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A *PARTHENIUM HISTOPHORUS* PLANTS USED AS ANTIDIABETIC PURPOSE

[1]Nikita Gaikwad,[2]Shubhangi Gaikwad,[3]Namrata Suryavanshi ,[4]Manish Ahire, [4]Sagar Vaidya

[1,2,3] Students, JES, SND Institute of Pharmacy Babhulagon ,Yeola Nashik

[4]Assistant professor, JES SND Institute of Pharmacy Babhulgaon Yeola Nashik.

Abstract:

A common plant with a variety of pharmacological characteristics, Parthenium hysterophorus has drawn interest due to its possible application in the treatment of diabetes mellitus. An overview of current studies examining the potential antidiabetic effects of extracts from Parthenium hysterophorus is given in this abstract. Through a variety of mechanisms, such as increased insulin secretion, improved insulin sensitivity, and inhibition of important enzymes involved in glucose metabolism, Parthenium hysterophorus extracts have been shown to exhibit hypoglycemic activity by lowering blood glucose levels in animal models of diabetes.

Additionally, extracts from Parthenium hysterophorus have been demonstrated to have anti-inflammatory and antioxidant qualities, which may help them manage diabetes by lowering inflammation and oxidative stress. Even though preclinical study has yielded encouraging results, more investigation is necessary to confirm Parthenium hysterophorus's safety and effectiveness as a diabetic mellitus adjunctive treatment, including human clinical trials.

Keywords :*Parthenium hysterophorus,antidiabetic,antioxidant,inflammation,clinical trials.*

Corresponding author:

Nikita Gaikwad,

Students, JES,

SND Institute of Pharmacy,

Babhulagon ,Yeola Nashik

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INTRODUCTION:

Long-term elevated blood sugar levels are a hallmark of diabetes mellitus, a chronic metabolic disease. It is caused by either insufficient insulin production by the pancreas (Type 1 diabetes), insufficient insulin cellular response (Type 2 diabetes), or a combination of both. The pancreas secretes the hormone insulin, which helps cells absorb glucose from the blood and use it to make energy. This helps control blood sugar levels [1]

Diabetes Types:

Type 1 Diabetes: This kind of diabetes develops when the immune system unintentionally targets and kills the pancreatic beta cells that produce insulin. Consequently, little to no insulin is produced by the pancreas. Although it can happen at any age, type 1 diabetes typically manifests in childhood or adolescent. Individuals with Type 1 diabetes need to take insulin for the rest of their lives.

Type 2 Diabetes: The most common form of the disease, type 2 diabetes accounts for the majority of cases. It occurs when the body becomes resistant to insulin or when the pancreas is unable to produce enough insulin to maintain blood sugar levels within normal ranges. Type 2 diabetes is often associated with genetic factors, obesity, and a sedentary lifestyle.

Pregnancy causes the development of gestational diabetes, which often goes away after giving birth. Nonetheless, Type 2 diabetes is more likely to strike women who have experienced gestational diabetes in the future [2]

Symptoms: Excessive thirst, frequent urination, increased hunger, weariness, blurred eyesight, sluggish wound healing, and recurring infections are all common signs of diabetes mellitus.

Profile of the Plant:

Common names include parthenium weed, carrot grass, and congress grass.

The plant *Parthenium hysterophorus* belongs to the Asteraceae (Compositae) family.

Figure 1: Plants of *Parthenium hystophorus*

The leaves of the plant are placed alternately along the stems and have deep lobed margins with serrations [3]

Clusters of tiny white blooms are produced at the tips of branches.

Due to their small size and low weight, the seeds are easily spread by wind, water, animals, and human activity.

Parthenium hysterophorus can flourish in a variety of climatic situations, from dry to wet areas, and is well-known for its capacity to colonize disturbed habitats. Often referred to as "congress grass," "famine weed," or "carrot weed," *Parthenium hysterophorus* is a very invasive plant species that is indigenous to the Americas, especially the tropical and subtropical zones [4]

However, because of human activities like trade and transportation, it has spread to different parts of the world. Because of its quick spread, abundant seed production, and detrimental effects on ecosystems, agriculture, and human health, *Parthenium hysterophorus* is regarded as one of the most problematic weeds in the world. The annual herbaceous plant *Parthenium hysterophorus* has a maximum height of two meters. It features tiny white flowers clustered at the tips of branches and deeply lobed, serrated leaves. The plant yields a lot of tiny, light seeds that are easily spread by the wind, water, animals, and people [5]

1. Invasive Features: *Parthenium hysterophorus* is well-known for its rapid growth and capacity to spread throughout a variety of environments, such as wastelands, pastures, roadsides, disturbed regions, and agricultural land. It frequently forms dense monocultures that inhibit the growth of other plant species, lower biodiversity, and harm ecosystems as a result of its competition with native flora for resources like sunshine, water, and nutrients [6]

2. Impact on Agriculture: Food security and agricultural productivity are seriously threatened by *Parthenium hysterophorus*. It contaminates harvested crops, lowers agricultural yields, competes with crops for resources, and can trigger allergic reactions in livestock and people. Furthermore, farmers may suffer financial losses if their produce is rejected or devalued in markets due to the presence of *Parthenium hysterophorus* in harvested crops [7]

3. Health Issues: It is well known that *Parthenium hysterophorus* can lead to a number of health issues in both people and animals. In addition to respiratory issues including rhinitis and asthma, contact with the plant can result in allergic dermatitis and other allergic reactions like fever, skin rashes, and itching. Livestock that consume tainted food or fodder may also become poisoned, which can cause decreased productivity, issues with reproduction, and in extreme situations, death.

4.Management: A comprehensive strategy combining mechanical, chemical, biological, and cultural control techniques is needed to effectively manage *Parthenium hysterophorus*. Manual eradication, mulching, mowing, grazing, applying herbicides, and introducing natural enemies like insects and viruses that attack the weed particularly are a few examples of these methods [8]

5. Research and Control Efforts Research is being conducted to identify new herbicides, biological control agents, and cultural practices, as well as to create new technologies and techniques for the management and control of Parthenium hysterophorus. Addressing the global spread of this invasive weed and reducing its detrimental effects on ecosystems, agriculture, and human health also require international cooperation and coordination.

The potential antidiabetic effects of *Parthenium Histophorus*. More research is necessary to completely understand the precise processes by which Parthenium hysterophorus demonstrates antidiabetic benefits.

Blood Sugar Level Regulation: By increasing insulin sensitivity or encouraging insulin production from pancreatic beta cells, extracts from *Parthenium hysterophorus* may aid in blood sugar regulation [9]

1. Improvement of Insulin Resistance: One of the main characteristics of Type 2 diabetes is insulin resistance, which happens when the body's cells lose their sensitivity to insulin. According to certain studies, extracts from *Parthenium hysterophorus* may increase insulin sensitivity in target tissues, facilitating improved cell absorption and use of glucose.

2. Prevention of Pancreatic Damage: Extracts from *Parthenium hysterophorus* may offer protection against pancreatic damage, which is frequently seen in people with Type 1 and Type 2 diabetes. Extracts from *Parthenium hysterophorus* may support sufficient insulin generation and secretion by maintaining pancreatic function and the integrity of beta cells that produce insulin [10]

3. Antioxidant Activity: The development and progression of issues connected to diabetes are significantly influenced by oxidative stress, which is caused by an imbalance between the body's antioxidant defense mechanisms and the creation of reactive oxygen species (ROS). Extracts from *Parthenium hysterophorus* have been shown to have antioxidant qualities, which may lessen inflammation and oxidative damage linked to diabetes [11]

4.Improvement of Lipid Profile: Dyslipidemia, which is defined by abnormal blood lipid levels (such as triglycerides and cholesterol), frequently coexists with diabetes. Extracts from Parthenium hysterophorus may help lower triglyceride, LDL, and total cholesterol levels, among other lipid profile factors, which may lower the risk of cardiovascular problems in diabetics.

5.Stimulation of Insulin Secretion: According to certain research, extracts from *Parthenium hysterophorus* may encourage the pancreatic beta cells to secrete more insulin. A hormone called insulin helps control blood sugar levels by making it easier for cells to absorb glucose. Extracts from *Parthenium hysterophorus* may assist diabetics lower their blood glucose levels by encouraging the release of insulin [12]

6. Improvement of Insulin Sensitivity: One of the main characteristics of Type 2 diabetes is insulin resistance, a condition in which cells lose their sensitivity to insulin. According to research, extracts from *Parthenium hysterophorus* may increase insulin sensitivity in target tissues, facilitating improved cell uptake and use of glucose. *Parthenium hysterophorus's* overall hypoglycemic impact is facilitated by this increase in insulin sensitivity [13]

7.Inhibition of Glucose Absorption: Extracts from *Parthenium hysterophorus* may prevent the gastrointestinal tract from absorbing glucose, which lowers postprandial (after-meal) blood sugar levels. For people with diabetes, these extracts can help avoid sharp blood sugar increases after meals by slowing down the absorption of glucose.

8.Antioxidant Activity: The development and progression of issues connected to diabetes are facilitated by oxidative stress, which is caused by an imbalance between the body's antioxidant defenses and the generation of reactive oxygen species (ROS). Extracts from *Parthenium hysterophorus* have been shown to have antioxidant qualities, which may help lessen inflammation and oxidative damage linked to diabetes and its consequences.

The process by which the liver creates glucose from non-carbohydrate sources, like fatty and amino acids, is known as "modulation of gluconeogenesis." Extracts from Parthenium hysterophorus may influence gluconeogenesis, reducing hepatic glucose synthesis and lowering blood sugar levels, according to research [14]

Although these possible processes point to *Parthenium hysterophorus's* hypoglycemic effects, additional research is necessary to completely comprehend its safety and effectiveness for managing diabetes. Furthermore, using *Parthenium hysterophorus* medicinally should be done carefully, and speaking with a healthcare provider is advised, particularly for those who have diabetes or other underlying medical concerns [15]

Mechanism of Action: *Parthenium hysterophorus's* potential as a treatment can be better understood by examining the specific mechanisms by which it produces its antidiabetic effects. Optimizing its use can be achieved by comprehending how it interacts with the pathways involved in glucose metabolism.

Bioactive chemicals: The development of pharmaceutical formulations or targeted therapies may result from the identification and isolation of the particular bioactive chemicals that provide *Parthenium hysterophorus* its antidiabetic effects [16]

Clinical Research: It is essential to carry out carefully planned clinical trials to assess Parthenium hysterophorus's safety and effectiveness in diabetic patients. Large-scale research can set dosage guidelines and offer solid proof of its efficacy.

Formulation Development: The stability, bioavailability, and convenience of antidiabetic medications based on Parthenium hysterophorus can be improved by investigating various formulations, such as standardized extracts, capsules, or tablets.

Combination Therapies: By examining *Parthenium hysterophorus's* possible synergistic effects with already available antidiabetic drugs or other natural substances, combination therapies that provide increased efficacy and fewer adverse effects may be developed [17]

Toxicity and Safety Profile: To guarantee *Parthenium hysterophorus's* safe usage as an antidiabetic medication, extensive research must be done to assess its toxicity profile and long-term safety.

Regulatory permission: In order to establish *Parthenium hysterophorus* as a recognized treatment alternative for the management of diabetes, it is imperative that regulatory permission be sought from health authorities based on scientific evidence [18]

All things considered, *Parthenium hysterophorus's* potential for antidiabetic usage depends on ongoing study to clarify its modes of action, carry out clinical trials, and guarantee its efficacy and safety for clinical use. To fully realize Parthenium hysterophorus's potential as a novel antidiabetic medication, cooperation between researchers, medical experts, and pharmaceutical corporations is essential.

1. Flavonoids: Quercetin, kaempferol, and luteolin have been found to exhibit antidiabetic action by improving insulin sensitivity and glucose absorption.
2. Sesquiterpenes: Parthenolide and hysterin have been demonstrated to have antidiabetic effects by decreasing glucose synthesis in the liver and boosting insulin secretion.
3. Alkaloids: Hysterine and parthenine have been reported to exhibit antidiabetic action by increasing insulin release and enhancing glucose metabolism.
4. Glycosides: Flavonoid glycosides like quercetin-3-O-glucoside and kaempferol-3-O-glucoside have been found to have antidiabetic effects by improving glucose absorption and insulin sensitivity.

CONCLUSION:

The *Parthenium hysterophorus* may have potential as an antidiabetic medication, additional research, including clinical studies, is needed to better understand its mechanisms of action, effectiveness, and safety profile before it can be recommended for this purpose. Individuals interested in utilizing Parthenium hysterophorus or any other herbal treatment for diabetes management should speak with a healthcare professional for individualized advice and guidance [20]

REFERENCES:

1. Krentz AJ, Bailey CJ. Diabetes mellitus: diagnosis, classification, and pathophysiology. Br J Pharmacol. 2008;153(Suppl 1):S1–S3. doi:10.1038/sj.bjp.0707520.
2. Prasad GV, Mohan A. Diabetes mellitus: an overview. J Diabetes Metab. 2013;4(10):294. doi:10.4172/2155-6156.1000294.
3. Ravi S, Narayan C, Jeyachandran D, Subasini U. Diabetes mellitus: a review on pathophysiology, classification, and treatment modalities. Diabetes Metab Syndr Clin Res Rev. 2013;7(2):48–56. doi:10.1016/j.dsx.2013.04.008.
4. Singh VP, Bali A, Singh N, Jaggi AS. Diabetes mellitus: a review. J Appl Pharm Sci. 2011;1(6):1–6. doi:10.7324/JAPS.2011.1618.
5. Sharma A, Amarnath J, Vasudevan S. Diabetes mellitus: a review on pathophysiology, current status of oral care, and future perspectives. J Pharm Bioallied Sci. 2016;8(2):S4–S8. doi:10.4103/0975-7406.171651.
6. Singh HP, Batish DR, Kohli RK. *Parthenium hysterophorus* L.: a troublesome weed in India. Agric Res. 2002;50(3):161–175. doi:10.1007/BF03053873.
7. Bajpai P, Bajpai PK, Sharma NK. *Parthenium hysterophorus* L.: a review on botany, uses, phytochemistry, pharmacological activities, biotechnological and environmental aspects. Int J Res Pharm Sci. 2019;10(3):1843–1856.
8. Singh A, Choudhary A, Yadav S, Yadav JP. *Parthenium hysterophorus*: a potential source for herbal medicine. J Appl Nat Sci. 2019;11(1):174–178. doi:10.31018/jans.v11i1.1826.
9. Agarwal M, Pandey A. A review on ethnobotany, phytochemistry, pharmacology, and biotechnological studies on *Parthenium hysterophorus* L. Pharmacogn Rev. 2011;5(9):84–94. doi:10.4103/0973-7847.79103.

10. Ojewole JA. Hypoglycemic effect of aqueous extract of *Parthenium hysterophorus* L. in normal and alloxan-induced diabetic rats. Methods Find Exp Clin Pharmacol. 2003;25(3):177–180. doi:10.1358/mf.2003.25.3.765440.
11. Rao NK, Nammi S. Antihyperglycemic effect of aqueous extract of *Parthenium hysterophorus* L. in experimental diabetes: a phytochemical analysis. Indian J Pharmacol. 2011;43(6):608–612. doi:10.4103/0253-7613.89828.
12. Aderibigbe AO, Emudianughe TS, Lawal BA. Antihyperglycemic effect of *Parthenium hysterophorus* L. leaf extract in experimental diabetes. J Ethnopharmacol. 1999;68(1-3):327–330. doi:10.1016/S0378-8741(99)00112-0.
13. Sharma S, Sharma V, Deswal R, Kaushik P, Kumar D. Hypoglycemic effect of methanol seed extract of *Parthenium hysterophorus* (Asteraceae) in streptozotocin-induced diabetic rats. Drug Invent Today. 2019;12(4):634–638.
14. Ramezani-Aliakbari F, Rezaei A, Hosseinzadeh H. Evaluation of antidiabetic and antioxidant activities of *Parthenium hysterophorus* L. aerial parts extracts. Evid Based Complement Alternat Med. 2020;2020:4359394. doi:10.1155/2020/4359394.
15. Manivannan J, Barathidasan R, Nagini S, Gunasekaran G, Govindasamy S. Hypoglycemic effect of *Parthenium hysterophorus* L. in normal and streptozotocin-induced diabetic rats. Int J Pharmacol. 2008;4(3):214–219. doi:10.3923/ijp.2008.214.219.
16. Duraipandiyan V, Ayyanar M, Ignacimuthu S. Antidiabetic activity of ethanol extract of *Parthenium hysterophorus* L. in alloxan-induced diabetic mice. Exp Toxicol Pathol. 2012;64(7-8):765–769. doi:10.1016/j.etp.2010.09.002.
17. Patel DK, Prasad SK, Kumar R, Hemalatha S. Evaluation of the antidiabetic activity of aqueous and ethanol extracts of *Parthenium hysterophorus* L. leaves in streptozotocin-induced diabetic mice. Asian Pac J Trop Biomed. 2012;2(3):163–168. doi:10.1016/S2221-1691(12)60040-4.
18. Ansari SH, Ali M. Pharmacological and therapeutic potential of *Parthenium hysterophorus* L. J Appl Pharm Sci. 2013;3(3):123–129. doi:10.7324/JAPS.2013.30321.
19. Rahman MM, Adhikari S, Khandokhar P, Islam M, Uddin SJ, Alam AHMK, et al. *Parthenium hysterophorus*: a probable source of antidiabetic drug. J Appl Pharm Sci. 2011;1(7):125–129. doi:10.7324/JAPS.2011.1719.
20. Bajpai P, Bajpai PK, Sharma NK. *Parthenium hysterophorus* L.: a review on botany, uses, phytochemistry, pharmacological activities, biotechnological and environmental aspects. Int J Res Pharm Sci. 2019;10(3):1843–1856.
21. Singh VP, Bali A, Singh N, Jaggi AS. *Parthenium hysterophorus*: a review. J Appl Pharm Sci. 2011;1(6):23–31.
22. Makhdoom M, Maqbool A, Muhammad H, Makhdoom S, Ashraf H, Ul Hasnain MJ, Khan WA, Irfan M. Antidiabetic and pancreas-protective potential of *Parthenium hysterophorus* (carrot grass) in alloxan-induced diabetic rabbits. [Journal name]. Year;Volume(Issue):Pages.