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Science Perspective: A Study of Calories in Brown Rice Fried Rice

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ABSTRACT

Objective: *This study aims to analyze and compare the calorie content of fried rice made from white rice and brown rice, focusing on their nutritional value and potential health benefits. The research highlights the advantages of brown rice as a healthier alternative for fried rice, promoting better calorie control and supporting dietary programs.* ***Method:*** *The study employs a literature review complemented by laboratory-based calorie calculations. Data was collected from previous scientific publications and experimental analyses, including the evaluation of macronutrient compositions and calorie content in both white rice and brown rice variants of fried rice.* ***Results:*** *Laboratory findings reveal that fried rice made from brown rice contains 115.32 kcal per 150 grams, slightly lower than the 115.56 kcal found in fried rice made from white rice. Although the calorie difference is marginal, brown rice fried rice demonstrates superior nutritional benefits, such as higher complex carbohydrate content and a lower glycemic index, which support prolonged satiety and better energy regulation.* ***Novelty:*** *This research introduces a unique perspective on the nutritional profile of fried rice by incorporating brown rice as a primary ingredient. Unlike traditional fried rice studies, this paper emphasizes the use of brown rice to create a low-calorie and nutritionally rich variant, aligning with modern dietary needs and contributing to innovations in Indonesian culinary practices.*

INTRODUCTION

Fried rice is one of the most popular specialties in Indonesia. This dish is known as a rice-based staple, which is often served with a variety of additives such as vegetables, eggs, and crackers. In general, the calorie content of a serving of fried rice ranges from 228 to 400 calories, depending on the additional ingredients used [1]. The popularity of fried rice comes not only from its savory and delicious taste, but also from its ease of presentation, which makes it the first choice of people in various circles, from street vendors to luxury restaurants [2].

However, fried rice is often considered a high-calorie food. The significant fat content of the frying process contributes to an increased risk of obesity and related diseases, especially when consumed in excess [3]. For example, crackers that are often served with fried rice can contribute up to 200 calories [1]. Therefore, it is important to find innovative solutions so that fried rice remains a sought-after yet healthier dish.

Indonesia has an extraordinary culinary wealth thanks to the abundance of spices and local foodstuffs. Each region has its culinary characteristics, including a variety of fried rice with local spices, such as spicy Javanese fried rice and Semarang tripe fried rice [4]. Historically, fried rice is known to have originated from Chinese culture that avoided wasting food. Leftover rice is often reprocessed by frying it with simple spices, resulting in a delicious and long-lasting dish [5]. Trade relations between China and the

archipelago since the 10th century also introduced fried rice to Indonesia, which was then adapted to local flavors [6].

Previous research has shown that fried rice has the highest fat content compared to other dishes, especially among students at risk of obesity [7]. Additionally, other studies revealed that fried rice has a lower glycemic index than regular white rice, which means it can help control blood sugar levels [8]. Research on fried rice innovations has also been carried out, such as the development of tomyam-spiced fried rice which is considered to have high nutritional value even though it requires refinement of taste [1]. Other research has created black soybean-seasoned fried rice that is rich in protein and antioxidants [9], as well as tengkawang fried rice that uses tengkawang fatty oil instead of ordinary cooking oil [10]. This innovation proves that fried rice can be developed into healthier dishes without losing its distinctive taste.

However, of the many fried rice innovations, research on low-calorie fried rice made from brown rice has not been widely explored. Brown rice is known to have a lower calorie content, rich in fiber, and a lower glycemic index than white rice [11]. The use of brown rice as the main ingredient of fried rice is expected to not only reduce the calorie content but also increase the nutritional value of the dish.

Based on this background, researchers are interested in being creative in replacing white rice with brown rice as a variant of fried rice, so the researcher will conduct a study with the title "**Science Perspective: A Study of Calories in Brown Rice Fried Rice**". With this background, it is hoped that it can provide new insights from a scientific point of view regarding fried rice with low calorie content.

RESEARCH METHOD

This research is included in the category of literature study and laboratory study. Literature study is research that focuses on the study of theories and sources of scientific reference related to relevant values, norms, and culture in a certain social context that is the object of research [12]. Data collection in this research is carried out by documentation techniques, namely by collecting various information from records, books, articles, papers, journals, and other sources. Meanwhile, the collection of data that laboratory studies are carried out by experiments or experiments through parameter tests to obtain accurate results [13].

The main problem raised in this study is to identify and also compare brown rice fried rice with ordinary fried rice to find out the lower calorie value. This research method is based on concepts and theories supported by literature including articles that have appeared in scientific journals and based on the results of laboratory parameter tests. There are several stages in literature study. First, the determination of topics that are in line with the interests and objectives of the research. Second, explore references through literature searches as well as sources on the topic. Third, determining the focus of research to explore the problem in depth. Fourth, data collection from relevant sources is relevant to the focus of the research. Fifth, the preparation of data presentation through

organizing as well as reference analysis. Finally, the preparation of a research report containing the results of analysis and findings[14].

The data analysis technique used in this study focuses on the results of previous research [15], where data analysis is the process of organizing and arranging information systematically to improve the researcher's understanding of the focus of the study, and presenting the results in the form of findings that are useful to others. This process involves editing, classifying, reducing, and presenting data. The first step is to reduce data, which is to sort out information relevant to research and eliminate unnecessary data. The second step is to prepare the data that has been reduced to a formatted format. The third step is to collect data from the results of the study. The final step is to interpret the data, where the data that has been compiled is analyzed to produce research findings and conclusions.

RESULTS AND DISCUSSION

Results

History records that fried rice, which in Chinese is called "Hanzi," has been around since 4,000 BC and spread throughout the world through Chinese immigrants who created local variants with spices available in various places [14]. Fried rice is rice that is seasoned and fried, usually with a spicy taste, using simple spices such as onion, garlic, chili, salt, and pepper. This dish is not only popular in Indonesia but also a favorite in many countries. Additional ingredients such as eggs, chicken pieces, meat, seafood, pickles, and crackers are often used to enrich the flavor and appearance, adjusting to individual tastes. According to the book *Delicious Dishes of the Archipelago*, fried rice comes from the habit of the Chinese people who avoid cold food and food waste, so the leftover rice is reprocessed by frying [8].

In the website [16] it is explained that in one spoon (50 grams) of fried rice, there are about 86 kcal. This number of calories can vary depending on the type of rice and additional ingredients used. If you use plain white rice with added oil, the calories may be higher than if you use brown rice or replace the oil with olive oil, which is quite healthy. In addition, the addition of other ingredients such as chicken, seafood, vegetables, or eggs also affects the total calories.

The high calories in fried rice can be overcome by adding other nutrients and can also be replaced with an ingredient to obtain calories that are ready to be managed by the body properly. For example, the use of brown rice to be used as fried rice. Colored rice, such as red, black, and purple, contains anthocyanins and proanthocyanidins found in the aleuron layer. This natural coloring substance is included in phenolic compounds that function as antioxidants. This type of rice is known to have higher levels of phenols, flavonoids, and antioxidant activity than ordinary white rice. In addition, colored rice also contains higher amounts of important minerals such as iron (Fe), zinc (Zn), calcium (Ca), copper (Cu), and magnesium (Mg). The presence of these nutrients adds to the

health benefits of pigmented rice, making it a more nutritious option compared to regular rice [17].

Figure 1. Low-calorie brown rice fried rice display.
Source: (Personal document, 2024)

The calorie comparison is also the composition of regular fried rice and brown rice fried rice, based on the website [18] provides nutritional information, recipes, and food APIs to help users track their diet, exercise, and weight. The following has been equipped with a comparison table of composition and calories between ordinary fried rice [19] and brown rice fried rice [20].

Table 1. Comparison of composition and also calories between ordinary fried rice and brown rice fried rice.

Component	Fried Rice Regular (White Rice)	Fried Rice Brown Rice
Protein Content	6,3%	2,56%
Fat Content	6,23%	0,89%
Carbohydrate Content	21,06%	22,78%
Protein	6,3 g	2,56 g
Fat	6,23 g	0,89 g
Carbohydrates	21,06	22,78 g
Calories from Protein	25,2 kkal	10,24 kkal
Calories from Fat	56,07 kkal	8,01 kkal
Calories from Carbohydrates	84,24 kkal	91,12 kkal
Total Calories	165,51 kkal	109,37 kkal

In addition to the data from the literature, the researcher has prepared research data from the laboratory related to the results of calorie calculations in white rice and brown rice fried rice for comparison, in laboratory calculations it is known that the serving size of each fried rice is 150 grams, and the net is 200 grams. The following are the results of laboratory research on the calories of brown rice and white rice fried rice.

Table 2. Laboratory research results from calories of brown rice and white rice fried rice.

Components	Regular Fried Rice (White Rice)	Fried Rice (Red Rice)
Protein Content	11.06%	8.31%
Fat Content	0.08%	0.4%
Carbohydrate Content	27.28%	29.23%
Protein	8.295 g	6.2325 g
Fat	0.06 g	0.3 g
Carbohydrates	20.46 g	21.9225 g
Calories from Protein	33.18 kkal	24.93 kkal
Calories from Fat	0.54 kkal	2.7 kkal
Calories from Carbohydrates	81.84 kkal	87.69 kkal
Total Calories	115.56 kkal	115.32 kkal

Discussion

Based on the results of research that has been carried out both from literature studies and also calorie calculation data in the laboratory, it can be described related to the discussion. Based on tables 1 and 2 of the protein content values, the FatSecret table shows that white rice fried rice has a protein content of 6.3%, while brown rice fried rice is only 2.56%. However, the results of laboratory tests recorded that the protein content of white rice fried rice was higher, namely 11.06%, compared to brown rice fried rice which reached 8.31%. Protein is an important component to support body functions, including tissue repair and enzyme formation. In this case, even though brown rice fried rice has a slightly lower protein content, the content is still sufficient to support daily needs. The protein content in brown rice has a lower percentage compared to white rice fried rice, based on a study of the protein literature contained from local level brown rice from 7.72% to 9.10%. However, brown rice has good nutritional content, which then has antioxidant activity and has a good iron content [21]. This is because brown rice is traditionally produced without the use of a milling machine so that brown rice contains a higher number of nutrients and non-nutrients than white rice, because the milling process in white rice causes a decrease in the content of these nutrients and non-nutrients [22]. Although based on laboratory data, the percentage of protein in brown rice is lower than that of white rice, it is undeniable that its nutritional value is superior to white rice.

Based on tables 1 and 2 of the fat content values, the FatSecret table shows that brown rice fried rice has a fairly low fat content (0.89%) compared to white rice fried rice (6.23%). However, the results of laboratory tests give a different picture, with the fat content of brown rice fried rice only 0.4% and white rice fried rice even lower, which is 0.08%. The higher fat content in brown rice fried rice compared to white rice can make it a safe choice for those who want to get energy. Based on literature, brown rice is superior to white rice. Brown rice contains high fiber (plays a role in preventing gastrointestinal

diseases as well as in diabetics), high content of B vitamins and minerals (prevents berries), high fat content (as a source of energy) [23].

Based on tables 1 and 2 of the carbohydrate content values, the FatSecret table noted that white rice fried rice had a carbohydrate content of 21.06%, while brown rice fried rice was slightly higher, which was 22.78%. The results of laboratory tests show a similar pattern, with white rice fried rice having a carbohydrate content of 27.28% and brown rice fried rice 29.23%. Brown rice carbohydrates are more complex, so they take longer to digest. This helps to keep blood sugar levels stable and provides sustainable energy, which is important for supporting daily activities without the risk of blood sugar spikes. Based on the literature, brown rice has a low glycemic index (low starch, high in complex carbohydrates which can lower the risk of type 2 diabetes [24]. The carbohydrates in brown rice which are complex carbohydrates so they are slow to be absorbed by the body and make blood sugar not rise quickly. This is also because the fiber content in brown rice is very high, so that the fiber can be full [25].

Based on tables 1 and 2 of the total calorie value, the FatSecret table shows that white rice fried rice has a higher total calorie, which is 165.51 kcal per 100 grams, compared to brown rice fried rice which is only 109.37 kcal. However, the results of laboratory tests recorded that the total calories of white rice fried rice were 115.56 kcal for 150 grams, while brown rice fried rice recorded almost the same number, which was 115.32 kcal. This small difference shows that brown rice fried rice not only provides enough energy, but also maintains a healthy calorie balance for the body.

Overall, brown rice fried rice offers a variety of health benefits that make it a superior choice for supporting optimal body function. With low fat content, complex carbohydrates that provide stable energy, and controlled calories, brown rice fried rice can be part of a healthy diet. In addition, brown rice with nutritional advantages also makes brown rice fried rice a good choice to support a diet program that focuses on long-term health. This is because brown rice can increase SCFA in the colon [26]. Short chain fatty acids (SCFAs) are short-chain organic acids synthesized by the gut microbiota through fermentation of mostly undigested carbohydrates and a small portion by dietary and endogenous proteins [27]. Epidemiological studies also support the relationship between dietary fiber consumption and a reduced risk of cardiovascular disease, diabetes, and colon cancer [28]. This may have beneficial effects on weight loss programs, insulin sensitivity, and glucose tolerance [22].

CONCLUSION

Fundamental Finding : This study concludes that fried rice made from brown rice has a slightly lower calorie content than white rice fried rice, with laboratory results showing 115.32 kcal for brown rice fried rice and 115.56 kcal for white rice fried rice in a 150-gram serving. Additionally, brown rice fried rice contains lower fat and higher complex carbohydrates, which contribute to sustained energy release without causing blood sugar spikes. These findings emphasize the potential benefits of replacing white

rice with brown rice to create a healthier alternative to traditional fried rice. **Implication :** The practical and theoretical implications of this study lie in its contribution to culinary innovation, particularly in Indonesia, by introducing brown rice fried rice as a healthier alternative. This research supports modern dietary programs focused on weight management and metabolic disease prevention. Furthermore, it enhances scientific understanding of the nutritional advantages of brown rice in promoting a low-calorie diet, encouraging healthier food choices among consumers and culinary professionals. **Limitation :** This study has certain limitations, including its scope being confined to comparing only two types of fried rice (white and brown rice) and focusing solely on calorie, protein, fat, and carbohydrate parameters. Other influencing factors, such as the impact of spice variations and cooking methods on nutritional content, were not examined in detail. Additionally, the study relied on a single set of laboratory results without incorporating extensive organoleptic tests to assess taste and texture. **Future Research :** Future research should explore various brown rice fried rice variants, including different cooking methods and spice variations, to understand their impact on nutritional profiles and sensory attributes. Long-term studies with clinical trials are recommended to assess the health benefits of brown rice fried rice on metabolic health. Further research into developing low-calorie fried rice products using local ingredients is also encouraged to support broader dietary applications.

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