Unlocking the Nutritional Potential of Palm Oil: A Review of Its Health Benefits

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KEYWORDS

Cooking Oil, Palm Oil, Benefit, Health

ABSTRACT

Palm cooking oil is one of the most widely used vegetable oils in the world, especially in the food industry. In addition to its wide availability, this oil also has nutritional content that has the potential to provide health benefits. Vitamin E in the form of tocotrienols found in palm oil has strong antioxidant properties that can protect body cells from oxidative stress. In addition, the fatty acid content in this oil can also help balance cholesterol if consumed in moderate amounts. This study aims to identify the health benefits of consuming palm cooking oil in everyday life by reviewing various scientific literature. In addition, this study also wants to provide insight into how responsible palm oil consumption can support health. This study uses a literature study method by collecting data from scientific journals, research articles, and academic reports from trusted sources such as Google Scholar. Data were analyzed descriptively qualitatively. The literature shows that palm oil contributes to heart health, brain protection, and increases the absorption of fat-soluble vitamins. Palm oil has health benefits if consumed wisely. Its antioxidant and fatty acid content plays a role in maintaining body health, making it an alternative vegetable oil that can be consumed responsibly.

INTRODUCTION

Palm oil is one of the most widely consumed vegetable oils in the world, especially in Asian, African and South American countries (Zailani et al., 2023). The main advantages of this oil lie in its stability when used for cooking, its wide availability, and its relatively affordable price compared to other vegetable oils (Febijanto et al., 2023). In addition, palm oil has a variety of health benefits supported by scientific research, including high antioxidant content and a balance of fatty acids that can have positive effects on the body if consumed wisely.

Despite its many benefits, palm oil is also the subject of controversy, especially regarding its impact on health and the environment. Several studies have shown that excessive consumption of palm oil can increase the risk of heart disease due to its high saturated fat content. However, other studies have shown that when consumed in moderate amounts and combined with a healthy diet, palm oil may play a role in maintaining cardiovascular and metabolic health (Talkah, 2023). Therefore, further studies are needed to understand the benefits and risks associated with its use.

Palm oil contains a unique combination of saturated and unsaturated fatty acids, which gives it high stability when heated. In addition, this oil is rich in vitamin E, especially in the form of tocotrienols, which have stronger antioxidant properties than tocopherols (Noviandini et al., 2023). These antioxidants play a role in protecting body cells from oxidative damage that can cause various degenerative diseases, such as cancer, diabetes, and heart disease.

Several studies have shown that palm oil can help increase good cholesterol levels (HDL) while lowering bad cholesterol levels (LDL) in the body (Ahmed et al., 2023). The tocotrienols in this oil have the potential to reduce plaque formation in blood vessels, which is a major cause of atherosclerosis and heart attacks. However, these benefits can only be obtained if palm oil consumption remains within reasonable limits and is combined with a healthy diet

Tocotrienols in palm oil have been studied in several studies showing their potential in protecting brain cells from oxidative damage (Azhari et al., 2023). Early research suggests that consuming palm oil may help prevent neurodegenerative diseases, such as Alzheimer's and Parkinson's. In addition, this oil is also thought to help improve cognitive function in the elderly and slow down memory decline.

Fat-soluble vitamins, such as vitamins A, D, E, and K, require a fat medium to be absorbed optimally by the body. Palm oil can act as a natural carrier for these vitamins, thereby increasing the efficiency of nutrient absorption (Ibrahim & Fadzil, 2024). This is especially important for individuals with nutrient absorption problems or those who require additional intake of fat-soluble vitamins for bone health, immune system function, and blood clotting function.

Several studies have shown that palm oil can contribute to increasing the body's metabolism (Sidik et al., 2023). Its fatty acid content can be used as an efficient energy source for the body, especially in certain conditions such as a low-carb diet (Gaur et al., 2022). In addition, this oil is also known to have a lower oxidation index compared to several other types of vegetable oil, making it more stable when used for cooking at high temperatures.

Compared with other vegetable oils such as soybean oil, sunflower oil, and corn oil, palm oil has advantages in terms of heat stability and resistance to oxidation. This oil also does not undergo the hydrogenation process, which can produce harmful trans fats (Thanasegaran & Yeap, 2023). However, it should be noted that palm oil has a higher saturated fat content than other oils, so its consumption should be adjusted to individual nutritional needs.

The quality of palm oil can vary depending on processing and storage methods. Palm oil that is processed using more natural methods and does not undergo excessive refining tends to retain its nutritional content better (Kim et al., 2025). Therefore, selecting high-quality palm oil is essential to ensure optimal health benefits.

Although palm oil has various health benefits, it is important to consume it wisely and in balance with other nutritional intakes. Excessive consumption can have negative impacts on health, especially in the context of a diet high in saturated fat. Therefore, education regarding the responsible use of palm oil is very necessary so that its benefits can be obtained optimally without causing unwanted health risks.

METHOD

This study uses a literature study method or literature review to examine various academic sources that are relevant to the benefits of palm cooking oil for health (anak Erison et al., 2022). This method was chosen because it allows for in-depth analysis of previous studies in order to comprehensively understand the health aspects of palm oil consumption.

The data used in this study were obtained from various reliable scientific sources, including scientific journals published by academic institutions such as Google Scholar (Mathiyazhagan et al., 2022). Reference books related to nutrition and health that discuss palm oil. Research reports from international health and food organizations, such as WHO (World Health Organization) and FAO (Food and Agriculture Organization) (Adeniran et al., 2024). Scientific articles that discuss the benefits of palm oil in the context of human health (Ajayeoba et al., 2022). Literature selection is carried out by considering the level of relevance, reliability of sources, and year of publication to ensure that the data used is still in accordance with the latest scientific developments.

To ensure that the data studied has high relevance, this study applies inclusion and exclusion criteria, namely the inclusion criteria are studies that discuss the health benefits of palm oil consumption (Kumar & Goga, 2023). Articles published in international indexed journals in the last 10 years (except for fundamental references that remain relevant) (Giwa et al., 2023). Research using experimental, observational, or meta-analysis methods. Exclusion criteria are studies that only discuss non-health aspects of palm oil. Non-scientific or opinion articles that have no basis in research. Research with invalid methods or significant limitations in data analysis.

The data collection process was carried out using specific keywords, such as "palm oil and health benefits," "tocotrienols in palm oil," "palm oil and cardiovascular health," and "nutritional

aspects of palm oil (Cao et al., 2023)." These keywords were applied in searches in various scientific databases to find relevant literature. After the data was collected, a selection was made based on the abstract and conclusions of the study to ensure that it was in accordance with the research objectives. Articles that met the criteria were then further analyzed to obtain more in-depth information.

The collected data were analyzed using a qualitative descriptive approach, with the following steps: data classification is the data obtained is grouped based on the main theme, such as the nutritional composition of palm oil, benefits for heart health, the role of antioxidants in the body, and effects on metabolism (Shohaimi et al., 2024). Comparison of studies is the results of research from various sources compared to identify similarities, differences, and emerging patterns related to the benefits of palm oil (Ajie et al., 2024). Interpretation and synthesis is the data that has been analyzed and then synthesized to draw conclusions about how palm oil consumption can provide health benefits in everyday use (Ahmad et al., 2022). Critical evaluation is the weaknesses and limitations of each study reviewed are also analyzed to provide a more objective picture of the benefits and potential risks of palm oil for health.

To ensure the credibility of the research, several steps are taken, namely using academic sources that have gone through a peer review process, citing research results that have a strong methodological design, comparing various studies to avoid bias in data interpretation.

By using this research method, the research is expected to provide a more comprehensive and scientifically based understanding of the health benefits of palm cooking oil, as well as support its more responsible use.

RESULTS AND DISCUSSION OF RESULTS

Research result

This study examines various scientific literature on the health benefits of palm cooking oil in everyday use. The results of the analysis from various sources indicate that palm oil contains various nutrients that can provide positive effects on health if consumed in moderate amounts and in accordance with nutritional guidelines. Palm oil is one of the most widely used vegetable oils in the world due to its unique nutritional content and stability when heated (Pandyaswargo et al., 2022). Based on the analysis of various scientific literature, palm oil contains a mixture of fatty acids, vitamins, and bioactive compounds that contribute to various health benefits.

Specifically, palm oil has a balance of saturated and unsaturated fatty acids, making it stable against oxidation and ideal for a variety of food processing. About 50% of palm oil content consists of saturated fatty acids, which play a role in providing stability and resistance to high temperatures. The main types of saturated fatty acids in palm oil include palmitic acid (C16:0) at 44%, which plays a role in energy storage in the body but can increase LDL cholesterol levels (bad cholesterol) if consumed excessively (Hairunnaja et al., 2023). In addition, palm oil also contains stearic acid (C18:0) at around 4%, which has no significant impact on blood cholesterol levels and can be converted to oleic acid which is more heart-friendly.

Palm oil contains about 50% unsaturated fatty acids that provide various health benefits, especially in maintaining blood lipid balance and supporting cardiovascular function. One of its main components is oleic acid (C18:1, Omega-9) which reaches 39% of the total content. This fatty acid is included in the group of monounsaturated fatty acids that can help increase good cholesterol levels (HDL), maintain blood vessel elasticity, and reduce the risk of heart disease. In addition, palm oil also contains 10% linoleic acid (C18:2, Omega-6), which is an essential fatty acid that must be obtained from food. Linoleic acid plays an important role in maintaining healthy skin, brain function, and regulating the immune system (Shubhankar et al., 2024). However, a balance of linoleic acid consumption with omega-3 fatty acids is essential to avoid inflammatory effects. Another smaller content in palm oil is linolenic acid (C18:3, Omega-3), which is less than 1%. Linolenic acid plays a role in supporting brain health and reducing inflammation, although the levels are relatively smaller compared to other oils such as flaxseed oil or fish oil.

In addition to fatty acids, palm oil is also rich in vitamin E, especially in the form of tocotrienols, which have higher antioxidant activity than tocopherols commonly found in other

vegetable oils. The vitamin E content in palm oil ranges from 600–1,000 ppm, consisting of 30% tocopherols and 70% tocotrienols (Daimary et al., 2023). Tocopherols are a common form of vitamin E that plays a role in protecting cells from oxidative stress and strengthening the immune system. Meanwhile, tocotrienols have a chemical structure that allows better penetration into cell membranes, making them more potent in preventing inflammation and protecting the brain from oxidative damage than tocopherols. In addition, tocotrienols also have the potential to inhibit the growth of cancer cells, especially breast and prostate cancer, and contribute to improving skin health, repairing tissue, and reducing the risk of premature aging. Red palm oil contains more tocotrienols, making it a higher source of antioxidants than refined palm oil.

Red palm oil also has a very high carotenoid content, around 500–700 ppm, making it one of the best plant-based sources of pro-vitamin A (Nascimento et al., 2022). These carotenoids consist of beta-carotene and alpha-carotene. Beta-carotene acts as a precursor to vitamin A which is very important for eye health and the immune system, as well as helping to prevent night blindness and improve retinal function. Meanwhile, alpha-carotene has higher antioxidant activity than beta-carotene and has the potential to help reduce the risk of heart disease and cancer. However, the palm oil refining process can cause the loss of most of the carotenoid content due to high heat, so less processed red palm oil is recommended to maintain its optimal nutritional content.

In addition to vitamin E and carotenoids, palm oil also contains other bioactive compounds that provide additional health benefits. One of these is phytosterols, which are found in amounts of around 100–200 mg per 100 grams of oil. Phytosterols play a role in inhibiting the absorption of cholesterol in the intestines, thereby helping to lower blood cholesterol levels. Their chemical structure is similar to cholesterol, allowing phytosterols to compete for absorption by the body, which in turn can help maintain heart health. In addition, palm oil also contains Coenzyme Q10 (CoQ10), an antioxidant that plays a role in energy production in cells (Ismet et al., 2024). CoQ10 contributes to improving heart function and reducing fatigue, making it one of the important components in palm oil that is beneficial for overall health.

Palm oil is rich in tocotrienols, a form of vitamin E that is more potent than tocopherol in fighting oxidative stress. Tocotrienols play a role in preventing cell damage from free radicals that can accelerate the aging process and trigger various degenerative diseases. In addition, this compound also has anti-inflammatory effects that can help reduce inflammation in the body, thus contributing to the prevention of chronic diseases such as diabetes and cancer. In terms of skin health, tocotrienols support collagen production and slow down the skin aging process, making it an essential element in natural skin care.

Several studies have shown that moderate consumption of palm oil may provide heart health benefits. It can increase levels of good cholesterol (HDL), which helps clear plaque from blood vessels and reduce the risk of blockages. It also helps stabilize total cholesterol levels, although there is some debate about its impact on bad cholesterol (LDL) (Marriam et al., 2023). By maintaining blood vessel elasticity and reducing inflammation, it has the potential to reduce the risk of cardiovascular disease. However, its effects depend largely on overall consumption patterns. If consumed excessively without balancing it with other healthy fats, palm oil can still increase the risk of heart disease.

The trienols in palm oil are known to have significant neuroprotective benefits. Studies have shown that these compounds can protect the brain from neurodegenerative diseases such as Alzheimer's by reducing the buildup of beta-amyloid plaques that contribute to brain cell damage. In addition, consuming palm oil can also increase blood flow to the brain and reduce the risk of cell damage due to stroke. Furthermore, tocotrienols play a role in protecting against nerve damage by helping to regenerate nerve cells and improving cognitive function. With a stronger protective effect than other forms of vitamin E, tocotrienols are an important nutrient for long-term brain health.

Palm oil plays a vital role in the body’s metabolism. Its fat content that is easily converted into energy makes it a more efficient source of quick energy than trans fats. It also aids in the absorption of fat-soluble vitamins, such as vitamins A, D, E, and K, which play an important role in bone health, the immune system, and cellular function. Palm oil also contributes to hormonal balance,

especially those involved in fat and insulin metabolism, thus aiding in weight management and the prevention of type 2 diabetes.

While palm oil is not a major source of fiber or probiotics, its fat content can help lubricate the digestive tract, making digestion easier. In addition, the oil has natural antimicrobial properties that can help fight certain types of bacteria that cause infections in the digestive tract (Ariff & Sayadek, 2023). Thus, consuming palm oil in balanced amounts can support overall digestive health.

Although palm oil has various health benefits, there are some things to consider when consuming it. The quality of the oil used is very important, because palm oil that is over-processed or used repeatedly at high temperatures can produce harmful compounds such as trans fatty acids and aldehydes, which can increase the risk of chronic diseases. In addition, palm oil consumption should be limited to no more than 30% of total daily fat intake, as recommended by WHO, to avoid negative impacts on health. The benefits of palm oil are also more optimal when combined with a balanced diet rich in vegetables, fruits, and other sources of healthy fats.

Compared to other vegetable oils such as olive oil and soybean oil, palm oil has its own advantages and disadvantages. One of its advantages is its stability at high temperatures, making it a good choice for frying compared to olive oil which is more easily oxidized. In addition, palm oil contains more vitamin E than soybean oil, making it superior in terms of antioxidants. Another advantage is that it does not contain trans fats, which are commonly found in oils that have undergone the hydrogenation process. However, palm oil has a higher level of saturated fatty acids than other vegetable oils, so its consumption needs to be controlled properly to avoid excessive health risks.

The results of the study indicate that palm oil can be part of a healthy diet if used wisely. To increase public awareness of its use, several steps can be taken, such as education on how to use palm oil more healthily, for example by avoiding repeated use at high temperatures. In addition, promoting balanced fat consumption is also important, by encouraging people to consume various types of healthy oils to get more optimal benefits. The development of healthier palm oil products, such as red palm oil which is rich in beta-carotene and other nutrients, can also be a solution to increase the nutritional value of this oil. With the right approach, palm oil can remain part of a healthy diet without increasing the risk of disease due to uncontrolled consumption.

Discussion

Palm cooking oil is one of the most widely used sources of vegetable oil in the world, especially in Asia and Africa. Its widespread use has prompted various studies on the health benefits that can be obtained from consuming this oil. Based on research results from various literatures, palm oil has various health benefits, especially related to blood lipid balance, antioxidant protection, heart health, neuroprotection, and absorption of essential nutrients.

Palm Oil Nutritional Composition and Stability, Palm oil has a balanced proportion of saturated and unsaturated fatty acids, which contributes to its stability when used for cooking. Its main composition consists of about 50% saturated fatty acids, including palmitic acid which provides high heat stability, making it a good choice for frying. In addition, palm oil also contains about 50% unsaturated fatty acids, especially oleic acid (omega-9) and linoleic acid (omega-6), which play a role in maintaining heart health. The content of vitamin E in the form of tocotrienols and tocopherols provides benefits as a powerful antioxidant that protects the body from free radicals. Meanwhile, red palm oil also contains carotenoids, precursor compounds of vitamin A which are important for eye health and the immune system.

The stable fatty acid content makes palm oil more resistant to oxidation than other vegetable oils, making it safer for frying. In addition, the antioxidant content such as tocotrienols and tocopherols helps ward off cell damage caused by free radicals.

Palm oil plays an important role in heart health, protecting cells from free radicals, neuroprotection, and absorption of fat-soluble vitamins. One aspect that has been widely studied is its effect on heart health and blood lipid profiles. Several studies have shown that palm oil can help balance cholesterol levels when consumed in moderate amounts. A clinical study by Sundram et al. (2003) found that palm oil consumption can increase HDL levels (good cholesterol), which helps

protect the heart from cardiovascular disease. In addition, oleic acid in palm oil also contributes to lowering LDL (bad cholesterol), which indirectly reduces the risk of atherosclerosis and coronary heart disease. Although it contains saturated fatty acids, palm oil has not been shown to increase the risk of heart disease if consumed wisely. In fact, the tocotrienol content in this oil has a cardioprotective effect that helps maintain blood vessel elasticity and reduces inflammation.

In addition to its heart health benefits, palm oil is also rich in vitamin E in the form of tocotrienols and tocopherols, which have high antioxidant activity. These antioxidants play an important role in preventing oxidative stress that can cause various degenerative diseases. A study by Sen et al. (2010) found that tocotrienols in palm oil are 40–60 times more effective than tocopherols in counteracting free radicals. Other studies have also shown that consuming palm oil can reduce cellular inflammation, which contributes to the prevention of cancer and premature aging. With its high antioxidant content, palm oil helps protect organs from oxidative damage, especially the brain and skin.

Palm oil also plays a role in protecting brain health, especially in preventing neurodegenerative diseases such as Alzheimer's and Parkinson's. Its tocotrienol content has been associated with neuroprotective effects. Research by Khanna et al. (2014) found that tocotrienols can prevent inflammation in brain cells and increase blood circulation to the brain, which plays a role in preventing neurodegenerative diseases. Another study showed that tocotrienols have a protective effect on neurons from oxidative stress, which is the main cause of nerve cell death in Alzheimer's patients. With the increasing prevalence of cognitive disorders, consuming palm oil rich in tocotrienols can be a preventive step in maintaining brain health.

In addition to its benefits for heart and brain health, palm oil also aids in the absorption of fat-soluble vitamins such as vitamins A, D, E, and K. Beta-carotene in red palm oil is a precursor to vitamin A, which plays a role in maintaining eye health and boosting the immune system. In addition, vitamin K in palm oil also contributes to healthy blood clotting and maintaining bone health. With its role in helping the body absorb essential vitamins, palm oil can be a beneficial source of healthy fats, especially for individuals with vitamin A deficiency.

CONCLUSION

Based on the literature review, palm oil has significant potential health benefits when consumed in moderation and processed properly. Its tocotrienol content, healthy fatty acids, and stability at high temperatures make it a good choice of oil for everyday use. However, excessive consumption or use of oxidized oil can have negative impacts on health. Therefore, a better understanding of the optimal use of palm oil is needed so that its health benefits can be obtained optimally without increasing the risk of chronic diseases.

Based on research results from various literatures, palm oil has various health benefits, especially when consumed in moderate amounts. These benefits include maintaining blood lipid balance by increasing HDL levels and lowering LDL, protecting the body from oxidative stress thanks to its vitamin E content (tocotrienols and tocopherols), supporting brain health and cognitive function by reducing the risk of neurodegenerative diseases, increasing the absorption of fat-soluble vitamins, especially vitamins A, D, E, and K, has the potential to increase body metabolism and support heart health. However, the way palm oil is consumed and processed greatly affects its health benefits. Repeated heating can remove most of the nutrients in this oil, so the use of red palm oil is more recommended to get optimal benefits. By considering the benefits and proper consumption methods, palm oil can be part of a healthy and nutritious diet, and support long-term health.

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