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Phytochemical screening and antioxidant activity of leaf extract of *Pistia stratiotes*

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Abstract
The plant *Pistia stratiotes* commonly known as water cabbage or water lettuce belongs to the family Araceae. *Pistia stratiotes* is a common medicinal plant the leaves are used in treatment of skin rashes, Boils, colds. The aim to the study the phytochemical screening and Antioxidant activity from the leaves of *Pistia* plants. The results showed that the presence of secondary metabolites *Alkaloid, Flavonoid, Amino acid, Tannins, Saponin and Carbohydrate. The* ethanolic extract of leaves of *Pistia* plants showed positive antioxidant activity. The phytochemical analysis of plant is very important commercially and has a great interest in pharmaceutical companies for the production of the new drugs for curing of various diseases.

Keywords: *Pistia stratiotes*, Phytochemical, Antioxidant activity

Introduction

Mankind through observation and experience developed knowledge of the properties of the plants as a source of food and medicines. Phytochemicals are as important as synthetic medicines since in some regions it is the only source of medicines. Tyagi Tulika And Agrawal Mala, (2014). The medicinal plants are useful for healing as well as for curing of human disease because of the presence of phytochemical constituents. Phytochemicals are naturally occurring in the medicinal plants, leaves vegetables and roots that have defence mechanism and protect from various disease. Phytochemicals are primary and secondary compounds. Chlorophyll, proteins and common sugars are included in primary constituents. Abdul *et al*., (2013) [1]

Medicinal plants find application in medicines, pharmaceuticals, agricultural and food industries and the use in for curing disease have been documented in history of all civilizations. Medicinal plants serve as important source of natural products or chemical substances which is produced by living organisms either by pathways of secondary metabolism called phytochemicals. Adeyemi and Shonkan (2016). The plant *Pistia stratiotes* commonly known as water cabbage or water lettuce belongs to the family Araceae is an edible, aquatic floating ornamental plant with widely distributed across tropical and sub-tropical areas around the world. It has been estimated that even today, 80% of the world population rely on herbal traditional medicine for their primary health care. Traditional knowledge of medicinal plants has always guided the search for new cures. In spite of the advent of modern high throughout drug discovery and screening techniques, traditional knowledge systems have given clues to the discovery of valuable drugs. Masih Usha *et al*. (2012). Traditional medicinal plants are often cheaper, locally available and easily consumable, raw or as simple medicinal preparations. Now days traditional medicinal practices form an integral part of complementary or alternative medicine. Although their efficiency and mechanism of action have not been tested scientifically in most cases, these simple medicinal preparations often mediate beneficial responses due to their chemical constituents. Damodar *et al*., (2011) [4].

The plants are known for medicinal value, the plants of the genus of aquatic plant of the arum family, Araceae are well known for their therapeutic potential. The plants of Araceae are usually aromatic many of the plants of this family are used in traditional medicine because of their antimicrobial, antioxidant, antiseptic and other pharmacological activities (Jadhav *et al*., 2021) [7]. The single species it comprises, *Pistia stratiotes*, is often called water cabbage, water lettuce, Nile cabbage. Leaves are used in traditional medicine for the treatment of ringworm infection of the scalp, Skin infection, wounds. Khan *et al*., (2011) [9]. The plant has been worked out very well and isolated several chemical constituents and had shown various biological properties.

Materials and method

Plant Samples

Healthy symptomless plants leaves were randomly chosen from their respective sites. The samples were collected in sterilized polythene bags and the plant leaves material were collected from the Lake of Swami Ramanand Teerth Marathwada University campus Vishnupuri Nanded. The collected samples were brought to the laboratory and processed within 24 hrs of collection.

Extraction

The leaves of *Pistia stratiotes* were rinsed with distilled water, dried in shade then homogenized to obtain fine powder using a mortar and pestle. 25 gm of dry powder of leaves of *Pistia stratiotes* was used for the extraction. The extraction was carried out by Soxhlet method. For the extraction of leaves ethanol is used as solvent. The process was carried out for two days. The obtained extracts evaporated at room temperature to get a dried solid product from stored in airtight bottles. The residual extracts were stored in refrigerator for further use.

Phytochemical screening

Phytochemical analysis was carried out for the extracts as the standard methods Kavit *et al*., (2013)

Test for Alkaloid: Weighted 0.5 to 0.6 of the powdered plant samples and mix in 8ml of 1% HCLGently warmed the mixture and then filtered. Take 2ml of the filtrate and treat separately with reagents (Mayers) Observed for the appearance of turbidity or precipitation formation for the positive test of alkaloids. Preparation of Mayers Reagent = dissolved 0.355g of Mercuric chloride in 60ml of D/W dissolved 5g of potassium iodide in 20 ml of distilled water. Mixed both the solutions and volume were raised to 100ml with distilled water.

Test for flavonoids: 1ml of aqueous extract was taken. Add 1ml of 10% lead acetate solution**.** Formation of yellow precipitate indicate positive test.

Test for tannins: 2ml of the aqueous extract was stirred with 2m of distilled water and few drops of FeCl3 solution were added. Formation of green precipitate indicates the presence of tannins.

Test for Saponins: 5ml of aqueous extract was shaken vigorously with 5ml of distilled water in test tube and warmed. The formation of stable foam indicates the presence of saponins.

Test for Steroids: 1ml of extract was dissolved in 10ml chloroform and equal volume of concentrated sulphuric acid was added by sides of the test tubes. Upper layer turns White and sulphuric acid layer shows yellow, this indicates presence of steroid.

Test for Amino acids: Crude extract solution was taken in a test tube, and a few drops of Ninhydrin reagent were added. A purple colour appeared indicating the presence of amino acids.

Test for Carbohydrate: Fehling's test the extracts were treated with Fehling's A and B solution and heated for a few minutes. The formation of brick red precipitate shows the presence of reducing sugar.

Antioxidant Activity of Plant Sample

DPPH radical scavenging activity assay. Navghare and Dhawale (2017) [12]

DPPH radical scavenging assay was carried out as per the method reported earlier, with slight modifications. Antioxidant activity of the plant extracts and standard was assessed based on the radical scavenging effect of the stable DPPH free radical. The diluted working solutions of the test extracts were prepared in ethanol. Ascorbic acid was used as standard in solutions ranging from 20µl to 100µl. 0.1mM DPPH solution in ethanol was prepared. Then 2ml sample of this solution was mixed with 2ml of solution of *Pistia* leaves extract 20µl to 100µl and the standard solution to be tested separately. These solution mixtures were kept in dark for 30min and optical density was measured at 517nM using a UV Vis spectrophotometer against ethanol as blank. The control was used is 2ml of ethanol with 2ml of DPPH solution. Ascorbic acid was used as the reference compound. 0.1mm DPPH solution was prepared by dissolving 4mg of DPPH in 100ml of ethanol. Free radical scavenging activity was expressed as the inhibition percentage and was calculated using the following formula.

% DPPH Radical scavenging activity= 1 – (sample OD/Control OD) × 100)

% of inhibition of DPPH activity = (A-B/A) ×100

Where A- Optical density of control

B- Optical density of Sample

Results

Phytochemical analysis was done to determine the phyto-components present in the leaf extracts. The Ethanolic extraction of leaves of *Pistia* shows positive results for the phytochemicals i.e., Flavonoids, Alkaloids, Saponins, Amino acid, Tanins, Carbohydrate. Ethanolic extracts of leaves show positive results for a number of tests indicates this result concluded that ethanol is the best solvent for extraction of phytochemical properties of leaves.

Table 1: Showing Phytochemical test of *Pistia* leaves extract.

Sr. No.	Phytochemicals	Results
1	Alkaloid	+
2	Flavonoids	+
3	Amino Acids	+
4	Tannins	+
5	Saponin	+
6	Carbohydrate	+
7	Steroid	-

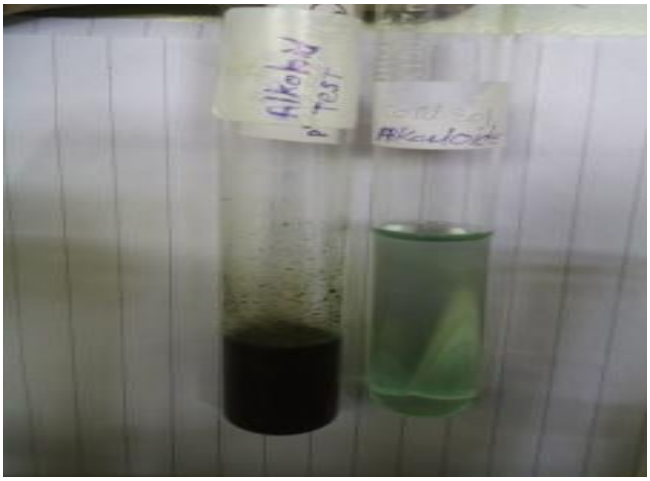


Fig 1: Alkaloid

Fig 2: Tannins

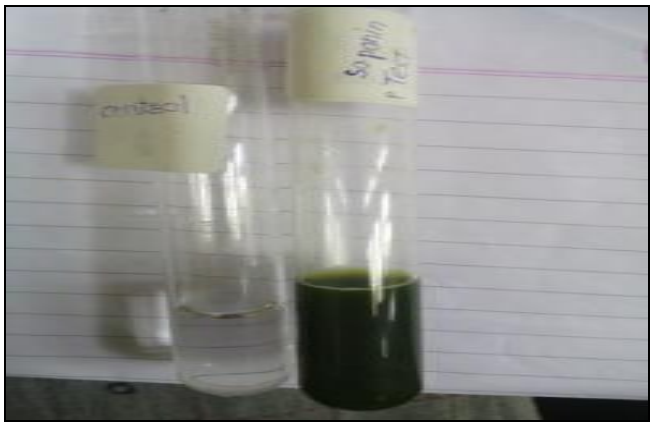


Fig 4: Saponins

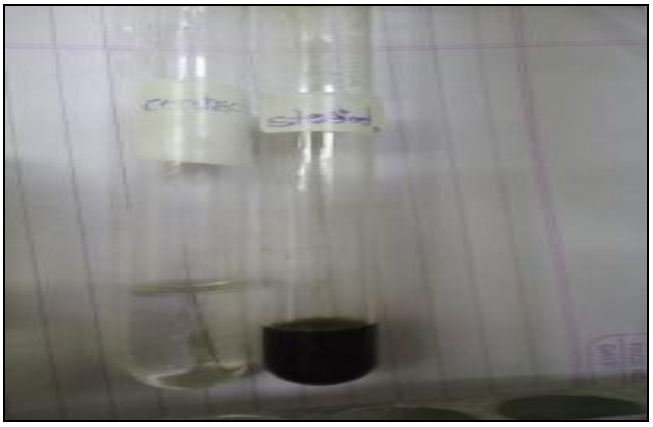


Fig 5: Steroid

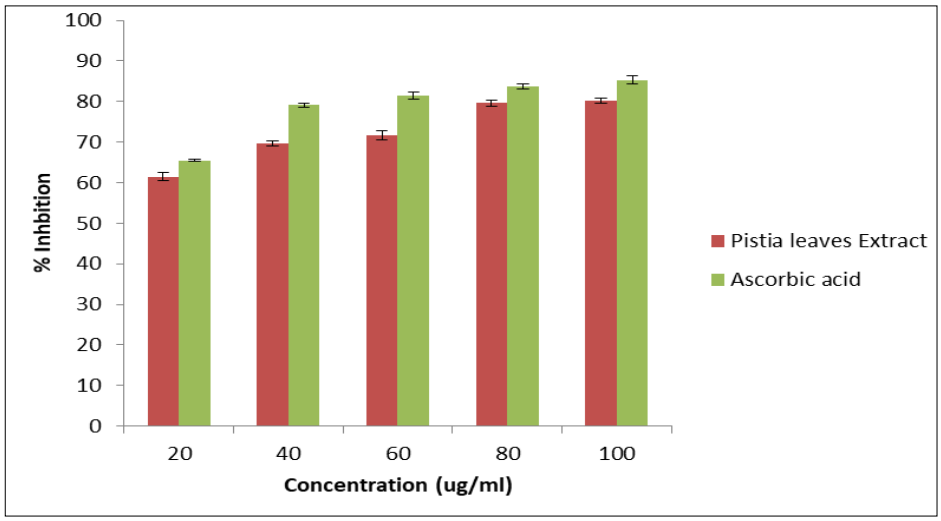
Fig 5: Amino acid

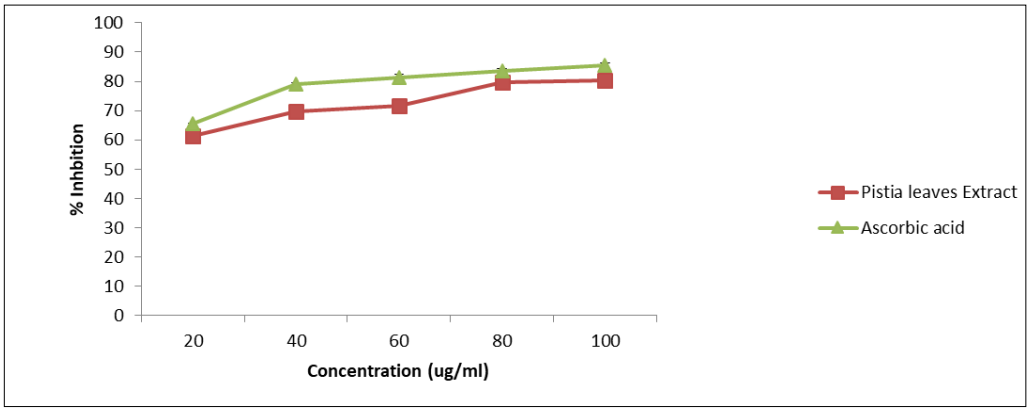
Fig 6: Carbohydrate

Antioxidant study

The DPPH radical scavenging assay is used for preliminary screening of the plant extracts for their antioxidant activity. The proton radical scavenging action is known to be an important mechanism of antioxidants. The results of this assay it was observed that he ethanolic extracts of the selected *Pistia* plant leaves were more potent in stabilizing DPPH radicals. The ethanol extract of *Pistia* leaves 79.93% possessed the highest scavenging activity. The standard ascorbic acid shows highest activity of 86.28%.

Sr. No	Sample µg/ml	% Inhibition	
		Pistia leaves Extract	Ascorbic acid
1	20	61.47±0.93	65.51±0.32
2	40	69.66±0.58	79.15±0.46
3	60	71.65±1.04	81.39±0.88
4	80	79.59±0.71	83.69±0.72
5	100	80.32±0.62	85.32±0.92





Discussion

Sandip Kumar et al. (2011) [14] reported that the preliminary screening of the dried ethanolic extract of *Pistia* showed the presence of carbohydrates, terpenoids and proteins. Similarly, our ethanolic extract of *Pistia* showed the presence of alkaloids, Flavonoids and amino acids. The phytochemical analysis of methanol and n-hexane extracts of *Pistia* confirmed the presence of tannins, alkaloids Adeyemi and Asian (2016) [2]. Similarly, our ethanolic extract of *Pistia* showed the presence of saponin, tannin and carbohydrate. Dethe et al. (2014) [5] observed that sesbania grandiflora and *Pistia* stratiotes both species show positive reaction for secondary metabolites like phenol, steroid and glycosides.

Similarly, our extract showed the presence of tannin and saponin but showed the absence of steroid in it. Observed the DPPH radical scavenging activity of n-hexane extract of *Pistia* showed optimum inhibition of 60.3% however compared to ascorbic acid (93.4%) Adeyemi and Asian., (2016) [2]. Similarly, our ethanolic extract of *Pistia* showed optimum inhibition of 80.55 % compared to ascorbic acid (86.26%) Al-Hashemi *et al*., (2016) studied the antioxidant activity of crude extract of neem plant in a different solvent by DPPH method and the highest value was obtained in conc. of 200µg/ml in butanolic extract. Similarly, our ethanolic extract of *Pistia* shows the highest value of absorbance obtained in conc. of 100µl per sample.

Conclusion

Plants are the best source of chemical compounds that show resistance against the number of microorganisms that cause disease. In the present research work the phytochemical analysis of the extracts of *Pistia startiotes* leaves shows the presence of the chemical compound flavanoid, saponin, carbohydrate, Tannins, and phenol in ethanolic extract. The leaf extracts of *Pistia startiotes* show positive DPPH scavenging activity towards the free radicals as an antioxidant.

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