

Analysis of The Effect of Sleep Quality and Nutritional Intake on Toddlers' Weight Growth After Appetite Massage Intervention

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ABSTRACT

Introduction: Toddler weight gain is influenced by multiple factors, particularly nutritional intake and sleep quality. Although appetite-stimulating massage may improve comfort and appetite, its effectiveness depends on adequate nutrition and sufficient sleep. This study aimed to analyze the influence of sleep quality and nutritional intake on toddler weight gain following an appetite-stimulating massage intervention.

Methods: An observational analytic study with a prospective cohort design was conducted among 30 toddlers selected through total sampling. The intervention consisted of a 15–20-minute appetite-stimulating massage administered twice weekly for eight weeks. Sleep quality was assessed using the Children's Sleep Habits Questionnaire (CSHQ), nutritional intake was evaluated through two-day 24-hour dietary recalls analyzed with NutriSurvey based on the Recommended Dietary Allowance (RDA), and body weight was measured before and after the intervention.

Results: Multiple linear regression analysis showed that sleep quality and nutritional intake jointly had a significant effect on toddler weight gain ($F = 22.134$; $p = 0.001$). The model explained 59.5% of the variance in weight gain (Adjusted $R^2 = 0.595$). Nutritional intake was the strongest predictor ($\beta = 0.485$), followed by sleep quality ($\beta = 0.372$).

Conclusion: These findings indicate that adequate nutritional intake and good sleep quality significantly enhance toddler weight gain following appetite-stimulating massage, with nutritional intake being the most influential factor.

Keywords: *sleep quality; nutritional intake; weight gain; toddlers; appetite-stimulating massage*

INTRODUCTION

The Ministry of Health of the Republic of Indonesia (Kemenkes RI) through the Health Development Policy Agency (BKPK) officially announced the results of the 2024 Indonesian Nutrition Status Survey (SSGI). The results of SSGI show that the prevalence of stunting in Indonesia in 2024 will be 19.8%. This figure is 0.3 percentage points lower than the stunting prevalence target set for 2024, which is 20.1%. The achievement in 2024 provides a breath of fresh air for the achievement of the target of reducing the national stunting rate to 14.2% by 2029, in accordance with the target of the National Medium-Term Development Plan (RPJMN). From 21.5% in 2023, to drop to 14.2% in 2029, this

means that Indonesia still has to reduce around 7.3 percentage points in the next five years.

The efforts that the government has made are divided into two: the first is the Prevention of Nutritional Problems, carried out from adolescent girls to pregnant women and toddlers, including the prevention of anemia and supplementation of blood supplements. The second is the Improvement of Nutrition Problems, as the "last hurdle" to ensure that toddlers who are already at risk of malnutrition do not experience stunting. Evaluation shows that the intervention on the last fence is still weak and needs to be strengthened.

Toddlers are an age group that experiences very rapid growth and development, so that they need to meet optimal nutritional and health needs. The growth of toddlers can be assessed through

various anthropometric indicators, one of which is weight. Weight is a sensitive indicator of changes in nutritional status in a relatively short time and is often used to monitor children's growth in health services and posyandu activities. According to the World Health Organization, regular growth monitoring is important to detect early nutritional problems that can affect children's health and development.

Nutritional problems in toddlers are still a public health challenge in various countries, including Indonesia. Based on data from the Ministry of Health of the Republic of Indonesia, the nutritional status of toddlers is influenced by various factors, both direct and indirect factors. Direct factors include food intake and infectious diseases, while indirect factors include parenting, socioeconomic conditions, environment, and family health behavior. Insufficient nutritional intake in a certain period of time can cause growth disorders characterized by slow weight gain in toddlers.

Nutritional intake is one of the main factors that play a role in the weight growth of toddlers. Adequate nutrition provides the energy and nutrients needed for the formation of body tissues, organ development, and metabolic activity. Unmet energy and protein needs can cause growth stunting and increase the risk of nutritional problems in children. Therefore, the adequacy of nutritional intake is one of the important indicators in supporting optimal growth in toddlerhood. According to the World Health Organization, providing food that is diverse, nutritious, balanced, and in accordance with the needs of the age is one of the main strategies in supporting children's growth.

In addition to nutritional intake, sleep quality also plays an important role in the growth process of toddlers. Sleep is a physiological need that affects the body's biological functions, including growth. During sleep, especially in the deep sleep phase, the body produces growth hormone, which plays a role in tissue formation and physical growth of children. Poor sleep

quality can interfere with the process of hormone secretion, potentially affecting weight growth and child development. Research conducted by Mindell, Jodi A. and colleagues shows that adequate sleep quality and duration are related to physical health, growth, and early childhood development.

Various efforts have been made to increase the appetite and weight growth of toddlers, one of which is through appetite massage. Appetite massage is a complementary therapy that aims to provide stimulation to certain points of the body so that it can increase comfort, improve blood circulation, increase relaxation, and stimulate children's appetite. Several studies show that appetite massage can positively affect appetite and weight gain in toddlers. However, the success of weight gain after an appetite massage intervention is influenced not only by the intervention but also by other factors that support growth, such as sleep quality and adequate nutritional intake.

Previous research on the effect of appetite massage and traditional massage on weight gain in toddlers shows that massage interventions can support children's weight growth. However, the study has not examined the factors that contribute to the success of weight gain after the intervention is performed. Therefore, further research is needed to analyze factors that may affect toddlers' weight growth after appetite massage interventions, especially sleep quality and nutritional intake.

Good sleep quality allows the body to carry out growth functions optimally through the regulation of growth hormone, while adequate nutritional intake provides the necessary energy and nutrients in the growth process. The combination of these two factors is thought to contribute significantly to the weight growth of toddlers after receiving an appetite massage intervention. However, until now, there are still limited studies that specifically analyze the effect of sleep quality and nutritional intake on weight gain under five years after appetite massage interventions.

The purpose of this study was to analyze the effect of sleep quality and nutritional intake on weight gain under five years after the appetite massage intervention. This research is expected to provide scientific information about the factors that affect the weight growth of toddlers so that it can be the basis for the preparation of strategies to improve children's nutritional status and health more comprehensively.

METHOD

Study Design

This study employed a prospective cohort analytical design to examine the influence of sleep quality and nutritional intake on weight gain among toddlers following an appetite massage intervention. The follow-up period lasted eight weeks.

Setting & Participants

The study population was all toddlers who met the inclusion criteria. The sampling technique used total sampling so that all toddlers who met the criteria during the study period were included. The number of samples obtained was 30 toddlers.

Based on the calculation of the need for multiple linear regression samples with $\alpha = 0.05$, power 80%, two predictor variables, and a medium effect size ($f^2 = 0.15$), the minimum sample number required is 68 respondents. However, this study only obtained 30 respondents because it used total sampling so that the entire available population was included.

Variables & Measurement

The independent variables in this study were sleep quality and nutritional intake, while the dependent variable was the weight growth of toddlers.

Sleep quality was measured using the Children's Sleep Habits Questionnaire (CSHQ), which is an instrument based on parental reports consisting of 33 questions covering eight domains,

namely bedtime refusal, difficulty starting sleep, sleep duration, sleep anxiety, waking up at night, sleep behavior disorders, breathing disorders during sleep, and sleepiness during the day. Data collection was carried out through direct interviews with mothers or primary caregivers based on toddlers' sleep habits over the past week. Each item uses a three-point Likert scale, namely 1 = rare (0–1 times per week), 2 = sometimes (2–4 times per week), and 3 = common (5–7 times per week).

Nutritional intake was assessed using the 24-hour food recall method for two days. Interviews were conducted directly with mothers or primary caregivers using a structured food recall form. Data on the type and amount of food consumed were then analyzed using the NutriSurvey software to obtain nutrient content. The level of intake adequacy is calculated as a percentage of the Indonesian Nutritional Adequacy Rate (AKG) according to the age group with the formula:

$$\%AKG = (\text{Actual nutrient intake} / \text{age-appropriate AKG}) \times 100\%.$$

Weight growth was measured using a digital scale with an accuracy of 0.1 kg. Measurements were taken at the beginning of the study before the intervention and repeated at the end of the eight-week follow-up period. Weight gain is calculated as the difference between final weight and initial weight.

Data Collection

The research began with an explanation of the purpose and procedure of the research to parents or guardians of toddlers, then continued with the signing of an informed consent sheet. Furthermore, the selection of respondents was carried out according to the research criteria and the initial weight measurement using digital scales.

All toddlers then received an appetite massage intervention for 15–20 minutes, twice every week for eight weeks using baby oil according to standard operating procedures. Massage procedures include stimulation of the

hand and finger area, palms, abdomen, around the ribs, stimulation points on the legs, and back. Massage techniques are carried out using rubbing movements, circular rubbing, light pressure, and gentle massage according to the established procedure.

During the study period, sleep quality measurement was carried out using CSHQ and nutritional intake assessment through the 24-hour food recall method. At the end of the eight-week follow-up period, a toddler's weight was re-measured using a digital scale.

Data Analysis

Data analysis was carried out using multiple linear regression to analyze the effect of sleep quality and nutrient intake on weight gain under five after the appetite massage intervention. Before the regression analysis was carried out, classical assumption testing was first conducted, which included residual normality tests, multicollinearity tests, heteroscedasticity tests, and linearity tests. All analyses were performed with a significance level of $\alpha = 0.05$.

RESULTS

Table 1. Frequency distribution of respondent characteristics (n=30)

Gender	Quantity (n)	Percentage (%)
Male	16	53.3
Female	14	46.7
Toddler Age		
1-2 Years	8	26.7
>2-3 Years	7	23.3
>3-4 Years	9	30.0
>4-5 Years	6	20.0
Early Nutritional Status		
Malnutrition	12	40.0
Good Nutrition	18	60.0

Based on Table 1, it is known that most of the respondents aged >3–4 years are 9 toddlers (30.0%). The majority of respondents were male,

as many as 16 toddlers (53.3%), and most of them had good nutritional status, as many as 18 toddlers (60.0%).

Table 2. Distribution of Research Variables (n=30)

Variabel	Mean $\pm$ SD	Minimum	Maximum
Sleep Quality (hours/day)	10.12 $\pm$ 1.15	8.0	12.5
Nutritional Intake (% AKG)	89.63 $\pm$ 10.48	68	110
Weight Gain (kg)	1.08 $\pm$ 0.42	0.3	2.0

Table 2 shows the average sleep quality of toddlers of 10.12 $\pm$ 1.15 hours per day. The average nutritional intake reached 89.63 $\pm$ 10.48%

of the nutritional adequacy rate (AKG), while the average weight gain after the appetite massage intervention was 1.08 $\pm$ 0.42 kg.

Table 3. Normality Test Results (n=30)

Normality Test	Statistical value	p-value	Stuttgart
Residual regression	0.962	0.347	Normal distribution

The results of the residual normality test using Shapiro-Wilk showed a significance value

of 0.347 ($p > 0.05$), so it can be concluded that the residual in the multiple linear regression model is

normally distributed (Table 3).

Table 4. Multicollinearity Test

Variabel	Tolerance	VIF	Remarks
Sleep Quality	0.842	1.188	Multicollinearity does not occur.
Nutritional Intake	0.842	1.188	Multicollinearity does not occur.

Tolerance values of >0.10 and $VIF < 10$ on all independent variables showed that there was no multicollinearity problem between sleep

quality and nutrient intake in the regression model.

Table 5. Results of Heteroscedasticity Test (Glejser Test)

Variabel	Tolerance	Remarks
Sleep Quality	0.521	Heteroscedasticity does not occur
Nutritional Intake	0.684	Heteroscedasticity does not occur

The results of the Glejser test showed that the significance value of all independent variables was greater than 0.05, so that the regression model did not experience heteroscedasticity. The results

of the Glejser test showed that the significance value of all independent variables was greater than 0.05, so that the regression model did not experience heteroscedasticity.

Table 6. Linearity Test Results

Variable Relationships	Sig. Linearity	Sig. Deviation from Linearity	Remarks
Sleep quality to weight gain	0.003	0.421	Linear relationships
Nutritional intake for weight gain	0.001	0.365	Linear relationships

The significance value at Linearity <0.05 and Deviation from Linearity >0.05 , so that the

relationship between sleep quality variables and nutritional intake with weight gain for toddlers meets the assumption of linearity.

Table 7. The Relationship between Sleep Quality and Nutrient Intake with Weight Gain

Variabel	r	p-value	Remarks
Quality of sleep with weight gain	0.512	0.004	There is a significant relationship.
Nutritional intake with weight gain	0.623	<0.001	There is a significant relationship

Table 8. Summary model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.785	0.617	0.595	0.268

Based on the results of multiple linear regression analysis, an R value of 0.785 was

obtained, which showed a strong relationship between sleep quality and nutrient intake and

weight gain in toddlers after the appetite massage intervention. The R-Square value of 0.617 indicates that these two independent variables can explain 61.7% of the variation in weight gain. After adjusting for the number of variables and the number of samples, an Adjusted R Square value of 0.595 was obtained, which means that 59.5% of

the variation in weight gain in toddlers can be explained by sleep quality and nutritional intake, while the remaining 40.5% is influenced by other factors that were not studied in this study. A Standard Error of the Estimate value of 0.268 indicates that the model's prediction error is relatively small.

Table 9. Anova

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	8.912	2	4.456		
Residual	5.533	27	0.205	22.134	0.001
Total	14.445	29			

Table 10. Coefficient

Variabel	B	SE	Beta	t	Sig
Sleep Quality	0.118	0.039	0.372	3.026	0.005
Nutritional Intake	0.013	0.004	0.485	3.944	0.001

Regression equations

The multiple linear regression equations obtained are:

$$Y = -1.245 + 0.018 (\text{Sleep Quality}) + 0.013 (\text{Nutritional Intake})$$

Description:

Y = Toddler weight gain (kg)

X₁ = Quality of sleep (hours/day)

X₂ = Nutrient intake (% CPA)

The results of the multiple linear regression analysis showed that sleep quality and nutrient intake simultaneously had a significant effect on weight gain in toddlers after the appetite massage intervention ($F = 22.134$; $p = 0.001$). An Adjusted R^2 value of 0.595 indicates that 59.5% of the variation in weight gain can be explained by sleep quality and nutrient intake, while other factors outside the study model influence the remaining 40.5%. Partially, sleep quality ($\beta = 0.372$; $p = 0.005$) and nutrient intake ($\beta = 0.485$; $p = 0.001$) had a significant positive effect on weight gain in toddlers.

DISCUSSION

The Effect of Sleep Quality on Weight Growth in Toddlers After Appetite Massage Intervention

The results showed that sleep quality had a positive and significant effect on the weight growth of toddlers after appetite massage intervention ($p=0.005$). The results of the regression analysis showed that the better the sleep quality of toddlers, the greater the tendency to gain weight. These findings show that sleep quality is one of the factors that contribute to the growth process of toddlers, in addition to other key factors such as nutritional intake and health conditions.

Physiologically, sleep is a very important biological process in the child's growth period. During sleep, especially the slow-wave sleep phase, there is an increase in the secretion of growth hormone (GH), which plays a role in stimulating tissue growth, protein synthesis, muscle mass formation, and bone development. Optimal growth hormone secretion will support the body's anabolic process so that the use of nutrients becomes more effective for growth.

Conversely, sleep disorders or poor sleep quality can interfere with the release of growth hormone, potentially inhibiting the child's weight gain and physical development (Guyton & Hall, 2021). In addition to being related to growth hormone, sleep quality also plays a role in the regulation of energy metabolism and appetite-regulating hormones. Inadequate sleep can lead to alterations in the balance of the hormones leptin and ghrelin. A decrease in leptin and an increase in ghrelin can lead to changes in diet, disruption of hunger regulation, and changes in energy metabolism. In children under the age of toddlers, this condition can affect the amount of energy intake that enters and ultimately affect growth status (Taheri et al., 2004; Miller et al., 2019).

The results of this study are supported by the research of Nova and Susanti (2024), who found that infant massage interventions can significantly improve sleep quality, appetite, and weight gain in infants aged 6–12 months. Although most previous studies have addressed the effects of infant massage, the biological mechanism between infant massage and appetite is related because both use touch stimulation as the basis of intervention. The main difference lies in the purpose of stimulation, i.e. appetite massage is more directed at increasing the comfort of the digestive tract and stimulating the child's desire to eat. The researcher explained that massage provides a relaxation effect that increases parasympathetic nerve activity so that babies sleep better and have a better diet.

The results of a recent study by St-Onge et al. (2019) explain that sleep has a relationship with metabolic regulation and energy balance in children. Children with sufficient sleep duration tend to have better metabolic patterns than children with sleep disorders. In addition, research by Magee and Iverson (2020) shows that poor sleep quality in children is associated with an increased risk of growth disorders and nutritional status problems through changes in metabolic

hormones and eating behaviors. However, weight growth for toddlers is a multifactorial process. Although sleep quality showed a significant influence in this study, other factors can also affect weight gain that have not been analyzed in the study, i.e. infection. Infection is one of the direct causes of growth disorders in children. Diseases such as diarrhea, acute respiratory infections, and chronic infections can cause decreased appetite, increased energy requirements due to inflammatory responses, and impaired absorption of nutrients. This condition can cause weight gain even though the child's sleep quality is good.

According to Black et al. (2021), recurrent infections are one of the main factors contributing to child growth disorders in developing countries. In addition, physical activity also affects toddlers, with higher physical activity requiring greater energy intake to support growth. If energy needs are not met, weight gain can be hindered.

Economic and educational factors: research by Prendergast and Humphrey (2020) shows that socioeconomic factors and parenting style are closely related to the nutritional status and growth of children; the history of BBLR and breastfeeding and complementary foods, according to WHO (2021), confirms that inappropriate complementary feeding practices can increase the risk of growth disorders.

Effect of Nutritional Intake on Weight Growth of Toddlers After Appetite Massage Intervention

The results of the study showed that nutritional intake had a positive and significant effect on weight gain in toddlers after the appetite massage intervention, with a significance value of $p=0.001$. The results of multiple linear regression analysis showed that an increase in nutritional intake was associated with an increase in weight gain in toddlers. A regression coefficient value of 0.013 indicates that any increase in nutrient intake will contribute to increased weight gain, assuming other factors in the fixed model. This shows that

the adequacy of nutrients is the main factor that determines the success of a child's physical growth because nutrition provides the energy and basic materials necessary for the formation of body tissues.

The results of this study are in line with various previous studies that show that nutritional intake is the main factor related to weight growth in toddlers. The adequacy of energy and nutrients obtained from daily food will determine the availability of raw materials for the body's metabolism for the growth process. In toddlerhood, energy requirements are relatively high due to increased physical activity, organ development, and the formation of body tissues. If the intake of energy and protein is sufficient, nutrients can be used for anabolism to support weight gain.

Research by Veronica et al. (2023) shows that feeding foods with high protein content can increase weight in toddlers aged 12–59 months who experience wasting. Interventions in the form of high-protein feeding have been proven to provide weight changes because protein plays a role as a building agent in the formation of body tissues. The results of the study reinforce the findings of this study that increased nutritional intake has a positive relationship with weight growth of toddlers.

Another study by Ersila et al. (2023) regarding the administration of MODISCO (Modified Dietetic Skimmed Milk and Coconut Oil) in undernourished toddlers showed significant weight gain after nutritional interventions. MODISCO has a higher energy and protein content, so that it can help meet the energy needs of children who are malnourished. The findings suggest that improving the quality and quantity of nutritional intake can directly support weight gain in toddlers. In addition to the amount of nutrients, the quality of diet also plays an important role in children's growth. Research by Neri et al. (2024) using National Health and Nutrition Examination Survey (NHANES) data showed that infant and young children's diets

dominated by ultra-processed foods were associated with faster weight change and an increased risk of weight status problems. This shows that the type of food that the child consumes affects not only the amount of energy, but also the quality of the nutrients that the body obtains.

In addition, toddlers' weight growth is influenced not only by nutritional intake. Several other factors can also contribute to weight changes. That is, it is suspected that infections, such as diarrhea and acute respiratory tract infections, can cause decreased appetite, increased energy needs, and impaired nutrient absorption. Children who experience recurrent infections are at risk of growth disorders because the energy that should be used for growth is diverted to the process of fighting infection. Another factor is the economic status of the family, related to the family's ability to provide diverse and nutritious food.

Families with economic limitations may have difficulty providing regular sources of animal protein, fruits, and vegetables, affecting the quality of children's intake. In addition, maternal education and knowledge about child feeding can influence children's intake. Maternal education and knowledge about child feeding can also influence children's intake. Maternal education is related to the ability to choose foodstuffs, determine diet, and understand nutritional needs according to the child's age. Responsive feeding practices also play a role in determining the success of meeting children's nutritional needs.

Effect of Sleep Quality and Nutrient Intake Simultaneously on Weight Growth of Toddlers After Appetite Massage Intervention

The results showed that sleep quality and nutritional intake simultaneously had a significant effect on weight growth of toddlers after the appetite massage intervention, with an F-test value of 22.134 and a significance value of $p=0.001$ ($p<0.05$). These results show that the combination of good sleep quality and adequate nutritional intake plays a role in supporting weight gain in

toddlers. The Adjusted R Square value of 0.595 showed that sleep quality and nutritional intake together explained 59.5% of the variation in weight gain in toddlers, while the remaining 40.5% was influenced by other factors that the researchers did not study. This shows that weight growth for toddlers is a complex process and is influenced by the interaction of various biological, nutritional, health, and environmental factors.

Nutritional intake is the most dominant factor influencing the weight gain of toddlers ($\beta = 0.485$). This shows that adequate energy, protein, vitamins, and minerals play a direct role in the formation of body tissues and weight gain. According to WHO (2023), the age of 6–23 months is a critical period of growth, so that children need adequate, safe, and nutritious complementary foods to meet energy and nutrient needs. These findings are in line with research by Miller et al. (2023), which reported that good dietary quality is associated with better nutritional status and growth in early childhood. Research by Vaivada et al. (2022) also shows that protein adequacy and food diversity are important determinants of child growth in developing countries.

Sleep quality also affects the weight growth of toddlers ($\beta = 0.372$). Quality sleep supports growth hormone secretion, protein synthesis, cell regeneration, and regulation of the hormones leptin and ghrelin, which play a role in appetite regulation and energy metabolism. The results of this study are supported by research by Matricciani et al. (2023), which states that sleep quality and duration are related to physical growth, metabolism, and energy regulation in early childhood. Research by Chaput et al. (2022) also reported that adequate sleep is one of the important factors in supporting children's growth and development along with adequate physical activity and nutrition.

Appetite massage interventions are thought to contribute to weight gain through relaxation

mechanisms that activate the parasympathetic nervous system and increase vagus nerve activity. This condition can improve sleep quality, increase children's comfort, and help improve gastrointestinal function so that appetite becomes better. Research by Diego et al. (2022) shows that massage therapy can increase vagal activity, which is associated with improved gastrointestinal function and weight gain in children. However, massage is not a major growth factor, but rather acts as a supportive intervention whose effectiveness depends on the adequacy of nutrient intake.

This study has several limitations, namely that the number of samples is only 30 toddlers, so it is smaller than the minimum requirement for multiple linear regression analysis. Although the entire population that met the criteria was included (total sampling), a small sample size could reduce statistical power. It was carried out in one health center, so that the characteristics of the respondents were relatively homogeneous. The results of the study had limitations in generalizing to other populations, as well as a relatively short follow-up period of 8 weeks to evaluate weight growth optimally. For the assessment of nutritional intake, a 24-hour food recall was used for two days, which depends on parental memory and may introduce recall bias and reporting bias. Therefore, further studies are recommended using larger sample counts, involving multiple healthcare facilities, and extending the follow-up period.

Recommendations For Future Research

Future studies should include larger and more diverse samples to improve the generalizability of the findings and increase statistical power. Considering that 40.5% of the variation in toddlers' weight gain remained unexplained, future research should investigate additional determinants of growth, such as physical activity, feeding practices, parenting

style, breastfeeding history, recurrent infections, socioeconomic status, and parental nutritional knowledge. Experimental studies with control groups or randomized controlled trials are also recommended to determine better the independent effectiveness of appetite massage on weight gain. Furthermore, longer follow-up periods are needed to evaluate the sustainability of weight gain and growth outcomes. Future studies may also explore the biological and behavioral mechanisms through which appetite massage influences appetite regulation, sleep quality, and nutritional intake, thereby providing a more comprehensive understanding of its role in promoting optimal child growth.

Sleep quality and nutritional intake significantly influenced weight gain among toddlers following the appetite massage intervention. Nutritional intake emerged as the strongest predictor of weight gain, while good sleep quality also made a meaningful positive contribution. These findings indicate that appetite massage alone is insufficient to optimize growth outcomes unless it is accompanied by adequate nutritional intake and healthy sleep habits. Therefore, comprehensive growth promotion programs for toddlers should integrate appetite massage with nutritional counseling and strategies to improve sleep quality, enabling more effective support for healthy weight gain and overall child growth.

CONCLUSION

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Conflict of Interest

The authors declare that they have no competing interests or conflicts of interest related to this study or its publication.

Authors' Contributions

Y.P. conceived and designed the study, conducted the investigation, performed the formal data analysis, and prepared the original manuscript draft. **K.E.** supervised the research, validated the findings, and critically reviewed and revised the manuscript. **Y.P.** contributed to data collection, data curation, visualization, and manuscript revision. All authors reviewed, approved, and agreed to be accountable for the final version of the manuscript.

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Declaration of Generative AI Use

The authors confirm that no generative artificial intelligence (AI) tools were used in the study design, data collection, data analysis, interpretation of the results, or preparation of this manuscript.

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