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Research Article

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Phytochemical analysis and acute toxicity study of *Argeyria speciosa*

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Abstract

The present study was carried out to study the preliminary phytochemical analysis and acute toxicity studies of the *Argeyria speciosa*. Fluroscence analysis and behavioural characteristics with chemical reagents of dry powders of *Argeyria speciosa* parts and preliminary phytochemical screening was done with standard tests for different extracts. The acute toxicity of the selected plant extracts also carried according to OECD guide lines. The tested extracts showed the presences of different phytochemical compounds, such as steroids, alkaloids, flavanoids, phenols etc. in them and the presence of constituents' variation was observed. The acute toxicity studies reveal that there is no behavioral changes and mortality on animals on oral administration of different doses of extracts.

Keywords: *Argeyria speciosa*, phytochemical analysis and acute toxicity.

1. Introduction

Traditional medicines have a long history of serving the people all over the world in almost all ancient civilizations for the treatment of diseases. (De Pasquale, 1984). Plants' products, particularly vegetables and fruits are highly beneficial to the humans because they are providing the nutrients, vitamins and other components in them as diet and medicine (Kokate *et al*., 2002). In recent times the researchers are evaluating and isolating the new phytochemical compounds (Ambasta, 2000) from different medicinal plants around the world because the modern medicine causing the different side effects on their long term usage for the treatment of diseases (Gogtay *et al.*, 2002). In this point of view, the present study was aimed to determine the phytochemical constituents, physiochemical characters and safety of different extracts of *Argeyria speciosa* (Rao *et al*., 2004).

Argeyria speciosa commonly known as elephant creeper is a climbing shrub with heart shaped leaves belonging to the family Convolvulaceae. Traditionally the plant *A. speciosa* have been using in the treatment of different illness such as syphilis, dysentery, small pox and stomach complaints (Kritikar and Basu, 1981; Guhabakshi *et al.*, 1999; The Wealth of India. 2004; Prusti *et al.*, 2008).

2. Materials and Methods

2.1 Collection of Plant material

The plant material was collected from the foothills of Tirumala hills, Tirupathi A.P and plant was identified and authenticated by Prof. Venkaiah, Taxonomist, Dept of Botany, Andhra University, Visakhapatnam. The voucher specimens (BGR/GVP/NOV 15) have been kept in our laboratory for further use. The plant material was separated, dried, coarsely powdered was further used for preparation of extracts.

2.2 Chemicals and reagents

All chemicals and reagents used were analytical grade from Sigma Chemicals Co. USA and Fine Chemicals Ltd., Mumbai, India.

2.3 Preparation of extracts and Physicochemical parameters

The aerial parts (Leaf and Stem) of plant were collected, washed in tap water, rinsed with distilled water. Then shade dried at room temperature. The dried material was mechanically powdered and stored in air tight container and further used for physicochemical and fluorescent analysis. The leaf powder and stem powder were used separately for fluorescence analysis later coarsely powdered material mixture was used for successive extraction using maceration process with

pet-ether (PTE), hexane (HE), ethyl acetate (EA), chloroform (CF) and Methanol (ME). The extractive values were reported as described by Archana *et al*., 2011. Fluorescence analyses were performed according to the standard methods prescribed in Indian pharmacopeia (Indian Pharmacopoeia, 1996; Nandkarni, 1995; Kokashi *et al.*, 1958).

2.4 Preliminary Phytochemical screening

Behavior of powder with different chemical reagents was studied to detect the presence of phytoconstituents with color changes under daylight Pratt and Chase 1949). The various extracts obtained from maceration were subjected to qualitative phytochemical analysis as per the standard procedures (Mallikarjuna Rao, 2013).

2.5 Acute toxicity studies

The acute toxicity study was conducted for different extract of *Argeyria speciosa* as per OECD guidelines 420 (OECD.2001) and regulations of the Institutional Animal Ethics Committee (Regd no. 516/01/A/CPCSEA). The albino rat of either sex, were selected in to four groups of consisting of 5 animals. They were maintained for one week before the experiment, under room temperature and allowed free access to water and diet. The animals were subjected for acute toxicity study using *A. speciosa* extract at doses 5, 50, 300, 2000mg/kg body weight orally in four groups at regular intervals of time, *i.e.*, 1, 2, 4, 8, 12 and 24h. During this time, the animals were under observation to note different conditions like skin changes, morbidity, aggressiveness, oral secretions, sensitivity to sound and pain, respiratory movements and finally their mortality.

3. Results and Discussion

The medicinal plants and their products have become popular in the therapeutic activities because of their wide diversity of chemical constituents and less side effects (Chandrakant Katiyar *et al.*, 2012; Balunas and Kinghorn, 2005). However, there are less scientific evidences on the toxicity and adverse effects of the medicinal plants remedies (Hong-Fang Ji *et al.*, 2009). Therefore, the present study aimed to identify the acute oral toxicity study to identify the range of doses and preliminary phytochemical analysis of one of such medicinal plant *A. speciosa*.

The Physicochemical and fluorescent analysis of the plant powder were determined by the behavioral characteristics of the leaf and stem powders of the selected plant was observed under UV light at short and long wavelength when treated with different chemical reagents and the results are given in Table 1 and Table 2 (Krishnaveni and Santh Rani Thaakur. 2009). The changes in the physical appearance and under the UV light indicates may be the presence of different phytoconstituents in the plants. The powdered material (10gm) was successively extracted with different solvents and the percentage yield of the all extracts of *A. speciosa* was calculated and recorded in Table 3.

The qualitative phytochemical analysis was carried out to identify different bioactive molecule in the different extracts of *A. speciosa* (Table 4). The extracts showed the presence and absence of different phytochemical compounds. The differentiation in the presence and absence of the phytochemical compounds in different extracts of *A. speciosa* may be due to their solubility in the extractive solvents used in the extraction process.

In the present study, we observed there were no visible sign of toxicity, mortality and no behavioral changes such as alertness, motor activity, breathlessness, restlessness, diarrhea, tremor, convulsion and coma were observed at the administered doses of *A. speciosa* during 24h study. The animals were physically active and no death was recorded even at the high dose of 2000mg/kg body weight (Table 5). Hence, the tested plants extract was considered as safe and non toxic.

4. Conclusion

In conclusion, to our knowledge, this investigation on the phytochemical analysis and toxicity studies of *A. speciosa*, reveals the presence of phytochemical constituents in its extracts and are safe, non toxic.

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Table 1. Behavioural Characteristics of powdered aerial parts of *Argeyria speciosa* with different chemical reagents.

S.No	Chemical reagents	Under Visible light	Presence of Constituent	U.V. light	
				Short wave length	Long wave length
1.	Powder	Dull green	--	Dark green	Dark green
2.	Powdered drug+ Ferric chloride (Aqueous)	Dull green	Tannins (+)	Dark green	Dark green
3.	Powdered drug+ Ferric chloride (Alcoholic)	Dull green	Tannins (+)	Dull green	Dark green
4.	Powdered drug+ Glacial acetic acid	Dull green	Glycosides (+)	Pale green	Dark green
5.	Powdered drug+ 10%Glacial acetic acid	Dull green	Glycosides (+)	Dark green	Dark green
6.	Powdered drug+ Aqueous NaOH	Dull brown	Flavanoids (+)	Dull green	Dull green
7.	Powdered drug+ NaOH (Alcoholic)	Dark green	Flavanoids (+)	Dark green	Dark green
8.	Powdered drug+ Conc.HNO_3	Yellow	Alkaloids (+)	Dull green	Dull green
9.	Powdered drug+10% HNO_3	Dull green	Alkaloids (+)	Dark green	Dark green
10.	Powdered drug+ Conc.HCl	Dull green	Flavanoids (+)	Black green	Black green
11.	Powdered drug+10% HCl	Dull green	Flavanoids (+)	Pale green	Pale green
12.	Powdered drug+ Conc.H_2SO_4	Dull green	Steroids/ Triterpenoids (+)	Pale green	Green
13.	Powdered drug+10% H_2SO_4	Dull brown	Steroids/ Triterpenoids (+)	Brown	Brown
14.	Picric acid	Yellow green	Alkaloids (+)	Light blue	Black
15.	Iodine solution	Dark green	Starch (+)	Brown	Black green

Table 2. Fluorescence analysis of *Argeyria speciosa* with various reagents

S.No	Powder with chemical reagent	Leaf powder			Stem powder		
		Under visible light	Short wave length	Long wave length	Under visible light	Short wave length	Long wave length
1.	Powder as such	Dark green	Dull green	-----	Brown	Brownish green	Brownish green
2.	Powder + 1N NaOH (aq)	Light green	Dark green	Light green	Light green	Brown	Light green
3.	Powder + 1N NaOH (alc)	Blackish green	Dark green	Dark green	Green	Dark green	Brown
4.	Powder +5% NaOH	Dark green	Dark green	-----	Green	Brown	Brown
5.	Powder +10% NaOH	Dark green	Dull green	Dull green	Green	Dark green	Brown
6.	Conc.Hcl	Dull green	Pale green	-----	Brown	Black	Black
7.	Conc H_2SO_4	Dull green	Light green	green	Brown	Black	Brownish black
8.	Powdered drug+ water	Dull brown	green	Dark green	Brown	Dark brown	Dark brown
9.	Powder +conc. HNO_3	yellow	Dark green	Blackish green	Dark brown	Dark brown	Blackish brown
10.	5% Ferric chloride (acq)	Dark green	Dark green	Blackish green	Brown	Black	Black
11.	5% Ferric chloride (alc)	Dark green	Dark green	Blackish green	Brownish green	Black	Black
12.	Acetic acid	Black	Blackish green	Blackish green	Brown	Black	Dark green
13.	Iodine solution	Dark green	Brown	Blackish green	Brown	Dark green	Blackish green
14.	Picric acid	Yellowish green	Green	Black	Brown	Brown	Black
15.	Dilute ammonia	Dark green	Light green	Dark green	Brown	Dark green	Dark green

Table 3. Extractive Values of *Argeyria speciosa*

S. No.	Solvent	Percentage of extractive (% w/w)
1.	Pet. Ether	1.68
2.	Hexane	0.46
3.	Chloroform	0.82
4.	Ethyl acetate	1.39
5.	Methanol	4.25
6.	Water	3.98

Table 4. Preliminary phytochemical analysis of *Argeyria speciosa*

S. No	Tests	ME Ext.	EA Ext.	CF Ext.	HE Ext.	PTE Ext.
1.	Alkaloids	+	+	-	-	-
2.	Tannins	+	+	-	+	-
3.	Phenolic compounds	+	+	+	+	+
4.	Glycosides	+	+	+	-	-
5.	Proteins	+	+	+	-	+
6.	Flavanoids	+	+	-	-	-
7.	Sterols	+	+	+	+	+
8.	Triterpenoids	+	+	-	-	-
9.	Saponins	-	-	-	+	-
10.	Volatile oils	-	-	-	-	-
11.	Fixed oils	+	+	-	-	-
12.	Sugars	+	+	+	-	+

+ = Present **- = Absent**

Table 5. Acute toxicity study of *Argeyria speciosa* at different doses

Groups	Behavioral observation	Mortality
I (5mg/kg)	Normal	0/5
II (50mg/kg)	Normal	0/5
III (300mg/kg)	Normal	0/5
IV (2000mg/kg)	Normal	0/5

Conflicts of interest

Author has none to declare.

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