



Full Length Research Article

PRELIMINARY PHYTOCHEMICAL AND PHARMACOGNOSTIC INVESTIGATION OF *SOLANUM NIGRUM* L. LEAF EXTRACTS

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ABSTRACT

The *Solanum nigrum* L. Leaves were selected to screen pharmacognostic and phytochemical studies. Plant material was collected from farmlands in Coimbatore district, Tamilnadu, India. *Solanum nigrum* L. is a well-known leafy vegetable and also a medicinal plant, which has been valued in ancient system of medicine. The leaf extracts were subjected to organoleptic, fluorescence analysis, physicochemical analysis and preliminary phytochemical screening. The study contributes to the development of standardization parameters of herbal drugs used in our system of medicine

INTRODUCTION

India, with its enormous natural resources, is bestowed with thousands of varieties of leafy vegetables, which is highly energy giving. India is the second largest producer of fresh leafy vegetables. Green leafy vegetables are used since ancient periods as source of food as they contain many nutrients and minerals which are helpful in maintaining human health. The health and nutrition of expanding world populations are major upcoming challenges especially in developing countries. Plant foods are good sources of energy, minerals and vitamins essential to health in addition to phytochemicals with further health benefits including glycemic control, immunostimulation or antioxidant activity (Ashok kumar *et al* 2013). *Solanum nigrum* L. (Family Solanaceae) which is commonly called as black nightshade. It is a common, short-lived perennial shrub. The leaf and fruits are used as traditional medicines with high neutraceutical, antiseptic, antidysenteric and antidiuretic properties and it also used for the treatment of many skin diseases, kidney disorders non-communicable diseases and many other common ailments (Mohamed *et al.*, 2009 and Kavitha shree *et al.*, 2012).

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MATERIALS AND METHODS

Organoleptic Study

The leaf powder of *Solanum nigrum*, was used for these studies. The colour variation and taste were the basis for this test as given by Jackson and Snowdown (1968).

Fluorescence Analysis

The fluorescence properties were studied under Ultra-Violet (UV) light adopting method described by Kokosi *et al.* (1958) and Chase and Pratt (1949). The behaviour of the leaf powder with different chemical reagents was studied and the fluorescence characters were observed under visible light and long UV light at 245 nm.

Physico chemical analysis

Physico chemical parameters of the powdered drug such as loss on drying, ash value, extractive value and crude fibre content were performed according to the standard method (Anonymous 1996) and as per WHO guidelines on quality control methods for medicinal plant materials (WHO 1998).

Preliminary Phytochemical Analysis

For the preliminary phytochemical analysis, the extract was prepared by weighing 100 gm of dried powdered leaf and were subjected to maceration with different solvents as per the polarity, methanol, petroleum ether and finally aqueous. The extracts were filtered in each step, concentrated and the solvent was removed by rotary evaporator. The extracts were dried over desiccators and the residues were weighed. The presence and absence of the primary and secondary phyto constituents was detected by usual prescribed methods (Harbone, 1998).

Test of Alkaloids

Mayer's reagent: To 1 ml of the extract, 2 ml of Mayer's reagent was added. Appearance of dull white precipitate indicated the presence of alkaloids.

Test for Flavonoids

To 1 ml of extract, 1 ml of neutral ferric chloride was added. The formation of brown colour confirmed the presence of flavonoids.

Test for Tannin

To 1 ml of the extract, few ml of 5 per cent neutral ferric chloride was added. The development of a dark bluish colour indicated the presence of tannins.

Test for Phenols

To 1 ml of extract, lead acetate solution was added and the precipitate formation indicated the presence of phenolic compounds.

Test for Steroids

Liebermann-Burchard's test: The extracts were dissolved in 2 ml of chloroform to which 10 drops of acetic acid and 5 drops of conc. Sulphuric acid were added and mixed. The change of red colour through blue to green indicated the presence of steroids.

Test for Terpenoids

Salkowski test: 5 ml of each extract was mixed in 2 ml of chloroform and conc. H_2SO_4 (3 ml) was carefully added to form a layer. A reddish brown colouration of the interface was formed to show positive results for the presence of terpenoids.

Test for Quinone

To 1 ml of extract, a few drops of conc. HCl is added. An yellowish brown colour is observed which shows the presence of quinone.

Test for Starch

To 1 ml of extract, a few drops of iodine solution. Any characteristic colour change shows the presence of starch.

Table 1. Organoleptic study of the *Solanum nigrum* leaf powder

1	Colour	Dark green
2	Odour	Pleasant
3	Taste	Highly Bitter

Table 2. Fluorescence analysis of the *Solanum nigrum* leaf powders

S.No	Treatment with Chemical Reagents	Observation	
		Visible light	UV light
1	Powder as such	Dark green	Greenish yellow
2	Powder + 1 N NaOH IN Methanol	Greenish yellow	yellow
3	Powder + 1 N HCl	Dark green	Light green
4	Powder + 50% H_2SO_4	Brown	Reddish Brown
5	Powder + Ethanol	Pale Green	Pale green
6	Powder + 50% Nitric acid	Brown	Brownish yellow
7	Powder + Ferric chloride solution	Brownish yellow	Dark green
8	Powder + Chloroform	Dark green	Yellowish green
9	Powder + Picric acid	Yellowish green	Yellow
10	Powder + Methanol	Green	Dark green

Table 3. Physico chemical evaluation of *Solanum nigrum* leaf powder

S. No	Parameters	Values% w/w
1	Loss on Drying,	5.0
2	Total Ash value	10.6
3	Acid Insoluble Ash	2.3
4	Water Soluble Ash	4.8
5	Water insoluble Ash	6.3
6	Sulphated Ash	2.35
7	Water Extractive Value	55.5
8	Ethanol Extractive Value	17.5
9	Foaming index	Less than 100
10	Swelling index	2.0

Table 4. Preliminary phytochemical analysis of *Solanum nigrum* leaf extracts

Name of the compound	Petroleum ether	Chloroform	Methanol	Aqueous
Alkaloids	+	+	+	+
Flavonoids	+	+	+	+
Tannins	-	+	+	+
Phenols	+	+	+	+
Steroids	+	+	+	
Terpenoids	+	+	+	+
Quinone	+	-	-	-
Starch	-	+	+	-
Cellulose	+	+	+	+
Fixed oil and fat	-	+	+	-

+ - present ; - - absence.

Test for Cellulose

To 1 ml of extract, a few drops of iodine solution is added followed by a few drops of H_2SO_4 . Dark brown or red colour observed shows the presence of cellulose.

Test for Fixed Oil and Fat

To 1 ml of extract, a few drops of sudan III solution is added. A shining orange colour obtained shows the presence of fixed oil and fat.

RESULTS AND DISCUSSION

Pharmacognostic Study

The pharmacognostic characters of the leaf powder have been studied by screening the same through the following parameters.

Organoleptic Study

The investigation on organoleptic study of the leaf powders of *Solanum nigrum* indicated the characters like colour, odour and taste. The colour of the dried leaf powder was dark green. The taste of the leaf is highly bitter and on analysis the leaf powder gives a pleasant odour (Table 1).

Fluorescence Analysis

The leaf powder are treated with various chemicals exhibited various colours in day / visible light and UV light. When the powder treated with 1 N NaOH in methanol shows greenish yellow colour in day light, yellow colour in UV light. In 1N HCl shows dark green colour in visible light and Light green colour in UV light. In 50% Nitric acid the leaf powder exhibited brown colour in visible light and brownish yellow colour in UV light and the results are depicted in Table 2.

Physico-chemical Analysis

The physico-chemical constant evaluation of the drug is an important parameter in detecting adulteration or improper handling of drugs. The total ash is particularly important in the evaluation of purity of drugs, i.e. the presence or absence of foreign inorganic matter such as metallic salts or silica (Musa *et al.*, 2006). The total ash content of the *S. nigrum* leaf is 10.6% and sulphated ash is 2.35%. The acid insoluble ash is less than that of water insoluble ash at 2.3% and 6.3% respectively. The water extractive value of *S. nigrum* is more than solvent extractive (Table 3).

Preliminary Phytochemical Study

Pharmaceutical preparations derived from natural sources such as vegetables often contain compounds that contribute to the antioxidant defence systems and apparently play a role in the protection against degenerative diseases. The phytochemical screening of various extracts revealed the presence of alkaloids, flavonoids, phenols, steroids, starch, terpenoids, fixed oils and fat and tannins (Table 4).

Conclusion

The comparative and multidisciplinary approach to the study of *S. nigrum* does help in understanding their identification and medicinal importance. The results of the present investigation reveal the adulterants in drugs obtain from *S. nigrum*. By using the above parameters the adulterants can be easily identified.

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