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"Lepet": Indonesian traditional food for Eid Al-Fitr celebrations

Ata Aditya Wardana^{1*}, R. Haryo Bimo Setiarto² and Laras Putri Wigati³

Abstract

Indonesia, a country with diverse cultures, possesses a rich variety of cultural heritage. The aim of this review is to discuss the culture of *lepet* considering its ethnic perspective, preparation and consumption, nutritional and functional properties, safety, and future outlook aspects. *Lepet*, a traditional Javanese dish, consists of sticky rice, grated young coconut, coconut milk, cowpea, and salt. It is wrapped in young coconut leaves with a specific pattern, boiled, soaked, and then hung to cool and dry. The persuasive technique employed by Sunan Kalijaga, which combines Javanese cultural traditions and Islamic religious teachings, symbolizes *lepet* for the Javanese people. This method facilitated the spread of Islam by emphasizing the importance of purity and refraining from committing further mistakes after apologizing during the *Eid Al-Fitri* tradition. *Lepet* is rich in carbohydrates and some protein. It is gluten-free and offers benefits for bone and skin health due to its contribution of antioxidants, vitamins, and minerals. Proper handling and storage of *lepet* are vital to prevent the growth of harmful bacteria and extend its shelf life. Given the rising worldwide acknowledgment of Indonesian gastronomy, advancements in technology and distribution, creative adaptations, and a surging demand for convenience, the prospects for *lepet* appear bright in the future.

Keywords Ethnic, Food philosophy, Health, *Nusantara*, Culture

Introduction

Indonesia is the largest archipelagic country in the world, where more than 17,000 islands are found and only about 7,000 are inhabited. Geographically, they are located at the junction of two continents (Asia and Australia) and two oceans (India and the Pacific). Indonesian society comprises about 300 ethnic groups, including Javanese, Sundanese, Batak, Chinese, Dayak and Papuan. These conditions make Indonesian culture very diverse. Even

Indonesia is considered the country with the most cultural diversity in the world [1, 2]. Culture, which means “*budaya*” in Indonesian, is derived from Sanskrit “*bud-dayah*” (thought or intellectuality). In terminology, it means that something coming from the thought or intellectuality of humans which is developed and passed down to the present generation [3].

Indonesia traditional food is made not only to consume and gives a feeling of fullness, but also a part of the cultural wealth of the Indonesian people. There are around 3,259 types of Indonesian indigenous culinary [4]. Those are divided into main food: 208; side dishes with coconut milk: 292; side dishes with soup: 554; side dishes without soup: 959; wet snacks: 750; dry snacks: 263; drinks: 147; others: 84 [4]. Indonesian food is influenced by various foreign cultures where Western Sumatra is influenced by India and Arabia; Eastern Sumatra is influenced by China and Malaysia; Northern Java is influenced by Chinese, Arabic and Dutch; West Kalimantan is influenced by China and Malaysia; Northern Sulawesi is influenced

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by Spain; Maluku is influenced by the Portuguese and the Dutch [1, 4].

Many Indonesian traditional foods have philosophical meanings. These foods become symbols to convey wise advice in a life. If learned and applied in everyday life, the good teachings conveyed through traditional food will bring goodness. Furthermore, their philosophical symbol has been strongly related with religion. As the largest Muslim population globally, many kind of Indonesian traditional food are associated with Islamic traditions [5]. Every year, all Muslim has a holy month, *Ramadhan*, where each Islamic adherents obliged to fast from *subuh* (dawn) until *maghrib* (sunset) for a whole month. Then, they it is followed by "*lebaran*", the annual biggest community tradition to celebrate *Eid Al-Fitr* (back to holy soul) in "*Syawal*" month, after completing *Ramadhan* that might be only found in Indonesia. *Lebaran* is marked by a long national holiday, visiting hometown, gathering with family, wearing something new, and eating the *lebaran* special culinary [6].

One of the most popular meals is *lepet*, the symbol of chastity and purity of soul. The tradition of *lepet* consumption has been spread, particularly in Java Island. It is usually prepared for self-consumption, family and neighbors, consumed a week after *Eid Al-Fitr* or "*Syawalan*" together with "*ketupat*", another type of Indonesian traditional food made of rice and wrapped with young coconut leave [5]. *Lepet* has become a part of Indonesian local wisdom, especially for Javanese and Sundanese people. The authenticity of food local wisdom lied in its essence and soul [7]. Despite its cultural significance, the available literature on *lepet* in international databases remains limited. The aim of this review is to discuss the culture of *lepet* from the point of view of ethnic perspective, preparation and consumption, nutritional and functional properties, safety, and future outlook aspects. Acquiring a comprehensive comprehension of this customary culinary preparation enables individuals to develop a deep understanding and admiration for the nation's culture and heritage. Additionally, it facilitates the conservation and advancement of traditional foods and indigenous cuisines, which frequently encounter challenges posed by globalization and the standardization of food.

Lepet in general

Lepet is a traditional Indonesian dish made from sticky white rice, mixed with grated young coconut, coconut milk, cowpea, and a pinch of salt (Fig. 1). The mixture is then wrapped in young coconut leaves or "*janur*" in Javanese, using a specific pattern and tied with bamboo straps called "*tutus*" (Fig. 7) [8]. This wrapping technique ensures that the dough remains intact while cooking. Once cooked, the *lepet* is soaked in water to remove any

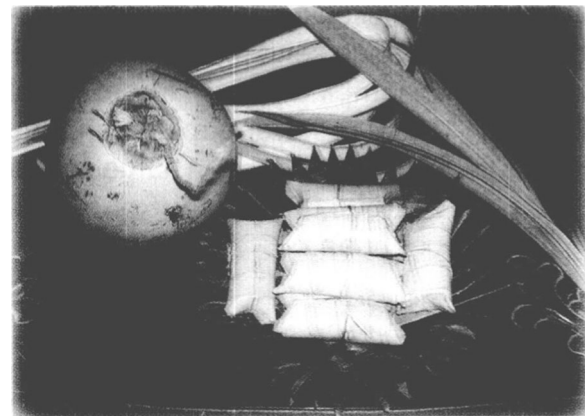


Fig. 1 Documentation of *lepet* (retrieved from: <https://repositori.kemdikbud.go.id/8306/>) [10]

stickiness and then hung to cool and dry quickly. The dish has been enjoyed by the Javanese people for over 500 years. To enhance its flavor, some people prefer to coat it with "*serundeng*", a mixture of roasted grated coconut, sugar, and spices [9].

Ethnic perspective

History of lepet

Lepet has been a popular food item since the eighth century during the Hindu-Buddhist kingdom era. Later, in the 15th to sixteenth century, Javanese people, influenced by the persuasive approach of Sunan Kalijaga, one of the "*walisongo*" (holy figures who spread Islam in Java) (Fig. 2), symbolized *lepet* together with *ketupat* or "*kupat*" in Javanese. That took place precisely in Demak Regency, Central Java Province (Fig. 3) [11, 12]. *Sunan Kalijaga's* approach to broadcasting his Islamic *da'wah* (preaching) became official and effective through three principles: "*momong*" (persuasiveness), "*momor*" (communicativeness), and "*momot*" (accommodation) [13]. One of the strategies employed was the utilization of food media, particularly those wrapped in *janur*, which hold philosophical significance [14]. The Javanese way of life is closely linked with the acculturation of local traditions into Islamic teachings. *Sunan Kalijaga* effectively spread Islam by blending into Javanese culture, including its food culture, which was infused with Hindu and Buddhist influences [13]. This syncretic approach combined Javanese cultural practices with Islamic teachings, resulting in compatibility between the two [14]. As a result, the Islamic message was readily embraced by the community.

One social concept that has been widely embraced by the followers of Sunan Kalijaga is the practice of "*Ba'da Lebaran*" or "*Bodo Cilik*" (small "*Lebaran*"), which takes place on the 8th day of the Islamic month of *Syawal*. In



Fig. 2 Walisongo (a) and Sunan Kalijaga (b) (retrieved from: <https://historia.id/agama/articles/revolusi-kultural-walisongo-PdbKg/page/1>) [15]



Fig. 3 Indonesian maps and the location of Indonesia (A), Central Java (B) and Demak (C) (retrieved from: https://d-maps.com/pays.php?num_pay=2495&lang=en) [16]

Javanese philosophy, *Lebaran* signifies the end of the month-long obligation of fasting during the Islamic month of *Ramadhan* [17]. During *Lebaran*, people engage in activities such as *Eid Al-Fitr* prayer, visiting and chatting with relatives, friends, and neighbors, and forgiving one another. *Bodo cilik* is celebrated after voluntary fasting for 6 days at the beginning of the month, after 1st *Syawal* (2–7th *Syawal*) [18, 19]. In Java, as *Bodo Cilik* approaches, *janur* are commonly sold as wrappers for *lepet*, as depicted in Fig. 8a, b. This food is prepared in most households and shared with others, including fellow worshippers at the mosque or small mosque (*musholla*) on the morning of the 8th day of *Syawal*, symbolizing togetherness as shown in Fig. 4 [20]. However, this celebration has become increasingly rare in urban areas.

In the Banyuwangi area (a city in East Java Province), *lepet* is traditionally served during "*selapan*" events, which celebrated 35 days after a baby is born and often coincide with the naming ceremony. *Lepet* is seen as a symbol of hope for the safety of the newborn [22]. In the Bangka area (a city in the Bangka Belitung Islands), *lepet* is not only served during *Eid Al-Fitr* but also during *Eid Al-Adha* (in the Islamic month of *Dzulhijjah*) and "*Sedekah Ruwah*" (a ceremony welcoming the fasting month of *Ramadan*) [10]. In the Pemalang area (a city in Central Java Province), *lepet* is used in the "*Baritan*" ceremony, a tradition known as "*Sedekah Laut*" (a gift to the sea) among traditional fishermen. Fishermen acknowledge their mistakes, such as littering and polluting the

environment, which can negatively affect their catch. As a form of apology and seeking permission, they hope to avoid disasters at sea. Such apologies and permissions are seen as good and polite ethics in their activities [23]. A similar ceremony called "*Pesta Lomban*" is observed in the Jepara area (a city in Central Java) [24]. In the Kudus area (a city in Central Java Province), *lepet* is served as a complement to the "*Sewu Kupa*" (1000 *kupa*) event, which is a tradition of the people around Mount Muria, symbolizing their overflowing joy in celebrating *Eid Al-Fitr*. This event is held a week after *Eid al-Fitr* on the 8th day of *Syawal* each year [25]. These types of events are still observed in these areas today (Fig. 5).

Over time, the raw materials and processing methods used for making *lepet* have been adapted and diversified. Numerous alterations have been identified in response to consumer preferences and regional variations, while maintaining the intrinsic philosophical essence embodied within the *lepet* [5]. Cowpeas are no longer the only adapted ingredient in *lepet*, as other materials like peanuts, red beans, and koro beans are now commonly added to the mix. Additionally, the filling materials have also become more varied and can include chicken, beef, or fish [26]. Sticky rice is no longer the sole basic ingredient used in *lepet*, as some areas, especially in the Sundanese region, replace sticky rice with corn and wrap it with "*klobot*" (corn husks), which is then called "*leupeut*" [26, 27]. Similarly, modified versions of *lepet* are also found in Lamongan and Tuban areas of East Java Province. The



Fig. 4 Documentation of *Syawalan* tradition in Surabaya, East Java (retrieved from: <http://kebudayaan.kemdikbud.go.id/bpnbyogyakarta/riyoyo-kupa-tradisi-sebagai-perekat-silaturahmi/>) [21]



Fig. 5 The appearance of Pesta Lomban (a) and Sewu Kupa (b) events. (Retrieved from: <https://www.medcom.id/foto/rona/ybDOj6qN-melihat-tradisi-kirab-sewu-kupa-di-kudus>)

Sundanese typically consume *lepet* filled with peanuts along with Sumedang tofu. In the Jakarta area (Jakarta Province), two types of *lepet* are known—one filled with red beans, and the other eaten with "*kinca*" (coconut brown sugar sauce). Furthermore, forest pandanus leaves, locally known as "*jelutuk*" (*Pandanus furcatus*), are used as wrappers instead of janur due to their unique fragrance [28], as shown in Fig. 6. The shape of *lepet* is not only limited to tubular, but also come in triangular and conical shapes [29, 30].

Philosophy of *lepet*

Lepet is a symbolic representation of chastity and purity of the soul. Many people hang it in front of their houses, such as on the roof or door, to repel negative energy or undesirable elements (Fig. 7a) [24]. The word "*lepet*" originates from the Javanese words "*silep*" which means "*tomb*" or "*safe*" and "*rapet*" which means "*tight*". There is a famous Javanese expression associated with it: "*monggo dipun silep ingkang rapet*", which translates to "let's bury it tightly" [32]. This expression

conveys the message that after apologizing for a mistake, one should not repeat it or harm another person [33]. Another report suggests that *lepet* comes from the Javanese phrase "*ngaku lepat*," which means "admitting to a mistake". Therefore, apologizing to each other is one of the significant traditions observed on the day of *Eid al-Fitr* and continues to this day.

The distinct form of *lepet* signifies a concept of "*Shiratal mustaqim*" (Arabic), which represents the straight path [34]. In Islam, it symbolizes the bridge that every individual must cross on the final day. After weighing their actions, each person must traverse this bridge. Those who successfully cross it will reach paradise and dwell there eternally. However, those who struggle and fall off the bridge will enter the valley of destruction and be among the unfortunate. Therefore, someone who is truthful and upright in fulfilling their roles as a "*abdullah*" (servant of God) and a khalifah (leader) will be directed to cross the *shiratal mustaqim* in the afterlife [35].

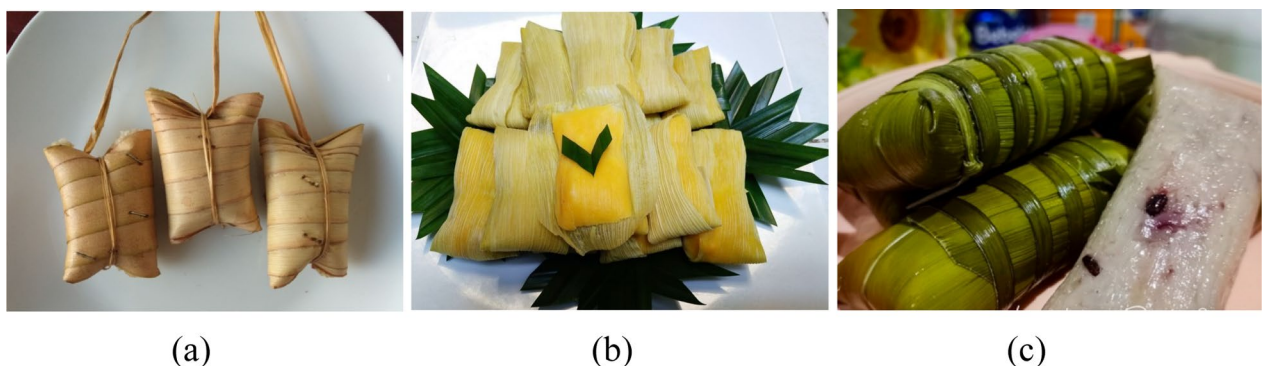


Fig. 6 The appearance of different *lepet* wrapper: (a) janur, (b) klobot, and (c) jelutuk (retrieved from: <https://cookpad.com/id/resep/15920635-lepat-ketan-daun-pandan>) [31]



(a)



(b)



(c)

Fig. 7 The visual appearance of hanging *lepet* on the house window (a), on the roof (b), and *janur* rolls (c)

The *lepet* packaging incorporates two types of *janur* patterns: (1) rolls with or without *tutus*, and (2) folds with three coiled *tutus*. The intricate design of the *janur*

rolls symbolizes the possibility of human mistakes, as shown in Fig. 7c [35]. The intertwined connection signifies a strong bond of friendship that remains unbroken,

while the main ingredients of sticky rice represent the importance of unity in relationships. Additionally, the *lepet* wrapper is fastened with three coiled bamboo ropes, resembling the wrapping of a corpse (Fig. 7b), thus emphasizing its corpse-like form. In Islam, a deceased person is wrapped in a shroud and tied at three points: the elbows, waist, and knees before burial. From a philosophical perspective, being tied in threes like a corpse implies that errors should not lead to vengeance and represents three significant Islamic symbols: "*Iman*" (faith), "*Ilmu*" (knowledge), and "*Amal*" (good deeds) [36]. Moreover, *lepet* has a sticky texture, symbolizing the fact that humans are prone to making mistakes. It is hoped that *lepet* will foster mutual understanding and forgiveness towards one another's errors [37, 38].

Each component used in making *lepet* holds its own philosophical meaning. The Javanese word *janur*, which means true light, refers to the sanctity of human beings after receiving enlightenment during the month of *Ramadan* [36, 39]. Additionally, the challenging process of obtaining the leaf from the top of the coconut tree symbolizes the efforts made by Muslims to attain purity. The Arabic origins of *janur*, which are "*jaa'a nuurun*" (coming light) and "*jannatun nuur*" (heavenly light) [36, 40], further associate it with happiness and brightness, represented by the color yellow, which is the source of light and heaven. Indonesia, known for its natural resources, is considered a place of abundant shards of heavenly light, and *janur* is a symbol of happiness that characterizes the Javanese people. It is often used not only to symbolize joy but also to decorate venues for circumcision events, weddings, and other celebrations [41, 42]. The glutinous and sticky texture of the rice used in *lepet* illustrates the strength of the bonds of friendship [43, 44]. The fine texture of grated coconut represents the subtlety

of emotions and manners that Muslims are expected to display during *Eid Al-Fitr*, while salt embodies the balance necessary for harmonious community relationships. *Tutus*, a symbol of strong friendship, is depicted by the nature of bamboo plants that grow in clusters. Bamboo is a towering tree that embodies the meaning of "*hablum minallah*" (Arabic) or relationship with God, and its strong roots signify "*hablum minannas*" (Arabic), or relationship with humans [36]. In addition to the ingredients, the long cooking process illustrates the patience required to solve problems. Finally, the unwrapping process, which involves carefully rotating each *lepet* from the top-middle-bottom, represents the need to solve problems step by step and with great care [45] (Fig. 8).

Preparation and consumption

The preparation of *lepet* involves using 500 g of white glutinous rice, 100 g of cowpea, half of a grated coconut, half a tablespoon of salt, *janur*, *tutus*, and water. These ingredients will yield 4–5 pieces of *lepet*, and the necessary cooking equipment includes a grater, spatula, boiler, bamboo tray, and stove [29].

The process of preparing *lepet* begins by soaking the glutinous rice and cowpea beans separately in containers overnight [29, 31]. The next day, they are washed, cleaned, and drained. Coconut meat that is not too young or too old is grated and separated from the epidermis, so that only the white flesh is used [30, 31]. The mixture of glutinous rice, cowpea, grated coconut, and salt is stirred until evenly distributed [29, 45]. A sheet of *janur* is folded in half to form a pocket. The raw material mixture is then filled into the pocket until it is half full, after which it is closed and tied with a bamboo strap [30, 45]. The rope from the bamboo sticks helps to wrap the *lepet* tightly and securely,



Fig. 8 The appearance of *lepet* material (*janur* and *tutus*) (a) and its trading in the traditional market of Jember, East Java (b)

preventing it from coming apart easily when boiled [29, 30, 45]. The raw *lepet* is boiled in a sufficient amount of water for about 5–6 h, traditionally over a stove with the aid of firewood, as shown in Fig. 9 [46, 47]. The cooking time may vary depending on the size of the *lepet*, the thickness of the container, and the heat of the steamer. The cooking process is checked periodically to avoid overcooking or undercooking [48]. Alternatively, a pressure cooker with a boiling time of about 1.5 h can be used as an alternative. Water needs to be refilled when it starts to decrease, so that the *lepet* remains submerged during boiling. Once cooked, the *lepet* is removed, drained, and served. The cooking factor for *lepet* depends on several factors such as the type of rice used, the amount of filling, and the method of cooking [49].

The culinary dish of glutinous rice mixed with grated young coconut is widely popular throughout Indonesia. One example is "*lemang*," where sticky rice and grated coconut are put into bamboo sticks and then cooked over a fire [50]. *Lemang* is commonly found on Sumatra Island, particularly in West Sumatra and North Sumatra. Another dish is "*lupis*," which consists of sticky rice mixed with grated young coconut and wrapped in banana leaves, then boiled and served with grated coconut and palm sugar. Although *lepet*, *lemang*, and *lupis* are made from the same base, their taste differs due to the packaging materials used, which greatly affect the flavor of the food [51].

Nutritional and functional properties

The nutrition content of *lepet* can vary depending on the filling and recipe used. Each nutritional compound and functional property of raw material of *lepet* is shown in Table 1. Sticky rice is high in carbohydrates and provides some protein, but it is low in fiber and other nutrients. One cup (174 g) of cooked glutinous rice contains about 169 cal, 1.9 g of protein, 0.5 g of fat, and 37.6 g of carbohydrates [52]. Furthermore, another report documented the micronutrients contained in glutinous rice. The result was obtained from 40 g of *lepet*, with an edible amount of 100% that it contained 8.2 mg of calcium, 0.65 mg of iron, 2 IU of vitamin A, and 0.96 mg of vitamin B1 [53]. The nutrition content of the filling will depend on the type of protein used and how it is prepared. Chicken and fish tend to be lower in fat and calories compared to beef, but they can still provide protein, vitamins, and minerals. If the filling includes vegetables or spices, it can also contribute some fiber and antioxidants (e.g., carotenoids, flavonoids, polyphenols, etc.). Overall, *lepet* is a tasty and convenient snack, but it is important to consume it in moderation considering high in calories and low in some essential nutrients. It is recommended to pair it with a balanced meal that includes a variety of nutrient-dense foods [54].

Lepet is often served as part of a savoury dish with meat and vegetables or sweetened and served as a dessert or meal [50]. How *lepet* sticky rice is served significantly affects the overall nutritional value. *Lepet* contains fiber and almost no fat or cholesterol [52–54]. This *lepet* also has high protein, B vitamins, selenium, zinc, magnesium,



Fig. 9 Flowchart of lepet preparation traditionally

Table 1 Nutritional compounds and functional properties of the raw material

Raw materials	Functional benefit of each nutritional compound	References
Sticky rice	Rich source of carbohydrates as the body's primary source of energy Naturally gluten-free, making it suitable for individuals with gluten intolerance or celiac disease Low in fat to maintain a healthy weight or reduce fat intake Essential amino acids that the body requires for building proteins and supporting various physiological functions Dietary fiber, aiding digestion and promoting satiety Minerals such as magnesium, phosphorus, and potassium, which are vital for maintaining healthy bones, muscles, and overall cellular function Certain varieties of sticky rice possess antioxidant properties, which can help combat oxidative stress and reduce the risk of chronic diseases	[52, 53, 55]
Cowpea nut	Good source of essential nutrients, including protein, dietary fiber, vitamins (such as thiamine, riboflavin, and folate), and minerals (such as iron, potassium, and magnesium) Low in fat and cholesterol, making it a beneficial component of a healthy diet Various phytochemicals with antioxidant properties, such as flavonoids, phenolic compounds, and carotenoids, which neutralize harmful free radicals in the body, reduce oxidative stress and the risk of chronic diseases like heart disease, cancer, and neurodegenerative disorders The soluble fiber helps slow down the absorption of carbohydrates, preventing rapid spikes in blood sugar levels Dietary fiber, which promotes healthy digestion and aids in maintaining regular bowel movements. The fiber content can also contribute to a feeling of fullness, supporting weight management and preventing overeating	[56, 57]
Grated coconut	Good source of dietary fiber, which aids digestion, promotes satiety, and helps maintain a healthy digestive system Medium-chain triglycerides (MCTs), which are easily metabolized by the body and can provide a quick source of energy. These fats are also believed to have potential benefits for weight management and cardiovascular health Phenolic compounds can act as antioxidant to help protect the body against damage from free radicals and oxidative stress Traditionally used for antimicrobial agent which has shown to exhibit antimicrobial activity against bacteria, viruses, and fungi Good source of vitamins and minerals, including vitamin C, E, B vitamins, iron, potassium, and magnesium, which are essential for overall health and well-being	[58]
Salt	Maintaining the balance of electrolytes in the body, which is crucial for proper nerve function, muscle contraction, and hydration Sodium helps retain water, preventing dehydration and ensuring efficient cellular function Source of iodine, a vital mineral required for the production of thyroid hormones. These hormones regulate metabolism, growth, and development	[59]

copper, and phosphorus levels [50, 52, 53]. *Lepet* sticky rice does not contain gluten, the protein found in wheat, and is safe for people on a gluten-free diet.

Lepet sticky rice is a gluten-free food option that is suitable for people who need to follow a gluten-free diet due to celiac disease, gluten sensitivity, or other health reasons [60, 61]. Gluten is a protein found in certain grains, such as wheat [62]. While gluten is commonly found in many processed foods and products, a gluten-free diet does not necessarily mean eliminating carbohydrates altogether, as there are still many carbohydrate-rich foods that do not contain gluten, such as rice, potatoes, and beans. Although claims suggest that a gluten-free diet can improve health, aid weight loss, and increase energy, more research is still needed to support these benefits [54, 61, 62].

Consuming *lepet* sticky rice can contribute to the development of strong bones and prevent osteoporosis, as it contains 2 mg of calcium per serving, which is crucial for

maintaining bone health [63, 64]. Calcium deficiency can lead to brittle teeth, cataracts, brain changes, and osteoporosis, a condition characterized by low bone mass and increased risk of fractures, particularly among older women [65]. Adequate calcium intake throughout life is necessary to maintain bone density and prevent osteoporosis, which can result from various factors, including hormonal changes, sedentary lifestyle, smoking, excessive alcohol consumption, and certain medications. Calcium plays a critical role in supporting the mineral density of bones, and a balanced diet and exercise are also vital for maintaining healthy bones, though calcium supplementation may be necessary for some individuals.

Lepet sticky rice is a beneficial source of antioxidants that promote skin health by accelerating collagen production, which improves skin elasticity, and is also rich in vitamins C, B6, B2, B1, and E [66]. With its traditional use in Asian skincare, sticky rice can be applied as a mask or body scrub [67]. Additionally, the vitamins

and minerals, including copper, zinc, and B, strengthen the immune system, reduce inflammation, and improve metabolism, ultimately reducing the risk of chronic diseases and decreasing oxidative stress.

Although *lepet* sticky rice is rich in nutrients, excessive consumption should be avoided due to its high glycemic index, which measures how quickly and significantly a food raises blood sugar levels on a scale of 0 to 100 [68]. With a glycemic index rating of 86, it is considered a high glycemic food, leading to fluctuations in energy levels and mood [69, 70]. Additionally, *lepet* sticky rice contains less dietary fiber compared to wheat *lepet*, as the milling process removes the outer bran layer that is high in fiber. Adequate fiber intake is essential for healthy digestion, cholesterol management, and weight maintenance, with dietary guidelines recommending women consume 25 g and men consume 38 g of fiber daily. Those are the benefits of *lepet* sticky rice for health [60].

Safety of *lepet*

The microbiology of *lepet* is an essential factor to consider in guaranteeing food safety and preventing foodborne illnesses, as with any other food product. The presence of microorganisms, particularly bacteria such as *Staphylococcus aureus* and *Bacillus cereus*, in significant numbers, can lead to food poisoning [71]. These bacteria can grow rapidly in cooked rice that is improperly stored [72]. Adherence to appropriate food handling and preparation practices is essential in preventing the growth of harmful bacteria in *lepet*, including ensuring the cleanliness and sanitation of equipment and surfaces, cooking rice and filling to the appropriate temperature, and storing the finished product at safe temperatures. Some producers may also use preservatives or antimicrobial agents (e.g., potassium nitrate, potassium propionate, potassium sorbate) to inhibit the growth of harmful bacteria and prolong the shelf life of *lepet* [71]. However, following food additives and preservatives regulations is necessary to guarantee their safety and ensure they do not pose a risk to human health [72]. Natural antimicrobials such as bacteriocin (e.g., nisin, plantaricin) could be natural preservatives to extend the shelf life of the *lepet* by inhibiting the growth of pathogenic bacteria. Bacteriocins are produced by the lactic acid bacteria (LAB) group, which are bactericidal against gram-positive and gram-negative bacteria [72]. Some of the advantages of bacteriocins are: (a) non-toxic and easily degraded by human proteolytic enzymes, (b) safe for intestinal microflora due to its rapid digestion by digestive tract enzymes, (c) alternative to reduce the use of chemicals as food preservatives, and (d) stable to pH and temperature [71].

The shelf life of *lepet* varies depending on several factors, including the ingredients used, how it is stored, and

the ambient temperature. Generally, *lepet* has a shelf life of up to 3–4 days stored in an airtight container in the refrigerator at a temperature below 40°F (4 °C). In the freezer temperature, it can extend the shelf life of *lepet* up to 2–3 months [8, 9]. Consuming *lepet* within a reasonable timeframe (maximum 7 days) is critical to reducing the risk of foodborne illness. If any indications of spoilage, such as the presence of mold, unusual odor, or slimy texture, are observed, the item must be promptly discarded.

The future, challenge, and prospect of *lepet*

It is challenging to predict the future of *lepet* due to various factors such as competition, consumer demand, and ingredient availability. Nonetheless, Indonesian cuisine is gaining recognition globally, which could potentially increase opportunities for *Lepet's* popularity outside of Indonesia [73]. Advancements in technology and distribution could also contribute to a wider audience reach. The production of innovative variations in fillings, flavors, and presentations could cater to different consumer preferences and dietary requirements. Additionally, the snack industry's increasing demand for convenience and portability makes *Lepet's* compact size and ease of consumption ideal for on-the-go consumption. To evaluate the feasibility of producing and selling *lepet*, a techno-economic analysis methodology could assess its technical and economic characteristics, including production process, raw material costs, and market demand. [74]. With the right adaptations to changing market trends, *Lepet's* future prospects could be promising.

Conclusion

Lepet, a traditional Indonesian dish, consists of sticky white rice combined with grated young coconut, coconut milk, cowpea, and a small amount of salt. This mixture is then wrapped in young coconut leaves. *Lepet* has gained popularity since the eighth century, during the period of the Hindu-Buddhist kingdom. In the 15th to sixteenth century, the Javanese people, influenced by Sunan Kalijaga's teachings, associated *lepet* with *ketupat*, representing purity and chastity of the soul. The tradition of consuming *lepet* has been widely practiced, especially in Java Island, during the celebration of *Eid Al-Fitri*. *Lepet* is rich in carbohydrates and provides some protein, but it lacks fiber and other essential nutrients. However, it serves as a valuable source of antioxidants and contains significant amounts of vitamins C, B6, B2, B1, and E, as well as calcium, copper, and zinc.

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Author contributions

AAW: Conceptualization (lead); visualization (lead); writing—original draft (lead). RHB: Conceptualization (equal); writing—original draft (lead). LPW: writing—original draft (equal).

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Availability of data and materials

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Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

The authors have given approval for the publication of this manuscript.

Competing interests

The authors declare no competing interests.

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