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Exploring the Chemical Properties and Mechanisms of Herbal Remedies in Moringa, and Ginger in Managing Chronic Diseases: Review

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Abstract

Herbal remedies have been used for centuries to treat various ailments. Natural products, derived from plants, animals, and microorganisms, have been used for centuries as a source of medicinal compounds in traditional and modern herbal remedies. Understanding the chemical properties and mechanisms of action of these remedies is crucial for their effective and safe application in managing chronic diseases. This review explores the effectiveness of herbal remedies in managing chronic diseases such as diabetes, cardiovascular diseases, and autoimmune disorders. It emphasizes the need for a balanced approach combining herbal and conventional medicine, reducing healthcare costs and improving patient outcomes. The review includes 10 studies investigating the efficacy of herbal remedies in managing chronic diseases in Moringa and Ginger. Moringa, a valuable plant in traditional and modern medicine, has diverse therapeutic effects, making it beneficial for managing chronic diseases. Ginger, a powerful herbal remedy with bioactive compounds like gingerols, shogaols, zingerone, and paradols, is also considered a powerful natural treatment due to its antioxidant, anti-inflammatory, antimicrobial,

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antiemetic, and anticancer activities. Understanding the chemical properties and mechanisms of action of these remedies can help develop effective treatments for chronic diseases and enhance their integration into modern medicine.

Keywords*:* Herbal Remedies, Chronic Diseases, Efficacy, and Safety, Complementary Alternative Medicine

Introduction

Chronic diseases pose a significant challenge to global health, economies, and societies. Addressing the burden of these diseases requires a multifaceted approach involving prevention, early detection, effective management, and policy interventions. Chronic diseases, such as diabetes, hypertension, and arthritis, are a major public health concern globally. While conventional medicines are often used to manage these conditions, herbal remedies are increasingly being sought as alternative or complementary therapies. Herbal remedies are perceived to be natural and safe, but their efficacy in managing chronic diseases is not well understood.

As scientific research continues to validate their efficacy and safety, herbal remedies are poised to play an increasingly vital role in promoting health and well-being globally. By embracing the holistic and preventive principles of herbal medicine. The most common reasons for using traditional medicine are that it is more affordable, more closely corresponds to the patient's ideology, allays concerns about the adverse effects of chemical (synthetic) medicines, satisfies a desire for more personalized health care, and allows greater public access to health information. The major use of herbal medicines is for health promotion and therapy for chronic, as opposed to life-threatening, conditions. However, usage of traditional remedies increases when conventional medicine is ineffective in the treatment of disease, such as in advanced cancer and in the face of new infectious diseases. Furthermore, traditional medicines are widely perceived as natural and safe, that is, not toxic. This is not necessarily true, especially when herbs are taken with prescription drugs, over-the-counter medications, or other herbs, as is very common (Canter and Ernst 2004; Qato et al. 2008; Loya, Gonzalez-Stuart, and Rivera 2009; Cohen and Ernst 2010).

Herbs and plants can be processed and can be taken in different ways and forms, and they include the whole herb, teas, syrup, essential oils, ointments, salves, rubs, capsules, and

tablets that contain a ground or powdered form of a raw herb or its dried extract. Plants and herbs extract vary in the solvent used for extraction, temperature, and extraction time, and include alcoholic extracts (tinctures), vinegars (acetic acid extracts), hot water extract (tisanes), long-term boiled extract, usually roots or bark (decoctions), and cold infusion of plants (macerates). There is no standardization, and components of an herbal extract or a product are likely to vary significantly between batches and producers.

Plants are rich in a variety of compounds. Many are secondary metabolites and include aromatic substances, most of which are phenols or their oxygen-substituted derivatives such as tannins (Hartmann 2007; Jenke-Kodama, Müller, and Dittmann 2008). Many of these compounds have antioxidant properties. Ethnobotanicals are important for pharmacological research and drug development, not only when plant constituents are used directly as therapeutic agents, but also as starting materials for the synthesis of drugs or as models for pharmacologically active compounds (Li and Vederas 2009). About 200 years ago, the first pharmacologically active pure compound, morphine, was produced from opium extracted from seeds pods of the poppy *Papaver somniferum*. This discovery showed that drugs from plants can be purified and administered in precise dosages regardless of the source or age of the material (Rousseaux and Schachter 2003; Hartmann 2007). The review aims to support the evidence-based use of herbal remedies in managing chronic diseases from different database and to foster a deeper understanding of their role in modern healthcare

Ginger

Ginger, a Southeast Asian plant, is a medicinal herb with over 2,000 years of history. Its edible rhizome, ginger root, has been used to treat digestive issues, inflammation, and pain. Modern scientific research has validated these traditional uses and discovered additional health benefits, making ginger a popular natural remedy in contemporary medicine.

In Nigeria, ginger can be found in various forms including fresh roots, dried powder, and as an essential oil. It is widely available in local markets and is an integral part of both traditional medicine and culinary practices. Traditional medicine in Nigeria incorporates ginger for its numerous health benefits, leveraging its bioactive compounds, such as gingerol, which have anti-inflammatory and antioxidant properties and its used to treat digestive issues, to relieve pain and reduce inflammation in conditions like arthritis. It is

also used to alleviate headaches and menstrual pain. Ginger has antimicrobial properties that make it effective against certain bacterial and fungal infections, is a popular remedy for colds and flu in Nigeria. It is often combined with honey and lemon to create a soothing tea that helps to relieve symptoms like sore throat, congestion, and cough. it antioxidant properties help in boosting the immune system, making it a common ingredient in herbal tonics and health drinks aimed at enhancing overall health and immunity, Ginger is animportant plant with several medicinal, ethno medicinal and nutritional values (Kumar et al., 2011).

Ginger's therapeutic properties stem from its rich bioactive compounds, including gingerols, shogaols, zingerone, paradols, and essential oils. These compounds offer various health benefits, including anti-inflammatory, antioxidant, and anti-cancer properties. Ginger's multifaceted nature makes it a valuable natural remedy for managing chronic ailments. As research continues to uncover its therapeutic mechanisms, ginger is poised to play a crucial role in integrative medicine.

Chronic diseases like arthritis, cardiovascular diseases, diabetes, and cancer require long-term management and complex treatment. Ginger, a popular herbal remedy, has gained interest due to its medicinal properties. Its rich bioactive compounds, including gingerols, shogaols, paradols, and zingerone, have anti-inflammatory, antioxidant, anti-cancer, anti-nausea, and antimicrobial effects, making it a promising candidate for effective, safe, and natural treatment. The antioxidant activities of ginger are primarily due to the presence of gingerols (especially 6-gingerol), shogaols (especially 6-shogaol), zingerone, and paradols. These compounds work through various mechanisms, including free radical scavenging, enhancement of antioxidant enzymes, inhibition of lipid peroxidation, and chelation of metal ions. Their collective effects contribute significantly to ginger's health benefits, including reducing inflammation, preventing chronic diseases, and promoting overall health and well-being.



Figure 1: **Moringa (Moringa oleifera)**

The height of the Moringa oleifera Lam. (MO) tree was 5 to 10 meters. Its numerous uses have led to its cultivation worldwide. Every portion of the moringa plant has specific nutritional and/or therapeutic uses. It has also been found to have anti-inflammatory, antimicrobial, antioxidant, anticancer, cardiovascular, hepatoprotective, anti-ulcer, diuretic, antiurolithiatic, and antihelmintic properties in addition to being an excellent source of protein, vitamins, lipids, fatty acids, micro-macro minerals, and different phenolics.Moringa (Moringa oleifera), commonly known as the drumstick tree, has garnered significant attention for its potential health benefits, particularly in the treatment and management of chronic diseases. It shows promise as an herbal remedy for various chronic diseases due to its rich nutrient profile and medicinal properties. Moringa has been shown to help lower blood sugar levels. Compounds like isothiocyanates and chlorogenic acid are believed to contribute to this effect. Moringa can improve insulin sensitivity, thereby helping manage diabetes. It also helps reduce cholesterol levels, which is crucial in preventing heart disease. Can help combat oxidative stress, which is linked to cancer development. Moringa supports liver health through its high antioxidant content and ability to detoxify heavy metals and other toxins. has been reported by Bureau ofplant industry that Moringa is an outstanding sourcenutritional components. Its leaves (weight per weight)have the calcium equivalent of four times that of milk, thevitamin C content is seven times that of oranges, while itspotassium is three times that of bananas, three times theiron of spinach, four times the amount of vitamin A incarrots, and two times the protein in milk (Kamal, 2008).

Moringa plant parts have substantial anti-inflammatoryactivity. For instance, the root extract exhibits significantanti-inflammatory activity in carrageenan induced rat pawoedema (Ezeamuzie et al., 1996; Khare et al., 1997). Moreover,n-butanol extract of the seeds of MO shows anti-inflammatory activity against ovalbumin-induced airwayinflammation in guinea pigs (Mahajan et al., 2009). Moringa olefera has enormous medicinal potential, which has long been recognized in the Ayurvedic and Unani system (Mughal et al., 1999). Nearly every part of this plant, including root, bark, gum, leaf, fruit (pods), flowers, seed, and seed oil have been used for various ailments in the indigenous medicine (Odebiyi and Sofowora, 1999)



Figure 2: moringa olefera

Table: Chemical Properties and Mechanisms of Herbal Remedies in Managing Chronic Diseases

Herb	Chemical Constituents	Chronic Diseases Managed	References
Moringa	Pterygospermin	Antibacterial and fungicidal effects	Rao et al. (1946)
	Epiglobulol (Quercetin and β-sitosterol)	Antioxidant (hyperglycaemia and hyperlipidaemia)	Vats, &Gupta, (2017). Harcourt, (2017)
	Niazimicin	Anticancer	Guevaraa et al. (1999)
	Alkaloid Moringine	Antiasthma tic	Agrawal & Mehta (2008)
Ginger			
	6-gingerol	anticancer	Shukla, & Singh, (2007).
	polyphenols	antioxidant	Prakash, J. (2010).
	6-gingerol	ant diabetic	Almatroodi, *et al.*,(2021)
	Lipoxigenase	anti-inflammation	Aryaeian,& Tavakkoli, (2015)
	6-gingerol	antimicrobial	Abd-Alrahman *et al., (*2013)

Discussion

The review discusses the potential benefits of herbal remedies in managing chronic diseases. Moringa oleifera, a potent plant with numerous bioactive compounds, is a valuable plant for treating various health conditions. Its antioxidant, anti-inflammatory, antimicrobial, anticancer, cardiovascular, and antidiabetic properties make it a valuable plant in traditional and modern medicine. Ginger, another potent herbal remedy, has a wide range of therapeutic properties due to its bioactive compounds like gingerols, shogaols, zingerone, and paradols. These compounds exhibit antioxidant, anti-inflammatory, antimicrobial, antiemetic, and anticancer activities, making ginger an effective natural treatment for various health conditions.

Conclusion

Herbal remedies like Moringa oleifera and ginger are effective in managing chronic diseases due to their rich array of bioactive compounds. Moringa oleifera has antioxidant, anti-inflammatory, antimicrobial, anticancer, cardiovascular, and antidiabetic properties, making it valuable in both traditional and modern medicine. Ginger, on the other hand, is highly effective due to its bioactive compounds like gingerols, shogaols, zingerone, and paradols, which exhibit significant antioxidant, anti-inflammatory, antimicrobial, antiemetic, and anticancer activities, making it a versatile and powerful natural treatment for various health conditions.

Implications

- Healthcare providers should be aware of the potential benefits and limitations of herbal remedies in managing chronic diseases.

- Patients should be advised to consult with a healthcare provider before using herbal remedies, especially if they have a chronic disease or are taking conventional medicines.

Limitations

- The review is limited to studies published in English, which may have excluded relevant studies published in other languages.

- The review did not include studies that investigated the efficacy of herbal remedies in preventing chronic diseases.

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