



ANALYSIS OF NUTRIENT CONTENT IN DODORO' AS A TRADITIONAL FOOD OF THE MAKASSAR TRIBE

ANALISIS KANDUNGAN GIZI PADA DODORO' SEBAGAI MAKANAN TRADISIONAL SUKU MAKASSAR

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Abstract

Dodoro' is a traditional food of the Makassar tribe that is widely associated with local food culture and is commonly found as a typical souvenir from Malino. The product is made mainly from black glutinous rice flour, palm sugar, and coconut and is characterized by a dark color and a chewy, soft texture. However, its nutrient composition has not been documented in the Indonesian Food Composition Table (TKPI). This study aimed to analyze the nutrient content and energy value of dodoro' using proximate analysis. The study used a descriptive quantitative design with a laboratory analysis approach. Analyses were conducted from May 20 to 26, 2026, at the Public Health Laboratory in Makassar. The parameters included moisture, ash, protein, fat, carbohydrate, crude fiber, and energy. Moisture was determined by the oven gravimetric method, ash by furnace incineration, protein by the Kjeldahl method, fat by Soxhlet extraction, carbohydrate by difference, and crude fiber by the enzymatic-gravimetric method, referring to SNI 01-2891-1992. The results showed that dodoro' contained 30.23% moisture, 1.01% ash, 4.34% protein, 0.89% fat, 63.53% carbohydrate, and 6.31% crude fiber. The calculated energy value was 279.49 kcal/100 g. Carbohydrate was the dominant nutrient component, while fat was the lowest. The findings provide an initial nutritional profile of dodoro' and may support the documentation and further development of Makassar local food products.

Keywords : Dodoro', Local Food, Proximate Analysis, Nutrient Content, Black Glutinous Rice.

Abstrak

Dodoro' merupakan makanan tradisional suku Makassar yang erat kaitannya dengan budaya kuliner lokal dan sering dijumpai sebagai oleh-oleh khas dari Malino. Produk ini berbahan dasar utama tepung beras ketan hitam, gula aren, dan kelapa, serta memiliki ciri khas berupa warna gelap dengan tekstur yang kenyal dan lembut. Namun, komposisi zat gizinya belum tercatat dalam Tabel Komposisi Pangan Indonesia (TKPI). Penelitian ini bertujuan untuk menganalisis kandungan zat gizi dan nilai energi



dodoro' menggunakan analisis proksimat. Studi ini menggunakan desain kuantitatif deskriptif dengan pendekatan analisis laboratorium. Analisis dilakukan pada tanggal 20 hingga 26 Mei 2026 di Laboratorium Kesehatan Masyarakat di Makassar. Parameter yang diukur meliputi kadar air, abu, protein, lemak, karbohidrat, serat kasar, dan energi. Kadar air ditentukan dengan metode gravimetri oven, kadar abu dengan metode pengabuan dalam tanur, protein dengan metode Kjeldahl, lemak dengan ekstraksi Soxhlet, karbohidrat dengan metode selisih (by difference), dan serat kasar dengan metode enzimatik-gravimetri, yang mengacu pada standar SNI 01-2891-1992. Hasil penelitian menunjukkan bahwa dodoro' mengandung 30,23% air, 1,01% abu, 4,34% protein, 0,89% lemak, 63,53% karbohidrat, dan 6,31% serat kasar. Nilai energi yang dihitung adalah sebesar 279,49 kkal/100 g. Karbohidrat merupakan komponen zat gizi yang paling dominan, sedangkan lemak merupakan komponen dengan kadar terendah. Temuan ini memberikan profil gizi awal bagi dodoro' dan diharapkan dapat mendukung pendokumentasian serta pengembangan lebih lanjut produk pangan lokal Makassar.

Kata Kunci : Dodoro', Makanan Lokal, Analisis Proksimat, Kandungan Nutrisi, Beras Ketan Hitam.

1. INTRODUCTION

Dodoro' is a traditional food of the Makassar tribe that is served on various occasions and is also recognized as a typical souvenir from Malino. The product is prepared from black glutinous rice flour, palm sugar, and coconut. Dodoro' is categorized as a semi-moist food because of its soft and chewy texture and its ability to be consumed without refrigeration. The traditional preparation involves cooking and continuous stirring for a relatively long period, producing a characteristic dark color and chewy texture (Kusdianto & Haedar, 2022; Sifa et al., 2020).

Lack glutinous rice (*Oryza sativa* var. *glutinosa*) is the main carbohydrate source in dodoro'. Its dark-purple color is associated with anthocyanin pigments, while its high amylopectin content contributes to the sticky and chewy characteristics of products made from it. According to the Indonesian Food Composition Table (TKPI), 100 g of black glutinous rice contains 360 kcal energy, 8.0 g protein, 2.3 g fat, 74.5 g carbohydrate, and 1.0 g fiber (Kemenkes RI, 2020). Anthocyanin-containing black glutinous rice has also been discussed as a source of antioxidant and bioactive compounds (Asfar et al., 2022; Hidayah et al., 2023).

Alm sugar is another important ingredient because it provides sweetness, characteristic aroma, color, and contributes to the preservation and texture of the product. TKPI reports that 100 g of palm sugar contains approximately 368 kcal and 92 g carbohydrate (Kemenkes RI, 2020). Coconut contributes fat, protein, and fiber, while also helping to create the savory taste and soft texture of dodoro'. In TKPI, 100 g of coconut contains 359 kcal, 3.4 g protein, 14 g fat, 14 g carbohydrate, and 4.7 g fiber (Kemenkes RI, 2020). The interaction among these ingredients and the prolonged heating and stirring process influences the final physicochemical characteristics of the product (Pratiwi & Arya Bima Senna, 2021; Setiavani & Suyatma, 2024).

lthough dodoro' has been consumed for generations and remains available in traditional markets and souvenir centers, its nutrient composition has not yet been recorded in the TKPI. Nutrient analysis is therefore important to provide scientific information on the nutritional value of this local food, to support consumer understanding, and to provide data that may be useful for future food-composition databases. Nutrient information can also support the evaluation and development of local food products (Kusumaningati, 2022; Suhaima et al., 2025).

Roximate analysis is commonly used to obtain an overall description of food composition through the determination of moisture, ash, protein, fat, carbohydrate, and fiber. Laboratory-based nutrient analysis can provide quantitative information that is useful for evaluating the nutritional characteristics and quality of a food product (Dwijayanti et al., 2023; Yunita et al., 2022). Based on this background, an analysis of the nutrient content of dodoro' is needed to document its nutritional profile as a traditional Makassar food.



2. RESEARCH METHOD

Study Design and Setting

This study employed a descriptive quantitative design with a descriptive laboratory analysis approach. The research was conducted from May 20 to 26, 2026, at the Public Health Laboratory in Makassar. The study measured the nutrient composition of dodoro' without applying a comparative treatment between experimental groups. Laboratory measurements followed the proximate-analysis procedures based on SNI 01-2891-1992.

Sample and Sample Preparation

The research object was dodoro', a local traditional food of the Makassar tribe made from black glutinous rice flour, palm sugar, coconut, water, and a small amount of cooking oil. The product formulation documented in the study consisted of 600 g black glutinous rice flour, 1 kg palm sugar, 500 g coconut, 500 mL water, and approximately 30 mL oil. The sample was obtained as the finished dodoro' product, packaged in a closed container, transported to the laboratory, homogenized, and prepared for analysis.

Laboratory Analysis

Moisture content was determined using the oven gravimetric method. A sample was weighed, heated, cooled in a desiccator, and repeatedly heated and cooled until a constant weight was obtained. Ash content was determined by furnace incineration at approximately 600°C. Protein content was determined using the Kjeldahl method, with digestion followed by distillation and titration. Fat content was determined using Soxhlet extraction with petroleum benzene. Carbohydrate content was calculated by difference using the formula: $100 - (\text{moisture} + \text{ash} + \text{fat} + \text{protein})$. Crude fiber was determined using the enzymatic-gravimetric procedure. All laboratory procedures were based on the methods documented in the research report and referred to SNI 01-2891-1992.

Energy Calculation

Energy was calculated using the Atwater conversion factors: 4 kcal/g for protein, 9 kcal/g for fat, and 4 kcal/g for carbohydrate. The energy value was calculated as: $\text{Energy} = (\text{carbohydrate} \times 4) + (\text{protein} \times 4) + (\text{fat} \times 9)$. The study also estimated a practical snack portion based on 10% of a 2,000 kcal daily energy requirement. The calculated 200 kcal equivalent corresponded to approximately 71.56 g of dodoro'. Because one package was 35 g, the study used two packages (70 g) as the practical daily snack portion.

Data Analysis

Laboratory results were recorded in grams per 100 g of sample and analyzed descriptively. The results were summarized in a table and interpreted using relevant literature cited in the research report. The analysis focused on the measured nutrient composition and the calculated energy contribution of dodoro'.

3. RESULT AND DISCUSSION

Nutrient Composition of Dodoro'

The laboratory analysis showed that carbohydrate was the largest component of dodoro', followed by moisture, crude fiber, protein, ash, and fat. The complete results are presented in Table 1.

Table Proximate composition and energy value of dodoro'.

Nutrient parameter	Method	Result (g or kcal/100 g)
Moisture	Oven gravimetric	30.23
Ash	Furnace	1.01
Protein	Kjeldahl	4.34
Fat	Soxhlet	0.89
Carbohydrate	By difference	63.53
Crude fiber	Enzymatic-gravimetric	6.31
Energy	Atwater conversion	279.49 kcal/100 g

Source: Primary Data, 2026



1. Moisture Content

Moisture content was 30.23 g. This means that approximately one-third of the product mass consisted of water. Moisture is an important quality parameter because it affects texture, stability, microbial growth, chemical reactions, and shelf life. Higher moisture may increase the risk of deterioration, whereas excessively low moisture can make a product dry and hard (Lidia & Ledyanna, 2025; Sutisna et al., 2026).

The moisture content of dodoro' is influenced by the water, coconut, and palm sugar used in the formulation. The research report notes that coconut contains substantial water and palm sugar also contains water and has hygroscopic properties. At the same time, the prolonged heating and continuous stirring for approximately 1–2 hours promote water evaporation. Therefore, the final moisture content represents a balance between the water contributed by the raw materials and the water lost during cooking (Fitri et al., 2024; Nadia et al., 2023; Uli et al., 2024).

The study describes dodoro' as a semi-moist product and reports that its relatively long storage is supported by the high sugar content, which can bind available water. A 35 g portion contains approximately 10.58 g water; two 35 g packages provide approximately 21.16 g water. These values describe the water contained in the food and should not be interpreted as a substitute for daily drinking-water requirements.

2. Ash Content

Ash content was 1.01 g. Ash represents the inorganic residue remaining after the organic components of food are burned and is commonly used as an indicator of the total mineral fraction of a food (Oktaviandi et al., 2024; Purwasih et al., 2022). In dodoro', the mineral contribution is associated mainly with coconut and palm sugar, which contain minerals such as potassium, calcium, phosphorus, magnesium, and iron.

The measured ash value indicates that mineral components remain in the product after processing. During heating, organic components undergo degradation, while mineral substances are relatively stable and remain as ash after incineration. The research report interprets the 1.01% value as a moderate mineral residue and notes that excessively high ash can affect sensory characteristics or indicate unwanted inorganic contamination, while very low ash would indicate a smaller mineral contribution (Mandjurungi et al., 2022; Wilmulda, 2021). A 35 g portion contains approximately 0.35 g ash, while two portions provide approximately 0.70 g total mineral residue.

3. Protein Content

Protein content was 4.34 g. Protein is an important macronutrient involved in tissue formation and maintenance as well as the formation of enzymes, hormones, and antibodies. In dodoro', protein originates primarily from black glutinous rice and coconut. TKPI reports protein contents of 8.0 g/100 g for black glutinous rice and 3.4 g/100 g for coconut (Kemenkes RI, 2020).

The relatively modest protein content of the finished product reflects the formulation, in which carbohydrate-rich black glutinous rice and palm sugar constitute major ingredients. Processing may also influence the characteristics of food proteins. The research report indicates that protein contributes to product structure, while a low protein level provides a smaller structural contribution (Adam et al., 2022; Ciptawati et al., 2021). A 35 g portion contains approximately 1.52 g protein, so two portions provide approximately 3.04 g. Thus, dodoro' can contribute protein, but it should not be considered the primary protein source in the daily diet.

4. Fat Content

Fat content was 0.89 g, the lowest measured nutrient component. Fat is an important macronutrient that provides energy, supports the absorption of fat-soluble vitamins, and contributes to flavor, aroma, texture, and mouthfeel. In the product, fat is mainly associated with coconut and the small amount of vegetable oil used in preparation.

Although TKPI reports 14 g fat per 100 g coconut, the final dodoro' product contained only 0.89% fat. The research report attributes this difference to the formulation and processing, in which whole grated coconut is incorporated into the dough and the product undergoes prolonged heating and



stirring. Importantly, the low measured fat content does not mean that the product must have a dry or non-smooth texture. The characteristic smooth, chewy, and glossy texture can also be related to the high amylopectin content of black glutinous rice and starch gelatinization during cooking (Setiavani & Suyatma, 2024; Yeoh et al., 2024). A 35 g portion contains approximately 0.31 g fat, while two portions provide approximately 0.62 g.

5. Carbohydrate Content

Carbohydrate was 63.53 g, making it the dominant nutrient component. The main sources are black glutinous rice flour and palm sugar. TKPI lists approximately 74.5 g carbohydrate per 100 g black glutinous rice and 92 g per 100 g palm sugar (Kemenkes RI, 2020). The dominance of carbohydrate in the final product is therefore consistent with the formulation.

Carbohydrate contributes both nutritional and technological functions in dodoro'. It is the principal source of energy and also contributes to the characteristic texture, chewiness, sweetness, and color of the product. The high amylopectin content of glutinous rice supports the formation of a cohesive and chewy structure during gelatinization, while sugar contributes sweetness and participates in browning reactions during heating. A 35 g portion contains approximately 22.23 g carbohydrate; two portions provide approximately 44.46 g carbohydrate.

6. Crude Fiber Content

Crude fiber content was 6.31 g. Fiber is the indigestible fraction of food that contributes to digestive health and can influence food texture. The fiber in dodoro' is associated mainly with black glutinous rice and whole grated coconut. TKPI reports approximately 4.7 g fiber per 100 g coconut, and the use of whole coconut allows more of the coconut solids to remain in the final product (Pratiwi & Arya Bima Senna, 2021).

The research report also notes that fiber can influence texture and moisture retention. Higher fiber levels may make a food more compact or coarse, whereas the interaction of fiber with water can help maintain moisture during storage. In dodoro', this effect occurs together with the gelatinized starch matrix, contributing to the product's chewy and compact character. A 35 g portion contains approximately 2.21 g crude fiber, while two portions provide approximately 4.42 g.

7. Energy Value and Practical Portion

The calculated energy value was 279.49 kcal/100 g. Using the Atwater factors, the energy contribution was calculated from carbohydrate, protein, and fat: $(63.53 \times 4) + (4.34 \times 4) + (0.89 \times 9) = 254.12 + 17.36 + 8.01 = 279.49$ kcal/100 g. The result shows that the energy contribution of dodoro' is driven primarily by its carbohydrate content.

Based on the portion calculation documented in the research report, 10% of a 2,000 kcal daily energy requirement corresponds to approximately 200 kcal for a snack. At 279.49 kcal/100 g, 200 kcal corresponds to approximately 71.56 g dodoro'. Because one package weighs 35 g, two packages correspond to 70 g and provide approximately 195.64 kcal, or about 9.78% of a 2,000 kcal daily requirement. The research therefore proposes two 35 g packages (70 g) as a practical snack portion. This is a portion estimate based on energy contribution rather than a universal medical or dietary prescription.

Two packages, the product provides approximately 44.46 g carbohydrate, 3.04 g protein, 0.62 g fat, 4.42 g crude fiber, and 21.16 g water. Because carbohydrate is the dominant nutrient, the product is best considered a carbohydrate-rich snack and should be consumed as part of a varied and balanced diet. The research report also emphasizes maintaining the traditional raw materials and processing methods while considering the addition of nutrition information on the product packaging.

4. CONCLUSION

1. The moisture content in dodoro' cake is 30.23 g. This value shows that the product falls into the semi-wet food category with a fairly good shelf life because it is influenced by the sugar content, which acts as a natural preservative.



2. The ash content in dodoro' cake is 1.01 g. This content comes from the natural minerals found in the main ingredients, namely coconut and palm sugar, most of which are preserved during processing.
3. The protein content in dodoro' cake is 4.34 g. This protein content comes from black glutinous rice flour and coconut, which can contribute building nutrients for the body.
4. The fat content in dodoro' cake is 0.89 g. Fat is the component with the lowest percentage because the coconut used is in shredded form, so some of its fat content evaporates during cooking.
5. The carbohydrate content in dodoro' cake is 63.53 g. Carbs are the main ingredient, coming from black glutinous rice flour and palm sugar.
6. It contains 6.31g crude fiber, which is good for your digestive health, coming from the whole coconut meat used in the making process.
7. The energy content of dodoro' cake is 279.49 kcal, providing energy for your body to stay active.

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