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Literature Review: Effects of Turmeric for Reducing Lipid Profiles

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Abstract

This literature review is a collection of several journals which aims to determine the effect of turmeric (Curcuma longa) on reducing lipid profiles, with emphasis on cholesterol and triglyceride levels. Turmeric is a daily food ingredient that is easy to find and has many good effects on the body, one of which is anti-inflammatory and anti-hypercholesterolemia. Hypercholesterolemia is a condition where the total cholesterol level in the body exceeds normal and can increase the risk of atherosclerosis. Curcumin is one of the active compounds in turmeric which has the function of reducing total cholesterol, LDL cholesterol, triglycerides which cause atherosclerosis and curcumin also increases the production of HDL cholesterol which helps protect against excess cholesterol accumulation which can cause heart and blood vessel disease. Based on several literature reviews, it is reported that the effectiveness of reducing cholesterol levels starts from a dose of 1000 mg - 1500 mg/day. The main aim of this research is to determine the effectiveness and safety of using turmeric as a supplement in reducing lipid profile levels in humans. Through this research, it is hoped that it can provide information regarding the effectiveness of turmeric as an effective additional therapy in managing lipid profiles.

Introduction

Turmeric (*Curcuma longa*It has been widely known and used in traditional medicine for its potential in addressing a variety of health problems, including lipid profile balancing. An unbalanced lipid profile, with elevated cholesterol and triglyceride levels, has been identified as a significant risk factor for serious cardiovascular disease. In recent years, interest in turmeric as an herbal supplement to address lipid profile issues has increased substantially. This is mainly due to research showing the potential anti-inflammatory and antioxidant effects of the compounds contained in turmeric, especially curcumin. Due to these properties, turmeric has been the subject of interesting research within the health field, especially in an effort to reduce the risk of cardiovascular disease through improving the balance of lipid profiles. Therefore, a deeper understanding of turmeric's potential as an herbal supplement in regulating lipid profiles could open the door to more effective therapies in the prevention of serious heart disease (Azis, 2019).

Scientific research has provided promising preliminary evidence of turmeric's potential in reducing lipid profiles. The main active compound in turmeric, curcumin, has shown interesting activity in lowering total cholesterol, LDL cholesterol (bad cholesterol), and triglyceride levels in various studies *Vitro* and in experimental animals. In some studies,

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curcumin has been shown to have an effect on inhibiting enzymes involved in lipid metabolism, thereby reducing the production and absorption of cholesterol by the body. In addition, turmeric has also been found to increase levels of HDL cholesterol (good cholesterol), which is known to have a protective effect against heart disease by helping clear cholesterol from blood vessel walls. These findings provide a solid basis for further research into turmeric's potential as an effective lipid-regulating agent. With a better understanding of the mechanism of action of curcumin and related compounds in turmeric, more sophisticated therapeutic strategies can be developed and focused on effectively addressing lipid profile issues (Puteri, 2020).

Although preliminary evidence on turmeric's potential in reducing lipid profiles is promising, there is still a great need for further studies involving human participation to confirm its effects directly. Many of the studies that have been conducted are preclinical or small-scale, and results have not always been consistent. Factors such as differences in dosage, duration of treatment, and characteristics of the subject population can influence the results of the study. In addition, although several mechanisms of action of curcumin have been identified, the understanding of how turmeric specifically affects human lipid metabolism is still not fully understood.

One of the consequences of increasing lipid profiles in the body is the formation of atherosclerosis. Atherosclerosis is described as "stiffening of the arteries" and is a chronic inflammatory process whose pathophysiology involves lipids, thrombosis, blood vessel walls, and immune cells. This process of atherosclerosis begins to form at a very early age, even while still in the stage of the mother's womb. With age, and in the presence of risk factors, the process will progressively develop and give rise to diseases associated with atherosclerosis and its complications. Atherosclerosis is chronic inflammation. Processes involving the pathophysiology of inflammation, lipids, thrombosis, and blood vessel walls include endothelial and immune cell dysfunction. The vascular endothelium will regulate vascular homeostasis by producing substances that can cause blood clotting or anti-clotting. The presence of inflammatory factors and other risk factors will lead to a loss of endothelial protective effect, including hyperlipidemia, hypertension, diabetes and smoking (Syamsu et al., 2024).

Therefore, quality and well-controlled follow-up studies are needed to evaluate the effectiveness and safety of using turmeric as a supplement in lipid profile reduction. Metabolic lipid disorders or commonly known as hypercholesterolemia which is characterized by an increase in total blood cholesterol levels which is still a health problem. In addition, the prevalence of hypercholesterolemia is still relatively high. Today, about 45% of people worldwide suffer from hypercholesterolemia, 30% in Southeast Asia, and 35% in Indonesia. It is estimated that hypercholesterolemia results in about 2.6 million deaths and 29.7 million disabilities annually. (Uda'a et al., 2023) In-depth clinical studies can provide a better understanding of individual responses to turmeric supplements, potential drug interactions, and possible side effects. By obtaining stronger evidence regarding turmeric's effects on human lipid profiles, a more solid foundation can be built to recommend the use of turmeric as part of cardiovascular disease prevention strategies. This is especially important given that cardiovascular disease is one of the leading causes of death globally, and the discovery of more effective therapies could contribute significantly in reducing the burden of this disease in society (Dewi et al., 2021).

Cholesterol levels that are too high and excessive in the blood will be very dangerous for the health of the heart and blood vessels. High cholesterol levels are one of the causes of metabolic problems that cause heart disease, blood vessels, and diseases associated with blockages in blood vessels. The accumulation of the amount of fatty deposits on the walls of blood vessels can cause a blockage in blood vessels or known as atherosclerosis. Blockages that occur in the coronary blood vessels of the heart will cause coronary heart disease (CHD). Not only that,

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blockage (atherosclerosis) can also occur in the walls of brain blood vessels, kidneys, locomotion, and various other organs (Midah et al., 2022).

This study focused on the effect of turmeric (Curcuma longa) on lipid profile reduction, with emphasis on cholesterol and triglyceride levels. The main objective of this study was to evaluate the effectiveness and safety of using turmeric as a supplement in reducing lipid profiles in humans. Through this study, it is expected to be more clearly confirmed whether turmeric has the potential to be an effective adjunct therapy in managing unbalanced lipid profiles. In addition, the study also aims to improve understanding of turmeric's mechanism of action on human lipid metabolism, which could pave the way for the development of more sophisticated therapeutic strategies in cardiovascular disease prevention. As such, this study has the potential to make a significant contribution to the field of public health by presenting stronger evidence on turmeric's health benefits and supporting its use as part of a holistic preventive approach to heart and blood vessel disease.

Methods

The literature review method was used in this study to investigate the existing evidence regarding the effect of turmeric on lipid profile reduction. Literature is obtained through the review of articles or scientific journals downloaded from several trusted sources, including PubMed, Garuda Portal, and Google Scholar. The selected articles must meet certain quality standards, namely having SINTA IV and V ratings that indicate a level of confidence in the research.

Article selection is carried out with strict criteria, such as the publication period between 2018 to 2023, the availability of full text that can be downloaded freely, and having open access to ensure the accuracy and disclosure of information. In addition, the selected articles also cover various research designs, including qualitative, quantitative, mix methods, and literature reviews that are relevant to the research topic. Thus, this literature review method allows researchers to collect, evaluate, and synthesize important findings from previous research to support the development of new knowledge in the field of turmeric use in reducing lipid profiles.

Result and Discussion

In order to conduct a literature search, the three main databases used are Pubmed, Garuda, and Google Scholar. The total number of articles found from these three sources reached 870 from Pubmed and 230 from Garuda, but the number from Google Scholar was not mentioned. Through a screening process, 120 relevant research journals were identified. From these journals, 10 were selected that will be reviewed further. In addition, as many as 500 articles in languages other than Indonesian and English, 200 articles that are not research or have not been published, and 123 journals that do not meet the criteria were also detected. Thus, despite extensive searching, only a small percentage of those articles fit the established research criteria. This process of managing information is important to ensure that available resources and time are used efficiently to obtain the most relevant and quality literature.

This study concluded that giving temulawak extract and black cumin extract to Sprague Dawley rats with dyslipidemia can reduce LDL and total cholesterol levels, and increase HDL levels. This suggests the potential of both extracts as therapeutic alternatives for dyslipidemia.

Table 1. Effect of Turmeric and Curcumin on Various Health Conditions

Authors	Article Title	Sample Size	Research Design	Results
Jarhahzadeh et al. 2021	The effect of turmeric on lipid profile, malondialdehyde,	The study sample included 64 cases of	The research design was a randomized double-blind	The study results showed that turmeric supplementation effectively reduced liver enzyme levels

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	liver echogenicity and enzymes among patients with nonalcoholic fatty liver disease: a randomized double-blind clinical trial	NAFLD, divided into two groups: one receiving turmeric and the other a placebo.	placebo-controlled trial.	(AST, ALT, GGT), lipid profile (triglycerides, LDL, HDL), and serum malondialdehyde (MDA) in NAFLD patients compared to the placebo group.
Rahmah, 2019	Efektivitas Rimpang Kunyit Terhadap Penurunan Risiko Aterosklerosis	The sample size was 23 samples.	The research method was a descriptive literature review using secondary data from various sources, including journals, case reports, and research articles.	The study indicated that curcumin, the active compound in turmeric, has the potential as an alternative therapy for reducing atherosclerosis risk.
Estancia et al. 2012	Pengaruh Pemberian Ekstrak Kunyit Terhadap Kadar Air, Protein, dan Lemak Daging Ayam Broiler	5 samples	Quantitative	The study showed that varying doses of turmeric extract did not significantly affect the water, protein, and fat content of broiler chicken meat, indicating that turmeric extract (Curcuma domestica) does not directly influence the nutritional composition of broiler chicken meat in this study.
Fahrumnisa, 2019	Ekstrak Kunyit Curcuma Longa Sebagai Tatalaksana Sindrom Poliklistik Ovarium	10 Literature Studies	Literature Review	Research on the use of turmeric extract (Curcuma longa) for managing polycystic ovary syndrome has yielded promising findings. This study showed that turmeric extract has potential as an effective alternative in managing polycystic ovary syndrome.
Nuryanti et al. 2022	Peran Serbuk Kunyit dan Kurkumin Terhadap Diferensial Leukosit Tikus Putih yang Diberi Pakan Hiperlipid	The study involved 25 Rattus norvegicus rats divided into 5 treatment groups with 5 replications each. Treatments included a high-fat diet with added curcumin, turmeric powder, or simvastatin for 56 days.	Quantitative	The study found that curcumin and turmeric powder did not induce changes in leukocyte differentials in rats fed a high-fat diet, maintaining normal leukocyte conditions.
Dehzad et al. 2023	Efek suplementasi kurkumin/kunyit pada profil lipid:	30	Descriptive study with a cross-sectional approach	The study found that curcumin or turmeric supplementation had a

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	Tinjauan sistematis yang dinilai GRADE dan meta-analisis dosis-respons dari uji coba terkontrol secara acak			significant effect on lipid profiles. Through a systematic review rated using the GRADE method and a dose-response meta-analysis of randomized controlled trials, it was concluded that curcumin or turmeric could contribute to reducing lipid levels in the body, suggesting their potential as supplements for managing lipid levels, with implications for further clinical applications.
Thendry et al. 2015	Pengaruh Pemberian Ekstrak Kunyit Terhadap Gambaran Histopatologi Aorta Tikus Wistar Hiperlipidemia	10	Quantitative	The study showed that turmeric extract significantly affected the histopathological picture of the aorta in Wistar rats with hyperlipidemia induced by margarine. Microscopically, the aortic walls in the group given turmeric extract showed fewer foam cells compared to the group given only margarine. These findings suggest the potential of turmeric extract as an agent to protect blood vessels from the damaging effects of hyperlipidemia.
Pujiastuti et al. 2021	Efektifitas Pemberian Nanopartikel Kunyit Terhadap Tekanan Darah dan Profil Lipid pada Pasien Hipertensi dengan Hiperkolesterolemia	10	True experimental design with a control group and random pre-test and post-test design.	The study found that consuming turmeric nanoparticles effectively reduced systolic and diastolic blood pressure, as well as lipid profile measures such as total cholesterol, HDL, LDL, and triglycerides in hypertensive patients with hypercholesterolemia.
Qin et al. 2017	Khasiat dan keamanan kunyit dan kurkumin dalam menurunkan kadar lipid darah pada pasien dengan faktor risiko kardiovaskular: meta-analisis dari uji coba terkontrol secara acak	Based on your description, the total number of subjects (patients) in this meta-analysis was 649.	Quantitative	The study concluded that turmeric and curcumin reduce LDL cholesterol and triglyceride levels in patients at cardiovascular risk with good safety, but their effect on total cholesterol needs further confirmation.
Budiarto et al. 2017	Pengaruh Pemberian Ekstrak Rimpang Temulawak (Curcuma Xanthorrhiza Roxb.)	22	Retrospective	The study concluded that temulawak extract and black cumin extract in dyslipidemic Sprague Dawley rats could reduce

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	dan Jintan Hitam (Nigella Sativa) terhadap Profil Lipid Tikus Sprague Dawley Dislipidemia			LDL and total cholesterol levels and increase HDL levels, indicating the potential of these extracts as alternative therapies for dyslipidemia.

Total Cholesterol Reduction

Turmeric has long been used in traditional medicine because of its health potential related to lowering cholesterol levels. The content of curcumin, the active compound in turmeric, has attracted attention as a potential agent in the management of high cholesterol. Curcumin has antihypercholesterolemic properties that have been proven in several studies. These properties allow curcumin to modulate lipid metabolism pathways in the body, reduce cholesterol synthesis in the liver and increase cholesterol excretion through bile (Safitri & Gustina, 2022).

In addition to inhibiting cholesterol synthesis, curcumin also interacts with various mechanisms in the body involved in lipid metabolism. These include increased activity of cholesterol-transporting receptors, such as LDL (low-density lipoprotein) receptors, which aid in the removal of cholesterol from the blood. In addition, curcumin can also suppress the activity of enzymes involved in cholesterol formation, thereby reducing cholesterol production in the liver. Thus, curcumin in turmeric acts multifactorially to reduce total cholesterol levels in the body (Sahara & Adelina, 2021).

The results showed that administration of turmeric or curcumin extract can provide significant benefits in lowering total cholesterol levels in various populations, including individuals with abnormal lipid profiles. However, it is important to remember that such effects may vary depending on dosage, form of administration, and individual characteristics. Therefore, more research is needed to understand the mechanism of action of curcumin in more depth and evaluate its effectiveness in the management of high cholesterol as well as potential interactions with other drugs. Thus, turmeric and curcumin offer potential as natural and valuable adjunct therapeutic agents in the control of total cholesterol levels in the body.

Decrease in LDL cholesterol

One of the main benefits of turmeric is its ability to lower levels of LDL (low-density lipoprotein) cholesterol, which is often referred to as "bad cholesterol". LDL cholesterol has an important role in atherosclerosis, which is the buildup of plaque on artery walls that can lead to coronary heart disease and heart attacks. High levels of LDL cholesterol in the blood are one of the main risk factors for cardiovascular disease, so controlling them is very important.

Curcumin, the active compound in turmeric, has attracted attention for its ability to lower LDL cholesterol. Studies have shown that curcumin can inhibit LDL oxidation, a process that triggers inflammation and damage to artery walls. In addition, curcumin can also affect cholesterol synthesis pathways in the liver, reducing LDL cholesterol production. By reducing these two factors, turmeric can help lower LDL cholesterol levels in the blood effectively (Fahrumnisa, 2019).

Turmeric's effect in lowering LDL cholesterol levels has significant implications in the prevention of coronary heart disease and other cardiovascular diseases. By reducing the risk of atherosclerosis through controlling LDL cholesterol levels, turmeric can help maintain heart and blood vessel health. However, it is important to remember that turmeric should not be considered a substitute for established treatment for serious medical conditions, and consultation with a medical professional is still necessary before making a decision about its use in the management of LDL cholesterol.

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Increased HDL cholesterol

In addition to its ability to lower LDL cholesterol levels, turmeric has also been shown to increase HDL (high-density lipoprotein) cholesterol levels in the body. HDL cholesterol is often referred to as "good cholesterol" because it has an important role in the process of transporting cholesterol. HDL works by transporting excess cholesterol from tissues and blood vessels back to the liver, where it can be cleared and broken down. By increasing HDL cholesterol levels, turmeric helps increase the efficiency of this process, thus helping to protect against excess cholesterol accumulation that can lead to heart and blood vessel disease (Nuralifah et al., 2019).

The benefits of turmeric in increasing HDL cholesterol levels have significant implications in the prevention of cardiovascular disease. High levels of HDL cholesterol have been linked to a reduced risk of coronary heart disease and atherosclerosis, due to its ability to remove excess cholesterol from blood vessels. Thus, turmeric may play a role in promoting a healthier overall lipid profile, by reducing potentially harmful LDL cholesterol levels and increasing protective HDL cholesterol levels. However, keep in mind that turmeric's effects on HDL cholesterol may vary depending on factors such as dosage, duration of use, and individual characteristics, so more research is needed to better understand its mechanism of action (Widiyanto et al., 2023).

Decrease in Triglycerides

In addition to regulating cholesterol levels, turmeric is also known to lower triglyceride levels in the blood. Triglycerides are a type of fat that is stored in fat cells and can be found in the blood. High levels of triglycerides have been linked to an increased risk of coronary heart disease and other cardiovascular diseases. Curcumin, the active compound in turmeric, has attracted attention for its ability to reduce triglyceride levels (Yusuf, 2023).

One of the ways in which turmeric can lower triglyceride levels is through inhibition of the activity of enzymes involved in triglyceride synthesis. Curcumin has been shown to reduce the activity of enzymes such as lipoprotein lipase and acetyl-CoA carboxylase, which play a role in triglyceride production in the liver and adipose tissue. By inhibiting the activity of these enzymes, turmeric can reduce the production of triglycerides in the body, thus helping to maintain a healthy lipid balance in the blood. More research is needed to better understand turmeric's mechanism of action in lowering triglyceride levels and evaluate its potential use as part of the management of dyslipidemia and cardiovascular disease (Diantari & Astuti, 2023).

Anti-inflammatory Effects

In addition to its benefits in lowering blood lipid levels, turmeric also has significant anti-inflammatory effects. Its main active component, curcumin, has been known for its properties that can reduce inflammation in the body. Chronic inflammation, especially in blood vessels and adipose tissue, is often associated with dyslipidemia and cardiovascular disease. By reducing this inflammation, turmeric may provide additional benefits in preventing or reducing the risk of heart disease and its associated conditions. This demonstrates turmeric's potential not only as a lipid-lowering agent, but also as part of a holistic cardiovascular disease prevention strategy (Patonah et al., 2022).

The reduction of inflammation in the body can also have far-reaching implications for health in general. In addition to cardiovascular disease, chronic inflammation has been linked to a variety of other health conditions, including diabetes, cancer, and autoimmune diseases. Therefore, turmeric's anti-inflammatory effects may have broader benefits than simply lowering the risk of cardiovascular disease. This confirms the importance of further research to explore turmeric's potential as an overall anti-inflammatory and risk-reducing agent in the body (Winarti et al., 2021).

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Thus, turmeric offers promise as an additional or alternative therapeutic agent in the management of dyslipidemia and cardiovascular disease. However, to effectively integrate turmeric in clinical practice, more research is needed to more comprehensively validate its efficacy and safety. Future steps could include larger, tightly controlled clinical trials to evaluate the long-term impact of turmeric use on patients at cardiovascular risk. In addition, follow-up studies may also focus on identifying optimal dosages and potential drug interactions with turmeric use. With a comprehensive approach, turmeric can be a valuable addition to the arsenal of therapies to manage dyslipidemia and cardiovascular disease more effectively (Nuryanti et al., 2022).

Conclusion

Overall, turmeric's effects in reducing lipid profiles, including decreased total and LDL cholesterol, increased HDL cholesterol, as well as decreased triglycerides, show its potential as an adjunct therapeutic agent in the management of dyslipidemia and cardiovascular disease. Turmeric's main active component, curcumin, has antihypercholesterolemic properties that have been proven in numerous studies. In addition, turmeric also offers anti-inflammatory benefits that can reduce inflammation in the body, which is often associated with dyslipidemia conditions and cardiovascular disease. Based on the literature that has been collected the dose given to humans varies from the highest which is 4000 mg / day to the lowest 80 mg / day, so far the side effects caused are still very minimal and need to be investigated further. To effectively integrate turmeric in clinical practice, further research is needed to more comprehensively validate its efficacy and safety, as well as to better understand its mechanism of action.

With a comprehensive approach, including larger clinical trials and studies on optimal dosage and potential drug interactions, turmeric has the potential to be a valuable addition in the management of cardiovascular health conditions. The application of turmeric as part of a holistic cardiovascular disease prevention strategy could open the door to a more natural and therapeutic approach in treatment. Therefore, turmeric holds promise as an adjunct therapeutic agent that can be considered as part of an overall dyslipidemia and cardiovascular disease management plan.

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