Research Article

Preliminary phytochemical analysis and total phenolic content of *Solanum giganteum* leaves and fruit extract

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ABSTRACT

Introduction: The leaves and fruits of *Solanum giganteum* are rich in nutrients and contain many phytochemicals; they also can be efficiently used as drugs, and the fruits especially are used as food supplements. Whenever there is a rise in a particular disease rate, say for example cancer, then there will be a search for the curative medicines and that too, the most acceptable ones by the society will be the one which is provided by our nature. Phytochemicals are secondary metabolites and help shield us from various ailments and disorders. **Aim:** The aim of this study was to analyze the phytochemicals and total phenolic content of leaves and fruit extract of *S. giganteum*. **Materials and Methods:** The phytochemical analysis and estimation of phenolic content of *S. giganteum* leaves and fruits extract were done for evaluating the presence of phytochemicals in it. Various tests were performed to analyze the phytochemicals and estimate the total phenols. **Results:** Phytochemicals, such as phlobatannins, carbohydrates, flavonoids, alkaloids, and terpenoids, were present in the *S. giganteum* leaves and fruit extract. The concentration of alkaloids and carbohydrates was more than the other phytochemicals in both the *S. giganteum* leaves and seed extract. **Conclusion:** Preliminary phytochemical analysis and estimation of total phenolic content were done in *S. giganteum* fruit and seed extracts.

KEY WORDS: Diseases, Nutritious, Phenolic content, Phytochemicals, *Solanum giganteum*

INTRODUCTION

Phytochemistry is the study of photochemical which are the secondary metabolic substances found in plants. They play an essential role to defend themselves from various pathogenic microbes which can be sometimes harmful.[1] Phytochemical in fruits may reduce the risk of cancer possibility due to the presence of phenol, antioxidants, and anti-inflammatory substances. Antioxidants have already been found in plants and their supplements. Phenolics are secondary plant metabolites ranging from the simple structure with one aromatic ring to complex structures such as tannins and lignin. The recreation toward phenolic compounds, particularly flavonoids and tannins, has considerably increased.[2]

This big shrub with its colorful, long-lasting berries and large leaves with silvery undersides make an unusual hedge or background plant. *Solanum giganteum* is a much-branched shrub or small tree up to 6 m high. Branchlets with white, woolly hairs and stout, and straight prickles up to 5 mm long. This mostly montane species is widely distributed in Africa South of the Sahara, from Cameroon to Ethiopia, and down from Eastern Africa to Cape. It is also indigenous to Southern India. In South Africa, it has been recorded from all provinces except the Free State and Northern Cape. It also occurs in Swaziland but not in Namibia, Botswana, or Lesotho. It is sometimes cultivated in botanical gardens and elsewhere but is not known to become naturalized. In Australia, it is known as African holly.[3]

Habitat: The healing-leaf tree usually grows in dense to partial shade in forest margins and clearings, among trees and often on river banks and in other moist places.[4,5]

Jaeger explains that the genus name *Solanum* is possibly connected to the Latin noun *Solamen*,

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Website: jprsolutions.info | ISSN: 0975-7619

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Received on: 23-02-2018; Revised on: 25-04-2018; Accepted on: 28-05-2018

meaning a relief or comfort, assumed from the palliative effects of the nightshades. The species name *giganteum* refers to the fact that the healing-leaf tree is relatively speaking, a very tall member of the genus *Solanum*, where trees are quite rare. The solanaceae is an economically important family of about 2,600 species of plants, with its chief center of diversity in Central and South America.[6] This family contains any poisonous, medicinal and edible plants, and also several horticultural favorites as well as many weeds. Potatoes, tomatoes, green peppers, and aubergines all belong to this family.[7,8] *Solanum* is a large, cosmopolitan genus of perhaps as many as 1,500 species; about 50 of these species are found in Southern Africa, and about 30 of them are indigenous. *S. giganteum* belongs to the section Giganteiformia (of the subgenus Leptostemonum) that the child defined in 1998. This is a group of about ten shrubs, and small trees growing in the forest clearings and savanna of tropical and Southern Africa as well as India and Sri Lanka.[9,10]

S. giganteum is a known medicinal plant, as indicated by its Afrikaans and English standardized common names. According to Watt and Breyer-Brandwijk (1962), the leaves were formerly used as a dressing for festering, open sores: the woolly undersurface being applied to cleanse the lesion and the smooth upper surface to heal it. The early Cape settlers also used an ointment (with fat) of the fresh juice of the berry and leaf for a similar purpose. Hutchings *et al*. (1996) record that the fruit is used for throat ulcers by the Zulu, Xhosa, and Mfengu. Various chemical constituents typical of the solanaceae have been isolated from this species, for example, solasodine from the fruit and leaves. The Xhosa and Mfengu use the berry to curdle milk.[11]

Extracts of fruits, vegetables, cereals, and other plant materials rich in phenolics increasingly of interest in the food industry because they retard oxidative degradation of lipids, and thereby improve the quality and nutritional values of food.[12] The phytochemical analysis and determination of the phenolic content of the fruits and leaves of *S. giganteum* were determined by performing some tests.[13] Most of the botanical medicines are derived from Medicinal plants which further strengthens the future where *S. giganteum* can be used for treating various oral diseases including throat ulcer and throat cancer.[14] The roles of fruit vegetables and red wine in disease prevention have been attributed to the antioxidant properties of their polyphenols such as vitamin E and C and carotenoids. Recent studies have shown that many dietary polyphenols from certain plants are more effective antioxidants.Previous research proves that healthy diet is the source of antioxidants or bioactive components.[15]

MATERIALS AND METHODS

Sample Preparation

The seeds of various citrus fruits (orange and lemon) have been collected and dried for a week. The dried seeds are crushed and powdered. An aqueous extract was prepared.

Tests done for phytochemical analysis are mentioned below:

Test for phylobatanins

Take 1 ml of the sample solution in a test tube and add 1 ml of hydrochloric acid (HCL) and mix it well. Put it for a water bath for 3 min, the formation of red colored precipitate confirms a positive result.

Test for carbohydrates

Fehling's test

Take 1 ml of solution in a test tube and add 1 ml of Fehling solution A and B. Mix it well and put it for a water bath for about 3 min and remove it. The formation of red colored precipitate confirms a positive result.

Benedict's test

Take 1 ml of the sample solution in a test tube and add 1 ml of benedicts reagent. Mix it well and put it for a water bath for about 3 min and remove it. The formation of red colored precipitate confirms a positive result.

Test for flavonoids

Take 1 ml of the sample solution in a test tube and add 2% of 2 ml of sodium hydroxide. Mix it well. The solution turns into an intensive yellow color which is turned into colorless when two drops of diluted HCL is added to the solution. The result indicates the presence of flavonoids.

Test for alkaloids

Take 1 ml of the sample solution in a test tube and add hexane to it. Shake it well. Add 1 ml of 2% of HCL and add few drops of picric acid to it. Mix it well. For of an yellow color confirms the presence of alkaloids.

Test for terpenoids

Take 1 ml of the sample solution in a test tube and add 2 ml of chloroform. Mix it well and put it for a water bath, and then after about 3 min remove it. Add 2 ml of concentrated sulfuric acid. Formation of gray-colored precipitate confirms a positive result.

Table 1: Phytochemical analysis of *S. giganteum* leaves and fruits

Phytochemicals	*S. giganteum* leaves	*S. giganteum* fruits
Phlobatannins	+	+
Carbohydrates		
a.Fehling's test	+++	++
b.Benedicts test	++	+
Flavonoids	++	+++
Alkaloids	+++	+++
Terpenoids	+	++

S. gigantenum: *Solanum giganteum*

Table 2: Total phenolic content

Total phenolic content	Extract
37 mg GAE/g	*S. giganteum* leaves
32 mg GAE/g	*S. giganteum* fruits

S. giganteum: *Solanum giganteum,* GAE: Gallic acid equivalent

Estimation of Total Phenolic Content

The total phenolic content of both orange and lemon seeds was calculated using Folin ciocalteau method, against the gallic acid standard.

RESULTS

Phytochemical Analysis

The preliminary phytochemical test indicates the presence of alkaloids, flavonoids, reducing sugars, terpenoids, and phloblatannins in the *S. giganteum* seeds and leaves [Table 1].

Total Phenolic Content

The total phenolic content of the extracts of *S. giganteum* fruits was found to be 32 mg Gallic acid equivalent (GAE)/g, and that of the leaves were found to be 37mg GAE/g [Table 2].

DISCUSSION

Different phytochemicals have been found to possess a wide range of medicinal properties, which may help in protection against various diseases. Phytochemicals are involved in promoting, maintaining, and repairing in cells, tissues or the whole human body. The phytochemicals that are frequently associated with human health are carotenoids, polyphenols, and tocopherols. This study has revealed the presence of phytochemicals considered as active medicinal chemical constituents.[16,17] Important medicinal phytochemicals, such as terpenoids, reducing sugar, flavonoids, alkaloids, and phlobatannins, were present in the sample [Table 1]. This study reveals that the concentration of flavonoids and alkaloids are high in citrus fruits. These molecules are present in a variety of fruits and vegetables. Flavonoids act as a very good antioxidant and anti-inflammatory substances whereas the alkaloids protect against chronic diseases. Flavonoids also contribute the vibrant color to the foods we eat.[18,19] Although the concentration of terpenoids is low in citrus fruits, they play a major role and act as an anti-inflammatory, expectorant, bronchodilator, and local antiseptic. This is beneficial for patients who experience insomnia when consuming cannabin. The concentration of phlobatannins is also low but they express analgesic properties.[20]

CONCLUSION

The preliminary phytochemical test indicates the presence of alkaloids, flavonoids, reducing sugars, terpenoids, and phlobatannins in the *Solanum giganteum* fruits and leaves extract. This further proves that fruits and leaves of *Solanum gigantenum* can be used to help prevent deadly diseases such as cancer and heart attack. Phytochemicals are nonnutritive plant chemicals that have a protective or disease preventive properties. It is well known that plant produces these chemicals to protect themselves but it can also protect human beings against diseases. The presence of phenol in both the extracts reveals its antioxidant potential and its health benefits.

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Source of support: Nil; Conflict of interest: None Declared