Oral Presentation

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Feeding local food noodles to haemoglobin (Hb) levels of children aged 12-59 months in the Rasau Jaya health centre area

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Abstract

Background: Nutritional problems still have a serious impact on the quality of human resources in Indonesia. Underweight is one of the serious nutritional problems that need to be addressed in addition to stunting. The results of the 2018 Riskesdas showed that the prevalence of undernourished children in Indonesia was 13.8%. The proportion of underweight toddlers in West Kalimantan at 23.8% is still high when compared to national figures. While in Kubu Raya Regency, the percentage of underweight toddlers is 16.89%. Overcoming undernourished toddlers is done by providing additional food (PMT). Additional food made from local ingredients in the form of noodles high in micronutrients. Noodles are an alternative and popular food substitute for rice that is widely consumed by the community. Making noodles can be modified from local ingredients, including yellow sweet potato (Ipomoea batatas L) is a type of tuber that has many advantages. Noodles can be enriched with nutrients by adding micronutrients sourced from local peatland food ingredients, namely cork fish and red fern. Cork fish has a protein content of 25.2%, and contains albumin 62.24 g/kg (6.22%). Meanwhile, red fern contains the minerals Calcium and Iron 291.32 mg, allowing it to prevent anaemia.

Objective: To determine the effect of giving noodles substituted with peatland local food sources of micronutrients on haemoglobin (Hb) levels in children aged 12-59 months in the Rasau Jaya Health Centre area.

Methods: This research design is an experimental study with a research design of Quasy Experiment. The research design model is Non-Randomised Group pre-post test design. In this design, treatment group 1 and treatment group 2 were not randomly selected. The population in this study were undernourished toddlers aged 12-59 months in the Rasau Jaya Health Centre work area. While the sample in this research is a malnourished toddler who is a representative of the population. The sample met the inclusion criteria, namely toddlers aged 12-60 months, domiciled in the Rasau Jaya Puskesmas work area, underweight toddlers.

Results: There was an increase in the average blood haemoglobin level of toddlers by 0.2833 with a p-value of 0.000. The average value of blood haemoglobin levels in the sample increased after being given noodles substituting sources of micronutrients from local peatland food sources.

Conclusion: The provision of noodles substituting peatland local food sources of micronutrients can increase haemoglobin (Hb) levels in children aged 12-59 months in the Rasau Jaya Health Centre area.

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Keywords: noodles, local food, Hb levels.

INTRODUCTION

Underweight is a serious nutritional problem that needs to be addressed. According to a 2017 UNICEF report, 92 million (13.5%) children under five in the world are underweight (Hanifah, Djais and Fatimah, 2019). The national prevalence of underweight toddlers in 2018 still reached 13.8% (Indonesian Ministry of Health, 2018). Malnourished toddlers in West Kalimantan were 23.8%, and Kubu Raya Regency was 16.89%. This shows that malnutrition in under-fives is still a serious health problem (Riskesdas, 2018). Food availability, intake and parenting patterns in providing food are the causes of nutritional problems among toddlers (Arlius, Sudargo and Subejo, 2017). (Wijayanti, 2010).

Underweight status is also due to low levels of adequate intake of energy, protein and fat including micronutrients (Shafira Roshmita Diniyyah, 2017). Inadequate intake of micronutrients, especially protein, zinc and iron consumption, also contribute to growth inhibition (Sundari and Nuryanto, 2016). Iron and zinc deficiencies affect growth, due to decreased appetite and worsened immunity to infection. Iron-deficient children have a longer duration of infection (Elemraid et al., 2011).

Overcoming underweight toddlers is done by providing additional food (PMT) (Iskandar, 2017) (Aghnita, 2018). PMT is nutritious food in addition to the main food for the target group to fulfil nutritional needs (Ministry of Health, 2011). PMT requirements for toddlers meet 350-400 calories and 10-15 grams of protein, to fulfil 1/3 of the needs (Nuringtyas and Adi, 2018). PMT has been given for a short period of time, not utilising local food ingredients that are rich in micronutrients (Kurnia Pramudia., Sarbini Dwi., 2010).

One of the local-based PMTs that can be made is noodles high in micronutrients as an alternative and popular food that is widely consumed by the community because the price is cheap and the processing and presentation are simple (Fitriani, 2019). Making noodles can be modified from local ingredients, including yellow sweet potato (Ipomoea batatas L) which has many advantages compared to other tubers (Mulyadi et al., 2014). In addition, the yellow colour of sweet potato can function as a natural dye (Richana, 2009). Yellow sweet potato contains a lot of beta-carotene equivalent to carrots (Nuringtyas and Adi, 2018).

Noodles can be enriched with micronutrients from local peatland food sources, namely cork fish and red fern. Cork fish contains albumin and the mineral zinc (Zn) in the body of cork fish contains 62.24 g/kg albumin (6.22%) (Yuniarti and Titik Dwi Sulistiyati and Eddy Suprayitno, 2013). The addition of zinc is very necessary in food to achieve normal serum Zn levels (Jain, Jadhav and Varma, 2013). Meanwhile, red fern contains Calcium and Iron 291.32 mg, allowing it to prevent anaemia (Mahyuni, 2015). The average Fe content in young lemiding (fern) is 0.39 mg/L. The average Fe content of old fern is 0.48 mg/L (Jenny.R and Indrawati, 2019). Kalakai or fern as a traditional vegetable typical of Kalimantan including West Kalimantan is an organic vegetable, because it grows wild, especially in peat areas (Purwandari, 2013).

Modification of ingredients in making noodles is needed, in order to enrich nutrients (Agus and Ismawati, 2018). This study will use a local food PMT formulation with yellow sweet potato, cork fish albumin and red fern extract, which will be made into noodles, then given to undernourished toddlers aged 24-59 months. Furthermore, blood haemoglobin and hair zinc levels were checked. Zinc content in hair and iron mineral analysis are useful as therapeutic guidelines in clinical investigations of toddlers with malnutrition and poor growth (Tae Hwan Han, Jin Lee, 2016) Examination of zinc levels in hair,

can determine the availability of zinc in the body (Kil, Kim and Kim, 2013).

METHODS

Design, Place, Time.

This research design is an experimental study with a Quasy Experiment research design. The research design model is the Non-Randomised Group pre-post test design. In this design, treatment group 1 and treatment group 2 were not randomly selected. This research was conducted in June-October 2022 in the working area of Rasau Jaya Health Centre, Rasau Jaya District, Kubu Raya Regency. The population in this study were malnourished toddlers aged 12-59 months in the Rasau Jaya Health Centre work area. While the sample in this research is a malnourished toddler who is a representative of the population. The sample met the inclusion criteria, namely toddlers aged 12-60 months, domiciled in the Rasau Jaya Puskesmas work area, underweight toddlers.

Materials and Tools

The ingredients used in the manufacture of these cookies consist of wheat flour, purple sweet potato flour, tempe flour, margarine, eggs, skimmed milk, powdered sugar, baking powder. Chemicals used for proximate analysis are distilled water, concentrated H2 SO4, selenium mix, NaOH, Hexane solvent, HNO3, HCl, ammonium molybdate, potassium dihydrogen, 95% ethanol, methyl red.

The tools used in making purple sweet potato flour and soya flour include a toaster oven, pin disc mill, and 80 mesh sieve. The tools used to make cookies include a mixer, grinder, roller, baking tray, and baking oven. The tools used in chemical analysis are oven, furnace, desiccator, condenser, soxhlet, Kjedahl flask, distillation apparatus, Erlenmayer flask, AAS (Atomic Absorption Spectrophotometer).

Research Stages

The research stages began with the preparation of yellow sweet potato flour and red fern extract and cork fish albumin. Furthermore, the formulation of the mixture of these ingredients was made with each composition presented in table 1.

Table 1. Formulation of Ingredients for Making Modified Noodles from Local Food Ingredients

Material Name	Modified Formula (Gram)
Wheat Flour	150
Yellow Sweet Potato	55
Cork Fish	25
Red Fern	25
Eggs	70
Oil	10
Water	50
Salt	5
Total (gr)	**390**

Source: (Nuringtyas and Adi, 2018)

The next step is to make noodles and give them to the research sample, according to the selected sample.

Data **Processing and Analysis**

Organoleptic test data to determine the selected formula was analysed descriptively using the mean value and percentage of panellist acceptance of the cookie formula. To determine the effect of treatment and the level of panellists' liking for cookies, the *Friedman* test was used. If these results show a difference between treatments, Duncan's further test is carried out. Acceptance. To determine the effect of the addition of dumbo catfish flour on the physical and chemical properties of control and selected flakes were analysed using independent samples t-test.

RESULTS and DISCUSSION

Respondent Characteristics

Purple sweet potato flour and tempe flour cookies are one of the food products that use food ingredients from wheat flour, purple sweet potato flour, tempe flour, margarine, powdered sugar, eggs, baking powder and milk powder. In this study, the formulations used in each purple sweet potato flour and tempe flour were (20%: 30%), (30%: 20%) and (40%: 10%). The cookie formula used refers to the cookie formula (Purba, Nainggolan, & Ridwansyah, 2017).

Organoleptic Properties of Cookies

Organoleptic properties testing aims to determine the selected cookie formula that will be used for further research. The testing of organoleptic properties includes colour, aroma, texture and taste attributes of the cookies. The rating scale starts from 1 - 5, namely very dislike, dislike, somewhat like, somewhat like and very like. The results of the organoleptic properties assessment can be seen in Figure 1 below.

Table 1. Characteristics of Respondents Based on Age (months), Gender, and Hb Levels in Rasau Jaya Village in 2022

Respondent Characteristics	n	%
Age (Months)		
12-24	10	33,3
25-36	13	43,3
37-48	6	20,0
49-60	1	3,3
Gender		
Male	18	60,0
Women	12	40,0
Haemoglobin Level (Pre)		
Normal	20	66,7
Anaemia	10	33,3
Haemoglobin Level (Pos)		
Normal	26	86,7
Anaemia	4	13,3
Total	30	100,0

Based on Table 1, the results of data collection can be seen that the characteristics of respondents show that most children are aged 25-36 (months), namely 43.3%. Based on gender, it was found that most were male, namely 60.0%. While haemoglobin levels at pretest and post-test were obtained more nomal, but still found toddlers who experienced anaemia.

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Assessment of the effect of substitute noodles on haemoglobin (Hb) levels in toddlers at Rasau Jaya health centre

Table 2. Distribution of Hb Level Scores Before and After giving substitute noodles in the Rasau Jaya District area 2022

	Knowledge		Difference
	Before	After	
Mean	11,6167	11,9000	0,2833
p-value		0,000	

The haemoglobin level score before and after giving the substitute noodles in Table 2 shows that from the *paired sample T-Test* test results, an increase of 0.2833 was obtained with a *p-value* of 0.000. The average blood haemoglobin level score in the sample increased after being given substitute noodles from local peatland food sources.

Discussion

The results showed that the provision of noodles using local food ingredients, in this case yellow sweet potato, red fern and cork fish, can increase blood haemoglobin levels of toddlers in the Rasau Jaya Puskesmas work area. Many things cause nutritional problems in toddlers, as a result of inadequate food consumed. Inadequate nutritional intake in toddlers will cause malnutrition and illness. The nutritional status of toddlers is highly influenced by several risk factors including

parenting and the level of energy and protein intake associated with the incidence of *underweight* in children aged 7-59 months. Most *underweight* toddlers go through a phase of poor parenting in terms of feeding practices, child treatment, and health practices (Kurnia Rahim, 2014). (Kurnia Rahim, 2014). In addition, according to Munawaroh (2015), nutritional status can not only be influenced by improper feeding practices but mothers must also pay attention to environmental hygiene and sanitation because it is related to the incidence of infectious diseases such as diarrhoea and respiratory infections. Children with nutritional deficiencies such as stunting and underweight are strongly associated with poor educational achievement, and stunted growth.

Knowledge plays an important role in the incidence of underweight children. Research by Rizal Damanik, Ekayanti, & Hariyadi (2010) analysed that the mother's education level affects the nutritional status of children under five. Mothers with low education levels have 1.49 times the risk of having children with underweight nutritional status when compared to mothers with higher education. Mother's education plays an important role in determining the best way of parenting for children, including the selection of nutritious and balanced food.

In addition, behaviour is also inseparable from malnutrition cases such as maternal behaviour in choosing nutritious food ingredients, good and correct feeding methods for toddlers. According to Irwan (2017) behaviour is the action of a community organisation or a person where the process of change occurs as a result of experience.

Interventions related to child feeding practices and maternal nutrition are key to addressing undernutrition in children. Interventions that need to be improved by providing a continuum of services from pre-pregnancy to two years of age covering the first 1000 days of life. Research conducted by Huriah et al (2014) on nutrition improvement through a home care programme in Yogyakarta showed that after a 3-month approach to toddlers with severe acute malnutrition there was a significant improvement in nutritional status and a decrease in severe acute malnutrition from 100% to 56.7%. The programme was conducted in three phases: intensive phase, strengthening phase and independent phase.

Poor sanitation and environmental hygiene also lead to digestive tract disorders, which divert energy for growth to the body's fight against infection. Another study found that the more often a child suffers from diarrhoea, the greater the threat of malnutrition. In addition, when children

are sick, they usually have a reduced appetite, resulting in lower nutrient intake. Diarrhoea is an infectious disease that often occurs in children. Globally, diarrhoea accounted for 9% of the estimated 5.9 million deaths in children under five years old in 2015 (UNICEF, 2015). Nearly one in five child deaths of about 1.5 million each year are due to diarrhoea. Diarrhoea contributes to undernutrition in children through several pathways, including reduced energy intake, loss of body electrolytes and malabsorption (Neumann et al, 2004).

Poor access to sanitation facilities and clean water and poor hygiene practices can affect child growth through infection and morbidity (e.g. diarrhoea), but also through decreased nutrient absorption due to chronic swelling of the gut. Evidence from global studies suggests that environmental enteric dysfunction, which is a subclinical disorder of the small intestine that causes swelling of the intestine and decreased nutrient absorption, is an important cause of stunting (MOH, 2017).

CONCLUSIONS and SUGGESTIONS

The provision of noodles substituting peatland local food sources of micronutrients can increase haemoglobin (Hb) levels in children aged 12-59 months in the Rasau Jaya Community Health Centre area.

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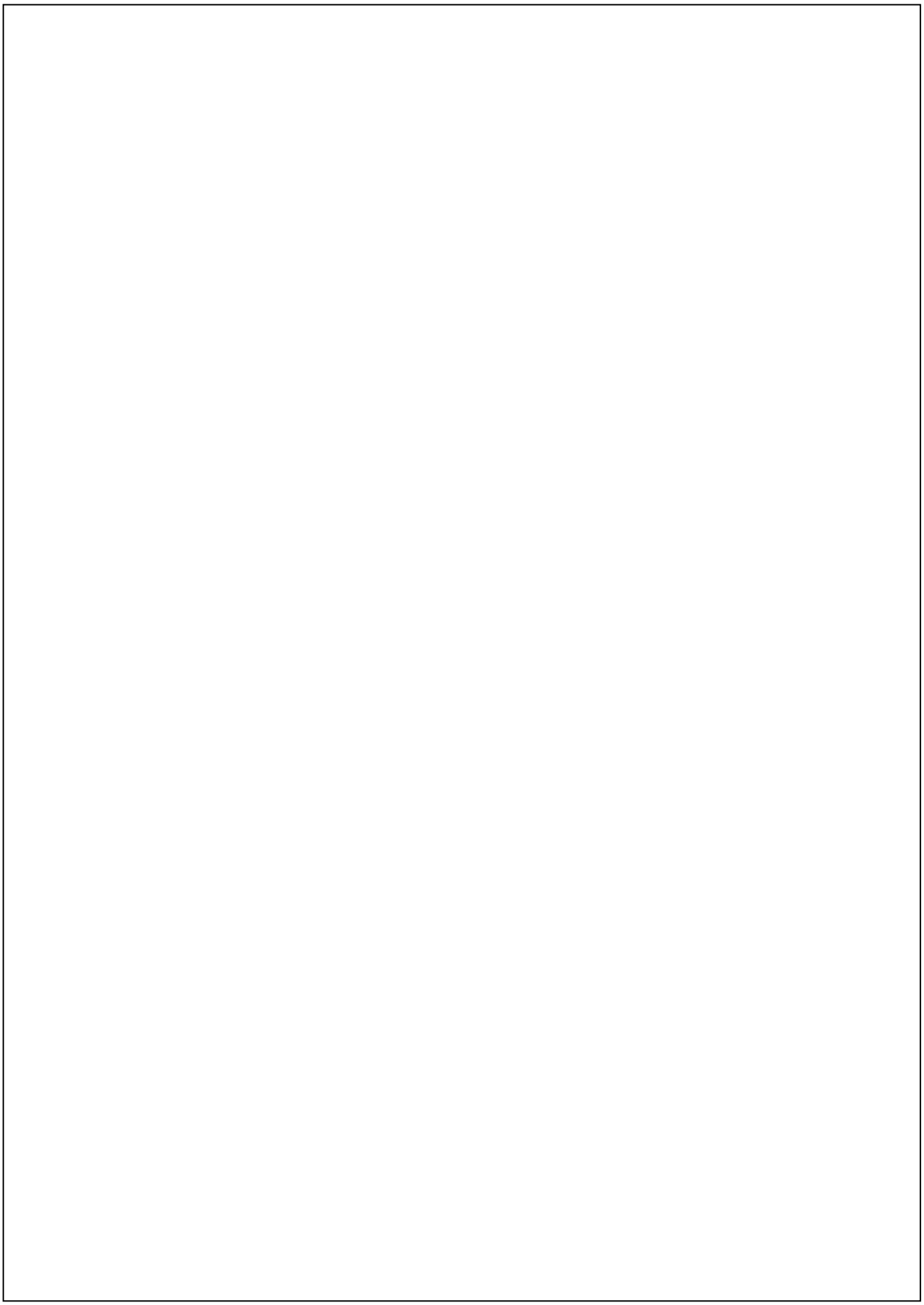

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