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PRELIMINARY PHYTOCHEMICAL SCREENING OF *Solanum trilobatum* (L.) LEAVES ON STEAMED PROCESSING

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Abstract

The present investigation was designed to evaluate the phytochemical screening on leaf extract of *Solanum trilobatum*. Phytochemicals are secondary metabolites produced by all plants in which some has medicinal uses. The phytochemical constituents like flavonoids, glycosides, reducing sugar, sterols, tannin, alkaloids, and saponins were investigated qualitatively. The study revealed that the leaf extracts of *Solanum trilobatum* are showing the presence of phytochemicals in both duration of processing (5 and 15 minutes respectively). Therefore, the study would conclude that the duration of steaming will not affect the presence of phytochemicals.

Key words: *Solanum trilobatum*, Bioactive compounds, Phytochemicals and Steamed processing.

1. Introduction

Medicine from plant sources have been in use in Homeopathy, Ayurvedic, Allopathy and in traditional medicine since time immemorial. Medicinal plants play a significant role among the traditional and modern systems. Their use has been multiplied through various researches and application due to a number of side effects from use of synthetic drugs, antibiotics and high cost. In India, with more than 75 % of the population residing in rural areas close to the natural resources, rich traditions of utilizing medicinal plants have existed among indigenous people for age (Pronob Gogoi and Islam, 2012). *Solanum trilobatum* belongs to the family Solanaceae, which is commonly known as *Alarka* in Sanskrit. Several reports document the diverse properties of this plant. *S. trilobatum* possesses antioxidant activity, hepatoprotective activity and protects against UV-induced damage and radiation-induced toxicity in mice. Aqueous and solvent extracts of *S. trilobatum* were found to possess anti-inflammatory and antimicrobial properties. In the recent years, however, a lot of research on phytochemistry has been going on (Njoku and Obi, 2009; Ismaila *et al*., 2011; Kavit *et al*., 2013). Most of these researches are showing the antimicrobial and antioxidant properties of these phytochemicals. However, minimal research toward indicating the use of phytochemicals in plant classification is being done (Ghani, 2012). Most of the leafy vegetables are cooked before consumed by various methods such as boiling, frying, steaming etc. These cooking processes may cause changes in physical characteristics and chemical composition (Rehmam *et al*., 2003; Zhang and Hamauzu, 2004) as well as bioactive compounds and antioxidant properties of vegetables. The present study was aimed to screen the phytochemical from processed leave sample.

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2. Materials and Methods

Study Area

Solanum trilobatum leaves were collected from Vellore, Tamil Nadu, India. It is dominated by mountain hills. The natural environment is very suitable for *Solanum trilobatum* growth.

Sample Collection

Healthy and matured leaves were collected from Vellore district, measured and placed into a numbered polythene bags. The samples were taken back to the laboratory for subsequent measurement.

Separation of leaves

Fresh leaves sample of *Solanum trilobatum* was subjected to some conventional food processing techniques as reported by standard procedure.

Steaming and sun-drying

The leaf samples (100 gm) was spread over a muslin cloth and placed on top of the boiling water for 5, 10 and 15 min respectively. The steamed leaf sample was further sundried for 2-3 days with adequate turning over to avert fungal growth.

Powdering and packing of materials

After drying of differently processed samples were divided according to its processing time and ground finely. And the finely powder sample were stored in polythene bags for further analysis.

Reagent and chemicals

All chemicals used were of analytical grade and were products of Scientific Chemicals, Chennai. Distilled water was used for all the washing, cleaning and preparation of solutions used. All the glassware was thoroughly cleaned with liquid detergents, rinsed with distilled water before being oven dried at 105 °C.

Preliminary Phytochemical Screening

Phytochemical screening of all extracts was carried out by following standard procedure. For phytochemical screening, 3 gm of fine powdered sample was weighed and soaked separately in 15 ml of different solvents (Ethyl acetate, Methanol, Benzene, Ethanol and Chloroform) in the ratio of 1:5 weights by volume (w/v). These were allowed to stand for 24 hrs at ambient room temperature. The soaked plant powder was filtered and used as crude extract. Different crude extracts of this plant were stored in a refrigerator and used as such for qualitative phytochemical analysis. Crude extracts of the plants were prepared and stored in a refrigerator and used for the phytochemical tests. These extracts were tested for the presence of various bioactive compounds which are given below:

***Test for Flavonoids*:** To 1 ml of the extract, a few drops of dilute sodium hydroxide were added. An intense yellow color was produced in the plant extract, which became colorless on addition of a few drops of dilute acid, indicating the presence of flavonoids.

***Test for Glycosides*:** To the test solution in alcohol, 1 ml concentrated H_2SO_4 was added and after hydrolysis of the test solution the presence of sugar was determined with the help of Fehling's solution. A black-red precipitate indicated the presence of glycosides.

***Test for Reducing Sugars*:** To the test solution, 2 ml of Fehling's reagent was added followed by 3 ml of water, formation of Red - Orange color showed the presence of reducing sugars.

***Test for Sterols/Terpenes (Salkowski Test)*:** Extract was treated in chloroform with few drops of concentrated sulfuric acid, shaken well and allowed to stand for some time, red color appeared at the lower layer indicating the presence of steroids and formation of yellow colored lower layer indicated the presence of triterpenoids.

***Test for Tannins*:** About 0.5 grams of the air dried processed herbal powder was boiled in 20 ml of

water in a test tube and was then filtered. A few drops of 0.1 % ferric chloride was added and observed for brownish green or blue-black coloration.

***Test for Alkaloids*:** Test solution was taken with 2 N HCl. Aqueous layer formed was decanted, to which one or few drops of Mayer's reagent (Potassium mercuric iodide solution) was added. White precipitate or turbidity formed showing the presence of alkaloids.

***Test for Saponins*:** The extract was diluted with distilled water and it was agitated for 15 mins. The formation of layer of stable persistent foam/froth showed the presence of saponins.

3. Results and Discussion

Processed (Steamed) and powdered *Solanum trilobatum* was subjected to various qualitative tests for the screening of phytochemicals constituents which are shown in Table - 1. The result revealed that Ethyl acetate, Methanol and Chloroform treated *Solanum trilobatum* extract showed the presence of phytochemicals and the duration of processing will not affect the presence of phytochemicals.

Flavonoids has been referred to as nature's biological response modifiers because of strong experimental evidence of their inherent ability to modify the body's reaction to allergies, virus and carcinogens. They show anti-allergic, anti-inflammatory, anti-microbial and anti-cancer activity (Maria *et al.*, 2012).

Glycosides are more water soluble and also known as Cardiac glycosides. The cardiac glycosides are known to work by inhibiting the Na^+/K^+ pump. This causes an increase in the level of sodium ions in the myocytes, which then lead to a rise in the level of calcium ions. This inhibition increases the amount of Ca_2^+ ions available for contraction of the heart muscle, which improves cardiac output and reduces distention of the heart. Thus, they are used in the treatment of congestive heart failure and cardiac arrhythmia (Denwick, 2002).

Reducing sugars can react with other parts of the food, like amino acids to change the color or taste of the food and it has anti-diabetic effect on human (Amakaha *et al.*, 2002). Sterols have possible relationships with atherosclerosis and other chronic diseases (Okello *et al.*, 2009). Tannins are water soluble plant polyphenols that precipitate proteins.

Table -1: Phytochemical screening of steamed *Solanum trilobatum* (L.) leaves in various solvent extracts

Phytoconstituents	Ethyl acetate		Methanol		Benzene		Ethanol		Chloroform	
	5 min	15 min	5 min	15 min	5 min	15 min	5 min	15 min	5 min	15 min
Flavonids	-	-	-	-	-	-	-	+	+	+
Glycosides	-	-	+	+	-	-	+	-	+	+
Reducing Sugar	+	+	+	+	-	-	+	+	-	-
Sterols	-	-	-	-	-	-	-	-	+	+
Tannin	+	+	-	+	-	-	-	+	-	-
Alkaloids	+	+	-	-	+	+	-	+	-	-
Saponins	-	-	+	+	-	-	-	-	+	-

*- Absent and *+ Present

Tannins have been reported to prevent the development of microorganisms by precipitating microbial protein and making nutritional protein unavailable for them. The growth of many fungi, yeasts, bacteria and viruses was inhibited by tannins (Chung *et al.*, 1998). Alkaloids have analgesic, antispasmodic and antibacterial properties (Jeruto *et al.*, 2010). Saponins are a special class of glycosides which have soapy characteristics. It has the property of precipitating and coagulating red blood cells. Tannins are also known antimicrobial agent. Tannins (commonly referred to as tannic acid) are water soluble polyphenols that are present in many plant foods (Sodipo *et al.*, 2000). The presence of the above said phytochemical constituents holds much curative properties for the cure of various ailments such as common cold, cough, liver problem, stomach-ache, skin diseases and jaundice and so on.

4. Conclusion

In conclusion, medicinal plants play an important role in providing primary health care to rural as well as urban communities. Herbal medicines are used to prevent or treat a range of health problems. About 80 % of the world's population use herbal products as medications. Some use herbal products with conventional medications; others use them as a replacement. Although, the high technology approaches of conventional medicine are especially useful for acute disease treatment and emergency care, herbal medicine was more suitable for dealing with chronic ailments. Hence, advance studies and research required to isolate the active principle from the crude extract for proper drug development.

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