

STUDY OF THE CINNAMOMUM CLAN AS AN ANTIDIABETIC**Budi Yasri^{1*}, Soraya Riyanti²**Universitas Jenderal Achmad Yani Bandung, Indonesia¹, Akademi Metrologi dan Instrumentasi Bandung, Indonesia²Email : budiyasri@akmet.ac.id^{1*}, soraya.riyanti81@gmail.com²

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ABSTRACT**Keywords:**ethnopharmaceutical;
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Ethnopharmacological research is an approach to exploring the local knowledge of specific communities about the use of medicinal plants. This article discusses the use of cinnamon (Cinnamomum) as an effective alternative medicine ingredient in several regions in Indonesia. The method used with data collection through literature search has been published in scientific research articles and journals. A literature search uses search engines published on several sites, such as Google Scholar, Pubmed, and Science Direct. Based on the review, it can be concluded that the Cinnamomum clan is widely used in various ethnic groups in Indonesia as a natural ingredient to help control blood glucose levels and is used as an alternative supplement for people with diabetes mellitus. Among the species of the genus Cinnamomum that have the potential to help control blood glucose levels are cinnamomum burmanii, cinnamomum verum, cinnamomum tamala, and cinnamomum zeylanicum.

**Introduction**

Ethnopharmacy is a scientific discipline that combines traditional knowledge and medicinal practices carried out by a particular ethnic group or society with modern scientific research. This field studies the use of plants, minerals, animals, and other natural materials in traditional medicine, as well as knowledge systems and medicinal practices related to local culture and wisdom. The main objective of ethnopharmacy is to understand the traditional knowledge inherent in a particular society in their traditional medicine and analyze the effectiveness and safety of using such natural ingredients. Research in ethnopharmaceuticals involves collecting information about medicinal plants, their traditional uses, processing methods, dosages, and possible side effects (Roudotuljannah & Azizah, 2019).

Ethnopharmacy studies using natural ingredients in traditional medicine and pay attention to the cultural, spiritual, social, and economic context in which such medicinal practices occur (Gunawan, Ardini, & Magdalena, 2020). Research in ethnopharmaceuticals involves collaboration between scientists, traditional practitioners, and local communities. It is essential to ensure respect for local wisdom and maintenance of traditional knowledge to understand and utilize natural resources sustainably. A critical aspect of ethnopharmacy is the documentation of traditional knowledge prone to information loss. Traditional medicine practices are often unwritten, and this knowledge is passed down orally from generation to generation (Mandasari, 2018).

Cinnamon (*Cinnamomum verum*) is a species widely used in traditional medicine in Indonesia. Cinnamon comes from the Lauraceae family and can be found in several regions in Indonesia, such as Sumatra, Java, and Kalimantan. In Indonesia, cinnamon has been used for a long time in various traditional medicine practices. Cinnamon has a distinctive taste, aroma, and a wide range of potential pharmacological properties. The part generally used is cinnamon bark, which is dried and ground into powder or made into small pieces (Rodiah, 2018).

Cinnamon (*Cinnamomum verum*) is a plant that has many potential benefits in traditional medicine. In addition to its use in traditional medicine, cinnamon is often used as an additive in food, beverages, and health products. The aroma and taste of cinnamon give a distinctive touch to certain dishes and drinks (Helmalia, Putrid, & Dirpan, 2019). However, the use of cinnamon in ethnopharmaceutical practices in several regions of Indonesia has not been studied comprehensively (Nuryanti, Jura, & Nursucianti, 2015).

Although cinnamon has been used extensively in traditional medicine, scientific research supporting those claims is limited. Research exploring the use of cinnamon in ethnopharmaceutical practices in several regions of Indonesia will provide valuable insights into the plant's potential in traditional medicine. This study aims to bridge the existing knowledge gap by studying the use of cinnamon in depth in ethnopharmaceutical practices in several regions in Indonesia. This research is expected to collect relevant data and information about the use of cinnamon, the processing method used, and the effects felt by the local community after consuming it (Kumar, Kumari, & Mishra, 2019). The main objective of this study was to collect comprehensive data on the use of cinnamon in ethnopharmaceutical practices in several regions in Indonesia. The information obtained will provide a better understanding of the potency and benefits of cinnamon in traditional medicine and provide a basis for further research into the effectiveness and safety of its use in modern medicine.

Research Methods

The research was conducted by collecting data through searching literature published in scientific research articles and journals. A literature search uses search engines published on several sites, such as Google Scholar, Pubmed, and Science Direct. This mini-review aims to examine the genus *Cinnamomum*, which can potentially have antidiabetic activity, by comparing several species found in the genus *Cinnamomum* from the results of previously published research. The results of this study are expected to be an illustration in determining the use of more optimal species in antidiabetic bioactivity.

Results and Discussion

Cinnamon contains protein, fiber, calcium, iron, potassium, selenium, phosphorus, vitamin A, vitamin B, and vitamin K, and substances with antioxidant, antibacterial, and anti-inflammatory properties (Putri, 2014). Thanks to its content, it is no wonder cinnamon has so many health benefits. Here are some of them:

1. Reduces inflammation and pain Content of antioxidants, polyphenols, and flavonoids

Cinnamon helps overcome inflammation, accelerate wound healing, and prevent damage to cells and body tissues due to free radicals. The pain relief effect produced by cinnamon can be used to overcome aches and pains in patients with headaches, toothaches, and joint and muscle pain.

2. Lowers blood sugar

Cinnamon extract can lower blood sugar and keep it stable. In addition, cinnamon is known to improve the performance and effectiveness of the hormone insulin in people with type 2 diabetes while preventing diabetes and insulin resistance in healthy individuals.

3. Maintain heart health

Cinnamon extract can reduce bad cholesterol (LDL) levels and triglycerides, which are bad fats that can cause blockage of blood vessels (atherosclerosis). These benefits make cinnamon an excellent herbal remedy to reduce the risk of cardiovascular diseases, such as stroke and heart.

4. Blood pressure control

Cinnamon contains lots of potassium and antioxidants, so it has a good effect on controlling blood pressure and preventing hypertension. To maximize these benefits, you should apply a healthy lifestyle: regular exercise, not smoking, eating nutritious foods, and limiting salt intake.

Fight fungal and bacterial infections. The cinnamaldehyde found in cinnamon is thought to help fight various infections, such as fungal infections that cause respiratory disorders and bacterial infections that cause tooth decay and bad breath.

In addition, the use of cinnamon can also be used as a traditional medicine in the treatment of various diseases, as shown in the following table:

Table 1.
Data Penelitian tentang Penggunaan Marga Cinnamomum di Indonesia

No	Area Location Name	Species Name	Parts Used	Uses	Suku bangsa	Pustaka
1.	Kerinci Regency, Jambi Province	Burmese Cinnamomum	Parts of young leaves, adult leaves, old leaves, twig bark, twig bark, and bark	Antioxidant	Minangkabau Batin Melayu	Lative, M., Tafzi, F., & Saputra, A. (2013).
2.	South Maja Village, Maja District, Majalengka Regency.	Burmese Cinnamomum	Parts of young leaves, adult leaves, old leaves, twig bark, twig bark, and bark	Antidiabetic	Sunda	Roudotu Ijannah, Y., & Azizah, N. (2019).

No	Area Location Name	Species Name	Parts Used	Uses	Suku bangsa	Pustaka
3.	Palu Sulawesi	Cinnamomum Burman/ Cinnamomum Cassiavera	Young leaf parts, mature leaves, old leaves, twig bark, branch bark, and stem bark	Anti-Jamur	Kaili	Handayani, V., Dahlia, A.A., Nurvadi Iah, A.F., (2022)
4.	Talaga Jaya Gorontalo	Burmese Cinnamomum	Twig bark, branch bark, and trunk bark	Antihypertensive	Gorontalo	Nuryanti, S., Jura, M. R., & Nursuci anti, N. (2015).
5.	Kedungkandang Malang City	Burmese Cinnamomum	Parts of young leaves, adult leaves, old leaves, twig bark, twig bark, and bark	Nifas Wounds Healing	Jawa	Mandasari, V. F. (2018). Wally, H. F. (2020).
6.	Tegal	Burmese Cinnamomum	Parts of young leaves, adult leaves, old leaves, twig bark, twig bark, and bark	Anti-bacterial (Wound Healing of Diarrheal Infection)	Jawa	Daughter, Nur Farida Utari (2014)
7.	South Lampung	Burmese Cinnamomum	Twig bark, branch bark, and trunk bark	Mouthwash	Hajimena, Natar	Gunawan, I., Ardini, D., & Makdalena, M. (2020)
8.	Surakarta, Boyolali, Sukoharjo, Wonogiri, Sragen, then Klaten.	Burmese Cinnamomum	Twig bark, branch bark, and trunk bark	Cholesterol Lowering	Jawa	Handayani, V., Dahlia, A.A., Nurvadi Iah, A.F., (2022)

Source: Data processed (2023)

In addition to the above uses, cinnamon is believed to prevent dementia and Alzheimer's disease, help fight HIV, and inhibit the growth of cancer cells (Yasri & Riyanti, 2023). Cinnamon can also treat diabetes by drinking cinnamon-boiled water (Handayani, 2022). The chemical content is essential oils, safrol, cinnamaldehyde, tannins, resins, calcium oxalate, flavonoids, triterpenoids, and saponins. The efficacy of cinnamon is as a remedy for gout, hypertension, ulcers, loss of appetite, flatulence, and diabetes (Prapti & Desty, 2013). According to Ervina et al. (2016), cinnamon has antidiabetic effects—cinnamon extract treats type II diabetes, characterized by insulin resistance. The main antidiabetic compounds are methyl hydroxy chalcone polymers, cinnamaldehyde polymers, and procyanidins. Research conducted by Hastuti & Rustanti (Hastuti & Rustanti, 2014) entitled "The effect of adding cinnamon on antioxidant activity and total sugar content of second functional drinks and stevia leaves as an alternative to type 2 diabetes drinks" showed that drinks with the addition of 1.5% cinnamon were the best. Panelists favored it with an excellent assessment of color parameters, aroma, and taste. The drink has a pH of 6.39, brightness (L^*) 37.10, antioxidant activity of 38.43%, and a total sugar content of 4.77%.

The essential oil of *Cinnamomum camphora* and other aromatic camphor-containing plants, such as sage, rosemary, and basil, widely used in traditional medicine, contain monoterpenes. Studies have shown that some components of essential oils, especially monoterpenes, have suppressive and antimutagenic effects on several human cancer cells, including colon cancer, gastric cancer, liver tumors, breast cancer, leukemia, and others. Most cancer chemotherapy treatments are drugs that are highly cytotoxic against proliferating cancer cells as well as healthy cells that can be harmful to the body. With different mechanisms of action, essential oils, with their monoterpene components, can have some pharmacological tumor-suppressing activity, mostly without harming the body.

Research conducted by (Ngadiwiyan, Nor Basid, & Purbowatiningrum, 2011) with the title "The potential of cinnamaldehyde isolated from cinnamon oil as an antidiabetic compound" As a result, cinnamaldehyde isolated from cinnamon oil has an IC_{50} value of 27.96 ppm compared to the enzyme α -glucosidase, so it has excellent potential to be a compound inhibiting the activity of the enzyme α -glucosidase so that it can be developed into an anti-diabetic compound.

Another study was conducted by (Fatmalia, 2017). The title "The effect of cinnamon consumption on blood glucose of diabetics mellitus in the pond also Lamongan" shows that cinnamon can reduce blood glucose levels because it contains flavonoids that can regulate blood glucose levels and increase the sensitivity of pancreatic beta cells to produce the hormone insulin. From the results conducted on 20 samples of people with diabetes who received cinnamon infusion, it can be concluded that consuming cinnamon infusion affects the reduction of blood sugar in people with diabetes. Tambak Ploso Village.

This ethnopharmaceutical study revealed that cinnamon has a rich content of active compounds such as essential oils, antioxidants, and other components. These compounds

provide significant health benefits in traditional medicine in Indonesia. The use of cinnamon in traditional medicine has long been practiced and is believed to provide benefits in relieving inflammation, fighting infection, regulating blood sugar, and accelerating wound healing. However, it is essential to note that the use of cinnamon in medicine must be supported by further scientific research to validate such claims (Zulfa, Sunarno, Alifah, & Prawitasari, 2019).

Research conducted by Suresh Kumar et al. (2012) on the potential use of *Cinnamomum* as an antidiabetic, antioxidant, and hypolipidemic was conducted with *Cinnamomum tamala*, oil (CTO) in streptozotocin (STZ) induced in diabetic rats. Analysis of GC-MS (Gas chromatography-mass spectrometry) showed 31 constituents, of which synamaldehyd was the main component (44.898%). CTO and cinnamaldehyde were administered orally to diabetic rats to study their effects on acute and chronic antihyperglycemic models—body weight, oral glucose tolerance tests, and biochemical parameters. Glucose levels, insulin levels, liver glycogen content, glycosylated hemoglobin, total plasma cholesterol, triglycerides, and antioxidant parameters in rats were estimated for all treatment groups and compared with the diabetes control group. The treatments carried out were CTO (100 mg/kg and 200 mg/kg), cinnamaldehyde (20 mg/kg), and glibenclamide. (0.6 mg/kg) in each group of diabetic rats given for 28 days can lower blood sugar in streptozotocin-induced diabetic rats. CTO and cinnamaldehyde results were comparable to the standard drug glibenclamide. In vitro antioxidant studies on CTOs using various models show significant antioxidant activity. In vivo antioxidant studies in STZ-induced diabetic rats revealed a decrease in malondialdehyde (MDA) and an increase in reduced glutathione (GSH). CTO has significant antidiabetic, antioxidant, and hypolipidemic activity. The study showed that oral administration of *Cinnamomum tamala* oil and its main constituents has potential antidiabetic, antihyperlipidemic, and antioxidant effects on STZ-induced diabetes (Prabowo, Tivani, & Purwantiningrum, 2021). CTO for use as a natural oral agent with antidiabetic, antihyperlipidemia, and antioxidant effects.

Yan Shen et al. research (Hen et al., 2010) found that cinnamon intake (*Cinnamomum zeylanicum*) can relieve pathological diabetes conditions. However, it is still necessary to discuss whether the beneficial effects depend on insulin or insulin mimetics—the study in question aimed to determine the effect of insulin from cinnamon. Streptozotocin-induced diabetic rats were divided into four groups and administered orally with liquid cinnamon extract (CE) for 22 days. Diabetic rats taking CE at doses of more than 30 mg/kg/day were not exposed to hyperglycemia and nephropathy, and these mice were found to have Upregulation Uncoupling Protein-1 (UCP-1) and glucose transporter 4 (GLUT4) in adipose tissue in muscle. This was verified using adipocytes 3T3-L1, where CE regulates GLUT4 translocation and increases glucose uptake. CE demonstrates the antidiabetic effects of insulin through two mechanisms: increased regulation of mitochondrial UCP-1 and increased translocation of GLUT4 in muscle and adipose tissue.

Usha Chakraborty et al. (Chakraborty, 2010) evaluated the anti-hyperglycemic activity of liquid extract of *Cinnamomum tamala* leaves (CTLEt) on the blood glucose of albino rats. CTLEt was administered at doses of 125 and 250 mg/kg body weight, respectively, to streptozotocin-induced diabetic rats for three weeks. Diabetic rats lost weight from normal mice. Administration of the extract at a dose of 250 mg/kg body weight/day decreases fasting blood glucose levels and urinary sugar, accompanied by a concomitant increase in the body. The extract resulted in a decrease in peroxidation production, namely thiobarbituric acid. A significant decrease in glutathione and glycogen content after diabetes induction was accompanied by an increase in liver tissue in STZ-diabetic rats treated with CTLEt. STZ-diabetic mice treated with CTLEt (250mg/kg) significantly returned to normal. The content of ascorbate and carotenoids from *C. tamala* leaves indicates that there is high antioxidant activity. It was seen that CTLEt induces antihyperglycemia and has antioxidant activity in STZ-diabetic rats.

Conclusion

Based on the review conducted, it can be concluded that:

1. Various ethnic groups in Indonesia widely use *Cinnamomum* as a natural ingredient to help control blood sugar. They can be used as an alternative supplement for people with street diabetes.
2. *Cinnamomum burmanii* and *Cinnamomum verum* have been shown to reduce inflammation, lower blood sugar, maintain heart health, control blood pressure, and fight infection.
3. *Cinnamomum tamala* has antidiabetic, anti-hyperlipidemic, and antioxidant effects on streptozotocin-induced diabetes (STZ).
4. *Cinnamomum zeylanicum* can relieve pathological conditions of diabetes through two mechanisms, namely increased regulation of mitochondrial Upregulation of Uncoupling Protein-1 (UCP-1) and increased translocation of glucose transporter 4 (GLUT4) in muscle and adipose tissue
5. *Cinnamomum tamala* has a high antioxidant activity that can induce anti-hyperglycemic while having antioxidant activity

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