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Review Article

Pharmacological Potentials of *Solanum virginianum* L - An Overview

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Abstract

Owing to the vast array of bioactive chemicals, plants have been considered a possible source of medicinal treatments. Numerous plants are employed in traditional medicine to treat common illnesses and encourage a healthy lifestyle. Various bioactive substances with exceptional therapeutic capabilities have been found through investigations into medicinal plants. *Solanum virginianum* L, sometimes referred to as nightshade plant or wild eggplant, is a prickly herb that grows throughout most of Asia and Australia. It is a member of the Solanaceae family and is covered in spines. An extensive literature review was conducted in order to examine the range of biological activities exhibited by *Solanum virginianum* L. Present review is undertaken to summarize all the available information on pharmacological activities, which provide a baseline support for further exploration of its unexplored therapeutic effects like immunomodulation, anti-piles activity, anti-anaphylactic activity, and sexual behaviour claimed by folklore.

Keywords: *Solanum virginianum* L

Introduction

Medicinal plants have a wide range of pharmacological activities due to the presence of various bioactive compounds. Plants have been used as a potential source of medicine, due to an enormous diversity of bioactive compounds. Many of the plants used in the traditional medicine to alleviate the common ailments and to promote a healthy life. World Health Organization mentioned that 80% of world population are dependent on the traditional medicine (Sen and Chakraborty, 2016). India possesses well-versed knowledge of the traditional medicine and its practice since from the ancient past [1]. The continuity of the traditional medicinal practice still today, owing to its cure and effective restoration potential. Bioactive compounds from the plant sources have always been of great significance to develop novel therapeutic drugs. In recent years, increased attention toward the use of herbal drugs has been observed throughout the world [2].

Overall traditional medicinal plants play diverse and important roles in health care systems world, wide, offering valuable insights into holistic approaches to health and well-being. However it is essential to ensure the safety, efficacy and sustainability of traditional medicines through scientific research, regulation and responsible utilization [3].

Plant profile

Figure 1

Taxonomy

Root	Root
Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Solanales
Family	Solanaceae
Genus	Solanum
Species	*Solanum virginianum* L

Table 1

Botanical classification

Kingdom	Plantae
Division	Spermatophyta
Sub-division	Angiospermae
Class	Dicotyledonae
Sub-class	Gaopetalae
Series	Bicarpellatae
Order	Polemoniales
Family	Solanaceae
Genus	Solanum
Species	*Virgianum*. L

Table 2

Common names

Sanskrit	Kantkan, Dusparsa
Marathi	Dorall ringani
English	Wild egg plant
Hindi	Katai
Bengal	Kantkari
Tamil	Kandan-kattiri
Gujarati	Bhoyaringani
Telugu	Callamulaga
Oriya	Bheji begun

Table 3

Botanical pharmacodynamics

Anti inflammatory action

Madhu Kushwaha., *et al*. [6] found out that a set of experimental animals are given an oral dose of the methanolic extract of *Solanum virginianum* leaves (e.g., 5, 50, 500, or 2000 mg/kg). No harmful effects were observed at doses of 5, 50, or 300 mg/kg. Animals that received a dose of 2000 mg/kg were found to have hazardous side effects, including poor breathing, itching, difficulty swallowing, and death. Then, 100 mg/kg, or one-third of the dose, has been chosen.

Wistar albino rats' paw edema models created with carrageenan were used to assess the anti-inflammatory properties. A carrageenan-induced paw edema model was used to determine the dose-dependent nature of the anti-inflammatory action. The current study's findings show that a methanolic extract of *Solanum virginianum* leaves possesses ($P < 0.05$).

Iraj Hameed., *et al*. [7] established that when there is a physical injury or illness, the immune system responds by causing inflammation. When typically self-limiting inflammatory processes turn chronic, chronic inflammatory disorders result. Increased blood flow and cell metabolism, fluid extravasation, soluble mediator release, vasodilatation, and cell influx are all components of the immunological nonspecific response, which is the main indicator of inflammation and happens in response to any type of physiological injury. Through the use of *in vitro* tests (the heat-induced hemolysis (HIH) assay, the DPPH scavenging assay, and the human red blood

cell membrane stabilization assay), this study sought to determine the anti-inflammatory and antioxidant potentials of methanolic extracts from the leaves of *Solanum virginianum* (L.) and *Acacia nilotica* (L.).

R N Gacche., *et al*. [8] identified the anti-inflammatory and antioxidant properties of crude extracts (in 50% v/v, ethanol) from the following plants were tested: *Zingiber officinale* Rosc. (Zingiberaceae), *Cuminum cyminum* L. (Apiaceae), *Vitex negundo* L. (Verbenaceae), *Argemone maxicana* L. (Papaveraceae), *Moringa oleifera* Lamk (Moringaceae), *Solanum virginianum* L. (Solanaceae), *Datura metel* L. (Solanaceae), and *Vitex negundo* L. (Verbenaceae). The reducing ability assay, 2, 2-diphenyl-1-picryl hydrazine (DPPH) radical and OH radical scavenging activity, as well as the inhibition of polyphenol oxidase—a model oxidizing enzyme that contains metals—were used to assess the antioxidant potentials. The concentrations of important antioxidants such as vitamin C and phenolics were estimated. The anti-inflammatory properties of the chosen botanicals were evaluated by conducting anti-inflammatory-related experiments, such as inhibition of trypsin, β-glucuronidase, and conjugated diene production.

Anti oxidant action

Madhu Kushwaha., *et al*. [9] analyzed results and demonstrate the antioxidant activity of the *Solanum virginianum* extract. Leaf extract demonstrated the strongest antioxidant activity equivalent to vitamin C, according to the DPPH assay (leaf IC50 = 58.3 ± 0.33 µg/mL; vitamin C = 21.7 ± 0.36 µg/mL). The normal procedures were followed while performing the DPPH assay for radical scavenging. These results demonstrate the antioxidant activity of the *Solanum virginianum* extract. Leaf extract demonstrated the strongest antioxidant activity equivalent to vitamin C, according to the DPPH assay (leaf IC50 = 58.3 ± 0.33 µg/mL; vitamin C = 21.7 ± 0.36 µg/mL).

Anti bacterial action

Preety Rohilla., *et al*. [10] undertaken the disc diffusion experiment was also done to evaluate the antibacterial activity of plant extracts. In summary, 100 µL of bacterial inoculum was added to nutrient agar plates before sterile discs were impregnated. Different concentrations of plant extract (100, 50, 25, and 12.5 mg/mL) were added to the discs. The positive and negative controls were DMSO and ampicillin (0.1 mg/mL), respectively. Petri plates were incubated for 24 hours at 37°C in a B.O.D. incubator. Using HiMedia Antibiotic ZoneScale-C, the obtained ZOI (zone of inhibition) was recorded. The experiment was run three times, and the mean ZOI diameter (mm) was used as the final measurement.

Anti urolithiatic action

Krishna Mohan Chinnala., *et al*. [11] have done a serious of experiments on rats. They were given oral ethylene glycolated water (0.75% v/v) for 28 days in order to produce urolithiasis.

Oral administration of *Solanum virginianum* ethanolic extract (200 mg/kg, 400 mg/kg) was started on the first day of the preventive regimen and started on the fifteenth day of the curative regimen. Findings: It was noted that the inducing agent ethylene glycol increased the levels of uric acid, serum creatinine, blood urea nitrogen (BUN), calcium, and phosphate in the urine. The administration of ethonolic extract derived from *Solanum virginianum* resulted in a significant ($P < 0.001$) decrease in the high levels of ions in urine, BUN, serum creatinine, and serum uric acid.

Anti diabetic action

Pravin Moranka., *et al*. [12] given views regarding Diabetes mellitus which has become a major health concern worldwide and development and progression of diabetic related complications are accelerated by reactive oxygen species which are generated and accumulated due to hyper glycemia. Herbal remedies are convenient for the management of diabetes due to their traditional acceptability and availability, low costs and lesser side effects. The present study was carried out to determine the *in vitro* antioxidant activity, antidiabetic activity and HPLC analysis of methanol extract of *Clematis heynei* and *Solanum virginianum*. Antioxidant activities of methanolic extract of *C. heynei* and *S. virginianum* were evaluated by H_2O_2 and No scavenging assay and antidiabetic activity was determined by *in-vitro* alpha-amylase inhibition assay and quercetin was detected in methanolic extract of *C. heynei* and *S. virginianum*.

Wound healing action

Padmanava Chakraborti [13] evaluated the wound healing activity of *Solanum virginianum* root extracts using excision and incision wound models. Methods: Moisture content, Ash value, Acid insoluble ash value, Water-soluble ash value, and different extractive values were studied as physicochemical parameters. Qualitative screening of each extract was carried out to determine different

types of phytochemicals. In addition, a pharmacological study was conducted on groups of rats to find the effectiveness of root extracts (aqueous and alcoholic) on the wound healing process. Results: Following observations were noted after the physicochemical test: Moisture content, 3.2%; Ash value, 5.77%; Acid insoluble ash, 1.17%; Water-soluble ash, 7.27%; Alcohol soluble extractive, 16.77%; Water-soluble extractive, 17.02%. After a qualitative chemical examination of alcohol and aqueous root extract, alkaloids, carbohydrates, phytosterols, saponins, phenolics, proteins [14-25].

Conclusion

It will be difficult for researchers, farmers, conservationists, and policy makers to manage and use our natural resources wisely, but herbal medicines are becoming more and more popular due to their affordable and environmentally friendly qualities. There is also an urgent need to meet the market's growing demand for medicinal plants. Standardization and stabilization studies on *Solanum virginianum* L. can be conducted in the future to assist demonstrate its potential as a source for the pharmaceutical and nutraceutical industries.

Since ancient times, *Solanum virginianum* has been used in Ayurvedic medicine to treat a wide range of illnesses. It has also been utilized in folklore. The traditional use of medicines by folklore to treat a variety of illnesses is said to be able to perform a number of pharmacological activity.

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