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A CRITICAL APPRAISAL ON MEDICINAL COROLLARY OF *MOORINGA OLEIFERA* IN MIDDLE OF VARIED AILMENT

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ABSTRACT: Diabetes is currently not well managed in the allopathic medical system. The dysfunction and damage to several organs, including as the blood vessels, heart, nerve fibres eyes, kidneys, and, neurons are chronic repercussions of long-term blood glucose elevations. There are many different therapy options available, but they frequently have negative side effects and cannot provide complete relief. The key to addressing these kinds of problems is to identify novel therapeutic targets and use them in conjunction with the present diabetes treatment approaches. Herbal plants are now being used by researchers to combat the negative impacts of currently available medications. When managing diabetes using conventional treatment. Herbal plants are now being used by researchers to combat the bad impacts of currently available medications. Therefore, it is essential to develop more modern, plant-based medicinal approaches that can be safer and more accessible. This study looked at the anti-diabetic effects of different *Mooringa oleifera* species parts, including the fruits, seeds, leaves, pods flowers, and stems. The resulting extract was administered to diabetic-induced rats or mice at various doses using various extraction techniques and solvents. Out of all the sections, leaves have the most bioactive components that are useful in the treatment of diabetes. It has been discovered that *Mooringa oleifera* holds enormous promise for the treatment of diabetes.

INTRODUCTION:

Current Diabetes Status: Recent projections predict that 285 million individuals globally (6.6 percent) in the 20- to 79-year-old age range would have diabetes in 2010, and that 438 million people (7.8 percent) of the adult population will have the disease by 2030. India holds the unenviable title of "diabetes capital of the world" for having the highest percentage of diabetic population in the world.

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According to the International Diabetes Federation's 2006 Diabetes Atlas, if no immediate preventive action is done, the country of India's estimated 40.9 million diabetics may increase to 69.9 million by 2025.

The term "Asian Indian Phenotype" describes specific clinical and biochemical abnormalities in Indians, such as increased insulin resistance, greater abdominal adiposity higher waist circumference despite lower body mass index lower levels of adiponectin, and higher levels of highly sensitive C-reactive protein. In urban populations, changes in eating habits and a decline in physical activity can lead to higher prevalence's of diabetes mellitus 11 Given that there are already 62 million diabetics in India, the disease is quickly reaching the status of a possible epidemic.

India (31.7 million) had the highest number of persons worldwide with diabetes mellitus in 2000, followed by China (20.8 million), the United States (17.7 million), and other countries in that order. According to Wild *et al.,* India would see the largest growth in the number of people with diabetes worldwide, from 171 million in 2000 to 366 million in 2030. According to estimates, up to 79.4 million people in India could have diabetes mellitus by 2030. The number of people with the condition in China (42.3 million) and the United States (30.3 million) is also expected to rise significantly [1, 2]. Blood glucose levels rise as a result of the chronic, non-communicable condition known as diabetes mellitus. Diabetes is characterised by insufficient or inadequate pancreatic insulin secretion, which can be inherited or acquired. There are various types of diabetes, including:

Type 1 Diabetes: Insulin is not produced by the body. This kind of diabetes may also be referred to as insulin-dependent diabetes, young-onset diabetes, or early-onset diabetes. Type 1 diabetes typically strikes before the age of 40, frequently in adolescence or early adulthood. Type 1 diabetes is not even close to being as prevalent as type 2. Type 1 diabetes accounts for about 10% of all cases. For the remainder of their lives, people with type 1 diabetes will require insulin injections. Additionally, they must maintain correct blood glucose levels by performing routine blood tests and adhering to a certain diet.

Type 2 Diabetes: Either the cells in the body do not respond to insulin, or the body does not create enough insulin for normal activity (insulin resistance). Worldwide, type 2 diabetes accounts for about 90% of all cases. By decreasing weight, maintaining a nutritious diet, getting enough of exercise, and keeping an eye on their blood glucose levels, some people may be able to manage the symptoms of type 2 diabetes. However, type 2 diabetes usually progresses over time, getting worse, and the patient will eventually need to take insulin, usually in the form of tablets. Compared to those with a healthy body weight, those who are overweight or obese have a much higher chance of acquiring type 2 diabetes [3, 4, 5]. Both disease types exhibit diverse traits and result in various problems. Diabetes is caused by a variety of ecological factors, some of which include obesity and advanced age. Sometimes an insufficiency or excess concentration of proteins, carbohydrates, and lipids results from less effective insulin action on the various target tissues, and more frequently, hyperglycemia leads to nephropathy and eyesight loss, which are the two main symptoms of diabetes. Heart disease and cardiovascular syndrome are also caused by it. Plants are still utilised as medication to treat many ailments despite more recent advances in the medical world.

Due to their antidiabetic properties, many plants are used as medicine to treat diabetes. Natural antioxidants play a part in preventing numerous diseases, including diabetes, and fighting oxidative stress. In an effort to cure diabetes, several plant extracts and vegetables are being used. The medications obtained from plants are utilised there for therapy since they are less expensive medicine because the poorer countries could not afford medical care and the more expensive drugs. Despite the development of medications containing insulin for the treatment of diabetes, it is important to use plants as remedies. Plants exhibit anti-diabetic properties and can inexpensively and organically treat diabetes. Plants exhibit hypoglycemic activity [6, 7].

Complications of Diabetes: Diabetes mellitus's elevated blood glucose causes a number of consequences, including metabolic alterations, an increase in oxidative stress, cardiovascular and renal illnesses. Diabetes problems are becoming more prevalent among middle-class individuals, impoverished urban slum residents and even persons in rural areas. This is a result of people in society becoming less physically active, changing their diets, and becoming more stressed. Unfortunately, delayed treatment may be the cause of higher risk of complications in diabetic people from disadvantaged backgrounds. According to a research study, metabolic syndrome and hypertension are more common among persons who engage in less physical activity. Both macrovascular and microvascular problems are the main cause of morbidity and mortality in diabetic individuals. The Chennai Urban Population Study and Chennai Urban Rural Epidemiology Study (CURES), two studies conducted in India, provided crucial information on the difficulties associated

with diabetes. According to that study, participants with diabetes had a higher prevalence of coronary artery disease than those with normal glucose tolerance. Additionally, it was discovered that diabetic participants of all ages had high levels of subclinical atherosclerosis as determined by intimal medial thickness. The largest population-based study of its kind in India, the CURES Eye study, which examined the prevalence of diabetic retinopathy, found that it was 17.6% overall. Nephropathy prevalence was reported to be 2.2 percent and micro albuminuria prevalence to be 26.9 percent among Indians in a population-based study. Overall, Asian Indians tend to be more likely to experience cardiovascular issues [8].

Role of Herbal Medicine: Herbal diabetes treatment with expanded research in the area of traditional medicine over the past few decades, eco-friendly, bio-friendly, affordable and generally safe plant-based medications have transitioned from the margins to the mainstream. There are many literature reviews regarding anti-diabetic herbal remedies by various writers, but Atta-ar-review, Rahman's which details more than 300 plant species recognised for their hypoglycaemic qualities, is the most instructive. According to their botanical name, nation of origin, parts used, and type of active agents, this review has categorised the plants. *Momordica charantia* is one of these plants (Family: Cucurbitaceae). 21,000 plants that are used as medicines worldwide are listed by the WHO. Out of these 2500 species, 150 species are used economically on a sizable basis in India. India is known as the world's botanical garden and is the country that produces the most medicinal herbs [2].

The "wonder tree," *Moringa oleifera*, is acclaimed for its abundance of antioxidants and health-promoting minerals, and nearly all components are regarded as nourishing in conventional herbal therapy.

It is a little, quickly-growing evergreen or deciduous tree that typically reaches heights of 10 or 12 metres. It has a fluffy canopy of tripinnate leaves, a spreading, open crown of drooping, frail branches, and thick corky, whitish bark [9].

Numerous vitamins and minerals are present in the plant. A good amount of amino acids, proteins, beta-carotene, alkaloids, flavonoids, phenolics, and other phytoconstituents like glucosinolates, isothiocyanates, tannins, and saponins may be found in various portions of this plant. This plant's phytoconstituents provide important nutrients and chemical compounds that aid in the treatment and prevention of disease. Numerous pieces of evidence support the claims that *Moringa oleifera* is a healthy, nutritious plant with positive benefits on people. Numerous *in-vitro* and *in-vivo* studies have demonstrated the bioactive components' prospective pharmacological efficacy [10].

TABLE 1: *MOORINGA OLEIFERA* ANTIDIABETIC ACTIVITY OF DIFFERENT PARTS IN DIFFERENT SOLVENT [11-27]

Sr. no.	Author Name	Title	Method of Extraction	Outcome
1	Rotimi Olusanya Arise *et al.*	Antidiabetic and Antioxidant Activities of Ethanolic Extract of Dried Flowers of *Moringa oleifera* in Streptozotocin-induced Diabetic Rats	Dried flowers powdered and extracted with 95 % ethanol with continuous shaking	The present study showed that ethanolic extract of *M. oleifera* flower has hypo- and normoglycemic properties in rats induced with diabetes via STZ injection
2	Ampa Luangpiom *et al.*	Anti-hyperglycemic Properties of *Moringa oleifera* Lam. Aqueous Leaf Extract in Normal and Mildly Diabetic Mice	Fresh leaves of *Mooringa oleifera* boiled for 1 hr, filtered, evaporated and dried	It was found that aqueous leaf extract of *M. oleifera* Lam. exhibited anti-hyperglycemic activities in normal mice and improved glucose tolerance impairment in mildly diabetic mice
3	Idakwoji Precious Adejoh et al.	*In-vivo* and *in-vitro* comparative evaluation of the anti-diabetic potentials of the parts of *moringa oleifera* tree	Different parts of tree like seed, stem bark, flower, leaves and root macerated with ethanol, concentrated and freeze dried .	It has been concluded that results from both the *in-vivo* and in vitro experiments have shown that each of the five extracts reduced blood glucose level in diabetic animals and inhibit α- amylase/ α-glucosidase activities respectively
4	Fahmy T. Ali	Potential activity of *Moringa*	Dried leaves of	It has been reported that alcoholic

	et al.	*oleifera* leaf extract and some active ingredients against diabetes in rats	*Moringa oleifera* macerated with ethanol, filtered, evaporated and then dried	extract has potent antidiabetic activity
5	Dolly Jaiswal *et al.*	Effect of *Moringa oleifera* Lam. leaves aqueous extract therapy on hyperglycemic rats	Fresh leaves of M.O.boiled for 48 hr,Filtered ,evaporated and then dried	Aqueous extract reduces the high blood glucose level in sub, mid and severely diabetic rats
6	Tarique Anwer *et al.*	Antidiabetic potential of *Moringa oleifera* Lam. leaf extract in type 2 diabetic rats, and its mechanism of action	Dried leaves of *Moringa oleifera* extracted using 95 % ethanol by percolation method	It produces antihyperglycemic activity through a mechanism involving modulation of hyperinsulinemia, PPARγ and inflammatory cytokines, and could therefore be developed for the management of diabetes mellitus.
7	Ameebahen B. Patel *et al.*	Antidiabetic activity of *Moringa oleifera* Lam.	Dried leaves of *Moringa oleifera* leaves extracted using Soxhlet with alcohol and chloroform	It shows the stimulation of insulin release hence used as antidiabetic agent
8	A. Villarruel-López *et al*.	Effect of *Moringa oleifera* consumption on diabetic rats	Direct use of dried *Moringa oleifera* Leaf powder	It was observed that direct use of M.O. leaf powder has good effect on diabetic rats
9	C. Udeogu *et al.*	Effects of *Moringa oleifera* Leaves Methanolic Extract on Alloxan- Induced Diabetic Albino Rats	Dried leaves of *Moringa oleifera* leaves extracted using methanol by cold maceration process	This observation provides the pharmacological basis for the traditional use in the management of diabetes mellitus
10	Elizabeth I. Omodanisi *et al*.		Dried leaves of *Moringa oleifera* extracted using hexane and again rextracted with methanol	M.O. has the potential in the management of diabetes mellitus
11	Anyanwu Anthony Chinedu *et al.*	Effect of the ethanolic leaf extract of *Moringa oleifera* on insulin resistance in streptozotocin induced diabetic rats	Dried leaves of *Moringa oleifera* leaves extracted with 70 % ethanol using maceration	This study revealed that the ethanolic leaf extract of Moringa oleifera has a potent anti-diabetic activity as it lowers blood glucose levels and improves insulin sensitivity and beta-cell function in diabetic rats
12	Rajnish Gupta *et al.*	Evaluation of antidiabetic and antioxidant activity of *Moringa oleifera* in experimental diabetes	Dried powdered pods of *Moringa oleifera* percolated with 100 % methanol	This explained the pods reduce the blood glucose level in STZ induced diabetic rats
13	Abdulrahman L. Al-Malki *et al.*	The Antidiabetic Effect of Low Doses of *Moringa oleifera* Lam. Seeds on Streptozotocin Induced Diabetes and Diabetic Nephropathy in Male Rats	Dried seed powder is used	It showed good antidiabetic activity
14	Hafiz Muhammad Irfan *et al.*	Anti-diabetic activity-guided screening of aqueous-ethanol *Moringa oleifera* extracts and fractions: Identification of marker compounds	Dried leaves of *Moringa oleifera* leaves extracted with ethanol and water using maceration method	It demonstrated the aqueous-ethanol extracts (95, 75, 50, 25 % [v/v] ethanol and 100 % water) did exhibit a hypoglycemic effect
15	Roushan kumari *et al.*	Phytoremedial effect of fruit extract of *Moringa oleifera* on alloxan induced diabetic model in Swiss albino mice	Dried fruits of *Moringa oleifera* etracted with ethanol	It explained fruit extract of *M. oleifera* provided potentially protection against hyperglycemia and its complications
16	M. S. Nadro *et*	Anti-diabetic Effects of	Dried seeds are	The results suggested that the

	al.	Aqueous Extract and Oil of *Moringa oleifera* Seed on Liver and Kidney Functions in Streptozotocin-induced Diabetes in Rats	extracted with distilled water by maceration and oil is extracted using hexane as a solvent with Soxhlet	extracts play a significant role as potent hypoglycemic agent and also nephron-protective activity
17	Muobarak J. Tuorkey	Effects of *Moringa oleifera* aqueous leaf extract in alloxan induced diabetic mice		The result shows that it has good potential in treating complications of diabetes

Medicinal Potential Value of *Moringa oleifera*: *Moringa oleifera* possess the tremendous activity and potentials against cancer, cardiovascular diseases diabetes, antioxidant antimicrobial and anthalmintic activity. Leaf extract of *Moringa oleifera* has investigated for anticancer and anti-inflammatory activity in streptozotocin-induced diabetes in the rat model. *Moringa oleifera* possesses the ability to reduce the damage caused by streptozotocin to hepatic and nephron and decrease the interleukin levels showing anti-inflammatory activity [28].

It is also used as plant growth enhancer. Moringa spray produced a wide range of advantageous benefits on plant crops, according to lab testing. Spray effects suggested that young plants are growing more quickly. Plants have greater firmness and disease and insect resistance. Longer lifespan, heavier roots, stems, and leaves, more fruit was produced, larger fruit was produced, and the yield increased by 20–35 percent [29].

Recently, phytoconstituents from *M. oleifera* is utilized for immunomodulatory treatment which shows the effect on both the cell-mediated and humoral immune systems [30].

Extract from *Mooringa oleifera* leaves raises monoamine levels in the brain, which may help treat Alzheimer's disease. Penicillin-induced convulsions, locomotor behaviour, brain serotonin (5-HT), dopamine, and nor-epinephrine levels were examined for in-vitro anticonvulsant action from the aqueous extract of Moringa oleifera roots and the ethanolic extract of leaves [31].

CONCLUSION: The family *Mooringaceae* plant Moringa oleifera has a wide range of medicinal properties. Additionally, the majority of plant components, including seeds, leaves, petals, and roots, are employed in the treatment of numerous ailments. Aqueous, ethanolic, and methanolic extracts are reportedly frequently used for research, identification, and quantification purposes. In the future, the active ingredients can be separated and created into dosage forms and delivery systems that are appropriate.

Additionally, *in-vivo* research based on animal models can be carried out in the future for better results.

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