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THE EFFORTS TO IMPROVE THE NUTRITIONAL STATUS OF TODDLERS THROUGH SUPPLEMENTARY FEEDING WITH SNAKEHEAD FISH SUBSTITUTION: A LITERATURE REVIEW

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ABSTRACT

Lack of nutritional intake can lead to malnutrition in children which will affect the growth and development of children. Supplementary feeding (PMT) made from local food is one of the strategies for handling nutrition problems in toddlers. One of the local foods that contain many nutrients is snakehead fish, which is a source of complete and high-quality animal protein. A non-systematic literature review that discussed the effect of snakehead fish substitution supplementary food with nutritional status in toddlers. The literature search was conducted through the Google Scholar search site with keyword searches such as supplementary food, nutritional status, and snakehead fish. The synthesized articles are experimental studies with restrictions from 2013 to 2023. The journal format used was PDF, in Indonesian and English, and was a free journal. The research results of these three articles are that there is a significant difference in changes in WAZ (p = 0.034) and WHZ (p = 0.017) of stunted toddlers between group-1 and group-2, there is a significant difference (p = 0.01) in the increase in weight and height of undernourished children aged 3-5 years between treatment group F15 and group F0 and there is a significant difference (p = 0.029) in the weight of children aged 12□36 months between the two groups. Supplementary feeding with cork fish substitution can improve nutritional status based on body weight index according to age and body weight index according to height and can reduce stunting rates (height for age) in children under five. The suggestion that can be given is that improving the nutritional status of toddlers can be done by providing additional food by maximizing local food products.

Keywords: supplementary feeding, nutritional status, snakehead fish

Introduction

Growth and development during childhood are influenced by adequate nutritional intake (1), lack of nutritional intake can lead to malnutrition in children (2). The nutritional status assessment indicators used to measure nutritional status are wasting, stunting, and underweight (3). Wasting is determined based on the index of weight-for-length with a z-score <-2SD, stunting is determined based on the index of height-for-age with a z-score <-2SD, and underweight based on weight-for-age with a z-score <-2SD (4). Wasting indicates low body weight for height. Wasting can be caused by sudden weight loss due to acute illness or low food intake, increasing the risk of death (5). Based on SSGI data, the percentage of waste from 2021 (7.1%) increased in 2022 (7.7%) as

well as the incidence of underweight increased from 2021 (17%) to 2022 (17.1%). Meanwhile, the incidence of stunting decreased from 24.4% in 2021 to 21.6% in 2022 (6).

Previous research explains that there are many health and physical impacts of undernutrition in children such as stunted physical growth and motor development, low intellectual quotient (IQ), behavioral problems, and low social skills. Childhood malnutrition also leads to high rates of chronic diseases in adulthood which may have intergenerational impacts (7,8). The most pressing determining factor is inadequate food intake (9,10). The Indonesian population consumes more cereals than animal foods, even though animal-sourced foods contain important nutrients to build cells in the body that are needed in the growth and development process of children under the age of five. Animal protein only contributes 4% as a source of energy in Indonesia (11,12). Data from the Food and Agriculture Organization of the United Nations (FAO) shows that the consumption of animal protein per day in Indonesia is only around 20-30 grams, less than in other ASEAN countries (13).

Supplementary feeding made from local food is one of the strategies to overcome nutrition problems in toddlers with the target of underweight toddlers, underweight toddlers, and underweight toddlers. Supplementary feeding made from local food can be in the form of snacks which are additional food and not a substitute for the main food (14). Based on several previous studies, the results show that there is a significant relationship between nutritional status and supplementary feeding in toddlers (15–17). Local food-based supplementary foods have also been shown to be effective and more easily accepted by toddlers. Previous studies have shown that the use of local food products or local food substitutes can improve the nutritional status of malnourished toddlers (18).

One of the local foods that contain many nutrients is snakehead fish, which is a source of complete and high-quality animal protein because it contains complete essential amino acids its composition is close to the amino acids needed by the body, and its digestibility is high so that the amount that can be absorbed is also high. Fish contains nutrients that are very important for the growth and development of toddlers (19)(20)(21). According to the Indonesian Food Composition Table (2017), fresh snakehead fish has a protein content of 16.2% and dried snakehead fish has a protein content of 58.0%. Meanwhile, snakehead fish meat that has been dried and made into flour has a protein content of around 66% (22).

There have been many studies on snakehead fish substitution supplementary foods, but these studies have only looked at acceptability and nutritional content. It is still rare to link snakehead fish substitute supplementary food with improved nutritional status in toddlers. This study aims to analyze the effect of supplementary food substitution of snakehead fish on nutritional status in toddlers. So that it can help in efforts to prevent and improve the nutritional status of toddle.

Methods

This literature review summarizes from several previous studies to provide information on cork fish substitution supplementary foods associated with wasting incidence in toddlers. The method used in this study is a non-systematic literature review method with a descriptive analysis approach through literature searches by reading various journals related to the research topic.

The first stage was a journal search using a search site on Google Scholar with relevant keywords and searching for synonyms using the MeSH search method. The keywords used were "supplementary feeding" OR "additional food" AND "malnutrition" OR "wasting" OR "stunting" AND "toddlers" OR “under-five children" AND "cork fish" OR "snakehead fish", The selection of articles also set limits from 2013 to 2023. The journal format used is PDF, in Indonesian and English, and is a free journal.

The second stage is screening. In this step, all references that have been obtained will be checked for duplication and adjusted to the predetermined criteria. The third stage in this research is Eligibility Checking. Articles that were screened were articles that used experimental research that analyzed the effect of supplementary food on improving the nutritional status of toddlers. The final stage of this research is that research journals that are by the criteria sought are then collected and analyzed and then made a summary as data extraction. The research results of all journals collected are then summarized and discussed to answer the objectives of the study.

Results

Study Selection

Four steps of this review are indicated in a flow diagram (Figure 1). A total of 92 studies were acquired through a comprehensive search of the electronic databases. Journals that do not meet the exclusion criteria include paid articles, not full text, research locations not in Indonesia, research reviews, and additional food that does not use snakehead fish. The journals obtained according to the criteria were then filtered into 3 journals. Thus, 3 publications were included in this review as illustrated in Figure 1.

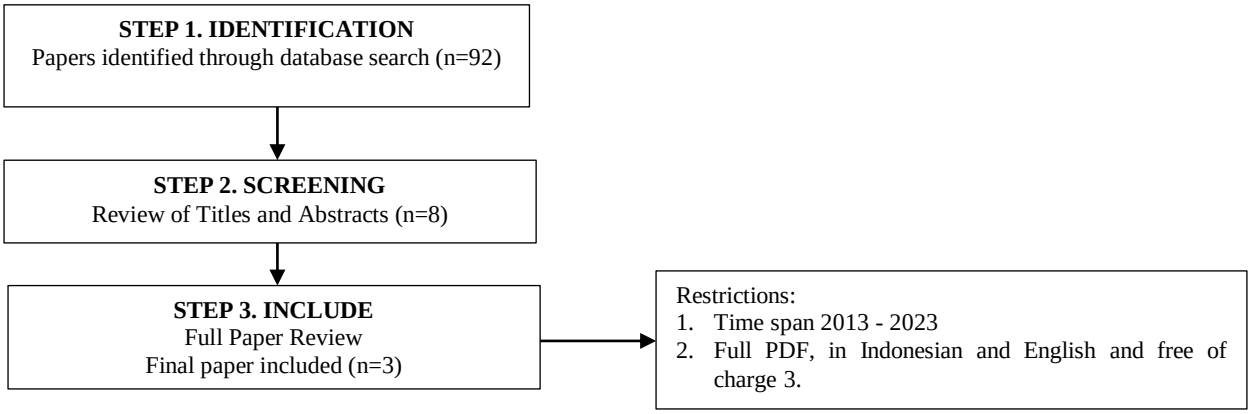

Figure 1. Diagram of Literature Search

The following is a review of 4 journals obtained from search results on the Google Scholar site can be seen in Table 1.

Table 1. Extraction of Artikel Data

Title / Author	Population and sample	Intervention	Results
Provision of supplementary food substitution of snakehead fish meal improves the nutritional status of toddlers (Nadimin, 2022)	a. Toddlers who are stunting b. Control and treatment groups of 25 children for each	a. Group-1 was intervened with snakehead fishmeal-based supplementary food (PMT Tibus) and online nutrition education. Group 2 only received nutrition education b. Administration of PMT Tibus for 1 month c. Nutrition education was given to mothers of children under five regularly (2 times a week) for 30 days	a. WAZ of group-1 was increased by 0,11 ± 0,28. Otherwise, the WAZ of group 2 was decreased by -0,11 ± 0,42. HAZ of group-1 and group-2 increased (0,22 ± 0,31 vs 0,24 ± 0,31). WHZ of group-1 increased by 0,4 ± 0,04 and group-2 was decreased by -0,37 ± 0,68. b. There was a significant difference in WAZ and WHZ scores between the two groups, respectively, with all p values < 0,05.
Improving the nutritional status of children under five years by the intervention of blondo, snakehead fish [Channa striata], and brown rice [Oryza nivara] based biscuit) (Widodo, 2015)	a. Undernourished toddlers b. Control and treatment groups of 25 children each c. Total analyzed 44 children	a. The treatment group was given F15 biscuits (substituted with blondo, snakehead fish flour, and brown rice flour) while the control group was given F0 biscuits (without any substitution). b. Providing biscuits for 90 days	a. The difference between baseline and end line in control group for energy was 20.8±3.9 kcal, the treatment group was 45.6±8.6 kcal, the endline in the control group for protein was 9.5±1 g, and the treatment group was 16.6±2.4 g. b. The changing of weight in the control group from 11.7±0.8 kg increase to 13.3±1.1 kg, and the weight of the treatment group from 11.7±0.7 kg increase to 13.6±1.0 kg. c. The increase of albumin level in the control group was 0.3±0.1 g/dl, and the treatment group was 1.0±0.2 g/dl.
Effect of Combinations of Snakehead Fish Biscuits and Purple Sweet Potato on Body Weight Children Aged 12–36 Months at The Puskesmas Purwadadi Work Area (Sari, dkk, 2022)	Total sample size of 64 children aged 12-36 months divided into two groups	a. The treatment group was given biscuits with a combination of snakehead fish and purple sweet potato, while the control group was given biscuits without the addition of snakehead fish and purple sweet potato. b. Providing biscuits for 30 days	a. There was an increase in body weight in the intervention group with an average of 6.65% and in the control group with an average of 1.15%. b. There was a difference in less weight gain ($p<0.05$) after being given the intervention

Overview of Included Articles

The three articles reviewed were studies that used experimental methods with two groups, namely treatment and control groups. Respondents used in this study were stunted toddlers (23), underweight toddlers (19) and toddlers aged 12-36 months (24). When viewed from Table 1 that the research conducted in these three journals is by providing PMT-Tibus and biscuits substituted with snakehead fish flour, snakehead fish and other ingredients. The study was conducted for 30 days and 90 days with different treatments between the treatment group and the control group.

Discussion

The first 1,000 days of life is a critical period for children to reach their potential and early development can be achieved by integrating nutrition interventions (25). Supplementary feeding and behavioral intervention programs that focus on stimulation and feeding practices provide positive benefits to toddlers' nutritional status and development (26). Family support from all aspects is critical, especially for children with stunted growth who need support from their families in providing adequate nutrition to support their growth and development (27).

Body weight is one of the anthropometric measures that provides an overview of body mass and is easy to change (19). The results showed that there was an increase in Z-score of body weight according to age (Z-BB/U) in the intervention group (stunting toddlers) after being given PMT-Tibus and online nutrition education (23), there was a change in body weight of the intervention group (undernourished toddlers) from 11.7 + 0, 7 kg to 13.6 + 1.0 kg after being given F15 biscuits (substitution of blondo, snakehead fish flour, and brown rice flour) (19) and there was an increase in the average body weight of the intervention group (toddlers 12-36 months) by 6.65% after being given cork fish biscuits and purple sweet potato (24). When viewed from the results of the research of these three journals are in line, namely additional food interventions with substitutions of snakehead fish can increase the body weight of toddlers. The results of this study are in line with several previous studies, namely the provision of interventions in the form of PMT or additional food can improve the nutritional status of malnourished toddlers (28–30).

Assessment of nutritional status based on the Weight-For-Age index assesses nutritional status that occurs acutely or chronically because BB is very sensitive to various health changes experienced by children. The child's weight gained every month must be in accordance with the child's age, (KBM), if the weight gain is below KBM for a relatively long time it can cause the child to experience nutritional problems (underweight), therefore it is important to monitor the child every month so that if a problem occurs it can be addressed immediately. Assessment of nutritional status is based on the proportion of the child's body by comparing the weight (31,32).

The results showed there was a change in height but there was no significant difference in the change ($p=0.05$) in height of undernourished children aged 3-5 years between the F15 treatment

group (substitution of blondo, cork fish flour, and brown rice flour) and the F0 group (without any addition) (19). There was a change in HAZ in the intervention group (stunted toddlers) after being given PMT-Tibus and online nutrition education, but there was no difference in HAZ changes in the two groups (23).

The height-for-age index reflects past nutritional status as a result of chronic undernutrition. Height gain is relatively insensitive to short periods of undernutrition (33). The effect of undernutrition on height growth is only apparent over a long period of time. The 30-day to 90-day PMT intervention in this study did not result in changes in height-for-age nutritional status. Height detection cannot reflect changes in nutrient supply in a short period of time. A child's current nutritional status for HAZ is an accumulation of eating habits from the previous time period, so a decrease in current food intake does not directly affect nutritional status based on height (34).

This proves that supplementary feeding during the intervention was not sensitive to increasing height-for-age. PMT has not been optimally utilized. One of the reasons is the lack of parental attention to growth and development. Many children are found to have delayed growth and development due to the lack of parents who care about early detection of growth and development (35). Adherence to biscuit consumption is also influenced by mothers/caregivers in order to motivate toddlers to consume additional food (36).

One strategy to fulfill the nutritional intake of children under five can be done through providing additional food and providing education to parents. Providing additional food in the form of additional food substituted with fish ingredients can improve the nutritional status of children under five. Several studies have developed additional food from snacks by adding cork fish flour. The results of research on biscuits show that fishmeal substitution can increase the quality value of biscuit protein(37).

Supplementary feeding focuses both on macronutrients and micronutrients for toddlers is needed to prevent nutritional problems (38). Based on several previous studies, the results show that there is a significant relationship between nutritional status and supplementary feeding in toddler (15–17). Supplementary foods based on local ingredients have proven effective and more acceptable than supplementation.

Previous studies have shown that the use of local food products or local food substitutes can improve the nutritional status of undernourished children (18). This is in line with the results of the research in this article, which is an increase in WHZ (0.04 ± 0.45) in the intervention group (stunting toddlers) after being given PMT-Tibus and online nutrition education, and there is a significant difference in WHZ changes between the intervention group and the control group ($p = 0.017$).

Conclusion

Supplementary feeding with snakehead fish substitution can improve nutritional status based on WAZ index and WHZ index and can reduce stunting rates (HAZ) in toodlers. The suggestion that can be given is that improving nutritional status in toddlers can be done by providing additional food by maximizing local food products.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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