

Assessment on in vitro phytochemical screening of fruit of *Solanum virginianum*

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Abstract

Solanum virginianum, a member of the Solanaceae family, is recognized for its medicinal properties as documented in traditional folk medicine. In India, particularly in the region of Manipur, *Solanum virginianum* serves as a therapeutic agent for the alleviation of coughs and fevers. The primary aim of the current investigation was to conduct a rigorous scientific assessment of the phytochemical composition of *Solanum virginianum*. The present study employed biochemical methodologies to analyze the phytochemicals found in the leaves, stems, roots, and fruits of *Solanum virginianum*. The investigation revealed a significant presence of various phytochemicals, prominently including alkaloids, terpenoids, glycosides, flavonoids, saponins, coumarins, tannins, proteins, and amino acids. The quantitative phytochemical analysis specifically examined phenolic compounds, flavonoids, and reducing sugars. The findings of this study may provide a foundational basis for the future development of pharmacological preparations derived from the studied plant, thereby substantiating traditional Ayurvedic practices. Nonetheless, extensive advanced investigations, including animal studies, are imperative prior to the large-scale commercial utilization of the plant.

Keywords: Phytochemical, TFC, TPC, Reducing sugar, solanum

Introduction

Solanum virginianum, commonly referred to as yellow fruit nightshade or yellow-berried nightshade, belongs to the Solanaceae family and is found growing naturally in various regions of India. The fruit produced by this plant is edible and is utilized by local populations for the treatment of numerous ailments as part of traditional folk medicine.

This plant is frequently employed in Ayurvedic medicine for the management of conditions such as asthma and bronchitis, which has led to its official inclusion in the Ayurvedic pharmacopoeia of India, where it features in various Ayurvedic formulations. It is well-recognized in Hindu medicine, as its roots constitute one of the components of Dashmul Ashava. *Solanum virginianum* proliferates abundantly in the wild across India. Different anatomical parts of this plant are utilized in the treatment of various maladies, including fever, asthma, tuberculosis, renal disorders, cough, constipation, toothache, sore throat, rheumatism, and gonorrhea.

Local communities utilize *Solanum virginianum* in folk remedies for the treatment of throat infections and other inflammatory conditions [1-3]. The fruits are acknowledged for their diverse medicinal properties, including anthelmintic, antipyretic, laxative, anti-inflammatory, anti-asthmatic, and aphrodisiac activities. An external application of fruit paste is employed for the treatment of acne and swellings. Various components of the plant are esteemed in traditional Hindu medicine for their considerable therapeutic value in the management of ailments such as cough, asthma, fever, and cardiovascular diseases. Furthermore, the extract of *Solanum virginianum* demonstrates insecticidal and molluscicidal effects [4-7]. As a natural remedy, the juice from its fruits is utilized for sore throats and rheumatism; a

decoction of the plant is administered for gonorrhea; a paste made from its leaves is applied to alleviate pain; seeds function as an expectorant for coughs and asthma; and roots serve as an expectorant and diuretic, proving beneficial in the treatment of catarrhal fever, coughs, asthma, and chest pain. One notable plant within the indigenous medical framework is kantkari. Based on the aforementioned background, the present investigation was meticulously formulated to assess the qualitative analysis of phytochemicals located in various anatomical sections of *Solanum virginianum*.

Methods and Materials

The experimental procedures were executed within the confines of the Department of Botany, M N College, Visnagar, Mehsana, Gujarat, India.

Material Plant material:

Solanum virginianum is prevalent throughout the Indian subcontinent. The botanical specimens were procured from the Visnagar taluka of Mehsana during the period extending from March to June in the year 2024. The collected plant material underwent a thorough washing process using running water, followed by dissection into smaller fragments; subsequently, it was air-dried and finely pulverized utilizing a hot air oven. The resulting powder was securely stored in small plastic bags, each labeled with appropriate paper tags.

Preparation of extracts

Water extract:

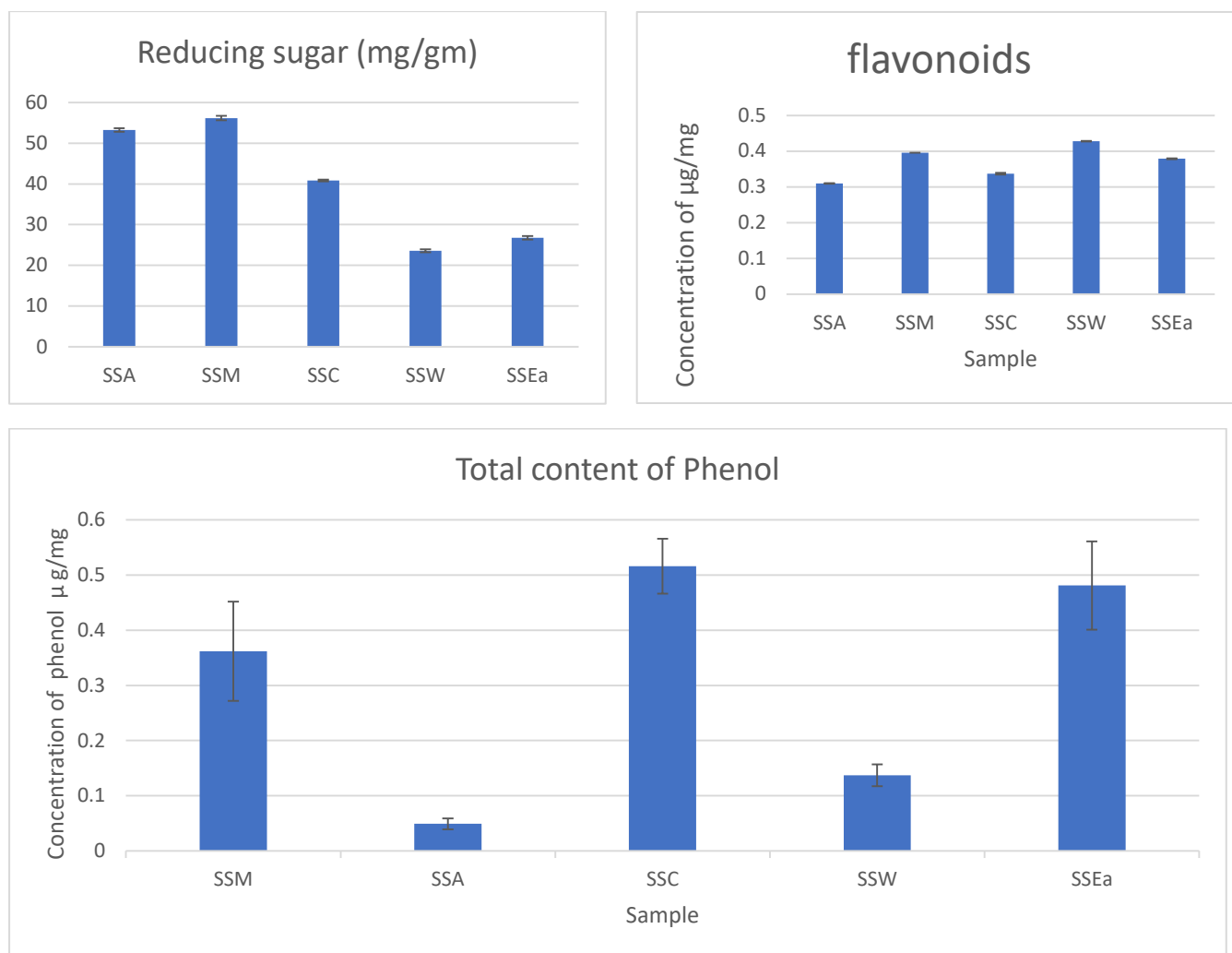
The water extraction process was executed following the classical methodology. A total of 3 grams of the homogenized leaves, stems, and root materials were precisely measured using an electronic balance and subsequently crushed in 100 ml of sterile water. This mixture was subjected to boiling at a temperature range of 50-60°C for a duration of 30 minutes within a water bath. Following this, the mixture was filtered through Whatman No.1 filter paper. The resultant filtrate was centrifuged at 2500 rpm for 15 minutes and was stored in sterile bottles at 5°C for subsequent analyses.

Estimation of Reducing sugar: By DNS assay

Estimation of phenolic content: Folin-Ciocalteu method (Harborne, A. J. (1998).

Estimation of flavonoid content: Aluminium chloride colorimetric assay Zou et al. (2004).

Result and Discussion



In these studies, highest level of reducing sugar in methanolic extract (56.18 ± 0.53 mg/gm), highest content of flavonoid in aqueous extract (0.428 ± 0.005 µg/mg) and phenolic compound found in chloroform extract (0.516 ± 0.05 µg/mg).

India has been recognized for its utilization of herb-derived traditional medicines since antiquity. The therapeutic properties of medicinal flora primarily stem from the presence of a wide array of secondary metabolites, including alkaloids, polyphenols, steroids, flavonoids, terpenoids, and coumarins[7]. In this regard, both extracts derived from *S. virginianum* fruits exhibited the presence of key phytoconstituents such as alkaloids, flavonoids, terpenoids, steroids, phenolics, glycosides, saponins, and carbohydrates. Furthermore, the aqueous and ethanolic extracts demonstrated substantial levels of total phenolic and total flavonoid contents. Notably, phenolics, alkaloids, steroids, flavonoids, sapogenins, triterpenoids, coumarins, and fatty acids (including palmitic acid, oleic acid, and linoleic acid) have been identified as significant phytochemicals in *Solanum* species[21]. The excessive reliance on antibiotics for the treatment of various diseases poses a considerable threat to humanity, particularly in light of the emergence of drug-resistant microorganisms[1],[12]. Plant extracts are regarded as promising alternatives to conventional antibiotics, which are recognized for

their capability to inhibit the proliferation of numerous pathogens, thereby addressing various microbial infections[16].

Conclusion:

The findings elucidated the presence of pharmacologically relevant compounds within the botanical specimens scrutinized. A plethora of evidence amassed from prior investigations has corroborated the bioactivity of the recognized phytochemicals. Numerous studies have confirmed that the existence of these phytochemicals confers both therapeutic and physiological attributes to the researched plants, facilitating the management of a variety of health ailments. As a result, extracts obtained from these botanical sources may be deemed promising candidates for the formulation of advantageous pharmacological agents. The utilization of traditional medicinal practices is strongly advocated for these plant species, and it is additionally recommended that further studies be undertaken to isolate, purify, and characterize the active compounds accountable for the therapeutic efficacy of these plants. Moreover, additional research is encouraged to clarify the potential mechanisms of action linked to these extracts.

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