



INNOVATION OF ALTERNATIVE YOGURT PRODUCTS FROM NUTS

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Abstrak

Salah satu hasil fermentasi probiotik adalah yoghurt, biasanya dibuat dari susu sapi. Inovasi terbaru memungkinkan pembuatan yoghurt dari bahan nabati. Yoghurt sari nabati memiliki potensi pengembangan karena kandungan fungsional dan nilai gizi tinggi. Yoghurt ini dihasilkan dari kacang-kacangan, yang kaya serat, bebas laktosa, dan tanpa kasein. Kacang kedelai, kacang hijau, kacang merah, kacang almond, kacang tanah, dan kacang arbilan sebagai sumber protein nabati dapat digunakan sebagai alternatif untuk pembuatan yoghurt nabati. Hasilnya menunjukkan potensi yoghurt kacang-kacangan sebagai produk pangan fungsional yang dapat mendukung kesehatan, dengan fokus pada manfaatnya dalam menurunkan risiko hipertensi. Artikel ini memberikan wawasan mendalam tentang perkembangan dan peluang pengembangan produk yoghurt berbasis kacang-kacangan sebagai alternatif yang sehat.

Abstract

One result of probiotic fermentation is yogurt, usually made from cow's milk. The latest innovation makes it possible to make yogurt from plant ingredients. Vegan yogurt has development potential due to its functional content and high nutritional value. This yogurt is made from nuts, rich in fiber, lactose-free, and casein-free. Soybeans, green beans, kidney beans, almonds, peanuts, and Arbilan nuts as plant protein sources can be used as an alternative to making plant-based yogurt. The results show the potential of nut yogurt as a functional food product that can support health, emphasizing its benefits in reducing the risk of hypertension. This article provides an in-depth overview of the development and opportunities for developing nut-based yogurt products as a healthy alternative.

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1. Introduction

Cases of hypertension are high, including in developing countries like

Indonesia. According to the World Health Organization (WHO), more than a billion people worldwide suffer from hypertension, leading to a mortality rate of 9.4 million each

year (Kemenkes RI, 2019). This fact highlights that hypertension is a common health problem that requires special attention. (Riskesdas, 2018) shows that the prevalence of hypertension in Indonesia reached 34.11%, with 427,218 people, or 0.67%, who died due to hypertension (Kemenkes RI, 2019). This confirms that Indonesia, as a developing country, also faces similar challenges. Hypertension or high blood pressure is a condition in which blood pressure increases above the normal threshold of 120/80 mmHg. (Andrianto, 2022). Symptoms of hypertension include headache, nausea, fatigue, vomiting, shortness of breath, restlessness, and blurred vision, caused by damage to vital organs such as the brain, eyes, the heart, and kidneys. Society is still not aware of the symptoms of hypertension, while hypertension has serious consequences, especially on target organs such as the brain, which can cause strokes, significantly increasing mortality rates. Hypertension is also a major trigger for non-communicable diseases such as heart disease.

Nuts provide essential amino acids, iron, vitamins, and minerals essential for health. Additionally, nuts contain mono and polyunsaturated fats that support heart health. Soy, in particular, is rich in plant protein, reaching high levels, of up to 35%, and even reaching 40-44% in superior varieties. The isoflavones, calcium, and magnesium content of soy make it useful in reducing hypertension by dilating blood vessels through increased nitric oxide release. Green beans also have a balanced fat composition, with 73% unsaturated fatty acids and 27% saturated fatty acids (Diniyati, 2012). The high content of unsaturated fatty acids makes it useful for maintaining heart health and has antihypertensive properties. Arbilan beans contain all the important nutrients, including carbohydrates between 60.55 and 74.62%, protein between 19.93 and 21.40%, and fiber between 4.20 and 5.50% (Nurud et al., 2013). The high protein content makes arbilan beans a potential option as a substitute for animal proteins, as mentioned by (Nafi et al., 2006)

Kidney beans, are rich in nutrients such as protein, fiber, carbohydrates, B vitamins, vitamin C, and minerals, have the potential to prevent heart disease and diabetes. Therefore, nut-based yogurt can be a nutrient-rich food product, especially as an antihypertensive.

Probiotics are live microorganisms, including bacteria and yeast, that provide health benefits when consumed in sufficient quantities. These beneficial microbes, often referred to as “good” bacteria, contribute to the balance of the gut microbiota, thereby improving digestive health and leading to overall health. A large number of bacteria, especially lactic acid bacteria such as *Lactobacillus* sp. and *Streptococcus* sp., have long been used as probiotics (Sari et al., 2021). Yogurt is a type of probiotic product that contains lactic acid bacteria. This product is formed by the fermentation of milk using the bacteria *Lactobacillus bulgaricus* and *Streptococcus thermophilus*, with or without the addition of other ingredients. Usually, yogurt is produced from cow's milk, but yogurt from plant-based ingredients is trending. Vegetable yogurt has development potential because it has functional properties and high nutritional value. An example is yogurt made from nuts, rich in fiber, without lactose or casein.

Soybeans, green beans, kidney beans, almonds, peanuts, and Arbilan nuts as plant protein sources can be used as an alternative to making plant-based yogurt. Because it has a high protein content and the oligosaccharides can function as prebiotics, creating high-protein yogurts (Wening et al., 2022). Commercial yogurt is often made using *Lactobacillus bulgaricus* as a lactic acid bacteria starter. However, the use of other bacteria such as *Lactobacillus casei* and *Lactobacillus plantarum* can also provide an alternative starter that influences the yogurt-making process. It is important to understand the impact of using different types of bacteria on yogurt production. This research aims to determine the nutritional content of yogurt made from several types of nuts and its role as

a functional food preparation that can maintain health and its benefits in reducing hypertension.

2. Method

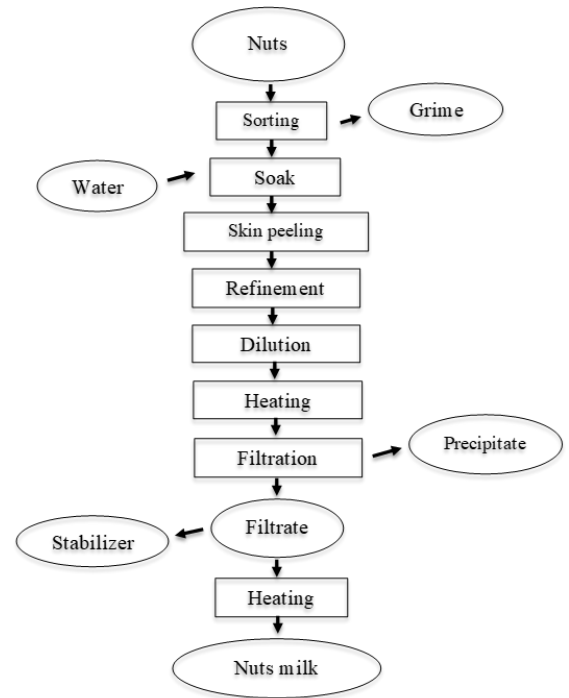
For this review, a literature search method was used through Google Scholar and articles related to keywords such as fermented yogurt food preparations, types of nuts, functional foods, hypertension, and benefits of yogurt for the body. The main focus is on journal publications from 2006 to 2023. Research topics include yogurt made from different types of nuts, its contents, its relationship with hypertension, as well as its potential as a food functional. Articles are first collected and then selected based on certain criteria, including those that provide nutritional data. The research data obtained from the articles were combined and analyzed to illustrate the comparative value of yogurt made from various nuts.

3. Results and Discussion

3.1. Making Yoghurt from Nuts

Making mung bean milk is similar to the process of making other bean milk, starting with selecting the beans, peeling the skin, grinding, diluting, heating, and filtering. Once the filtrate is collected, stabilizers such as Carboxy Methyl Cellulase (CMC) and calcium lactate 600 ppm are added. Figure 1 shows the steps for making green bean milk. This process begins by sorting the green beans to remove impurities. Soaking is carried out in boiling water and kept for fourteen hours until the water cools. Soaking is done to soften the texture of the green beans for grinding. Grinding is used to increase the surface area of the material to produce the most effective bean juicing results. The skin of the nuts is peeled and mixed with a ratio of dried beans: water (1:8). For about ten minutes, the pea puree suspension is heated until boiling. Then, we filter and take the peanut filtrate which is mixed with the stabilizer Carboxy Methyl Cellulose (CMC) and 600 ppm of calcium lactate. Then heated for a few moments. (Koswara, 2006) stated that the unpleasant

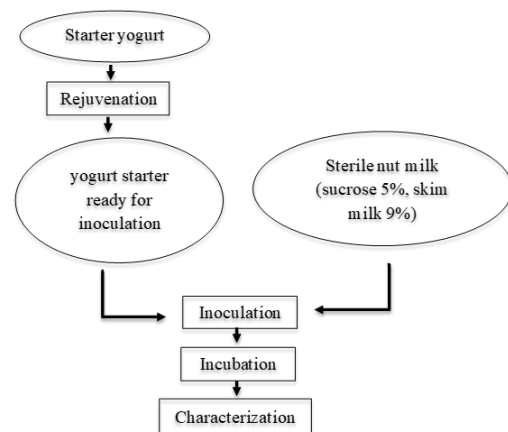
taste and odor of green bean milk can be removed by using heat to remove the lipoxygenase enzyme.



Picture 1. Flow Chart Making a Peanut Milk
Source: (Agustina & Andriana, 2010)

3.2. Making Yoghurt Nuts

Making this nut yogurt begins by rejuvenating the culture or making a yogurt starter. This is done by inoculating 10% of the initial starter into commercial whole cow's milk (UM), which is then incubated for 18 hours at 37 degrees Celsius. Next, the yogurt starter was added at 10% w/v to 1,000 milliliters of sterile peanut milk, to which 5% sucrose and 9% skim milk were added. This method is based on research carried out by (Triyono, 2010)



Picture 2. Flow Chart Making Yoghurt Nuts

Source : (Agustina & Andriana, 2010)

3.1.2. Nutrient Contents of Yoghurt Nuts

Nut yogurt is a food choice rich in nutritional content, including high protein, healthy fats, and several important nutrients. According to research (Serino & Salazar, 2018) in the journal “Nutrients”, the combination of yogurt and nuts makes a positive contribution to health, providing essential nutrients that support optimal body function and maintain nutritional balance.

Table 1. Nutrient Contents of Yoghurt Nuts

Type of Nuts	Nutrient Contents	Total	The potential of Functional Food	References
Arbil a Nuts	Proteins Fat Carbohydrate	4,32% 1,09% 11,36%	Vegan Yoghurt	(Nalu et al., 2021)
Mung Beans	Proteins Fat	2,12% 0,29%	Anticancer Control cholesterol levels	(Agustina & Andriana, 2010)
Red Bean	Proteins Fat Flavonoids	7,5% 5,5% 5,5%	Antioxidant	(Putriningtyas & Wahyuningsih, 2017)
Soya Bean	Proteins Fat Carbohydrate Genistein Daidzein Total BAL	5,98% 11,61% 0,35% 250,46 µg/g 173,02 µg/g 3,7×10 ⁷ colony/ml	High Isoflavones Many of probiotics	(Labiba et al., 2020)

Benefits of Nutritional Contents for Human Health:

1. Proteins

In the human body, proteins are responsible for the composition of most of the body's cells. There are two types of proteins, namely animal proteins and plant proteins. The benefits of protein improves the immune system, controls blood sugar, help form hormones and enzymes, and provides a source of energy.

2. Fat

Fat is a type of compound that cannot be dissolved in water, found in almost all types of food, but if in excessive amounts it will cause disease. The function of fat is to protect the body's organs, help absorb

vitamins, and maintain the skin. and healthy-looking hair and store energy reserves. Fats in the body can be classified as saturated fats or saturated fats. This type of fat can increase cholesterol in the body if consumed in excessive amounts, and unsaturated fats or unsaturated fats are further divided into monounsaturated fats and polyunsaturated fats.

3. Carbohydrat

Carbohydrates are one of the important compound components in the body. Two types of carbohydrates, namely complex carbohydrates take longer for the body to digest, while simple carbohydrates the body digests more quickly. The function of carbohydrates is to support brain performance, maintain muscle body mass, and optimize protein function.

4. Flavonoids

Flavonoids are a type of antioxidant that can be found in grains, fruits, vegetables, and other plant products. The largest and most important function of flavonoids is to protect the body against free radical attacks that can cause degenerative diseases or other complications.

Potential Food Benefits:

1. Vegan Yoghurt

Vegan yogurt contains a lot of fiber, which is good for the body, is an alternative product for people with lactose intolerance, and increases the amount of vitamins and minerals in the body.

2. Anti-cancer

Consuming yogurt about twice a week can reduce the risk of developing cancer because yogurt can bind to carcinogenic compounds and then produce antimutagenic substances to prevent the disease from developing.

3. Control Blood Sugar Levels

Yogurt is suitable for consumption by people suffering from diabetes because this product contains less sugar and therefore can be consumed safely.

4. Antioxidant

Antioxidants are compounds whose function is to repair cells damaged by oxidation reactions.

5. High Isoflavones

Isoflavones can be found in various nuts, their function is to overcome inflammation, reduce high blood pressure, reduce the risk of heart disease, and reduce menopausal symptoms.

6. Many of Probiotics

Probiotics are a group of good microorganisms found in foods or drinks such as kimchi, yogurt, kombucha, bananas, and asparagus. The benefits of probiotics improve digestion, prevent inflammation of the intestines, and increase the body's immunity.

4. Conclusions

The stages of making vegetable yogurt, from sorting, soaking, boiling, adding inoculum, and fermentation until it becomes yogurt. The soaking process is intended to facilitate peeling before making it into a slurry. Vegetable yogurt is considered good for people with high blood pressure because it contains more fiber and is low in sugar and sodium. It is hoped that the existence of plant-based milk yogurts can increase people's purchasing power for probiotic products, which previously tended to be expensive. Even though it was largely developed from animal milk, vegetable milk yogurt remains a limited choice in yogurts.

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