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Review Article

Antidiabetic Activity of Catharsntus Pusillus: A Review

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Abstract:
For centuries, diabetes and its variants have been a familiar illness to medical professionals. Being a lifestyle disease, diabetes necessitates extensive research into the physiological effects of insulin as well as its various clinical manifestations, including tissue complications. It is important to emphasize the importance of appropriate treatment in terms of diet and anti-diabetic medications. Herbal diabetes treatments are not new, in actuality. As early as 1550 B.C., plants and plant extracts were used to treat the illness; up to 400 plants were "prescribed" before the creation of potent diabetes drugs earlier this century. An attempt has been made in this paper to provide an overview of some Indian plants that have been studied for their antidiabetic properties, along with information on their phytoconstituents and mechanism of action. This endocrine system metabolic disorder affects approximately 10% of the global population, and the number of affected individuals rises daily. The profiles that are displayed contain details about the plant parts and test model that were utilized, the scientific and family names, the level of hypoglycemic activity, and the active chemical agents. These plants' effects have the potential to correct metabolic abnormalities and postpone the onset of diabetic complications. This study encourages more investigation into the possible applications of therapeutic plants with antidiabetic properties.
Keywords: Antidiabetic, Hypoglycemic, Phytoconstituents, Clinical, Endocrine

Introduction

The complicated and diverse group of disorders known as diabetes mellitus affects how fat, protein, and carbs are metabolized. It is caused by insufficient or absent insulin secretion or by a decrease in the tissue's sensitivity to insulin. There are currently several medications available to lower hyperglycemia in people with diabetes mellitus, including biguanides and sulfonylureas. In order to overcome the side effects of these medications and solve the problems associated with diabetes, a new class of compounds must be found [1]. Diabetes has become a significant public health concern for India due to its phenomenal rise in prevalence. It

is also a disease that affects many people from all walks of life in many different nations, and Ayurvedic medicine, which is the oldest in the world, is once again being looked to for treatment. [2]. Different types of reported diabetes mellitus can be classified under following two categories:

Insulin-dependent diabetes mellitus (IDDM) type 1 is characterized by an absence of insulin production by the body. Young adults and children are most commonly affected. 5–10% of cases of diabetes are caused by type 1 diabetes. Juvenile diabetes, also known as type 1 diabetes, is a chronic illness marked by the body's incapacity to produce insulin. The hormone insulin controls blood sugar, or glucose, levels, enabling the body's cells to absorb and utilize glucose for energy. Blood sugar levels can rise dangerously high in the absence of insulin. Being an autoimmune condition, type 1 diabetes is caused by the body's immune system attacking and killing the beta cells in the pancreas that produce insulin by mistake. Although the precise cause of this autoimmune reaction is unknown, a mix of environmental and genetic factors are believed to be responsible. Type 1 diabetes can strike at any age, although it usually first manifests in childhood or adolescence. Its symptoms, which often come on suddenly, can include blurred vision, excessive thirst, frequent urination, and unexplained weight loss. Insulin injections or the use of an insulin pump are required to replenish the insulin that is lost in people with Type 1 diabetes. In order to modify their insulin dosage as needed, they must closely monitor their blood sugar levels throughout the day. To avoid complications, blood sugar control must be maintained. If blood sugar levels are consistently too high, it can lead to long-term complications such as heart disease, kidney damage, nerve damage, and eye problems. On the other hand, excessively low blood sugar levels (hypoglycemia) can be dangerous and cause seizures or loss of consciousness. Managing Type 1 diabetes also involves paying close attention to diet and exercise. A balanced diet and regular physical activity can help regulate blood sugar levels. People with Type 1 diabetes must be careful about the types and amounts of carbohydrates they consume. Monitoring: Continuous glucose monitoring (CGM) devices and blood glucose meters are commonly used to monitor blood sugar levels. CGM provides real-time data on glucose levels and trends, making it easier to make insulin dose adjustments.

Type 2 is noninsulin-dependent diabetes mellitus (NIDDM), in which the body does not produce enough, or improper use of secreted insulin is the most common form of the disease, accounting for 90–95% of diabetes. Type 2 diabetes is nearing epidemic proportions, due to an increased number of elderly people, and a greater prevalence of obesity and sedentary lifestyles.

Insulin is a tiny protein made up of two polypeptide chains joined by disulfide bonds. Proinsulin, the precursor protein that is synthesized, is cleaved by proteases to produce insulin and peptide C, which are then secreted by the pancreatic beta cells. In contrast to NIDDM patients, normal people secrete less proinsulin than insulin. Hormones, autonomic mediators, and blood glucose levels all influence insulin secretion. The most frequent cause of secretion is elevated blood glucose, which is absorbed by the pancreatic beta cells and phosphorylated there. The potassium channels are blocked by rising adenosine triphosphate [ATP] levels, which results in membrane depolarization and an influx of calcium ions that trigger pulsatile insulin exocytosis.

Insulin is isolated from beef and pork pancreas. Human insulin is replacing the animal hormone for therapy. Human insulin is produced by special strain of E. coli that has been genetically altered to contain the gene for human insulin. Pork insulin is closest to human insulin, differing by only one amino acid [5, 6].

Insulin is a hormone produced and secreted by the pancreas, a vital organ located behind the stomach. The secretion of insulin plays a crucial role in regulating blood sugar (glucose) levels in the body. The pancreas contains clusters of cells

called the Islets of Langerhans. Within these islets, beta cells are responsible for producing and secreting insulin. When blood glucose levels rise, beta cells are stimulated to release insulin.

Catharanthus Pusillus

Catharanthus pusillus is a small flowering plant belonging to the Apocynaceae family. It is commonly known as "small periwinkle" or "Madagascar periwinkle," similar to its more famous relative, Catharanthus roseus, which is also known as the Madagascar periwinkle. These two plants share certain characteristics, but they are distinct species. Catharanthus pusillus is native to Madagascar, just like Catharanthus roseus.

Catharanthus pusillus is a low-growing perennial herb with small, attractive, funnel-shaped flowers. The flowers can vary in color, typically ranging from white to pink, with a yellow or pale center. The leaves are shiny and green, and the plant has a spreading, mat-like growth habit. This species is native to Madagascar, which is known for its rich biodiversity. It can also be found in other tropical and subtropical regions, especially in areas with warm and humid climates.

Catharanthus roseus, Catharanthus pusillus has been used in traditional medicine. In some traditional practices, it has been employed for its potential medicinal properties, including as a treatment for various ailments. However, it is important to note that the specific traditional uses and preparation methods may vary among different cultures and regions. Catharanthus roseus, Catharanthus pusillus contains alkaloids, which are biologically active compounds found in the plant. Some alkaloids are known to have medicinal properties and are used in the pharmaceutical industry. However, the specific alkaloid content and their uses in Catharanthus pusillus may differ from those in Catharanthus roseus. Catharanthus roseus has been extensively studied for its alkaloid content and potential medicinal applications, research on Catharanthus pusillus is more limited.

Catharanthus pusillus:

1. Microscopic Analysis:

- Leaf Structure: Microscopic examination involves studying the leaf's cellular structure, including epidermal cells, stomata, trichomes, and vascular bundles.
- Identification of Specific Cells: Identifying specialized cells or structures unique to Catharanthus pusillus.

2. Macroscopic Analysis:

- Overall Plant Characteristics: This involves observing the plant's size, shape, color, and any distinctive features visible to the naked eye.
- Flower and Fruit Characteristics: Examining the flowers and fruits for specific characteristics that aid in identification.

3. Physiological Analysis:

- Metabolic Pathways: Investigating the plant's biochemical pathways, particularly those related to the production of secondary metabolites.
- Environmental Adaptations: Understanding how Catharanthus pusillus responds to various environmental conditions.

Collection of Plant:

1. Selection:
- Identification: Ensuring accurate identification of Catharanthus pusillus.
- Healthy Specimens: Choosing healthy plants for collection.

2. Timing:
- Seasonal Considerations: Collecting plants at the appropriate time of the year when their active constituents are at peak levels.

3. Parts Collected:
- Leaves, Roots, or Flowers: Depending on the specific plant, the relevant plant parts are collected.

Extraction Process:

1. Harvesting:
- Cleaning: Removing any foreign matter from the collected plant material.

- Drying: Allowing the plant material to dry, preserving it for further processing.

2. Extraction Methods:

- Solvent Extraction: Using solvents like ethanol or methanol to extract bioactive compounds.
- Steam Distillation: For essential oils.
- Cold Press Extraction: For oils from seeds.

3. Concentration and Purification:

- Concentration: Removing excess solvent to obtain a concentrated extract.
- Purification: Refining the extract through additional processes if needed.

4. Analysis:

- Chemical Analysis: Identifying and quantifying the chemical components of the extract.
- Quality Control: Ensuring the extract meets quality standards.

Please note that specific details may vary based on the plant species and the intended use of the extracted compounds. For up-to-date and specific information on Catharanthus pusillus, you may need to refer to recent scientific literature or consult with experts in the field.

Catharanthus pusillus

Role of Catharanthus Pusillus in Diabetes

Catharanthus pusillus, commonly known as small periwinkle or Madagascar periwinkle, is a plant species belonging to the Apocynaceae family. This plant is related to Catharanthus roseus, also known as the Madagascar periwinkle or vinca, which is well-known for its medicinal properties, particularly its role in the treatment of diabetes. Catharanthus roseus contains compounds known as alkaloids, such as vincristine and vinblastine, which have been used in cancer treatment. However, the role of Catharanthus pusillus in diabetes is less well-studied and understood. There is limited scientific information available on the specific use of Catharanthus pusillus in diabetes management. Unlike Catharanthus roseus, which has been extensively researched for its potential antidiabetic properties, there isn't much data regarding the antidiabetic effects of Catharanthus pusillus.

C. pusillus possess carbohydrate, flavonoid, saponin and alkaloids. Alkaloids are the most potentially active chemical constituents of Catharanthus pusillus. The presence of various bioactive compounds confirms the application of C. pusillus for various ailments [12]. Thirty three compounds were identified in the whole plant extract of C. pusillus. Among the identified compounds, Hexadecanoic acid, methyl ester is a fatty acid ester having antioxidant activity [13]. Catharanthus pusillus is widely used as various treatments of diseases and traditionally used as herbal medicine [14]. The roots, leaves and latex of these plants are used to treat skin and liver diseases, leprosy, dysentery, worms, ulcers, tumor [15] ear aches, meningitis in children, rheumatic, heart diseases, hernia, infantile malnutrition, dyspepsia and asthma. About 20g of fruits powder administered orally for 3 months to relieve Hysteria. Decoction of dried plant is boiled in oil and rubbed on thelions in case of lumbago. The plant have medicinal properties like antimicrobial, anticancerous [16] antioxidant [17] activity. Catharanthus pusillus, also known as small periwinkle or Madagascar periwinkle, has been of interest for its potential medicinal properties, although it is not as well-studied as its relative, Catharanthus roseus (Madagascar periwinkle). The medicinal importance of Catharanthus pusillus is based on the presence of alkaloids, similar to Catharanthus roseus. Alkaloids are biologically active compounds that can have pharmacological effects. Catharanthus pusillus, like Catharanthus roseus, contains alkaloids. Some of the alkaloids in Catharanthus pusillus may have therapeutic properties. These alkaloids

include vincristine and vinblastine, which are well-known for their use in cancer treatment. These compounds are used to inhibit cell division and are particularly effective in treating leukemia and lymphoma. The alkaloids found in Catharanthus pusillus have been researched for their potential anticancer properties. Vincristine and vinblastine are used in chemotherapy to treat various types of cancer. These alkaloids interfere with the growth of cancer cells and have been effective in certain cancer treatments. Catharanthus pusillus has been used for various purposes, including treating diabetes and high blood pressure. However, it's important to note that traditional uses may vary among different cultures, and scientific evidence supporting these traditional uses may be limited. Catharanthus pusillus and related species have attracted the interest of pharmaceutical researchers. They are investigating these compounds for their potential to develop new drugs, not only for cancer treatment but also for other medical conditions. Research into the broader pharmacological potential of Catharanthus pusillus is ongoing. Some studies suggest that extracts from Catharanthus pusillus may possess anti-inflammatory and antioxidant properties. These properties can be valuable in various health applications, such as managing inflammatory diseases and oxidative stress-related conditions.

Conclusion: Diabetes is a condition that affects how proteins, fats, and carbohydrates are metabolized. It is caused by a decrease in insulin production or an increase in the body's resistance to it. Patients with diabetic retinopathy, diabetic peripheral neuropathy, insulin-dependent and non-insulin-dependent diabetes, etc., have all benefited from herbal treatment for their condition. The effectiveness of botanicals in lowering blood sugar levels has been demonstrated by scientific validation of multiple Indian plant species. Several plants, each with a unique mechanism of action and phytoconstituent, are recognized for their antidiabetic properties. This is an attempt to reduce plasma glucose by streamlining the phytoconstituents of a particular family with a particular mode of action. It is believed that the botanicals play a significant role in the management of diabetes given the reports on their possible efficacy against the disease.

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