

Isolation of Alkaloids, Saponins and Tannins from Plants

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ABSTRACT

Current study involves the detection and estimation of alkaloids, saponins and tannins in the 3 plant species *vis.*, *Oxalis debilis*, *Chenopodium vulvaria* and *Malva neglecta* were taken as sample study. All the selected plant samples were brought to the laboratory of university and were oven dried at 70°C. Following standard method of Eluyode and Alabithe, detection and estimation of alkaloid, saponin and tannin was carried out. The results showed variation in all the plant species of 3 families containing different concentration of alkaloids, saponins and tannins. The study symbolise the variation along with the level and concentration of alkaloids, saponins and tannins.

Keywords: *Chenopodium vulvaria*, *Malva neglecta*, *Oxalis debilis*, Phytochemical, Saponin, Tannin.

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INTRODUCTION

The chemical compounds such as alkaloids consist of different groups such as true alkaloids, proto alkaloids, polyamine and peptide etc. The word alkaloid was derived from the Latin language Alkali in 1819 by the chemist Carl Friedrich Wilhelm. The products of plants have been used as the part of the phytochemicals, derived from barks, leaves, flowers, roots, fruits and seeds (Smit, 2004). Besides several worker reported the number of phytochemicals, are investigated which shows therapeutic activities such as antifungal, anti constipated, antibacterial, anti plasmodium and insecticidal. In India herbal medicines have been the bases of treatment and cure for various diseases in traditional methods such as Ayurveda, Unani and Sidha. The therapeutic potentials of plant and animal origin crude drugs are being used from the ancient times by the simple process without the isolation of the pure compounds. The pharmacological activity of crude drug is determined by the nature of its constituents. Saponins are the chemicals of natural products which belong to amphipathic glycosides due to formation of soap like foam in aqueous solution (Hostettmann and Marston, 2008). The word tannin a solid compounds was used for the tanning process which derived from plants extracts (Rajiv et al., 2012). They are solid compounds found in many plants and used as mordents and medical astringents. The objective of the study to make a comparative study of plants parts and also investigated the secondary metabolites through modern techniques.

MATERIALS AND METHODS

Collection of samples

The plants like *Oxalis debilis*, *Chinopodium vulvaria* and *Malva neglecta* were collected and identified in the field. Later they oven dried at 70 degree for isolation of alkaloids, saponins and tannins.

Preparation of extracts

The extracts were obtained by continuous hot extraction method using soxhlet apparatus. The plant material was cut into small pieces, dry in shade and finely powdered. Approx. 250 gm of powder of plant material was passed through sieve no. 60 and packed in soxhlet apparatus and extracted using petroleum ether, ethyl acetate and methanol as solvents. The filtrate was

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concentrated in rotary evaporator and the extracts were calculated for their extractive value.

Estimation of Alkaloids

Preparation of Mayer's Reagent

Approximately, 1.5 gm of HgCl₂ taken in a beaker and dissolved it in 100ml of distilled water and labeled as solvent A. Now take 5 gm of KI₂ in 10 ml of distilled water and labeled it as solvent B. Now mixed A and B solvent and allowed to stand. When KNO₃ ppt out and supernatant then fill the solution up to 100ml. Each extracts were treated with few drops of Mayer's reagent. A reddish brown or orange precipitates will indicate the presence of alkaloids (Eluyode and Alabi, 2007).

Analysis for saponins

Approximately 0.5 gm of dried plant powdered material was extracted in the 5 ml of 50%aqueous methanol solution. Extracted material was transferred in to a test tube and hand shaken. Formation of foam on the surface was taken an indication for saponin.

Analysis for tannins

Plant material (0.1 gm) was taken in test tube and 3 ml of butanol-HCL reagent (95 ml of n-butanol and 5ml of concentrated HCL) was added to it. Test tubes were plugged with cotton and were heated on boiling water bath for an hour. Appearance of pink color was taken as presence of tannin.

RESULT AND DISCUSSION

The results of detection of alkaloid, saponin and tannin in given in Table 1 shows that the young leaves contain high concentration of alkaloid and very low amount of saponin but lack tannin. Old leaves contain slightly high concentration of alkaloid but lack saponin and tannin both. Young stem contain low concentration of alkaloid, traces of saponin and high concentration of tannin while the old stem contains traces of alkaloid and very high concentration of tannin but lacks saponin.

The result of parameter factors in Table 2 shows that the Young leaves of plant *Chenopodium* contain high concentration of alkaloid and saponin. Old leaves contain slightly high concentration of alkaloid and very low concentration of saponins. The young stems contain slightly high concentration of alkaloid and very low concentration of saponin. However, old stems contain low concentration of alkaloid and traces of saponin.

It is concluded that the traces of saponin is present only in the young leaves of *Malva neglecta* and are absent in various parts of plant (Table 3). Young and old leaves both contain slightly high

Table 1: Presence of alkaloids, saponins and tannins in various parts of *Oxalis debilis*.

S.N.	Chemicals	Plant parts	Approximate concentration				
			+	++	+++	++++	+++++
1	Alkaloid	Young leaves	-	-	-	+	-
		Old leaves	-	-	+	-	-
		Young stems	-	+	-	-	-
		Old stems	+	-	-	-	-
2	Saponin	Young leaves	+	-	-	-	-
		Old leaves	-	-	-	-	-
		Young stems	+	-	-	-	-
		Old stems	-	-	-	-	-
3	Tannin	Young leaves	-	-	-	-	-
		Old leaves	-	-	-	-	-
		Young stems	-	-	-	+	-
		Old stems	-	-	-	-	+

Symbols = + (Presence), - (Absent), + (Very Low Concentration), ++ (Low Concentration), +++ (Slightly High Concentration), ++++ (High Concentration), +++++ (Very High Concentration)

Table 2: Presence of alkaloids, saponins and tannins in various parts of *Chenopodium vulvaria*.

S.N.	Chemicals	Plant parts	Approximate concentration				
			+	++	+++	++++	+++++
1	Alkaloid	Young leaves	-	-	-	+	-
		Old leaves	-	-	+	-	-
		Young stems	-	-	+	-	-
		Old stems	-	+	-	-	-
2	Saponin	Young leaves	-	-	-	+	-
		Old leaves	-	+	-	-	-
		Young stems	+	+	-	-	-
		Old stems	-	-	-	-	-
3	Tannin	Young leaves	-	-	-	-	-
		Old leaves	-	-	-	-	-
		Young stems	-	-	-	-	-
		Old stems	-	-	-	-	-

Symbols = + (Presence), - (Absent), + (Very Low Concentration), ++ (Low Concentration), +++ (Slightly High Concentration), ++++ (High Concentration), +++++ (Very High Concentration)

Table 3: Alkaloids, saponins and tannins in various parts of plant, *Malva neglecta*.

S.N.	Chemicals	Plant parts	Approximate concentration				
			+	++	+++	++++	+++++
1	Alkaloid	Young leaves	-	-	+	-	-
		Old leaves	-	+	-	-	-
		Young stems	-	+	-	-	-
		Old stems	+	-	-	-	-
2	Saponin	Young leaves	+	-	-	-	-
		Old leaves	-	-	-	-	-
		Young stems	-	-	-	-	-
		Old stems	-	-	-	-	-
3	Tannin	Young leaves	-	-	-	-	-
		Old leaves	-	-	-	-	-
		Young stems	-	-	-	+	-
		Old stems	-	-	+	-	-

Symbols = + (Presence), - (Absent), + (Very Low Concentration), ++ (Low Concentration), +++ (Slightly High Concentration), ++++ (High Concentration), +++++ (Very High Concentration).

and very low concentration of alkaloid respectively but lack tannin while very low concentration and traces of alkaloid and high concentration and slightly high concentration of tannin has been observed in young and old stems, respectively.

The certain properties and constituent available in plants are exposed by the process of phytochemical screening. This screening is necessary for manufacture of drugs for other applications such as for the cure of illness (Agoha, 1976).

Among the recently studied plants 2 plants contained detectable amount of all anti nutritional factors i.e. alkaloid, saponin and tannins while only single plant contained two factors i.e. alkaloid and saponin. *Oxalis* contains high concentration of alkaloid, low concentration of saponin and traces of tannin in it, while leaves were rich in these antinutritional factors than the stems (Rashmi and Rajkumar, 2011; Mishra *et al.*, 2012; Sakat *et al.*, 2012). *Chinopodium* contains high concentration of alkaloids and the traces of saponin while the plant lacks tannins. The high concentration of alkaloids, traces of saponins and low concentration of tannin revealed (Salehi *et al.*, 1992; Mojab *et al.*, 2003; Abbas *et al.*, 2012).

CONCLUSION

It is to be concluded that 3 plant species were selected for the screening of phytochemical factors which were alkaloid, saponin and tannin. On the basis of result findings it is proved that alkaloid, saponin and tannin were present in all plant species with different concentration. Alkaloid is used in the manufacture of many drugs such as quinine. Alkaloid is also used in pain killer asthma, fever and for mouth wash.

All plant Samples contained different concentration of phytochemicals while the further research should be carried out on the quantitative study of plant which will be an interesting area for further study.

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