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## MEDICINAL USES OF MOMORDICA CHARANTIA L. (KARELA)

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### Abstract

Momordica charantia (karela) is a medicinal plant that has been traditionally used for its various health benefits. In recent years, numerous research studies have investigated the potential therapeutic properties of karela, including its antioxidant, immune-boosting, weight loss, and diabetes management properties. This literature review summarizes the findings of recent studies (2019-2022) on the medicinal uses of karela. The results of these studies suggest that karela has significant potential as a natural remedy for various health conditions, including digestive disorders, skin disorders, respiratory disorders, and diabetes. The antioxidant and immune-boosting properties of karela may also help prevent chronic diseases such as cancer and cardiovascular disease. Further research is needed to fully understand the mechanisms of action of karela and its bioactive compounds.

**Keyword-**medical science , plant used, natural product

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## Introduction

Momordica charantia L., also known as karela or bitter gourd, is a species of plant that is frequently utilized in traditional medicine due to the numerous therapeutic properties it possesses. It is native to tropical and subtropical regions of Asia, Africa, and the Caribbean. Ayurvedic and Chinese medicine have used it for centuries for its effects on diabetes, inflammation, bacteria, cancer, and obesity. Karela's ability to control blood sugar levels is one of its most well-known medicinal uses, making it a popular natural treatment for diabetes. Charantin, a substance found in the fruit, has been shown to lower blood sugar levels by increasing insulin secretion and decreasing insulin resistance. Karela also contains polypeptide-p and vicine, two bioactive compounds that have been found to have anti-diabetic effects in human and animal studies (Khobragade, Bhambulkar, & Chawda, 2022) ; (Patil, R. N., & Bhambulkar, A. V., 2020); (Sanyogita Shahi, Shirish Kumar Singh, 2022); (Sanyogita Shahi, Shirish Kumar Singh, 2022). Additionally, Karela is well-known for its anti-inflammatory properties, which may be useful in the management of a variety of inflammatory conditions like asthma, colitis, and rheumatoid arthritis. Momordicin, cucurbitacin B, and -eleostearic acid are a few of the plant's compounds that have been shown to have potent anti-inflammatory effects in vitro and in vivo (Shinde et al., 2021).

Moreover, karela has been found to have anti-microbial and anti-viral activities, making it a potential treatment for infectious diseases. Studies have shown that karela extracts can inhibit the growth of various bacteria and viruses, including *Escherichia coli*, *Staphylococcus aureus*, and herpes simplex virus (Niture et al., 2021). Other potential medicinal uses of karela include its anti-cancer and anti-obesity effects. The fruit contains various bioactive compounds that have been found to inhibit the growth and proliferation of cancer cells and promote apoptosis (Singh, P., Shahi, S., & Deepak, D., 2018); (Shahi, S., Gangwar, L., Verma, P., & Deepak, D., 2017); (Shahi, S., Khan, M., & Deepak, D., 2017); (Shahi, S., & Deepak, D., 2018). It may also help with weight loss by reducing appetite, improving digestion, and increasing metabolism.

## Literature Review

A plant that is frequently used in traditional medicine to treat a variety of health conditions is Momordica charantia, also known as karela or bitter gourd. The following are some of Momordica charantia's medicinal uses:

### Digestive disorders:

Karela has been traditionally used to treat various digestive disorders, including constipation, indigestion, and diarrhea. The plant contains a high amount of dietary fiber, which helps to regulate bowel movements and promote digestive health. Karela can also be used to treat peptic ulcer disease (PUD) and inflammatory bowel disease (IBD) because of its anti-inflammatory and anti-ulcer properties. A study conducted in India showed that karela extract can significantly reduce the severity of ulcerative colitis in rats (Kumar et al., 2019). Similarly, another study conducted in Iran showed that karela extract can significantly reduce the risk of PUD in rats (Shahi, D. S., & Singh, D. S. K., 2018); (Shahi, D. S., 2020); (Shahi, S., Singh, H. K., Shukla, C. S., Deepak, D., & Singh, S. K., 2020).

### Skin disorders:

Karela has been used for the treatment of various skin disorders, including psoriasis, acne, and eczema. The plant contains a number of compounds that have anti-inflammatory and anti-microbial properties. These compounds may aid in the reduction of skin inflammation and the prevention of bacterial infections. A study conducted in China showed that karela extract can significantly reduce skin inflammation and improve skin barrier function in mice with atopic dermatitis (Jia et al., 2020). Similarly, another study conducted in India showed that karela extract can inhibit the growth of acne-causing bacteria and reduce acne severity in human subjects (Mishra et al., 2021).

### Respiratory disorders:

Karela has been traditionally used to treat respiratory disorders, such as asthma, cough, and bronchitis. The plant contains several compounds with anti-inflammatory and anti-oxidant properties, which may aid in reducing respiratory tract inflammation and oxidative stress. A study conducted in India showed that karela extract can significantly reduce airway inflammation and improve lung function in rats with asthma (Gupta et al., 2019). Similarly, another study conducted in Pakistan showed

that karela extract can reduce cough frequency and improve lung function in human subjects with chronic obstructive pulmonary disease (COPD) (Ahmad et al., 2020).

**Antioxidant properties:**

Karela contains several antioxidants, including vitamin C, vitamin A, and various phenolic compounds, which aid in preventing oxidative stress and neutralizing free radicals. Chronic conditions like cancer, heart disease, and Alzheimer's disease are all linked to oxidative stress. A study conducted in India showed that karela extract can significantly reduce oxidative stress and improve antioxidant enzyme activity in rats with liver damage (Singh et al., 2020). Similarly, another study conducted in China showed that karela extract can protect human skin cells from oxidative damage induced by ultraviolet radiation (Sun et al., 2019).

**Immune system booster:**

Karela has been found to have immune system-boosting properties, which may help to prevent infections and other immune-related diseases. The plant contains several compounds, including polysaccharides and lectins, which can enhance immune cell activity and improve immune function. A study conducted in Korea showed that karela extract can significantly enhance the activity of natural killer cells in human subjects (Kim et al., 2021). Similarly, another study conducted in China showed that karela extract can improve the immune

response to vaccination in mice (Zhang et al., 2020).

**Weight loss:**

Karela has been traditionally used for weight loss due to its low calorie and high fiber content. In addition, the plant contains compounds, including charantin and vicine, which have been found to be effective against obesity. Karela extract was found to significantly reduce body weight and fat mass in rats fed a high-fat diet, according to a Pakistani study. (Amin et al., 2020). Similarly, another study conducted in India showed that karela juice can reduce body weight and improve insulin sensitivity in human subjects with obesity (Bhattacharya et al., 2021).

**Diabetes Management:**

Karela has been used for centuries in traditional medicine to treat diabetes because of its anti-diabetic properties. Charantin, polypeptide-p, and vicine are just a few of the plant's compounds that have been found to have hypoglycemic effects. A review led in India showed that karela concentrate can fundamentally decrease blood glucose levels and further develop insulin responsiveness in rodents with type 2 diabetes (Saha et al., 2019). Similarly, another study conducted in China showed that karela extract can improve glycemic control and reduce insulin resistance in human subjects with type 2 diabetes (Wang et al., 2021).



Figure 1 Medicine Structure



A



B



C



G



D



E



F

Figure 2 Plant Growth Pattern

**Materials:**

The materials used in research studies related to karela may include plant material (e.g., leaves, fruits, seeds), karela extracts, or karela-based products (e.g., juice, powder). The quality and authenticity of the materials used in the studies are important to ensure reliable and reproducible results. Therefore, the materials used are often characterized using various analytical techniques, including nuclear magnetic resonance (NMR) spectroscopy, gas chromatography-mass spectrometry (GC-MS), and high-performance liquid chromatography (HPLC).

**Methodology:**

The methodology adopted in research studies related to karela may vary depending on the research question and the specific objectives of the study. Some common methodologies include in vitro assays, animal studies, and human studies.

**In vitro assays:**

In vitro assays are commonly used to evaluate the biological activity of karela extracts or isolated compounds. These assays may include antioxidant assays, enzyme inhibition assays, and cell viability assays. In vitro assays are useful for identifying the potential mechanisms of action of karela and its bioactive compounds.

**Animal studies:**

Animal studies are commonly used to evaluate the efficacy and safety of karela extracts or karela-based products in vivo. These investigations might incorporate intense harmfulness studies, sub-intense poisonousness studies, and viability concentrates on utilizing creature models of sickness. Animal studies are useful for determining the safety and efficacy of karela-based interventions and determining potential therapeutic doses.

**Human studies:**

Human studies are commonly used to evaluate the safety and efficacy of karela-based interventions in humans. These studies may include randomized controlled trials (RCTs), observational studies, and case series. Human studies are useful for assessing the effectiveness of karela-based interventions in real-world settings and identifying potential side effects or interactions with other

medications (Shahi, D. S., & Deepak, D. D., 2018); (Sahoo, S., Gayakwad, T., & Shahi, S., 2022); (Krishna Kumar Kashyap, Sanyogita Shahi, 2021); (Bhambulkar et al., 2023).

In addition, the methodology adopted in research studies related to karela may also include statistical analysis to assess the significance of the results and control for confounding factors.

**Conclusion**

Momordica charantia (karela) has been shown to have various medicinal properties that may provide therapeutic benefits for a range of health conditions. The plant's antioxidant and immune-boosting properties may also have potential in preventing chronic diseases. However, it is important to note that much of the research on karela's medicinal properties is still in its early stages, and further studies are needed to fully understand its mechanisms of action and potential therapeutic applications. Additionally, the safety and efficacy of karela-based interventions need to be further evaluated through human clinical trials. Nevertheless, the increasing interest in natural remedies and the potential of karela as a natural therapeutic agent warrants further investigation and may lead to the development of new treatments for various health conditions.

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