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CULINARY IN ISLAMIC-JAVANESE CULTURAL HERITAGE FROM A CHEMISTRY PERSPECTIVE

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ABSTRACT

Food plays a significant role in the religious rituals of Java, specifically within the realm of Islam, where special foods are prepared and consumed during religious ceremonies and celebrations, imbuing spiritual practices with a unique cultural essence. Understanding the chemistry behind these foods is essential for comprehending their health benefits and their embodiment of noble values within Javanese and Islamic cultures. This article seeks to delve into the chemistry of various cultural heritage foods from an Islamic-Javanese standpoint. To achieve this, a thorough literature review was conducted, focusing on culinary practices embedded within the Islamic-Javanese cultural heritage and exploring the corresponding chemical explanations. The research employed a systematic and meticulous search across academic databases, online libraries, and search engines to gather a broad range of perspectives, theories, and empirical evidence. Food, as a reflection of culture, serves both practical and symbolic roles within a particular cultural community. It serves as a manifestation of the values, traditions, and identity of the cultural group, while also meeting the physiological needs of individuals by providing essential nutrients and energy. Beyond mere sustenance, food holds utilitarian value by ensuring survival and promoting overall well-being. By delving into the chemistry of these cultural heritage foods, this article aims to shed light on their significance within the Islamic-Javanese context, uncovering the intricate interplay between chemistry, culture, and spirituality.

Keyword: Chemistry, Food, Islamic-Javanese Culture, Nutrition

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1. INTRODUCTION

Food plays a significant role in religious rituals, particularly Islam, as practiced in Java (Khairani, 2021; Wardana, Setiarto, & Wigati, 2023). In Javanese Islamic traditions, special foods are prepared and consumed during religious ceremonies and celebrations, adding a distinct cultural flavor to the spiritual practices (Nasir, 2019). Numerous studies have been conducted on the food consumed during religious rituals, focusing primarily on the symbolic meanings or changes in the types of food served (Anam, 2017; Julianto, Setiawan, & Harianja, 2021; Rosydiana, 2023). However, this article presents a fresh perspective by examining the chemical composition of these foods. Exploring the chemical aspect aims to contribute to developing the concept of *halalan thoyyiban* (permissible and wholesome) food, which complements the spiritual significance of religious rituals (Alzeer, Rieder, & Hadeed, 2018). The inclusion of this chemistry perspective may enhance our understanding and appreciation of the blessings associated with these rituals.

During Eid al-Fitr celebrations, for instance, a variety of traditional foods hold a special place in the culinary culture of Indonesia, particularly in Java (Wardana et al., 2023). One of the most iconic dishes enjoyed during this festive time is *ketupat*. *Ketupat* is made by weaving young coconut leaves into a pouch shape and then filling it with compressed rice, which is cooked until the rice becomes compact and forms a firm texture (Bolotio, 2018; Fibrianto, 2019). *Ketupat* is a symbol of confession to God and human beings. *Ketupat*, commonly known as kupat, can be interpreted as *ngaku lepat*. In this context, it conveys the idea that one should express remorse or apologize when they have committed a mistake (Rianti, Novenia, Christopher, Lestari, & Parassih, 2018).

One of the notable food-related rituals in Javanese Islamic culture is served during the practice of *Nyadran* or *Sedekah Bumi* (Anam, 2017; Rosydiana, 2023). *Nyadran* is a thanksgiving ceremony held by Javanese Muslims to express gratitude for the blessings of the harvest season (Julianto et al., 2021). It involves offerings of various agricultural products, including rice, fruits, vegetables, and traditional snacks, which are shared among the community members and distributed to the less fortunate (Sobaya, Pusparini, & Achiria, 2023). This ritual emphasizes the Islamic principle of giving back to the community and acknowledging the blessings bestowed by Allah (Sunyoto, 2016).

Many other foods are available during celebrations and ritual activities in Islam associated with Javanese Culture (Van den Boogert, 2017). These foods are related to culture and have explicit or implicit Islamic and ethical values. Islamic values such as spirituality, social harmony, and moral conduct heavily influence Javanese culture (Normayanti & Zamhari, 2022). The Javanese practice of *slametan*, a communal feast, reflects the Islamic principle of sharing and fostering unity among community members (Nasir, 2019; Van den Boogert, 2017). The practice of this tradition promotes the deepening of spirituality and devotion, exemplifying the application of religious beliefs that contribute to the reinforcement of societal diversity (Mibtadin et al., 2023).

From a scientific view, especially in chemistry, these foods also have good nutrition (Rianti et al., 2018; Wardana et al., 2023). Javanese Muslims follow Islamic dietary guidelines, ensuring that the food consumed aligns with the principles of *halal* (permissible) and *tayyib*

(wholesome) (Dewi, Jittanoon, & Wiroonpanich, 2020). It includes avoiding pork, alcohol, and other prohibited ingredients and observing proper slaughtering methods for meat (Alzeer et al., 2018). Food in Javanese Islamic religious rituals nourishes the body and serves as a means of spiritual connection and cultural expression. These practices demonstrate the integration of Javanese customs and Islamic teachings, creating a unique blend reflecting local heritage and religious devotion. Through preparing and sharing special foods, Javanese Muslims in Java strengthen their bonds as a community, express gratitude, and deepen their connection to their faith (Rianti et al., 2018; Rosydiana, 2023; Wardana et al., 2023).

Preserving Javanese culture is paramount as it embodies a rich and distinctive heritage passed down through generations (Wijaya, 2019). Preserving Javanese culture ensures the continuity of a unique and valuable legacy with significant historical, social, and artistic worth. Preserving Javanese culture is vital for maintaining a unique and valuable heritage (Faris, 2016). It ensures the transmission of wisdom, values, artistic expressions, historical narratives, and a sense of identity to future generations. It also enriches Indonesia's cultural diversity and promotes social cohesion, understanding, and appreciation of collective human heritage (Sunarti & Fadeli, 2021).

Several studies discuss the food available in religious ceremonies in Javanese culture and Islam. The food available during the *Nyadran* ceremony was explained in some research. They detailed the values contained in the ritual (Anam, 2017; Rosydiana, 2023). Laili (2023) described the values in the *brokahan* culture commonly practised in Mojokerto. This activity is carried out to express gratitude and joy for the birth process, which went well (Budiman, Wulandari, & Sukmawati, 2022). The food available during Eid al-Fitr is also widely discussed in many research, such as Ketupat (Amrullah & Puspitasari, 2023; Ningrum & Adiyanto, 2022) and *Lepet* (Wardana et al., 2023). However, not much research discusses the food of Javanese and Islamic cultural heritage from a chemical perspective.

Understanding the chemistry behind the availability of the foods can contribute to understanding the importance of recognizing that these foods offer health benefits and embody the noble values in Javanese and Islamic cultures. Chemistry is crucial in analyzing these foods' nutritional composition, processing techniques, and preservation methods, ensuring their quality and safety (Li et al., 2021). Therefore, this work aims to detail several Islamic-Javanese cultural heritage foods from chemistry perspective. It also integrates Islam and science which characterize the development of UIN Sunan Kalijaga.

2. METHOD

The research methodology employed in this study was a comprehensive literature review, specifically on exploring the culinary practices within the Islamic-Javanese cultural heritage and investigating the corresponding chemistry explanations. To begin with, the initial step of the research process involved a focused and systematic search to identify relevant scholarly articles encompassing the research topic. The primary objective was to gather a comprehensive collection of literature that delved into the culinary traditions specific to the Islamic-Javanese culture and the underlying chemical aspects that contribute to these culinary (Gentles, Charles, Nicholas, Ploeg, & McKibbon, 2016).

A systematic and rigorous search was conducted using various academic databases, online libraries, and search engines (Cooper, Booth, Varley-Campbell, Britten, & Garside, 2018). By casting a wide net, the researchers aimed to capture diverse perspectives, theories, and empirical evidence related to the research problem. Once the literature was assembled, a critical evaluation and analysis were conducted. It involved a meticulous examination of each selected source to extract key findings, theories, concepts, and empirical evidence that directly addressed the research problem. This rigorous analysis identified common themes and patterns regarding the culinary traditions in the Islamic-Javanese cultural context and the associated chemistry explanations (Gentles et al., 2016).

3. RESULT AND DISCUSSION

Food, a reflection of culture, serves both practical and symbolic roles within a specific cultural community. It is a manifestation of culture, playing a significant role in reflecting and expressing the values, traditions, and identity of a particular cultural group (Nasir, 2019; Rianti et al., 2018). On a practical level, food fulfills the fundamental physiological needs of individuals by providing essential nutrients and energy required for bodily functions. From a utilitarian perspective, people consume food not only to satisfy hunger and meet their nutritional requirements but also to ensure their survival and well-being (Allen, Gupta, & Monnier, 2008).

However, the role of food extends beyond its utilitarian function. Within a cultural context, it holds symbolic significance and becomes a means of expressing cultural identity, heritage, and social meanings (Wijaya, 2019). The selection of ingredients, cooking techniques, and dining rituals are all influenced by cultural values, beliefs, and customs. Food choices can reflect social status, regional affiliations, religious practices, and historical influences (Nasir, 2019; Van den Boogert, 2017).

From a chemistry viewpoint, food can be analyzed and understood regarding its chemical composition, structure, and reactions (Tsao, 2010). Composed of various organic and inorganic compounds, including carbohydrates, proteins, lipids, vitamins, minerals, and water, food chemistry involves studying the interactions between these components during food processing, storage, and cooking (Li et al., 2021). The application of heat, acids, bases, enzymes, and other chemical agents can alter the chemical composition, structure, and sensory properties of food. Understanding these chemical aspects provides insights into their nutritional value, safety, and the development of new culinary techniques (Wang et al., 2022).

Understanding the relationship between food and culture involves exploring its technical functions such as meeting physiological needs and its symbolic meanings reflecting a community's values, traditions, and social dynamics (Karaosmanoğlu, 2020). By studying food within a cultural context from both a scientific aspect especially from a chemistry viewpoint researchers can gain insights into the complex interplay between food cultural heritage and chemistry.

History and Philosophy

Traditional food in Java reflects the values derived from assimilating Javanese culture and Islamic principles (**Table 1**) (Wijaya, 2019). It serves as a testament to the region's rich cultural heritage, blending the Javanese people's customs and traditions with the teachings of Islam (Khairani, 2021; Wardana et al., 2023). Some of them have been enjoyed

as a popular culinary delight since the eighth century, during the Hindu-Buddhist kingdoms, and had been adapted after entering Islam in Java. The influence of Walisongo, especially Sunan Kalijaga in 15th-16th century resulted in the Javanese people adopting the values of those food with Islamic values emphasizing the importance of modesty, generosity, and harmony (Wardana et al., 2023). These values are reflected in the communal nature of Javanese dining, where meals are often shared among family members, friends, and neighbors. The act of sharing food fosters a sense of togetherness and strengthens social bonds within the community (Eko & Putranto, 2019).

Table 1. Symbolic significance, meanings, of traditional food and cultural acitivities in culinary islamic-javanese herritage

Traditional food or cultural activities	Symbolic significance	Meanings
Ketupat, Kupat	Ngaku Lepat	Confessing fault
	Laku Papat, i.e. lebaran, luberan, leburan, and laburan	Four Action, i.e. "width" and "over", abundant", "forgiving one another", and "pure",
Janur	Jatining nur	True light
Lepet	ngaku lepat	Confessing fault
Apem	Afuwun (Arabic term)	Apology
Brokahan	Barokah (Arabic term)	Gratitude and joy
Tumpeng	metu dalan kang lempeng	Live through a straight path
Yellow color (in tumpeng)	-	Prosperity and good fortune
Ingkung	inggalo jungkung	Suggesting an immediate act of prostration
	inggalo manekung	Promptly engaging in the remembrance of Allah
Slametan	Salamah (Arabic term)	Safety, peace, or well-being

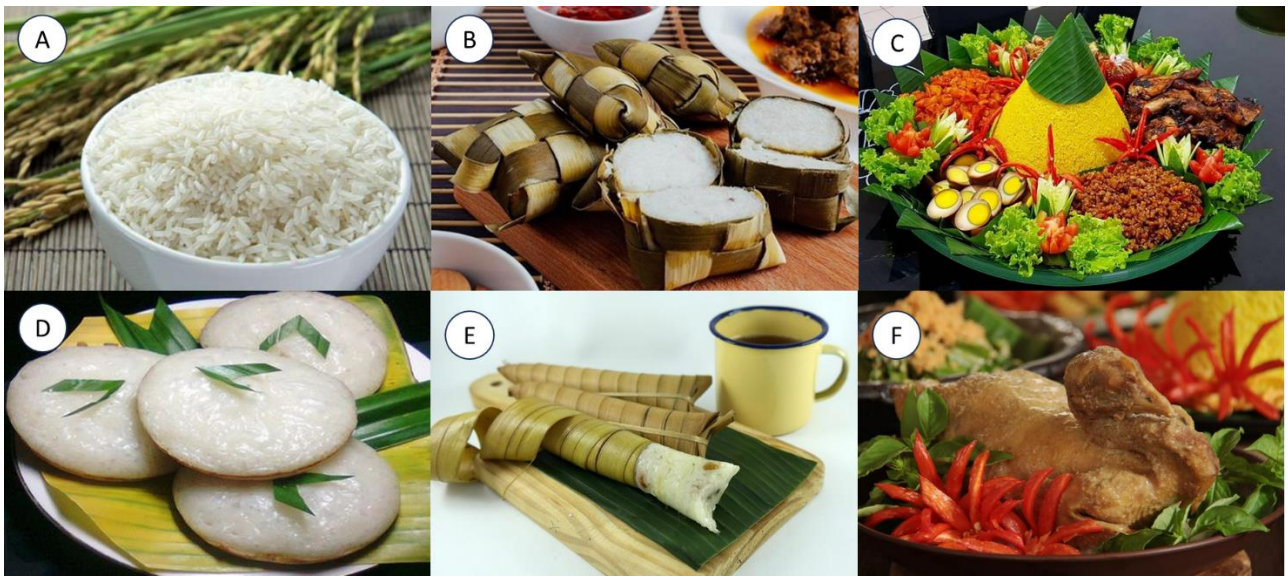

Figure 1. traditional food and cultural acitivities in culinary islamic-javanese herritage, (A) rice as a common ingredient, (B) Ketupat, (C) Tumpeng, (D) Apem, (F) Lepet, and (G) Ingkung
The figure retrieved from (A) media.suara.com, (B) cdns.klimg.com, (C) goodnewsfromindonesia.id, (D) liputan6.com, (E) asset.kompas.com, (F) awsimages.detik.net.id

Such of traditional javanes culinary assimilated with Islamic values are ketupat, lepet, apem, nasi tumpeng, ingkung, bubur pitu, and others (**Figure 1**) (Wijaya, 2019). Those food provides deep values of Islamic values and noble Javanese culture. *Ketupat* which is often

used interchangeably to refer to *kupat* can be interpreted as an act of *ngaku lepat* (confessing fault) *in Javanese* (Bolotio, 2018; Rianti et al., 2018). Symbolically, *ketupat* represents both forgiveness and blessings. It serves as a symbolic means for confessing sins to both God and fellow human beings. The primary ingredients used in *ketupat* are rice and young coconut leaves, each holding its own special significance. Rice symbolizes worldly desires, while young coconut leaves, known as *janur* in Javanese, derive from the term *Jatining nur*, meaning "true light" or conscience (Rianti et al., 2018). *Ketupat* beautifully embodies the harmony between worldly desires and conscience, urging individuals to resist the temptations of the material world. Moreover, in Indonesian culture, it is customary to seek forgiveness from one another after significant Eid al-Fitr, and *ketupat* serves as a symbolic representation of this act of forgiveness. *Ketupat* is also associated with the concept of *laku papat*. *Laku papat* encompasses four actions: *lebaran, luberan, leburan*, and *laburan* which have other valuable meanings (Achroni, 2017). *Lebaran* has dual meanings as "width" and "over". *Luberan*, *leburan*, and *laburan*, on the other hand, signify "abundant", "forgiving one another", and "pure", respectively (Rianti et al., 2018).

Lepet is a traditional Indonesian delicacy that consists of sticky white rice combined with grated young coconut, coconut milk, cowpea, and a touch of salt (Alfiah, Sunarya, & Werdiningsih, 2023). It is well-liked in Java, particularly in the regions of Central Java and East Java. Although *lepet* shares similarities with *ketupat*, it stands out due to its unique shape and preparation method (Wardana et al., 2023). To create *lepet*, glutinous rice is soaked overnight and then partially cooked until it becomes sticky. The partially cooked rice is tightly wrapped and subsequently steamed or grilled over charcoal until fully cooked, acquiring the delightful aroma from the packaging (Alfiah et al., 2023).

Lepet has been enjoyed as a popular culinary delight since the eighth century, during the era of Hindu-Buddhist kingdoms. In the 15th to 16th century, the influence of Sunan Kalijaga resulted in the Javanese people adopting lepet as a favored dish. During the Bodo Cilik celebration in Java, *janur*, or young coconut leaves, are commonly sold as wrappers for *lepet* (Wardana et al., 2023). In certain areas, such as the Sundanese region, *lepet* is wrapped in forest pandanus leaves, known as *jelutuk* (*Pandanus furcatus*). Alternatively, in some regions, glutinous rice is replaced with corn and wrapped in *klobot* (corn husks), resulting in a variation known as *leupeut* (Wardana et al., 2023). This dish is prepared in many households and shared among community members, including fellow worshippers at the mosque or small mosque (*musholla*), particularly on the morning of the 8th day of Syawal. In other parts of Java, *lepet* is also served during *selapan* events, which commemorate the 35th day after a baby's birth and often coincide with the naming ceremony (Budiman et al., 2022; Laili, 2023). Furthermore, *lepet* is a customary food offering during events like *Sedekah Ruwah*, *Sedekah Laut*, Eid al-Adha, and other traditional Islamic-Javanese activities. *Lepet* derives its name from the Javanese term *ngaku lepat*, same as *ketupat* (Mibtadin et al., 2023). As a result, offering apologies to one another holds significant importance and remains a cherished tradition during Eid al-Fitr. This phrase encapsulates the notion that once an apology is made for a wrongdoing, it should not be repeated, and no harm should be inflicted upon others. Lepet serves as a symbolic embodiment of the virtues of integrity and inner purity.

Apem is rooted in the word *afuwun*, which in Arabic means an apology both for oneself and the deceased's family asking God for protection and forgiveness (Mibtadin et al., 2023; Rosydiana, 2023). *Apem* cakes hold great cultural significance in Javanese traditions, serving as a meaningful element on various occasions. One such occasion is *Nyadran*, a traditional Javanese ritual that venerates ancestors, often accompanied by the presence of *apem* cakes (Anam, 2017; Julianto et al., 2021; Rosydiana, 2023). Another event is *Brokahan*, a communal gathering where people come together to pray and share food, with *apem* cakes commonly included in the offerings. *Brokahan* derives from the Arabic word *Barokah*, signifying gratitude and joy for a safe and smooth birth process. In essence, *Brokahan* also conveys the anticipation of blessings from the Divine Creator, emphasizing the desire for the baby's well-being and protection (Budiman et al., 2022; Laili, 2023). Furthermore, *apem* cakes hold significance during *tahlilan*, which is a gathering held to honor and remember the departed. In this context, *apem* cakes symbolize a symbolic act of seeking forgiveness from those who have passed away (Shofi & Maisaroh, 2020).

Another ritual such as *Slametan* provides many other traditional foods, such as *tumpeng, ingkung* and many others (Nasir, 2019; Van den Boogert, 2017). *Tumpeng*, a well-known dish in Indonesia, derives its name from the abbreviation *metu dalan kang lempeng*, meaning "live through a straight path". The rice used in tumpeng is typically yellow, representing prosperity and good fortune (Achroni, 2017). Alongside *tumpeng*, another dish commonly served is *ingkung*, which is a flavorful and aromatic chicken dish prepared by marinating, stuffing, and cooking the chicken in a mixture of herbs and spices (Lestari & Pratami, 2018). The term *ingkung* signifies *inggalo jungkung* suggesting an immediate act of prostration. It can also mean *inggalo manekung*, which refers to promptly engaging in the remembrance of Allah (Khofifah, 2021). Therefore, *ingkung* chicken symbolizes the aspiration to draw closer to God, attained through consistent prostration and recitation of dhikr (remembrance of God). It signifies the realization of one's spiritual desires.

Overall, many Islamic-Javanese traditional foods play a multifaceted role in Islamic-Javanese culture, representing ancestral reverence, communal unity, expressions of gratitude, and the aspiration for blessings and forgiveness in significant life events and remembrance ceremonies.

Nutritional Properties

Traditional food in Java can provide sufficient nutrition when consumed as part of a well-balanced diet. Traditional Javanese cuisine often incorporates a variety of ingredients, including rice, chicken, egg, vegetables, plant/herb utilization in the cuisine and others. These ingredients offer a range of nutrients that contribute to a healthy diet.

a. Rice

Rice (Oryza sativa L), which serves as the primary food source for over half of the global population, is cultivated in over 100 countries, with a significant 90% of the total production coming from Asia. While there exist an impressive array of over 110,000 cultivated rice varieties (Fukagawa & Ziska, 2019). Rice serves as a fundamental dietary component not only in Java but throughout Indonesia (Mariyono, 2014). Consequently, during religious ceremonies, rice-based dishes and snacks are readily available due to their prominence. Examples of such offerings include tumpeng rice, ketupat, apem (a rice flour-

based delicacy), and various others (Nasir, 2019; Wijaya, 2019). Thousands of rice varieties are available throughout the world and glutinous rice (Oryza sativa var. glutinosa) is one of the most popular varieties. Glutinous rice differs from other types of rice in that the grain starch contains essentially no amylose (0–2% dry basis) and high amount of amylopectin which is responsible for the sticky quality of cooked glutinous rice (Kang, Rico, & Lee, 2010). Gloutinus rice is commonly used in traditional food such as Lepet (Wardana et al., 2023).

Rice provides a significant contribution to the body's energy, protein, and iron requirements, accounting for 63.1%, 37.7%, and 25-30% respectively (Fukagawa & Ziska, 2019). It is a carbohydrate-rich food source that serves as a vital energy source for individuals in Indonesia . A 150-gram serving of rice contains approximately 45 grams of carbohydrates, predominantly in the form of amylose and amylopectin and derived as glucose (Zhou, Robards, Helliwell, & Blanchard, 2002). Glucose is derived from the breakdown of starch, yielding around 1250 glucose molecules that play a critical role in energy production within the body. This process, known as glycolysis, involves glucose's participation in the generation of ATP (Adenosine Triphosphate), which serves as a crucial form of energy for the body. Additionally, glucose plays a significant role in lipid metabolism (Jones, 2016).

In addition, rice boasts a wealth of essential vitamins and minerals, including thiamine (vitamin B1), niacin (vitamin B3), iron, magnesium, phosphorus, potassium, zinc, manganese, and more (Anjum, Pasha, Bugti, & Butt, 2007; Chaudhari, Tamrakar, Singh, Tandon, & Sharma, 2018; Verma & Srivastav, 2017). Thiamine, also referred to as vitamin B1, plays a crucial role in maintaining a healthy nervous system. It aids in carbohydrate metabolism, facilitating the conversion of food into usable energy for the body (Fattal-Valevski, 2011). Thiamine also supports the normal functioning of the heart, muscles, and other organs. Insufficient thiamine levels can lead to beriberi, a condition characterized by symptoms such as fatigue, muscle weakness, and nerve damage (Fattal-Valevski, 2011; Mrowicka, Mrowicki, Dragan, & Majsterek, 2023).

Niacin, or vitamin B3, is involved in various metabolic processes within the body. It plays a key role in breaking down carbohydrates, fats, and proteins, enabling the conversion of food into energy (MacKay, Hathcock, & Guarneri, 2012). Niacin also contributes to the maintenance of healthy skin by promoting the production of skin cells and supporting skin barrier function (Martins et al., 2020). Additionally, niacin has been found to have positive effects on cholesterol levels, raising high-density lipoprotein (HDL) cholesterol, known as "good" cholesterol, and lowering levels of low-density lipoprotein (LDL) cholesterol, often referred to as "bad" cholesterol (McKenney, 2004).

The iron content in rice is not as high as in some other foods, it still contributes to overall iron intake (Matres et al., 2021). Iron is essential for red blood cell production and oxygen transportation in the body (C. P. Gupta, 2014). Rice is also a good source of magnesium, which is vital for maintaining healthy bones and regulating blood pressure . Moreover, magnesium plays a crucial role in various bodily functions, including muscle and nerve function, as well as supporting a healthy immune system (Tian et al., 2021). Phosphorus, present in significant quantities in rice, is important for bone health, energy metabolism, and DNA and RNA synthesis (Takeda, Yamamoto, Yamanaka-Okumura, &

Taketani, 2012). Rice is also a source of potassium, an electrolyte that aids in fluid balance regulation, nerve function, and muscle contractions (Kundu, Raha, & Dubey, 2021).

Nonetheless, it is crucial to be mindful of excessive rice consumption, especially in diets high in carbohydrates, as it can heighten the risk of developing type 2 diabetes. Factors such as obesity, an unhealthy lifestyle, and insufficient physical activity are the primary risk factors for type 2 diabetes. Diets rich in simple carbohydrates, such as white rice, which are quickly digested and can cause spikes in blood sugar levels, may contribute to the risk of type 2 diabetes (Dam, 2020).

Nevertheless, in ancient Javanese culture, the combination of white rice with other dietary elements played a role in minimizing the risk of type 2 diabetes (WHO, 2022). Ancient Javanese individuals followed a balanced diet that included various side dishes, vegetables, and spices alongside rice. This diet, which was rich in fiber, vitamins, minerals, and other nutrients, helped maintain blood sugar balance and reduce the risk of diabetes (Higuera, 2023). Additionally, the ancient Javanese population generally led physically active lifestyles, engaging in activities such as farming, fishing, and other daily tasks that required significant physical exertion (Gertisser, Troll, & Nandaka, 2023). Regular physical activity aids in regulating blood sugar levels and improving insulin sensitivity.

The preparation of traditional foods not only enhances their quality but also extends their shelf life. For instance, ketupat, a traditional dish made by packing rice into woven coconut leaves (janur), undergoes a cooking process that involves boiling for approximately 5 hours. Once cooked, the ketupat is rinsed with cold water and left to hang until completely dried. This step serves various purposes, including preventing spoilage and removing excess water from boiling. The drying process reduces the moisture content, contributing to a longer shelf life for the ketupat (Li et al., 2021). When properly prepared, ketupat can be stored for a minimum of 2 days in a cool environment, and refrigeration can further extend its edibility for an even longer duration (Rianti et al., 2018).

b. Egg

Eggs play a prominent role in traditional Javanese cuisine, being a versatile ingredient used in various dishes like tumpeng, ketupat, and traditional snacks. Apart from adding protein and essential nutrients, eggs contribute a distinct texture, flavor, and deliciousness to these dishes. They are easily accessible and commonly incorporated into everyday cooking in Java (Wijaya, 2019).

Eggs are a nutrient-rich food source with numerous benefits for the human body. They are packed with important nutrients, including high-quality protein, vitamin A, vitamin B12, vitamin D, vitamin E, riboflavin, folate, iron, zinc, and phosphorus (Ruxton, Derbyshire, & Gibson, 2010). These nutrients are crucial for maintaining overall health and supporting various bodily functions. Eggs are particularly valued as an excellent source of animal protein, providing essential amino acids necessary for building and repairing body tissues such as muscles, bones, skin, and organs (Puglisi & Fernandez, 2022).

Moreover, eggs contribute to growth and development, especially in children and adolescents, due to their content of vital nutrients like vitamin D, vitamin B12, and folate.

They also contain lutein and zeaxanthin, known to promote eye health by protecting against age-related eye diseases such as macular degeneration (Eisenhauer, Natoli, Liew, & Flood, 2017). Additionally, eggs contain healthy fats and calories that provide the necessary energy for daily activities. The combination of protein and fat in eggs helps promote satiety, keeping you feeling full for longer periods. Eggs are also a source of essential nutrients such as choline and vitamin B12, which support brain health. Choline, in particular, is crucial for optimal brain function, including brain development in infants and cognitive function in adults (Ruxton et al., 2010).

c. Chicken

Chicken is a commonly used ingredient in traditional Javanese cuisine, appearing as the main or additional component in various typical dishes like ingkung, tumpeng, and served with ketupat and other traditional foods (Lestari & Pratami, 2018; Shofi & Maisaroh, 2020; Wijaya, 2019). With its rich nutrient content, chicken serves as a valuable source of animal protein that offers numerous health benefits (Dei, 2021). High-quality protein found in chicken plays a vital role in the construction and repair of body tissues, including muscles, bones, skin, and organs. Protein is also essential for maintaining hormone balance, enzyme function, and a robust immune system (Wu, 2016).

Chicken is a noteworthy source of iron, a crucial element in red blood cell formation and the transportation of oxygen throughout the body. Iron deficiency can lead to anemia and fatigue. Furthermore, chicken provides an array of B vitamins, including vitamin B6, vitamin B12, niacin, riboflavin, and pantothenic acid. These vitamins contribute to energy metabolism, nerve function, red blood cell production, and the maintenance of healthy skin, eyes, and the digestive system (Dei, 2021). Another significant component found in chicken is selenium, an essential mineral serving as an antioxidant that safeguards body cells against damage caused by free radicals and supports optimal thyroid function (Zoidis, Demiris, Kominakis, & Pappas, 2014). Chicken also contains phosphorus, a mineral vital for bone and teeth growth, DNA and RNA formation, and maintaining the body's acid-base balance (Shastak & Rodehutscord, 2013).

Additionally, chicken is a source of vitamin D, which aids in the absorption of calcium and phosphorus, maintains healthy bones and teeth, and supports the immune system. While chicken does contain fat, including saturated fat, the presence of healthy unsaturated fats provides energy, protects internal organs, and aids in the absorption of fat-soluble vitamins. It is important to consume saturated fats in moderation while incorporating the beneficial aspects of unsaturated fats present in chicken (Ameenuddin, Sunde, & Cook, 1985).

d. Plant/herb utilization in the cuisine

Traditional Javanese delicacies, including tumpeng, ingkung, lepet, and apem, derive their distinct flavors and appearances from a variety of additional ingredients, colorings, and special spices (Djono, Sukmawati, & Salimi, 2023). These dishes often incorporate grated coconut, lemongrass, pandan leaves, bay leaves, galangal, shallots, garlic, ginger, turmeric, coriander, and cumin (Lestari & Pratami, 2018; Nasir, 2019; Van den Boogert, 2017; Wijaya, 2019).

For visual enhancement, natural colorings like turmeric or pandan leaves are commonly used in dishes such as tumpeng and apem (Wijaya, 2019). These natural dyes not only add visual appeal but also infuse the dishes with unique aromas and flavors (Fajriati et al., 2022). Turmeric, a spice with a longstanding history in China and India, is readily available in Indonesian markets. Alongside its health benefits, turmeric contains curcuminoids, known as diferuloylmethane ($C_{21}H_{20}O_6$) (Lee et al., 2013). Curcumin, the vibrant yellow pigment in turmeric, exhibits its color in a water solvent with a neutral pH, existing in either a ketone or enol form (Lee et al., 2013).

The utilization of natural dyes promotes the safety and healthiness of traditional Javanese cuisine (Wijaya, 2019). In contrast, synthetic colorings such as metanil yellow or sunset yellow pose risks and potential dangers, including poisoning, organ damage, nervous system disorders, or even cancer at high doses. Synthetic dyes can also trigger allergic reactions or intolerances, resulting in symptoms like skin rashes, itching, swelling, or digestive issues (Mohammadi, Ahangari, Mousazadeh, Hosseini, & Dufossé, 2022). These substances pose particular risks to children, potentially leading to behavioral disorders such as hyperactivity or attention deficits (Miller et al., 2022).

Javanese spices, such as lemongrass, bay leaves, galangal, and others, play a crucial role in imparting rich and complex flavors to traditional dishes. These spices contribute distinctive fragrances and spiciness, giving Javanese cuisine its unique and irreplicable characteristics. Unlike synthetic processes or genetic modifications, these spices retain their natural composition, packed with nutrients and inherent compounds. Another frequently used ingredient in dishes like ingkung and lepet is grated coconut, which adds a creamy texture and savory taste, enhancing the overall dish (Wijaya, 2019). The incorporation of these additives, colorings, and spices is an integral part of Javanese culinary heritage. They not only offer a diverse range of flavors and visually appealing presentations but also symbolize the rich culture and culinary traditions that have thrived in Java for centuries (Nasir, 2019).

e. Food packaging

In traditional Javanese cuisine, it is common to utilize banana leaves or young coconut leaves (known as janur) as containers for serving various dishes (Wijaya, 2019). Banana leaves are typically employed to wrap foods like tumpeng (Nasir, 2019), while coconut leaves can be used as containers for dishes such as ketupat, lepet or market snacks (Rianti et al., 2018; Wardana et al., 2023). The utilization of leaves as containers not only imparts a natural aroma but also contributes to the traditional ambiance of Javanese cuisine. Moreover, leaves provide a protective layer that helps retain the moisture of the food and adds a distinctive aesthetic touch to the presentation of traditional Javanese dishes (Arumugam, Pugazhenthi, & Selvaraj, 2023; Wijaya, 2019).

Banana tree components, including the peels and leaves, possess antioxidant activities and various biological functions such as anti-diabetic, anti-diarrheal, anti-tumor, anti-mutagenic, and anti-ulcerogenic properties (Sidhu & Zafar, 2018). Bananas have also been found to contain bioactive compounds that inhibit the growth of bacteria and fungi, showcasing their antimicrobial activity (Jouneghani, Hortência Fonsêca Castro, Panda, Swennen, & Luyten, 2020; Mostafa, 2021). This broad spectrum of antimicrobial properties

makes leaves suitable for packaging and serving food (Erdiansyah, Meryandini, Wijaya, & Suwanto, 2021). They also contain abundant fibers, flavonoids, polyphenols, and tannins. Traditionally, Javanese people have used banana leaves to treat skin ailments like eczema, wounds, irritation, rashes, dandruff, and sunburn due to their cooling effect (Arumugam et al., 2023; Mostafa, 2021).

In addition to banana leaves, coconut leaves are widely utilized as containers for serving dishes. Similar to banana leaves, coconut leaves serve as natural insulation and biodegradable packaging materials (P. Gupta, Toksha, & Rahaman, 2022; Hasanah, Putri, Dewi, Santoso, & Supriyadi, 2022). The steaming process applied to janur, or young coconut leaves, has an impact on their physical and chemical characteristics as traditional packaging materials. These leaves possess specific physical and chemical traits that make them suitable for use as packaging materials. When fresh, they exhibit a tensile strength of 19.19 MPa, which increases to 30.62 MPa after being steamed for 30 minutes at 100°C. The water content of fresh leaves measures at 73.54%, which decreases to 69.57% after steaming. The fat content is 1.85% when fresh and reduces to 0.54% after steaming (Hasanah et al., 2022).

4. CONCLUSION

Food plays a crucial role in religious rituals, particularly in the Islamic traditions practiced in Java. Javanese Muslims prepare and consume special foods during religious ceremonies and celebrations, contributing a distinctive cultural essence to their spiritual practices. These culinary traditions not only nourish the body but also serve as a means of establishing spiritual connections and expressing cultural identity. The integration of Javanese customs and Islamic teachings is evident in these practices, resulting in a unique fusion that reflects local heritage and religious devotion. From a scientific standpoint, particularly in the field of chemistry, these foods also offer excellent nutritional value. Javanese Muslims adhere to Islamic dietary guidelines, ensuring that the food they consume aligns with the principles of *halal* (permissible) and *tayyib* (wholesome). These food traditions are worth preserving and passing down to future generations.

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