The Potential of Dadih as a Functional Food in Disaster Preparedness

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ABSTRACT
Dadih is a traditional food from West Sumatra made through a 48-hour fermentation process in bamboo. It exhibits a diverse range of nutritional content and active compounds. This research aimed to evaluate dadih from Padang Panjang as a potential functional food for emergency situations. The method involved testing dadih to determine its nutritional content, antioxidant activity, and shelf life. The research results indicated that dadih has a relatively good protein content at 7.55% and an antioxidant activity of 142.49±0.25 mg/kg, falling into the moderate category. Furthermore, dadih boasts an excellent shelf life, lasting up to 6 days at room temperature and 30 days in the refrigerator. In conclusion, based on its nutritional content, antioxidant activity, and shelf life, dadih is considered a suitable candidate for a functional food in emergency conditions.
Keywords—Dadih, Functional food, disaster

INTRODUCTION

Functional food is a term used to refer to a type of food that not only provides basic nutrition needed by the body but also has additional positive benefits for human health. These additional benefits can include a reduced risk of disease, improved immune system function, or support for other bodily functions. Functional foods often contain bioactive components such as fiber, antioxidants, probiotics, vitamins, minerals, or other compounds that contribute to human health and well-being. (Goldberg, n.d.). Emergency situations, such as natural disasters, conflicts, or pandemics, often result in limited food availability and can cause serious disruptions to food security within communities. In these situations, it is crucial to seek innovative and sustainable solutions to meet the nutritional needs of affected populations.(Khorram-Manesh, 2017).

Dadih is a traditional fermented dairy product originating from West Sumatra, Indonesia, and it holds significant potential as a functional food in emergency situations. Dadih is prepared by coagulating milk proteins with the assistance of lactic acid bacteria, particularly Lactobacillus plantarum. Besides being a good source of protein, dadih also contains various bioactive components such as probiotics, bioactive peptides, vitamins, and minerals. This rich nutritional content provides additional benefits for human health, which can be particularly valuable in emergency situations where access to nutritious food may be limited.(Arnold et al., 2021).

One of the advantages of dadih is its ability to serve as a natural source of probiotics. Dadih contains lactic acid bacteria that can act as probiotics. Probiotics help maintain gut health by balancing intestinal microbiota and enhancing digestion. Good gut health is crucial in emergency situations where changes in diet and stress can disrupt digestive function and immune health. (Venema & Surono, 2019).

Dadih is also rich in vitamins and minerals that are essential for human health. Among these vitamins are B2, B12, and D, which play vital roles in various bodily functions, including energy metabolism and bone health. Additionally, mineral content such as calcium, phosphorus, and magnesium provides additional benefits in emergency conditions, helping maintain bone health, nervous system function, and electrolyte balance. (Usmiati & Risfaheri, 2013).

Dadih has an advantage in terms of longer storage capability compared to fresh milk. With proper handling, this product can have a relatively long shelf life, making it a suitable choice in emergency situations where proper food storage may be challenging.(Mataragas et al., 2011). In addition, dadih production can be carried out locally using local milk as raw material, reducing dependence on external food supplies and enhancing the community's resilience in emergency conditions. One of the regions known for dadih production in West Sumatra is Padang Panjang.

The use of dadih as a functional food in emergency situations can not only help meet the nutritional needs of affected communities but also enhance food security and the well-being of the population in the long run. Therefore, further research is needed to identify the potential of dadih as an innovative and sustainable food solution in emergency situations. This research aims to evaluate dadih from Padang Panjang for its suitability as a functional food in emergency conditions.

METHODS

Material and Equipment

The materials used in this research include dadih from Payakumbuh, Batusangkat, Bukittinggi, and Alahan Panjang, which were collected on the second day of fermentation, CuCl2.2H2O, DPPH (1,1-diphenyl-1-picrylhydrazyl), and other chemicals. The equipment used consists of an icebox, UV-Vis spectrophotometer, burette and stand, Erlenmeyer flask, rubber suction, watch glass, dropper pipettes, volumetric flasks, and volumetric pipettes.

Nutrition Content Analysis

The nutritional content of dadih is analyzed using proximate analysis to measure moisture content, ash content, protein content, fat content, carbohydrate content, and fiber content.

Antioxidant Analysis

A 10-gram sample of dadih was weighed and dissolved in 10 mL of analytical-grade ethanol (1000 ppm). From this solution, dilutions were prepared with concentrations ranging from 100 to 500 ppm by pipetting 2.5 mL into a 5 mL volumetric flask. Then, 2.5 mL of this solution was pipetted, and 1 mL of DPPH (2,2-diphenyl-1-picrylhydrazyl) was added. The sample was incubated at room temperature for 30 minutes. Absorbance was determined using UV-Vis spectrophotometry at a wavelength of 517 nm. The sample was prepared in triplicate, and an equation was subsequently established to correlate the concentration of the solution with its

absorbance. (Grigelmo-Miguel et al., 2009). The results of the equation are incorporated into the formula as follows:

Antioxidant Capacity = (V sample x [sample] x Dilution Factor) / Sample Weight (g)

RESULTS AND DISCUSSIONS

Nutrition Content

Dadih is one of the traditional functional beverages that undergo natural fermentation using buffalo milk as its raw material. Buffalo milk is known to have a relatively high content of animal protein compared to other food sources. Table 1 show the nutritional content of dadih originating from Padang Panjang, West Sumatra.

Table 1. The Nutrition composition of Dadih from Padang Panjang, West Sumatra

Parameter	Unit	Content
Total Energy	Kcal/100 g	115.75±1.40
Energy from fat	Kcal/100 g	72.20±1.32
Ash	%	1.00±0.02
Moisture	%	80.40±0.13
Carbohydrate	%	2.80±0.01
Total Fat	%	8.05±0.15
Protein	%	7.55±0.03

In 100 grams of dadih, there is an energy content of 115.75 kcal/100 grams. This calorie content is quite good when used as food during emergency situations. Dadih contains a relatively high protein content of 7.55 ± 0.03%, which can serve as a source of protein. Protein plays a central role in disaster conditions as it is involved in tissue maintenance, repair, immune system function, metabolism, and nutrient transportation. In emergency situations, such as natural disasters or conflicts, adequate protein intake becomes crucial because the body requires protein for tissue repair, immune defense against infections, energy maintenance, fluid balance regulation, and even enhancing resilience to physical and psychological stress. Therefore, in disaster preparedness and response, it is important to ensure the availability of sufficient protein sources to meet the nutritional needs of affected individuals. (Tsuboyama-Kasaoka & Purba, 2014).

Antioxidant Capacity

The antioxidant activity in dadih was tested using the DPPH (2,2-diphenyl-1-picrylhydrazyl) method. In this method, dadih samples were mixed with DPPH free radicals that had been dissolved in various concentrations. Subsequently, the ability of dadih to neutralize free radicals was examined using a UV-Vis spectrophotometer. Based on the antioxidant activity test results, an IC value of 142.49±0.25 mg/kg was obtained, which falls into the moderate category. There is a very strong relationship between antioxidant activity and the amount of amino acids in dadih. (Akan, 2022). Each amino acid possesses antioxidant activity, and

among them, seven amino acids exhibit the best antioxidant activities, including tryptophan, methionine, histidine, lysine, cysteine, arginine, and tyrosine. (Xu et al., 2017).

The strong antioxidant activity in dadih makes it a potential functional food option in addressing various degenerative diseases, such as dyslipidemia, atherosclerosis, obesity, and more. (Brigita et al., 2023; Mohamadshahi et al., 2014; Roza et al., 2022). In the context of disaster situations, antioxidant activity can expedite the recovery of disaster victims. (Tambunan & Siregar, 2021).

Shelf Life of Dadih

Dadih is a product of buffalo milk fermentation for 48 hours. The quality of dadih is influenced by the duration of storage. The longer the storage time, the quality of dadih, including taste, aroma, color, and preference, will decrease. Dadih has a shelf life of 6 days at room temperature and 30 days in the refrigerator. (< 10oC)(Priadi et al., 2020; Sisriyenni & Zurriyati, 2004). The extension of the shelf life of dadih can be achieved by designing the dadih production process with sterilization techniques and using sturdy packaging, specifically retort packaging. (Silva et al., 2022). Alternatively, dadih can be transformed into powder form using freeze-drying techniques. (Santos et al., 2018). As a result, the stabilized product has a long shelf life and can be used as a functional food in emergency situations.

CONCLUSION

Dadih has the potential to be developed into functional food in emergency situations. The protein content of dadih is quite good at 7.55%, which can serve as a source of nutrients for recovery. Furthermore, dadih also has a significant antioxidant content to enhance individual immunity status. The shelf life of dadih at room temperature is 6 days, and in the refrigerator, it is 30 days. Special processing techniques such as sterilization are required to extend the shelf life of dadih, making it a durable functional food that is highly suitable for use during disaster conditions.

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