THE EFFECTIVENESS OF SNAKEHEAD FISH NUGGETS ON BODY MASS INDEX OF BREASTFEEDING MOTHERS

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KEYWORDS

Nuggets, Snakehead Fish, Body Mass Index, Breastfeeding Mothers

ABSTRACT:

Introduction: Breastfeeding mothers represent a particularly vulnerable demographic when it comes to malnutrition. Weight loss in this group often correlates with a reduced Body Mass Index (BMI).
Objectives: The aim of this study is to assess the effect of snakehead fish nuggets on the BMI of breastfeeding mothers. A preexperimental design was employed, specifically a one-group pretest-posttest approach.
Methods: The study sample comprised 128 participants, selected through a quota sampling method. Data collection involved the use of observation sheets, microtoise/stature meters, and scales. Measurements of BMI (height and weight) were taken before and after the intervention on day 14. The data were analyzed utilizing the Wilcoxon signed-rank test.
Results: The findings indicated that a significant effect of the snakehead fish nuggets on the Body Mass Index (BMI) of breastfeeding mothers.
Conclusions: The study showed that there is a significant difference in BMI values in breastfeeding mothers before and after taking snakehead fish nuggets. Therefore, it is recommended that the Community Health Center provide routine education in their work area to help improving the nutritional status of breastfeeding mothers.

1. Introduction

Breastfeeding mothers are likely to experience a weight loss that is twice as significant as that of mothers who do not engage in breastfeeding following childbirth (Ratih Suryaman, Elpinaria Girsang, 2021). During the initial year of breastfeeding, weight loss may range from 5 kg to 2 kg after the infant's birth (Ruan *et al.*, 2024). Additionally, a reduction in weight is associated with a lower Body Mass Index (BMI) among breastfeeding mothers (Karcz, Lehman and Królak-Olejnik, 2020).

The nutritional status of breastfeeding mothers can be evaluated through anthropometric measurements, specifically by assessing weight and height (Yosali, 2022). These two measurements are then utilized to calculate BMI (Fariz, 2023). A BMI of less than 18.5 in breastfeeding mothers indicates a higher risk of breastfeeding difficulties compared to those with a normal nutritional status (Rofiana, Pradigdo and Pangestuti, 2021).

Breastfeeding mothers with poor nutritional status will affect the adequacy of breast milk because the body needs sufficient nutrients to produce breast milk while the body of poor nutritional status mothers cannot fulfill the demand and therefore it will also affect the quality of produced breastmilk (Oktarina and Wardhani, 2020). Many efforts have been made to overcome the problem of malnutrition in

breastfeeding mothers, one of which is by providing additional food in the form of snakehead fish nuggets (Ekawidyani *et al.*, 2022).

Nuggets represent a category of processed food that is readily available and highly sought after by diverse demographics, including both children and adults, primarily due to their appealing flavor. A notable ingredient in the production of nutritious nuggets is snakehead fish, recognized for its substantial protein content, as well as significant levels of zinc, iron, and albumin (Ratnasari and Dewi R, 2021). A serving of 100 grams of snakehead fish nuggets comprises 9.12 grams of carbohydrates, 18.66 grams of protein, 2.28 grams of albumin, 13.76 grams of fat, along with 81.59 mg/kg of calcium, 2.95 mg/kg of iron, and 6.70 mg/kg of zinc (Simanjuntak *et al.*, 2023).

The protein found in snakehead fish nuggets is of high nutritional quality, easily digestible, and contributes to the development of muscle tissue within the body (Agusta, Ayu and Rahmayuni, 2020). Maintaining adequate levels of albumin in the body facilitates effective nutrient circulation in the bloodstream, which can support weight gain. Prior studies have indicated that the administration of snakehead fish extract capsules can enhance body weight, thereby improving nutritional status, body weight, and body mass index (Warouw, 2021). Additional research has demonstrated that daily consumption of 2 grams of snakehead fish can elevate blood albumin levels by 0.6 to 0.8 grams/dl over a period of 7 to 10 days (Erdani, Novika and Ramadhana, 2021).

Malnutrition among breastfeeding mothers can hinder the recovery process following childbirth, as well as the growth and development of their children. In the Health Center area of Bogor City, it has been observed that 9.4% of breastfeeding mothers possess a body mass index (BMI) that falls below the normal range. One potential intervention to enhance the nutritional status of these mothers is the provision of snakehead fish nuggets. Previous studies indicate that the introduction of snakehead fish substitute biscuits has a beneficial impact on weight gain in children suffering from poor nutritional status, with an average increase of 0.83 kg (Windiyaningsih, Sulistyowati and Ariestanti, 2021). Additionally, other research has demonstrated that the consumption of snakehead fish dumplings positively influences the nutritional status of women of childbearing age who are experiencing chronic energy deficiency (CED) (Sarumaha, 2018).

An analysis of patient visits to the outpatient department of the Bogor Community Health Centre revealed that certain breastfeeding mothers were suffering from malnutrition. To date, there has been no research undertaken in the Community Health Centres of Bogor regarding the impact of snakehead fish nuggets on the Body Mass Index (BMI) of breastfeeding mothers. It is plausible that outcomes may vary due to cultural influences and the autonomy of each region.

2. Objectives

This study will concentrate on evaluating the effectiveness of snakehead fish nuggets on the Body Mass Index (BMI) of breastfeeding mothers.

3. Methods

Design

A pre-experimental with a one group pretest-posttest design. This design is beneficial for conducting

initial evaluations of interventions; however, it has limitations in determining causal relationships due to possible confounding variables and the lack of a control group for comparison purposes. The researchers performed preliminary evaluations of the snakehead fish nuggets intervention prior to committing to more rigorous experimental methodologies. Additionally, this design serves to investigate the potential impacts of the intervention, yielding data that may support the need for more controlled experimental studies in the future.

Ethical clearance was obtained from the Research Ethics Committee of Wijaya Husada Institute, number 008/STIKes-WH/IX/2024, dated 10th September 2024. Written informed consent was obtained from each key informant, and verbal consent was obtained from each respondent. The confidentiality of the study participants was maintained at each level of response.

Sample

The research was carried out within the Bogor Community Health Center's jurisdiction from September to December 2024, involving a total sample of 128 participants. The inclusion criteria for this study encompassed breastfeeding mothers with infants aged 12 to 24 months who were in good health, cooperative, and willing to participate. Conversely, the exclusion criteria included breastfeeding mothers with infants younger than 12 months or older than 24 months, those in poor health, and those unwilling to participate. The sampling method employed was quota sampling.

Data collection

Instrument

The research instruments included observation sheets to document the provision of snakehead fish nuggets to participants, the snakehead fish nuggets produced by the researchers, a stature meter/microtoise for measuring the height of breastfeeding mothers, and digital scales for weighing the respondents. To prepare 500 grams of snakehead fish nuggets, the following ingredients are required: 200 grams of snakehead fish, 75 grams of wheat flour, 25 grams of bread flour, salt to taste, 25 grams of chicken eggs, 50 grams of carrots, 15 grams of leeks, 25 grams of garlic, 50 grams of egg whites, 25 grams of shallots, 15 grams of celery, and 35 ml of oil. The preparation involves combining all the ingredients, steaming the mixture for 20 minutes, and then cutting it into pieces as desired. The snakehead fish nuggets can be stored in the refrigerator. If intended for a visit to a breastfeeding mother, it is advisable to fry the nuggets beforehand to ensure they are ready for immediate consumption.

Body Mass Index assessment

Participants received an intervention consisting of fried snakehead fish nuggets, administered once daily for 14 consecutive days, with each serving comprising 2 pieces of nuggets (100 grams). Data collection involved measuring Body Mass Index (BMI) through height and weight assessments before and after the intervention on day 14. The classification of Body Weight (BW) in relation to Height for BMI parameters is as follows (World Health Organization, 2023):

1. Underweight: BMI less than 18.4 kg/m²
2. Normal: BMI between 18.5 and 22.9 kg/m²

3. Overweight: BMI between 23 and 24.9 kg/m²

Data analysis

Data analysis was conducted to assess any differences in the body mass index of breastfeeding mothers using the Wilcoxon signed-rank test, as the data did not follow a normal distribution.

4. Results

Table 1 indicated that the majority of respondents fell within the age range of 20 to 29 years, comprising 56.3% of the sample. Additionally, 65.6% of the participants had attained a Senior High School education level, while a significant portion of the respondents, 75%, were identified as housewives.

Table 2 presented the Body Mass Index (BMI) values of the respondents prior to the intervention, revealing an average of 22.67 kg/m² and a median of 22.90 kg/m², accompanied by a standard deviation of 5.38. The recorded BMI scores ranged from a minimum of 14.90 kg/m² to a maximum of 36.90 kg/m². Following the intervention, the average BMI values increased slightly to 22.75 kg/m², with a median of 22.95 kg/m² and a standard deviation of 5.39. Post-intervention, the lowest BMI score recorded was 15.00 kg/m², while the highest reached 37.10 kg/m².

Table 1: Respondents' characteristics (n = 128)

Characteristics	Categories	n (%)
Age (years old)	20-29	72 (56.3)
	30-39	52 (40.6)
	40-49	4 (3.1)
Current education level	Elementary School	8 (6.25)
	Junior High School	28 (21.9)
	Senior High School	84 (65.6)
	University/College	8 (6.25)
Occupation	Housewife	96 (75)
	Self-employed	20 (15.7)
	Laborer	12 (9.3)

Table 2: Distribution of body mass index before and after snakehead fish nuggets given (n=128)

Categories	Pretest	Posttest
Mean	22.67	22.75
Median	22.90	22.95
SD	5.38	5.39
Minimum	14.90	15.00
Maximum	36.90	37.10

SD – standard deviation

Table 3: Effectiveness of Snakehead Fish Nuggets on BMI of Breastfeeding Mothers

BMI before and after intervention	N	mean rank	sum of ranks	p value
Negative Ranks	8	14.50	29.00	0.000
Positive Ranks	84	11.76	247.00	
Ties	36			
Total	128			

Table 3 indicated that the number of negative ranks was 8, signifying that 8 respondents experienced a reduction in BMI following the intervention. Conversely, the positive rank value was 84, demonstrating that 84 respondents saw an increase in BMI after the intervention. The results for ties, which amounted to 36, reveal that among the 128 respondents, 36 did not exhibit an increase in BMI post-intervention. The p-value of 0.000 suggests a statistically significant difference in BMI values among breastfeeding mothers before and after the intervention involving consumption of snakehead fish nuggets.

5. Discussion

Body Mass Index (BMI) is a metric established by the World Health Organization (WHO) to assess body weight in relation to the square of an individual's height. The nutritional status of mothers who are breastfeeding is significantly affected by their nutrient intake. It is essential for breastfeeding mothers to maintain a balanced diet, as this directly impacts milk production. Adequate nutrition for these mothers plays a crucial role in the growth and development of their infants. When mothers successfully achieve a balanced nutritional intake during breastfeeding, it not only promotes optimal growth in their babies but also contributes to the mother's overall health and strength, resulting in a beneficial quality and quantity of breast milk production (Kair *et al.*, 2019).

Snakehead fish is a rich source of protein, essential for the body to construct and sustain tissues while also facilitating the repair of damaged (Pioner, 2021). Additionally, protein plays a crucial role in defending the body against foreign substances and organisms. It is integral to the formation of antibodies, which are vital for immune response. Meeting protein requirements can enhance antibody production, thereby reducing the risk of various infections (Agusta, Ayu and Rahmayuni, 2020).During lactation, a mother must eat an adequate amount of protein in order to maintain her own muscle mass, while also providing adequate nutrition to the infant through breast milk (Huynh *et al.*, 2018). An increased protein intake correlates with a greater formation of muscle tissue, a relationship that is also reflected in the Body Mass Index (BMI) value (AKG, 2019).

Based on this study, giving snakehead fish nuggets for 14 consecutive days, showed a significant impact (p=0.000) on BMI of breastfeeding mothers. The findings indicated that the average BMI prior to the introduction of snakehead fish nuggets was 22.67 kg/m². Following the intervention, the average BMI increased to 22.75 kg/m². There was a tendency of increasing BMI of breastfeeding mothers who were given snakehead fish nuggets.

The components utilized in the preparation of snakehead fish nuggets include snakehead fish, wheat flour, red beans, egg whites, carrots, celery, and various spices. Wheat flour and red beans serve as sources of carbohydrates. In the human body, carbohydrates are stored as glycogen, which, over time,

can be converted into triglycerides, leading to fat reserves (N and Sobariah, 2022). The accumulation of fat in adipose tissue can result in an increase in body weight. Consequently, an increase in body weight will also elevate an individual's Body Mass Index (BMI) (Mufida, Rohmah and Wungo, 2022).

Snakehead fish is recognized for its high nutritional content, particularly in protein and zinc. The protein found in snakehead fish is easily digestible and readily converted into amino acids, which are essential for muscle tissue formation in the body (Pearce *et al.*, 2024). Additionally, the zinc present in snakehead fish enhances immunity in breastfeeding mothers, reducing their susceptibility to illness (Erdani, Novika and Ramadhana, 2021). Zinc also plays a crucial role in the synthesis of growth hormones, which are vital for the development of body tissues. Both protein, in the form of albumin, and zinc are nutrients that can help elevate BMI to a normal range (Ratnasari and Dewi R, 2021). The findings of this study align with the research conducted by Nouvy Helda Warouw in 2021, which demonstrated that the administration of snakehead fish extract capsules over a period of 14 consecutive days effectively increased body weight. This is attributed to the presence of essential amino acids, proteins, vitamins, and minerals in snakehead fish extract that are necessary for the body (Warouw, 2021).

The results of another study by Mela Mustika Sari, *et al*. in 2022 showed that giving snakehead fish substitute biscuits had a positive effect on weight gain in children with malnutrition status, with an average of 0.83 kg increase (Sari, Hartiningsih and Sastramihardja, 2022). The results of this study were reinforced by Herlina Tarigan's research (2022) in Central Tapanuli. Based on her research, providing tempeh nuggets as a substitute for snakehead fish was proven to improve nutritional status (BMI) in school aged children (Tarigan, 2022).

Snakehead fish nuggets were given every day with an amount of 100 grams or as many as 2 pieces. It contains 235 kcal energy, 2.28 grams albumin, 1.59 mg calcium, 2.95 mg iron, 9.12 grams carbohydrate, 13.76 grams fat, 18.66 grams protein and 6.70 mg Zinc. With these various nutrients, snakehead fish nuggets can have a significant impact on BMI (Gilda and Muryawan, 2017).

Giving snakehead fish nuggets promotes positive results for breastfeeding mothers in improving nutritional status, especially BMI value, since it contains high nutritional value, easily to digest and can help the process of forming muscle tissue in the body (Asfar *et al.*, 2015). The protein in snakehead fish also functions to improve the quality of breast milk (Anam *et al.*, 2020). This finding confirms the effectiveness of the method of providing snakehead fish nuggets as an alternative nutrition for breastfeeding mothers (Sibarani, 2020). The practical implications include the preparation of activity programs to provide routine education that can help improve the knowledge of breastfeeding mothers in improving their nutritional status. With the scientific support (evidence-based practice) from this study, it encourages the use of various alternatives for improving nutritional health status of breastfeeding mothers in the community.

To enhance the education of breastfeeding mothers regarding the consumption of snakehead fish nuggets for the purpose of increasing BMI, we can develop educational resources and evidence-based materials that highlight the nutritional advantages of snakehead fish. Public health practitioners could also organize community workshop to educate participants on the benefits and preparation methods for snakehead fish nuggets. Collaborations between healthcare professionals such as nurses, midvies,

lactation consultants, dieticians and doctors help to raise awareness and ensure that breastfeeding mothers are well-informed and can effectively integrate snakehead fish nuggets into their diets.

6. Discussion

This study concluded that snakehead fish nuggets intake had significant effect on the Body Mass Index (BMI) of breastfeeding mothers. It is recommended that the Community Health Center provide regular nutrition education in their work area to help improving the health status of breastfeeding mothers.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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