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The Effect of Tuina Massage in Improving Diet in Underweight Children Under Five in 2024

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Abstract: Underweight among children under five remains a major nutritional problem that affects physical growth and cognitive development. One of the non-pharmacological approaches to improve appetite and digestion is *Tuina* massage, a traditional Chinese therapy that stimulates specific meridian points related to the digestive system. However, empirical evidence on its effectiveness in improving dietary patterns among underweight children is still limited. This study aimed to determine the effect of *Tuina* massage on improving eating patterns among underweight children under five years old in 2024. This research employed a pre-experimental design with a one-group pretest–posttest approach conducted from October to December 2024 across seven health centers in Banten Province, including Cisimeut Health Center, Azzahra Maja Primary Clinic, Pasar Baru Health Center, Tambak Menteng Hospital, Cipanas Inpatient Health Center, and two private midwife clinics (PMB Desy Sri Latipah and PMB Iis Parhati). The Wilcoxon signed-rank test was used to analyze pretest and posttest differences in dietary patterns. Statistical analysis showed a significant improvement in dietary patterns after *Tuina* massage intervention ($p < 0.05$) across all study sites. *Tuina* massage effectively enhances eating behavior among underweight children and may serve as a complementary, non-pharmacological therapy for improving nutritional intake in early childhood.

Keywords: Dietary pattern; Toddlers; *Tuina* massage; Underweight

Introduction

Optimal nutrition during early childhood is a key determinant of physical growth, brain development, and overall health. The toddler phase, covering the age of one to five years, is a critical period where adequate nutrient intake strongly influences the achievement of growth and developmental milestones (Setyawati et al., 2018). Children at this stage are entirely dependent on their parents for essential activities such as feeding, bathing, and hygiene. Adequate and balanced food consumption during this period not only supports optimal physical and cognitive growth but also plays a significant role in shaping immunity and long-term health outcomes (Ariani, 2017; Widiyanti et al., 2021).

From a nutritional perspective, underweight status in toddlers is one of the most prevalent public health problems worldwide. According to UNICEF (2022), approximately 167 million children under five are undernourished, with the highest prevalence in South Asia (52%), followed by West Asia (15%) and Southeast Asia (17%). In Indonesia, the prevalence of underweight among children under five reached 17% in 2021, an increase from 13.8% in 2018 (Ministry of Health of the Republic of Indonesia, 2021). Nutritional status is commonly measured using the weight-for-age index (BB/U), where scores between -3 SD to < -2 SD indicate

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underweight, and below -3 SD indicate severe underweight (Supriadi, 2021). The primary causes of underweight are multifactorial, including inadequate food intake, poor dietary diversity, limited household access to nutritious food, low income, and poor feeding practices (Aboagye et al., 2021; Akombi et al., 2017; Khura et al., 2024; Rehena, 2022).

Loss of appetite and feeding difficulties are among the leading contributors to low nutrient intake in toddlers. Eating difficulties may manifest as food rejection, prolonged mealtime, vomiting, or playing with food (Gigola et al., 2022; Istiqomah et al., 2018). These behaviors often result in nutrient deficiencies that can hinder cognitive development and lower immunity. Several theories have explained these conditions: the biopsychosocial theory suggests that eating behavior in children is influenced by biological, psychological, and environmental factors, including parental pressure and emotional climate during meals (Keller et al., 2019; Maulida et al., 2024; Russell et al., 2019). Meanwhile, the Traditional Chinese Medicine (TCM) approach views loss of appetite as a result of an imbalance in *qi* and digestive energy (*pi wei qi*), which can be improved through specific therapeutic stimulation such as *Tuina* massage (Ahmad et al., 2023).

Tuina massage, a therapeutic technique rooted in TCM, involves rhythmic stimulation of specific meridian points to restore physiological balance, improve digestion, and enhance appetite. Several studies have demonstrated its effectiveness in improving eating behavior in children (Ningsih et al., 2023). Ratnaningsih et al. (2021) emphasized that *Tuina* acts as a non-pharmacological intervention that can increase *qi* flow, smooth blood circulation, and strengthen the digestive organs. Research by Asih et al. (2018) showed that eight sessions of *Tuina* massage were sufficient to alleviate feeding difficulties among toddlers, while Faizah et al. (2023) reported that this therapy could regulate appetite-related hormones such as ghrelin and leptin. These findings indicate that *Tuina* massage may offer a practical and safe complementary approach for improving dietary patterns in underweight children.

A preliminary survey conducted at seven health facilities in Banten Province including Cisimeut Health Center, Azzahra Maja Primary Clinic, Pasar Baru Health Center, Tambak Menteng Hospital, Cipanas Inpatient Health Center, PMB Desy Sri Latipah, and PMB Iis Parhati found a considerable number of underweight children aged 3–5 years, ranging from 8 to 16 cases per site. Most mothers expressed confusion about how to handle their child's eating difficulties and reported never having practiced *Tuina* massage therapy. Considering the persistence of underweight problems and the limited empirical evidence on the therapeutic impact of *Tuina* in this population, this study aims to determine the effect of *Tuina* massage in improving dietary patterns among underweight children under five. The findings are expected to provide a scientific foundation for the use of *Tuina* as an evidence-based, non-pharmacological intervention to support child nutrition and maternal empowerment in managing eating difficulties.

Method

Research Design and Location

This study employed a pre-experimental design with a one-group pretest–posttest approach to determine the effect of *Tuina* massage on improving dietary patterns in underweight children under five years old. The research was conducted from October to December 2024 across seven health facilities in Banten Province, namely Cisimeut Health Center, Azzahra Maja Primary Clinic, Pasar Baru Health Center (Tangerang City), Tambak Menteng Hospital, Cipanas Inpatient Health Center, PMB Desy Sri Latipah, Amd.Keb, and PMB Iis Parhati, SST, Bd.

Population and Sample

The population in this study consisted of all children under five years old who were categorized as underweight based on the Weight-for-Age (BB/U) index (score between -3 SD and < -2 SD). Samples were selected using purposive sampling, with inclusion criteria: (1) toddlers aged 1–5 years diagnosed as underweight, (2) willing to participate in *Tuina* massage sessions, and (3) accompanied by their parents or guardians. Exclusion criteria included toddlers with chronic diseases, congenital abnormalities, or those under pharmacological treatment affecting appetite.

Variables and Instruments

The independent variable in this study is *Tuina* massage, while the dependent variable is the child's eating pattern (appetite and mealtime behavior). Data were collected using a validated questionnaire to measure eating difficulties, and the *Tuina* massage procedure followed the Standard Operating Procedure (SOP) adapted from Asih et al. (2018). Massage sessions were performed by trained practitioners over several sessions, focusing on meridian points related to digestion and appetite regulation.

Procedure

a) Pretest Phase: Assessment of eating patterns and nutritional status before the *Tuina* intervention.
b) Intervention Phase: Application of *Tuina* massage following the standardized SOP for a specified number of sessions.

c) Posttest Phase: Re-assessment of eating patterns using the same questionnaire to identify changes after the intervention.
d) Data Analysis Phase: Statistical analysis of pretest and posttest results.

Data Analysis

Data were analyzed using SPSS version 25.0. Univariate analysis was conducted to describe respondent characteristics, while bivariate analysis employed the paired sample t-test (if data were normally distributed) or Wilcoxon signed-rank test (if not normally distributed) to determine the effect of *Tuina* massage on changes in eating patterns. A p-value < 0.05 was considered statistically significant.

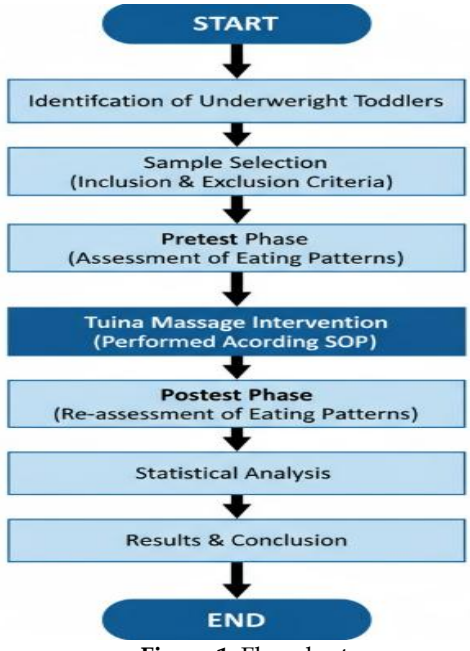

Figure 1. Flowchart

Result and Discussion

The results of this study show that the diet of toddlers before the tuina massage consists of seven regions in this study, namely the Cisimeut Health Center, Azzahra Maja Primary Clinic, Pasar Baru Health Center Tangerang City, Tambak Menteng Hospital, Cipanas Inpatient Health Center, PMB Desy Sri Latipah and PMB Iis Parhati, SST, Bd found that all toddlers who experienced *Underweight* had a bad diet (100%).

The results of this study show that the diet of toddlers after doing tuina massage consists of seven areas in this study, namely the Cisimeut Health Center obtained the majority of good diet as many as 8 respondents (80%) and bad diet as many as 2 respondents (20%), Azzahra Maja Pratama Clinic obtained the majority of good diet 7 respondents (70%) and bad diet as many as 3 respondents (30%), The Pasar Baru Health Center in Tangerang City received the majority of good diets as many as 9 respondents (90%) and bad diets as many as 1 respondent (10%), RSIA Tambak Menteng got the majority of good diet 9 respondents (90%) and bad diet as many as 1 respondent (10%), Cipanas Inpatient Health Center got the majority of good diet 8 respondents (80%) and bad diet as many as 2 respondents (20%), PMB Desy Sri Latipah got the majority of good diet as many as 9 respondents (10%) and bad diet as many as 1 respondent (10%), PMB Iis Parhati, SST, Bd got the majority of good diet as many as 9 respondents (90%) and bad diet as many as 1 respondent (10%).

Table 1. Distribution of Toddler Diet Frequency Before Tuina Massage in Children Who Are Underweight in 2024

Areas of children who experience *underweight*	Toddler Diet				Total	
	Good		Bad			
	F	%	F	%	F	%
Cisimeut Health Center	0	0	10	100	10	100
Azzahra Maja Primary Clinic	0	0	10	100	10	100
Puskesmass Pasar Baru Tnagerang City	0	0	10	100	10	100
RSIA Tambak Menteng	0	0	10	100	10	100
Cipanas Inpatient Health Center	0	0	10	100	10	100
PMB Desy Sri Latipah, Amd.Keb	0	0	10	100	10	100
PMB Iis Parhati, SST, Bd	0	0	10	100	10	100

Table 2. Distribution of Toddler Diet Frequency After Tuina Massage in Children Experiencing *Underweight* in 2024

Areas of children who experience *underweight*	Toddler Diet				Total	
	Good		Bad			
	F	%	F	%	F	%
Cisimeut Health Center	8	80	2	20	10	100
Azzahra Maja Primary Clinic	7	70	3	30	10	100
Pasar Baru Health Center of Tangerang City	9	90	1	10	10	100
RSIA Tambak Menteng	9	90	1	10	10	100
Cipanas Inpatient Health Center	8	80	2	20	10	100
PMB Desy Sri Latipah	9	90	1	30	10	100
PMB Iis Parhati, SST, Bd	9	90	1	30	10	100

Table 3. Normality Test Results

	Kolmogorov - smirnov			Shapiro - wilk		
	Statistics	Df	Sig.	Statistics	Df	Sig.
Before	.184	70	.000	.846	70	.000
After	.203	70	.000	.844	70	.000

Table 3 shows the results of the normality test using Shapiro-Wilk values of 0.000 (before) and 0.000 (after).

Since the p-value of the Shapiro-Wilk test < 0.05, it can be concluded that the data is not normally distributed. Based on these results, the statistical analysis used in this study is a non-parametric test, namely a Wilcoxon to draw conclusions from hypothesis tests.

Table 4. The Effect of Tuina Massage in Improving Diet in Children Who Are Underweight in 2024

Region	Diet	N	Mean	Standard deviation	Min	Max	P-Value
Cisimeut Health Center	Before	10	21.10	4,886	15	28	0.002
	after		34.80	2,936	28	30	
Azzahra Maja Primary Clinic	Before	10	20.90	5,859	15	24	0.004
	after		32.40	3,273	26	32	
Tangerang City Pasar Baru Health Center	Before	10	23.20	4,808	14	22	0.001
	after		30.40	1,265	29	34	
RSIA Tambak Menteng	Before	10	21.90	5,857	12	28	0.003
	after		36.10	1,663	26	36	
Cipanas Inpatient Health Center	Before	10	20.20	5,308	10	26	0.000
	after		35.90	1,663	28	38	
PMB Desy Sri Latipah, Amd.Keb	Before	10	23.90	4,458	14	20	0.001
	after		35.70	1,636	24	32	
PMB Iis Parhati, SST, Bd	Before	10	21.10	4,886	15	28	0.002
	after		34.10	3,381	28	32	

The results of this study showed that the average score of the dietary assessment before and after the tuina massage consisted of seven regions in the study at the Cisimeut Health Center before the tuina massage was carried out, the average diet assessment score was 21.10, the standard deviation was 4.886 with a minimum of 15 and a maximum of 28, while the average afternoon assessment after the tuina massage was 34.80, standard deviation of 2.936 with a minimum diet score of 28 and a maximum of 30. The results of the non-parametric statitik test based on the normality test were found not to be normally distributed, the Wilcoxon P-Value result was obtained which is 0.002 which means that there is an Effect of Tuina Massage in Improving Diet in Children Who Are Underweight at the Cisimeut Health Center.

Azzahra Maja Pratama Clinic before the massage was carried out with an average diet assessment score of 20.90, a standard deviation of 5.859 with a minimum of 15 and a maximum of 24, while the average afternoon assessment after the massage was 32.40, a standard deviation of 3.273 with a minimum of 26 and a maximum of 32 dietary scores. The results of the non-parametric statitik test based on the normality test were found not to be normally distributed, the Wilcoxon P-Value result was obtained which is 0.004 which means that there is an Effect of Tuina Massage in Improving Diet in Children Who Are Underweight at Azzahra Maja Pratama Clinic.

The Puskesmass Pasar Baru Tnagerang City before the massage was carried out had an average diet assessment score of 23.20, a standard deviation of 4.808 with a minimum of 14 and a maximum of 22 dietary score assessments, while the average afternoon assessment after the tuina massage was 30.40, a standard deviation of 1.265 with a minimum of 29 and a maximum of 34 dietary score assessments. The results of the non-parametric statitik test based on the normality test were found not to be normally distributed, the Wilcoxon P-Value result was obtained which is 0.001 which means that there is an Effect of Tuina Massage in Improving Diet in Children Who Are Underweight at the Pasar Baru Health Center, Tangerang City.

RSIA Tambak Menteng before the tuina massage had an average diet assessment score of 21.90, a standard deviation of 5.857 with a minimum of 12 and a maximum of 28, while the average afternoon assessment after the tuina massage was 36.10, a standard deviation of 1.663 with a minimum of 26 and a maximum of 36. The results of the non-parametric statitik test based on the normality test were found to be not normally distributed, the Wilcoxon P-Value result was obtained which is 0.003 which means that there is an Effect of Tuina Massage in Improving Diet in Children Who Are Underweight at Tambak Menteng Hospital.

The Cipanas Inpatient Health Center before the tuina massage had an average diet assessment score of 20.20, a standard deviation of 5.308 with a minimum of 10 and a maximum of 26, while the average afternoon assessment after the tuina massage was 35.90, a standard deviation of 1.663 with a minimum of 28 and a maximum of 38. The results of the non-parametric statitik test based on the normality test were found not to be normally distributed, the Wilcoxon P-Value result was obtained which was 0.000 which means that there is an Effect of Tuina Massage in Improving Diet in Children Who Are Underweight at the Cipanas Inpatient Health Center.

PMB Desy Sri Latipah, Amd.Keb before the tuina massage had an average diet assessment score of 23.90,

a standard deviation of 4.458 with a minimum of 14 and a maximum of 20, while the average afternoon assessment after the tuina massage was 35.70, a standard deviation of 1.636 with a minimum of 24 and a maximum of 32. The results of the non-parametric statitik test based on the normality test were found not to be normally distributed, the Wilcoxon P-Value result was obtained which is 0.001 which means that there is an Effect of Tuina Massage in Improving Diet in Children Who Are Underweight at PMB Desy Sri Latipah, Amd.Keb.

PMB Iis Parhati, SST, Bd before the tuina massage had an average diet assessment score of 21.10, a standard deviation of 4.886 with a minimum diet score of 15 and a maximum of 28, while the average afternoon assessment after the tuina massage was 34.10, a standard deviation of 3.381 with a minimum of 28 and a maximum of 32. The results of the non-parametric statitik test based on the normality test were found not to be normally distributed, the results of the Wilcoxon P-Value test were obtained which is 0.002 which means that there is an Effect of Tuina Massage in Improving Diet in Children Who Are Underweight in PMB Iis Parhati, SST, Bd.

The results of the study were obtained in all 7 regions, all of which obtained the results of the wilcoxon test, obtained a p value of 0.005< 0.05, meaning that there is an influence of tuina massage in improving diet in children who experience underweight in 2024.

Toddler's Diet Before Tuina Massage in Children Who Are Underweight in 2024

The diet of toddlers before the tuina massage consisted of seven areas in this study, namely the Cisimeut Health Center, Azzahra Maja Primary Clinic, Pasar Baru Health Center Tangerang City, Tambak Menteng Hospital, Cipanas Inpatient Health Center, PMB Desy Sri Latipah and PMB Iis Parhati, SST, Bd found that the majority of 70 toddlers experienced a bad diet Underweight.

Children under five often experience a phase of food selection or picky eating, where they tend to only want to eat certain types of food and reject others. At this age, children are learning about the taste and texture of food, which sometimes causes them to reject foods they are not familiar with or that have textures they don't like (Asih et al., 2018).

Difficulty eating or lack of appetite is often experienced by toddlers, especially in the age range of 1 – 3 years is also called the age of food jug, namely children only eat food they like, suck, swallow vomiting or spit food that has entered their mouths, play with food or eat for a long time, do not want to put food in their mouths or close their mouths tightly, vomit or spill food, dismiss feeds, do not like many variations of food, and unusual eating habits (Wulaningsih et al., 2022).

Eating behavior is greatly influenced by the psychological, health and social state of the child. Therefore, the state of the environment and family attitude are very important in feeding children so that children are not anxious and worried about their food. As in adults, a pleasant atmosphere can arouse the appetite for food (Hidayanti, 2023).

Based on this theory, the researcher can conclude the results of research on children under five who experience underweight due to lack of nutritional intake. Children who do not get enough calories and essential nutrients such as protein, healthy fats, vitamins, and minerals are at risk of being underweight. This can happen because children do not want to eat, often choose certain foods (picky eating), or irregular diets.

Malnutrition can also be caused by a lack of appetite in children. Other factors that can cause respondents to experience a lack of appetite include the type of food, the way it is served, and also the food menu that is not liked by toddlers

Toddler's Diet After Tuina Massage in Children Who Are Underweight in 2024

The diet of toddlers after doing tuina massage consisted of seven areas in this study, namely Cisimeut Health Center, Azzahra Maja Primary Clinic, Pasar Baru Health Center Tangerang City, Tambak Menteng Hospital, Cipanas Inpatient Health Center, PMB Dessy Sri Latipah and PMB Iis Parhati, SST, Bd obtained the majority of good diet as much as 59 (84.3%) and bad diet as much as 11 (15.7) % of toddlers experienced underweight.

Tuina Massage stimulation is to provide massage to the nerve endings on the surface of the skin (massage will cause the permeability of cell membranes to thin so that it will facilitate the exchange of sodium (Na) and potassium (Ka) ions which will stimulate the potential occurrence of muscles and nerves. The potential action that occurs in the sympathetic nerve and the sympathetic will affect the work of the organs, including: stimulation of the Vagus Nerve will affect the Gastrointestinal system, namely increased peristalsis so that gastric emptying increases due to rapid hunger (appetite will increase) and eating becomes voracious. In addition, there will also be an increase in the production of digestive enzymes that will help the absorption of nutrients. The nutrients absorbed will enter the blood circulation which also increases due to stimulation from the sympathetic nerve (Hidayanti, 2023).

Based on this theory, researchers conclude that neat tuina massage has a positive impact on some children, especially in increasing appetite and a better diet. This

suggests that tuina massage can help stimulate the digestive system, reduce body tension, and promote relaxation, ultimately contributing to increased appetite. Although tuina massage therapy provides benefits for some children, some respondents do not experience significant changes in their diet This can be due to a variety of factors, including established eating habits, and psychological factors that may affect the child's appetite.

The Effect of Tuina Massage in Improving Diet in Children Who Are Underweight in 2024

The results of the study were obtained in all 7 regions, all of which obtained the results of the wilcoxon test, obtained a p value of < 0.05, meaning that there is an influence of tuina massage in improving diet in children who experience underweight in 2024.

Research in line with Lestari et al. (2024) techniques that can be done on toddlers who experience a decrease in appetite and difficulty eating, namely with Tui Na massage.

The research is in line with Wulaningsih et al. (2022) which explains the effect of tuina massage on the increase in appetite of toddlers after and before tuina massage. Excessive stimulation of the nerve endings on the surface of the skin (massage) will result in thinning of cell membrane permeability so that it will facilitate the exchange of Sodium (Na) and Potassium (K) ions which will stimulate the potential to occur in muscles and nerves.

The potential action that occurs in the sympathetic nerve and the sympathizers will affect the work of the organs, including: stimulation of the vagus nerve will affect the gastrointestinal system, namely increased peristalsis so that gastric emptying increases due to rapid hunger (appetite will increase) and eating becomes voracious. In addition, there will also be an increase in the production of digestive enzymes that will help the absorption of nutrients. The nutrients absorbed will enter the blood circulation which also increases due to stimulation from the sympathetic nerve (Wulaningsih et al., 2022).

Tui Na massage is carried out with the techniques of sliding massage (Effleurage or Tui), massaging (Petrissage or Nie), tapping (tapotement or Da), swiping, pulling, twisting, shaking, and vibrating certain points so that it will affect the flow of body energy by holding and pressing the body on certain parts of the body. Tui Na Massage is a more specific massage technique to overcome eating difficulties in toddlers by improving blood circulation in the spleen and digestion, through modifications from needleless acupuncture, this technique uses pressure on the body's meridian points or energy flow lines so that it is relatively easier to do (Lestari et al., 2024).

Massage therapy that is routinely carried out can increase the activity of the vagus nerve and will stimulate digestive hormones, namely insulin and gastrin. Insulin has an important role in carbohydrate metabolism, glycogen storage, fatty acid synthesis, amino acids, and protein synthesis. These two hormones function to stimulate digestion so that the absorption of food juices becomes better (Faizah et al., 2023).

Tuina massage is a massage technique derived from traditional Chinese medicine that uses various techniques such as pressure, massage, and body manipulation to stimulate the flow of energy (Qi) in the body. One of the main mechanisms of tuina massage is to improve blood circulation and stimulate the autonomic nervous system. In underweight children, digestive problems or appetite disorders are often the main causes of weight loss. With tuina massage, it is believed that stimulation at certain points in the body can help improve the functioning of the digestive system and stimulate appetite, so that the child feels hungrier and can eat more (Puspita et al., 2021).

The most frequent cause of toddlers' appetite is impaired digestive and lymphatic function, so that the food that enters is not immediately digested which results in food stagnation in the gastrointestinal tract, complaints that are often experienced by toddlers, namely nausea, vomiting, and even toddlers have no appetite. In overcoming this, tuina massage therapy can be given because tuina massage can help in smoothing blood flow and can maximize the work of the digestive organs, with massage the intestinal motility will increase and will improve the absorption of nutrients by the body so that appetite increases and will have an impact on weight changes in toddlers (Faizah et al., 2023).

This study found that there was an effect of tuina massage on the diet of underweight children, although it was still found that the results obtained showed no significant changes in the children's diet before and after the tuina massage. The researcher's assumption is that tuina massage can stimulate appetite, improve the digestive system, and reduce stress that affects children's diets. However, several factors can explain why there is no obvious change, including the duration or frequency of the massage that may not be optimal, the presence of other external factors that affect the child's diet, and the variability of the individual's response to the tuina massage.

Therefore, tuina massage can be used as one of the efforts to overcome eating difficulties in children that can be done regularly so that you get maximum results to increase appetite so that there is hunger that can increase weight.

Conclusion

Based on the results and discussion, this study concludes that *Tuina* massage has a significant effect in improving dietary patterns among underweight children under five years old. Across seven research sites—Cisimeut Health Center, Azzahra Maja Primary Clinic, Pasar Baru Health Center (Tangerang City), Tambak Menteng Hospital, Cipanas Inpatient Health Center, PMB Desy Sri Latipah, and PMB Iis Parhati—the intervention led to a notable improvement in toddlers' eating behavior, where 84.3% demonstrated good dietary patterns after receiving *Tuina* massage. Statistical analysis using the Wilcoxon test showed a p-value < 0.05, indicating a significant difference between pretest and posttest conditions. These findings confirm that *Tuina* massage can serve as an effective, non-pharmacological therapy to stimulate appetite and enhance food intake among underweight children, thereby supporting optimal growth and nutritional improvement.

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N.A., C.R., D.A., D.A., L., F.T., R.D. Contributed to the conceptualization, data collection process, data processing, and article writing.

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Conflicts of Interest
The authors declare no conflict of interest.

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