a possible score ranging from 1 to 5, with higher scores indicating a greater tendency toward picky eating behavior. Children with a mean Food Fussiness score ≥3 were classified as picky eaters, whereas those with a score <3 were classified as non-picky eaters. This cut-off was based on previous studies using the Food Fussiness subscale as an indicator of picky eating behavior.

The Indonesian version of the CEBQ had previously undergone translation and psychometric validation. Previous validity testing demonstrated satisfactory item-total correlations, while reliability testing showed a Cronbach's alpha of ≥0.70. In the present study, the Food Fussiness subscale demonstrated good internal consistency, with a Cronbach's alpha of 0.82.

Stunting status was determined using anthropometric measurements based on the length-for-age z-score (LAZ) according to the Indonesian Child Anthropometry Standards. Children with LAZ < –2 SD were classified as stunted, whereas those with LAZ ≥ –2 SD were classified as non-stunted.

Data Collection

Data were collected in the service area of the Polanharjo Community Health Center (Puskesmas), Klaten Regency, from July 7 to August 31, 2025. Potential participants were initially identified from Community Health Center records and screened according to the eligibility criteria. Parents or caregivers of eligible children were informed about the study and invited to participate. After informed consent was obtained, anthropometric data were assessed to determine stunting status based on the LAZ indicator. Parents or caregivers subsequently completed the Indonesian version of the CEBQ Food Fussiness subscale to assess picky eating behavior. Participants were then categorized as picky or non-picky eaters according to their mean Food Fussiness scores.

Data Analysis

Data were analyzed to examine the association between picky eating behavior and stunting status. Categorical data were analyzed using the Chi-square test. The strength of the association was estimated using odds ratios (ORs) with 95% confidence intervals (CIs). Statistical significance was set at $p < 0.05$.

Ethical Consideration

Ethical approval was obtained from the Research Ethics Committee (Reference Number: 038/KET/I.3.AU/F.5/VI/2025). Parents or caregivers were informed about the study procedures and provided informed consent before participation.

RESULT AND DISCUSSION

RESULT

Demographic Characteristics of Responden

The characteristics of respondents in the case and control groups are presented in Table 1. The distribution of gender, maternal education, maternal occupation, and picky eating behavior was described for each group.

Table 1. Characteristics of Respondents at Polanharjo Community Health Center (n=38)

Characteristics	Category	Cases (f)	Cases (%)	Controls (f)	Controls (%)
Gender	Male	21	55.3	20	52.6
	Female	17	44.7	18	47.4
Mother's Education	Basic	3	7.9	4	10.5
	Secondary	30	78.9	30	78.9
	Higher	5	13.2	4	10.5
Mother's Occupation	Farmer	1	2.6	2	5.3
	Entrepreneur	1	2.6	4	10.5
	Civil Servant	1	2.6	1	2.6
	Employee	11	28.9	6	15.8
	Housewife	24	63.2	25	65.8
Picky Eating	Picky eating	35	92.1	25	65.8
	Non-picky eating	3	7.9	13	34.2

Note : The case group consisted of 38 stunted children, and the control group consisted of 38 non-stunted children.

The characteristics of respondents are presented in Table 1. In both groups, most children were male, accounting for 55.3% of the case group and 52.6% of the control group. Most mothers had a secondary education in both groups (78.9%). Housewives were the most common maternal occupation, representing 63.2% of the case group and 65.8% of the control group. Picky eating behavior was more prevalent among children in the case group (92.1%) than in the control group (65.8%).

Bivariate Analysis

The association between picky eating behavior and stunting among children aged 12–24 months was examined using the Pearson Chi-square test, as presented in Table 2.

Table 2. Relationship between Picky Eating and the Incidence of Stunting at Polanharjo Community Health Center

Eating Behavior	Stunting f (%)	Non-Stunting f (%)	p-value	Pearson Chi-Square
Picky eating	35 (92.1%)	25 (65.8%)	0.005	7.917
Non-picky eating	3 (7.9%)	13 (34.2%)		
Total	38 (100%)	38 (100%)		

Note: Data are presented as frequency and percentage, n (%). χ^2 = Pearson Chi-square statistic. A p-value < 0.05 was considered statistically significant.

Picky eating behavior was more common among stunted children (92.1%) than among non-stunted children (65.8%). The Chi-square test showed a statistically significant association between picky eating behavior and stunting ($\chi^2 = 7.917$; $p = 0.005$).

Strength of Association

The strength of the association between picky eating behavior and stunting was further assessed using the odds ratio (OR), as presented in Table 3.

Table 3. Odds Ratio Test Results between Picky Eating and Stunting Incidence

Parameters	Value
Common Odds Ratio (Estimate)	6,067
ln (Estimate)	1,803
Standard Error of ln (Estimate)	0,692
Asymptotic Significance (2-tailed)	0,009
95% Confidence Interval Lower Bound	1,563
95% Confidence Interval Upper Bound	23,548

Note: OR = odds ratio; CI = confidence interval; ln (OR) = natural logarithm of the odds ratio. A p-value < 0.05 was considered statistically significant.

Children with picky eating behavior had significantly higher odds of stunting than those without picky eating behavior (OR = 6.067; 95% CI: 1.563–23.548; p = 0.009). This finding indicates a significant association between picky eating behavior and stunting. Given the case–control design, the result should be interpreted as an association rather than a causal relationship.

DISCUSSION

The results of this study indicate a statistically significant association between picky eating behavior and stunting among toddlers aged 12–24 months at Polanharjo Community Health Center, as evidenced by a p-value of 0.005 ($p<0.05$). Picky eating was more prevalent among children in the stunted group (92.1%) compared to those in the non-stunted group (65.8%). The odds ratio (OR) of 6.067 (95% CI: 1.563–23.548) indicates that toddlers exhibiting picky eating behavior had approximately 6 times higher odds of being in the stunted group than those without such behavior. However, given the case–control design of this study, the OR should be interpreted as reflecting an association rather than causation between picky eating and stunting (17).

The higher prevalence of picky eating among stunted children may be attributable to differences in dietary variety and adequacy. Children exhibiting picky eating behavior often consume a limited range of foods and may consistently reject specific food groups, such as vegetables, fruits, and protein-rich foods. This dietary restriction can reduce intake of energy, protein, iron, zinc, calcium, and other micronutrients essential for normal growth. However, picky eating is also a common developmental behavior during toddlerhood and does not invariably result in nutritional deficiencies. Consequently, the presence of picky eating alone should not be regarded as sufficient evidence of inadequate nutritional status or stunting (18).

Previous research reported that children exhibiting picky eating tendencies frequently reject unfamiliar foods, even when their overall nutritional status remains within the normal range (19). This finding is important because food rejection may represent an eating behavior that limits dietary variety rather than an immediate indicator of malnutrition. Picky eating is generally characterized by limited food preferences, rejection of certain foods, reluctance to consume a variety of foods, and food neophobia, or reluctance to try unfamiliar foods (20). Thus, the nutritional consequences of picky eating may depend on the duration and severity of the behavior, the types of foods rejected, and the extent to which parents can provide nutritionally adequate alternatives.

According to previous research, persistent picky eating may reduce dietary diversity and increase the likelihood of inadequate intake of macronutrients and micronutrients, particularly protein, iron, zinc, calcium, and vitamins that are important during periods of rapid growth (18). The 12–24-month age range is particularly important because children undergo substantial physical and developmental changes as they gradually transition from breastfeeding or complementary feeding to a more diverse family diet. When food restriction is persistent and nutritionally important food groups are frequently rejected, children may have difficulty meeting their nutritional requirements. This mechanism provides a plausible explanation for the association observed in the present study, although it does not establish that picky eating preceded or caused stunting (21).

The relationship between picky eating and stunting should also be understood within the multifactorial nature of child growth impairment. Stunting is a manifestation of chronic growth faltering that may result from inadequate dietary intake, recurrent infections, poor feeding practices, and broader socioeconomic and environmental conditions. UNICEF's conceptual framework emphasizes the interaction between immediate, underlying, and basic determinants of malnutrition, including inadequate food intake, disease, household food security, caregiving practices, access to health services, and environmental conditions (22). Therefore, picky eating may represent one component of a broader set of factors affecting children's nutritional adequacy and growth.

The present findings should therefore be interpreted with caution, as several potential determinants of stunting were not examined in this study. Factors such as birth weight, breastfeeding history, complementary feeding practices, dietary diversity, recurrent infectious diseases, household socioeconomic status, environmental sanitation, and maternal characteristics may influence both children's eating behavior and their growth outcomes (23). The relatively wide confidence interval of the OR (1.563–23.548) also indicates considerable uncertainty around the magnitude of the observed association, which may partly reflect the sample size and the influence of other unmeasured factors. Residual confounding therefore cannot be excluded.

The finding that 100% of children in the case group were classified as stunted reflects the case–control sampling procedure rather than the incidence or prevalence of stunting in the study population. In contrast, children in the control group were selected as non-stunted controls. Therefore, comparing picky eating between the two groups provides evidence of an association between picky eating and stunting status but cannot be used to estimate the incidence or prevalence of stunting in the source population (24).

The high proportion of picky eating in both groups also deserves attention. Although picky eating was significantly more frequent among stunted children, it was also observed in 65.8% of children in the non-stunted group (25). This finding supports the view that picky eating can occur as a common behavioral characteristic during toddlerhood and does not inevitably lead to growth impairment (26). The difference between the groups may instead indicate that picky eating becomes more nutritionally consequential when accompanied by inadequate dietary diversity, insufficient nutrient intake, inappropriate feeding practices, or other adverse conditions affecting child growth (27).

Parental feeding practices are critical in determining whether picky eating remains a transient developmental phase or becomes associated with inadequate dietary intake. Responsive feeding involves recognizing children's hunger and satiety cues, offering appropriate food choices, maintaining a positive mealtime environment, and avoiding coercive feeding practices. Parents who pressure children to eat, impose excessive restrictions, or allow excessive autonomy without nutritional guidance may unintentionally reinforce problematic eating behaviors (7). In contrast, structured mealtimes, repeated exposure to unfamiliar foods, appropriate portion sizes, and a positive eating environment can encourage children to accept a broader range of foods.

The maternal characteristics observed in this study offer important contextual insights. Most mothers had attained secondary-level education and were homemakers. Maternal education can influence knowledge of child nutritional requirements, food selection, meal preparation, and strategies for managing eating difficulties (27). However, the high prevalence of picky eating despite the predominance of mothers with secondary education suggests that educational attainment alone may not guarantee optimal feeding practices. Effective translation of knowledge into practical behaviors, such as meal planning, food variety, responsive feeding, and appropriate management of food refusal, is essential (28).

The findings also have implications for child nutrition and growth monitoring at the primary healthcare level. Identification of picky eating behavior may be incorporated into routine assessment of children's dietary patterns, particularly among toddlers aged 12–24 months. However, picky eating

should not be used as a stand-alone indicator of stunting risk. Children identified as picky eaters should instead receive a comprehensive assessment that includes anthropometric measurements, dietary diversity, feeding practices, growth trajectory, and relevant health and social factors. This approach is more consistent with the multifactorial nature of stunting (29).

Interventions to prevent stunting generally involve both specific and sensitive nutrition interventions. Within this framework, addressing picky eating may help improve dietary quality and diversity, particularly when children frequently reject nutritionally important food groups (24). Children with persistent picky eating may have diets characterized by lower consumption of protein-rich foods, fruits, vegetables, and other nutrient-dense foods (25). Other studies have similarly reported associations between picky eating, reduced dietary diversity, lower body weight, and poorer growth outcomes (16, 17). Nevertheless, these findings should be considered as part of a broader nutritional intervention strategy rather than as evidence that correcting picky eating alone will prevent stunting.

Practical strategies for managing picky eating include establishing regular meal and snack schedules, offering a variety of nutritionally appropriate foods, repeatedly introducing previously rejected foods without coercion, limiting distractions such as gadget use during meals, and presenting food in an appealing and age-appropriate manner (26). Creative food presentation may increase children's willingness to interact with and try unfamiliar foods. These strategies are particularly relevant for parents and caregivers because the home environment plays an important role in shaping children's eating behavior. However, the objective of these strategies should be to improve dietary variety and feeding quality rather than to imply that picky eating is the sole determinant of growth impairment.

These findings have significant implications for nursing and primary healthcare practice. Nurses and nutritionists at community health centers can play a key role in early identification of problematic eating behaviors through growth monitoring, nutritional assessment, and evaluation of family feeding practices. Counseling should focus on responsive feeding, dietary diversity, appropriate meal routines, and parental strategies for managing food refusal. Children exhibiting persistent picky eating with inadequate dietary intake or growth faltering may require further nutritional assessment and referral. Therefore, management of picky eating should be integrated into comprehensive stunting prevention efforts rather than addressed as an isolated intervention.

Several limitations should be considered when interpreting these findings. First, the case–control design allows identification of an association between picky eating and stunting but cannot establish causality or determine whether picky eating preceded stunting. Second, picky eating was assessed using parent-reported responses through the Children's Eating Behavior Questionnaire (CEBQ), which may be affected by recall, interpretation, and reporting bias. Third, this study did not assess several potential confounding factors, including birth weight, exclusive breastfeeding, complementary feeding practices, dietary diversity, history of infectious diseases, household income, environmental sanitation, and other family dietary characteristics. Consequently, residual confounding may have contributed to the observed association. Fourth, the relatively wide confidence interval of the OR indicates uncertainty regarding the precise magnitude of the association. Finally, the study was conducted at a single primary healthcare center, Polanharjo Community Health Center, which may limit the generalizability of the findings to populations with different demographic, cultural, nutritional, and socioeconomic characteristics.

Overall, this study indicates a significant association between picky eating behavior and stunting among toddlers aged 12–24 months at Polanharjo Community Health Center. The substantially higher proportion of picky eating among stunted children and the OR of 6.067 suggest that picky eating is an important behavioral factor that warrants attention in child nutritional assessment. However, the findings should not be interpreted as demonstrating that picky eating independently causes stunting. Rather, picky eating may interact with dietary intake, feeding practices, infection, socioeconomic conditions, and other determinants of child growth. Future research should employ prospective cohort

designs with larger and more diverse populations and systematically assess potential confounding factors. Such studies would allow clearer determination of the temporal relationship between picky eating and growth faltering and provide stronger evidence regarding whether persistent picky eating contributes to subsequent stunting or primarily reflects broader nutritional and developmental conditions.

CONCLUSION

This study highlights the importance of considering picky eating behavior as part of the broader nutritional and growth assessment of children aged 12–24 months. Healthcare providers should incorporate eating behavior, dietary adequacy, and growth monitoring into early nutritional assessment, particularly during the complementary feeding period. However, picky eating should not be regarded as an isolated determinant of stunting, as child growth is influenced by multiple biological, dietary, socioeconomic, infectious, and environmental factors. Future prospective studies should examine these potential confounders to clarify the temporal relationship between picky eating behavior and impaired linear growth.

ACKNOWLEDGEMENT

The authors would like to thank the Polanharjo Community Health Center and its healthcare staff for their support and assistance during the study. We also sincerely thank all participating mothers and children for their valuable contribution. Appreciation is extended to the academic supervisors and institutions for their guidance and scientific support throughout the research process.

AUTHOR'S CONTRIBUTION STATEMENT

SY: Conceptualization, methodology, investigation, data curation, formal analysis, writing – original draft, and writing – review & editing. ST: Supervision, methodology, validation, writing – review & editing, and academic guidance. FNK: Methodology, investigation, instrument development, data interpretation, writing – review & editing, and intellectual content review. INH: Data curation, formal analysis, literature review, writing – review & editing, and interpretation of findings. AF: Investigation, data curation, project administration, participant coordination, and writing – review & editing. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors acknowledge the use of Grammarly to support language improvement, improve clarity, and improve the overall readability and structure of the manuscript.

FUNDING

None.

DATA AVAILABILITY

The dataset generated and analyzed during the current study is available from the corresponding author upon request.

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