THE EFFECT OF GIVING INSTANT NOODLES PATETA (CATFISH, TEMPEH FLOUR, AND TAPIOCA FLOUR) ON BODY WEIGHT OF UNDERWEIGHT TODDLERS

Pengaruh Pemberian Mi Instan PATETA (Ikan Patin, Tepung Tempe, Dan Tepung Tapioka) terhadap Berat Badan Balita Underweight

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ABSTRACT

Underweight remains one of the most common nutritional problems among toddlers, characterized by body weight that does not meet age standards due to inadequate nutrient intake. One effort to help meet toddlers' nutritional needs is through the provision of supplementary food (PMT) in the form of instant noodles made from catfish, tempeh flour, and tapioca flour. This study aims to determine the effect of instant noodles based on catfish, tempeh flour, and tapioca flour on the body weight of underweight toddlers at Makrayu Public Health Center. A quasi-experimental method with a pre-test and post-test control group design was used. The study was conducted over 21 days with a total sample of 59 toddlers aged 24–59 months, selected using simple random sampling. The participants were divided into two groups: 29 toddlers in the treatment group and 30 toddlers in the control group. The results showed that the treatment group experienced an average weight gain of 0.3983 kg, while the control group showed an average gain of 0.2033 kg. Statistical analysis using independent t-test indicated a significant effect of the instant noodles on weight gain among underweight toddlers at Makrayu Health Center (p-value = 0.002).

Keyword : *catfish; instan noodle; tapioca flour; tempeh flour; underweight*

ABSTRAK

Underweight masih menjadi salah satu permasalahan gizi yang banyak dialami oleh balita yang ditandai dengan berat badan yang tidak sesuai usia akibat kekurangan gizi. Salah satu upaya untuk membantu dalam pemenuhan asupan nutrisi pada balita adalah melalui pemberian makanan tambahan (PMT) berupa mi instan yang berbahan dasar dari tepung tempe, ikan patin, dan tepung tapioka. Penelitian ini bertujuan untuk mengetahui adanya pengaruh pemberian mi instan berbasis ikan patin, tepung tempe, dan tepung tapioka terhadap berat badan balita *underweight* di Puskesmas Makrayu. Penelitian ini menggunakan metode *quasi experiment* dengan desain penelitian *pre-test* dan *post-test with control group*. Penelitian dilakukan selama 21 hari dengan sampel sebanyak 59 balita yang berusia 24 – 59 bulan dengan metode pengambilan sampel menggunakan *simple random sampling* yang kemudian dibagi menjadi 29 balita sebagai kelompok perlakuan dan 30 balita sebagai kelompok pembanding. Hasil menunjukkan pada kelompok perlakuan terdapat kenaikan rata-rata berat badan sampel sebelum dan sesudah sebesar 0,3983 kg dan pada kelompok pembanding kenaikan rata-rata berat badan sampel sebelum dan sesudah sebesar 0,2033 kg. Untuk hasil uji statistik (uji t-*independent*) menujukkan ada pengaruh pemberian mi instan berbasis ikan patin, tepung tempe, dan tepung tapioka terhadap peningkatan berat badan balita *underweight* di Puskesmas Makrayu (*p-value* = 0,002).

Kata Kunci : ikan patin; mi instan; tepung tapioka; tepung tempe; *underweight*

INTRODUCTION

Toddlers are vulnerable to nutritional problems. One of the most prevalent nutritional issues among toddlers is underweight. Underweight is a condition where a toddler fails to achieve their ideal body weight due to nutritional deficiencies (Syafrani *et al*., 2023).

According to the UNICEF modified conceptual framework (1998), the causes of nutritional problems are divided into direct and indirect causes. The direct causes of nutritional problems are infectious diseases and dietary intake, while the indirect causes include household food security, childcare practices, and health services.

According to the 2024 Indonesian Health Survey, the prevalence of underweight toddlers in Indonesia was 16.8%. In South Sumatra, the prevalence of underweight toddlers was 15.4%, and in the city of Palembang, it was 16.1%. These prevalence rates remain above the WHO public health problem threshold for underweight, which is less than 10% (De Onis *et al*., 2019). The Makrayu Community Health Center is one of the health centers reporting cases of underweight. In December 2024, there were 88 cases of underweight children out of 5,213 toddlers who were weighed.

If the problem of underweight in toddlers is not addressed promptly, it can affect their growth and development. This is characterized by decreased productivity, impaired cognitive abilities, diminished intelligence, and a weakened immune system, making children susceptible to infectious diseases (Budiana *et al*., 2021; Kumala *et al*., 2023).

One method to help fulfill toddlers' nutritional intake is through Supplementary Feeding (PMT). Supplementary Feeding is an intervention program provided to children suffering from malnutrition to help improve their nutritional status and meet their nutritional requirements for achieving good health. Noodles are one type of food favored by many toddlers (Trisnawati *et al*., 2024).

Noodles are a popular food across various segments of society due to their easy preparation, pleasant taste, and relatively low cost (Safitri *et al*., 2022). Providing noodles in the form of instant noodles has advantages over other types of noodles, namely a long shelf life and ease of preparation (Prerana *et al*., 2020). However, the nutritional content of instant noodles is still insufficient to meet other nutritional values, such as protein, fat, and

minerals (Utami *et al*., 2023). Fortification and substitution in the production of instant noodles are therefore appropriate strategies for enhancing their nutritional value.

The addition of catfish and the substitution of wheat flour with tempeh flour in noodle production can increase its nutritional value, particularly its protein content. Per 100 grams, catfish contains 17 grams of protein (Kementerian Kesehatan Republik Indonesia, 2020), while 100 grams of tempeh flour contains 46.5 grams of protein (Susianto, 2021). However, using tempeh flour in noodle making reduces the dough's elasticity; thus, adding tapioca flour can help improve the texture of the tempeh-flour noodle dough.

Based on the above explanation, the researcher is interested in conducting a study on the effect of providing instant noodles based on catfish, tempeh flour, and tapioca flour on the body weight of underweight toddlers at the Makrayu Community Health Center in Palembang.

METHOD

Design, Place, and Time

This study employed a quantitative approach using a quasi-experimental method with a pretest-posttest with a control group design. The research was conducted over 21 days in January 2025 within the working area of the Makrayu Community Health Center in Palembang.

Sample Size and Sampling Technique

The population in this study was all toddlers in the working area of the Makrayu Community Health Center, Palembang. The study sample consisted of toddlers aged 24-59 months, who were not suffering from infectious diseases, enjoyed eating noodles, resided within the health center's working area, and were classified as underweight. The sample used in this study totaled 59 toddlers, drawn from data on underweight children previously collected by the community health center and subsequently re-screened by the researchers. The data were collected using a simple random sampling method, after which the subjects were divided into two groups: 29 toddlers in the treatment group and 30 toddlers in the control group.

Types and Methods of Data Collection

The data in this study consisted of primary data and secondary data. The primary data included sample identification details, body weight measurements taken before and after the intervention, results of

organoleptic tests, and proximate analysis results. The secondary data provided a general overview of the research location, namely the Makrayu Community Health Center in Palembang.

Data collection was divided into two phases: the preparation phase and the implementation phase.

During the preparation phase, the researchers processed the official cover letters required to conduct the research. After obtaining permission, the researchers prepared for sample screening by measuring the body weight of underweight toddlers in the working area of the Makrayu Community Health Center to determine the underweight sample. Body weight was measured using a digital scale, and underweight nutritional status was categorized based on the z-score.

During the implementation phase, a total of 59 toddlers were obtained as the sample, comprising 29 toddlers in the treatment group and 30 toddlers in the control group. On the first and second days, the researchers conducted verification to confirm the underweight status data by re-weighing the children. This was done using a digital scale with a capacity of 150 kg and an accuracy of 0.05 kg. Subsequently, the researchers provided

"Pateta" instant noodles to the treatment group for a 21-day intervention period. The control group, however, only had their body weight and dietary intake monitored. Throughout the 21-day study, 24-hour food recalls were conducted for both the treatment and control groups on three occasions: one day before the intervention began, on the 14th day, and on the 21st day. A final body weight measurement was performed on the 22nd day.

Data Analysis

The data obtained during the intervention were analyzed using univariate analysis and bivariate analysis methods to determine any significant influence. The statistical tests employed for this purpose were the paired t-test and the independent t-test.

RESULTS AND DISCUSSION
Nutritional Value of Pateta Instant Noodles

The ingredients used in the production of the instant noodles, based on catfish, tempeh flour, and tapioca flour, were as follows: catfish meat (26.1%), chicken egg (10.4%), tapioca flour (26.1%), tempeh flour (10.4%), salt

(0.78%), and water (26.1%).

The production process was carried out as follows:

1. The catfish meat, separated from the bones and finely ground, was marinated with lime juice.

2. The catfish meat was then ground together with garlic.

3. Tapioca flour and tempeh flour were mixed, after which the ground fish, water, and egg were added gradually until evenly combined.

4. The dough was flattened using a dough sheeter to form individual sheets, ensuring the noodles would be thin. It was then passed through the machine again to form noodle strands.

5. The noodle strands were steamed at 100°C for approximately 10 minutes before being removed.

6. The noodles were subsequently dried in an oven at 130°C for approximately 20 minutes until completely dry.

7. The noodles were served to the respondents in a pre-cooked state, allowing for immediate consumption.

The results of the proximate analysis of Pateta instant noodles are presented in Table 1.

Table 1. Proximate Analysis Results of Pateta Instant Noodles

Analysis Parameter	Content	Method
Water (%)	2,90	SNI 3551-2018 l, Annex A.3
Ash (%)	1,90	SNI 01-2891-1992 Point 6.1
Total Energy (kkal/100 g)	433,70	18-8-9/MU/SMM-SIG (calculation)
Carbohydrat (%)	70,28	18-8-9/MU/SMM-SIG (calculation)
Total Fat (%)	10,58	18-8-5/MU/SMM-SIG (Gravimetry)
Protein (%)	14,34	18-8-31/MU/SMM-SIG (Titrimetry)

Based on the proximate analysis results, the total energy content of Pateta instant noodles is 433.70 kcal per 100 g. Given the 70 g portion provided during the intervention, this portion could fulfill 22.49% of the daily energy requirement for children aged 1–3 years and 21.68% for children aged 4–6 years.

The carbohydrate content of Pateta instant noodles was 70.28% per 100 g. The provision of a 70 g portion during the intervention could meet 22.88% of the daily carbohydrate requirement for children aged 1–3 years and 22.36% for those aged 4–6 years.

The fat content of Pateta instant noodles was 10.58% per 100 g. A 70 g serving provided during the intervention could fulfill 16.46% of the daily fat requirement for children aged 1–3 years and 14.81% for children aged 4–6 years.

The protein content of Pateta instant

noodles was 14.34% per 100 g. A 70 g serving provided during the intervention could meet 50.19% of the daily protein requirement for children aged 1–3 years and 40.15% for children aged 4–6 years.

Sample Overview

The sample characteristics in this study were the sex and age of the respondents, which are presented in Table 2.

Table 2. Frequency Distribution by Sex and Age of Respondents

Variable		Treatment Group		Control Group	
		n	%	n	%
Sex	Male	7	24,1	12	40
	Female	22	75,9	18	60
Age (months)	24 – 36	13	44,6	13	43,3
	37 – 59	16	55,2	17	56,7

According to Table 2, the frequency distribution of respondents by sex shows that the majority in both groups were female, with 22 toddlers (75.9%) in the treatment group and 18 toddlers (60%) in the control group. Regarding the age category, the majority in both groups were aged 37–59 months, with 16 toddlers (55.2%) in the treatment group and 17 toddlers (56.7%) in the control group.

Univariate Analysis
Mean Body Weight, Energy Intake, and Macronutrient Intake

Respondents' body weight was measured before and after the intervention. Data on energy and macronutrient intake were obtained using the 24-hour food recall method through interviews conducted before the intervention, on day 14, and on day 21 of the intervention.

According to the results in Table 3, the mean body weight before the intervention in the treatment group was 10.83 kg, while in the control group it was 10.90 kg. After the intervention, the mean body weight in the treatment group was 11.22 kg, compared to 11.11 kg in the control group.

The increase in body weight is attributed to the increased intake from the provision of Pateta instant noodles. This finding aligns with (Nurminingsih, 2020), who reported a significant relationship between a good diet and increased body weight. Based on Table 3, the mean energy intake in the treatment group before the intervention was 981.93 kcal. After the intervention, it increased to 1122.09 kcal. In the control group, the mean energy intake was 960.10 kcal before the intervention and decreased to 929.50 kcal afterwards.

Research by W. Anggraeni *et al*., (2023), indicated that children with low

energy intake have a 10.06 times higher risk of being underweight. This is because energy intake directly influences body weight. When energy expenditure exceeds energy intake, it creates an energy imbalance. If this imbalance persists, it can lead to a direct reduction in body composition, consequently causing underweight (Kusmadila, 2021).

Table 3. Body Weight, Energy Intake, and Macronutrient Intake of Respondents Before and After the Intervention in Both Groups

Group	Variable	Period	Minimum	Maximum	SD	Mean
Treatment	Body Weight (kg)	Before	8,75	13,5	1,43	10,83
		After	8,85	13,80	1,51	11,22
Control		Before	8,10	13,20	1,24	10,90
		After	8,25	13,35	1,23	11,11
Treatment	Energy Intake (kkal)	Before	639,50	1294,15	195,09	981,93
		After	673,65	1484,35	194,25	1122,09
Control		Before	651,63	1169,80	144,00	960,10
		After	559,05	1255,35	169,78	929,50
Treatment	Carbohydrate Intake (g)	Before	91,33	178,15	26,03	129,34
		After	80,70	222,77	30,19	155,32
Control		Before	62,40	159,08	22,04	123,32
		After	88,04	166,95	23,28	124,56
Treatment	Fat Intake (g)	Before	23,42	54,64	8,41	37,92
		After	28,13	56,60	7,55	40,66
Control		Before	18,37	57,64	10,15	37,45
		After	17,97	50,66	8,56	35,49
Treatment	Protein Intake (g)	Before	9,93	39,89	7,97	26,53
		After	22,5	50,04	6,36	36,54
Control		Before	12,91	45,85	7,16	29,01
		After	15,75	42,6	6,06	28,27

Based on Table 3, the mean carbohydrate intake in the treatment group before the intervention was 129.34 grams. After the intervention, it increased to 155.32 grams. In the control group, the mean intake was 123.32 grams before the intervention and 124.56 grams afterwards.

Carbohydrates are essential as an energy source for children. According to research by Tanjung & Nazara (2023), if carbohydrate intake is deficient, the resulting energy shortfall will be compensated for by using protein. If this persists, it can disrupt the growth process.

Table 3 shows that the mean fat intake in the treatment group before the intervention was 37.92 grams, which increased to 40.66 grams after the intervention. In the control group, the mean intake was 37.45 grams before the intervention and decreased to 35.49 grams afterwards.

Research by Listyawardhani *et al*., (2024) found a significant relationship between fat intake and the nutritional status of toddlers. Fat intake plays a crucial role in toddlers because 20% of a child's brain mass and 40% of brain composition are derived from unsaturated fatty acids. Therefore, insufficient fat intake in toddlers can affect both body weight and brain development (Kumala *et al*., 2023; Ulhaq *et al*., 2024).

Based on Table 3, the mean protein intake in the treatment group before the intervention was 26.53 grams. After the intervention, it increased to 36.54 grams. In the control group, the mean intake was 29.01 grams before the intervention and was 28.27 grams afterwards.

According to research by Hairunnisah *et al*., (2025), consuming foods from five or more different food groups can help prevent toddlers from being underweight. Although the protein intake in both the treatment and control groups was generally adequate both before and after the intervention, the respondents remained underweight. This is because, based on the recall results, most respondents consumed only animal-based protein sources daily without additional fruits or vegetables, leading to suboptimal protein absorption.

Bivariate Analysis
Difference in Mean Body Weight Change Before and After Intervention in Both Groups

In the treatment group, the mean body weight of respondents increased from 10.83 kg to 11.22 kg, with a difference of 0.398 kg. The control group also experienced an increase in mean body weight, from 10.90 kg to 11.11 kg, with a difference of 0.203 kg.

The results of the dependent t-test in the treatment group showed a p-value of 0.000 with a significance level of <0.05 and a 95% confidence level. This indicates a significant difference in the mean body weight of the sample before and after the provision of Pateta instant noodles to underweight children.

In the control group, the dependent t-test also yielded a p-value of 0.000 with a significance level of <0.05 and a 95% confidence level, indicating a difference in the mean body weight of the sample before and after the intervention in underweight children.

This finding is consistent with research conducted by Riska (2023), which obtained a result of $\alpha < 0.05$ (p = 0.000),

meaning there is an effect of providing supplementary food in the form of catfish noodles based on tapioca flour and moringa leaves, with an increase of 0.533 kg.

Providing supplementary food can help increase the weight of toddlers. This aligns with research by (Ramazana *et al*., 2024) where undernourished toddlers given supplementary food experienced weight gain, leading to a change in nutritional status.

The ingredients used in making Pateta instant noodles can help increase energy and macronutrient intake, thereby leading to weight gain. According to research by (D. A. Anggraeni, 2021), supplementary food using tempeh flour as a base material influences weight gain in toddlers in Torongrejo Village, Junrejo District.

Furthermore, research by Sarmana *et al*., (2021), indicated that providing supplementary food in the form of cake made from tempeh flour influences weight gain in toddlers.

The Effect of Providing Catfish, Tempeh Flour, and Tapioca Flour-Based Instant Noodles on Toddlers' Body Weight

Based on the independent t-test results, a p-value < 0.05 (p-value = 0.002)

was obtained, leading to the conclusion that there is a significant difference in weight change between the intervention group, which received the catfish, tempeh flour, and tapioca flour-based instant noodles, and the control group, which received no intervention.

These results show an increase in body weight among underweight toddlers after a 21-day intervention, with a difference in weight gain between the intervention and control groups of 0.195 kg.

This study aligns with Riska (2023), who found $\alpha < 0.05$ (p = 0.004), meaning there is an effect of providing supplementary food in the form of catfish noodles based on tapioca flour and moringa leaves, with an increase of 1.003 kg in the intervention group and 0.124 kg in the control group.

The weight change in the sample occurred because the provided product – the catfish and tapioca flour-based instant noodles – contained 303.59 kcal of energy, 10.038 grams of protein, 7.41 grams of fat, and 49.196 grams of carbohydrates.

In the intervention group, almost all toddlers experienced weight gain, except for a few who lost weight. This weight loss was due to decreased appetite caused by

infectious diseases, namely cough and cold. This aligns with research by Syafriani, *et al.*, (2023), who obtained a p-value = 0.023, indicating a relationship between infectious diseases and the incidence of underweight. Some toddlers who gained weight also experienced an improvement in their nutritional status. However, some toddlers who gained weight still remained classified as underweight, indicating the need for further action from the community health center.

CONCLUSION

In the treatment group, the mean body weight increased from 10.83 kg to 11.22 kg after the intervention. The control group also experienced a weight increase from 10.90 kg to 11.11 kg after the intervention period. Therefore, it can be concluded that the provision of Pateta instant noodles significantly influenced the body weight of underweight toddlers in the working area of the Makrayu Community Health Center in Palembang.

STUDY LIMITATIONS

a. Some toddlers did not finish the provided noodles, so family members consumed the remaining portions.

b. During the 24-hour food recall interviews, some parents could not recall in detail all the items their children had consumed.

c. This study did not address several factors such as physical activity, maternal education level, and social and economic factors. Future research should investigate these potential influences on child nutritional status.

d. The limited duration of the study resulted in weight gain that was not substantial enough to change the nutritional status of some toddlers, who remained underweight.

e. The initial weighing before the intervention was conducted in the afternoon, after lunch. This may have resulted in less accurate body weight measurements, potentially elevated due to recent food consumption.

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