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Antimicrobial Efficacy and Phytochemical Screening of water cabbage (*Pistia Stratiotes* L.)

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Medicinal plants in the form of drugs are used for ages but due to the side effects of allopathic medicines, people are rushing towards natural and herbal drugs again. We cannot rely on the available drugs and should find new substances and eventually new drugs. To cope with the increasing demands, we tried to find the secondary metabolites mainly the anti-microbial and phytochemical agents in different solvents of the *Pistia Stratiotes* plant. Flavonoids, saponins, alkaloids, carbohydrates, tannins, phenols, steroids, and proteins are the resultant phytochemicals occurring in the respective plant. Activity against different microbes was carried out by making extracts in five different solvents i.e. ethyl acetate, N-hexane, chloroform ether, and petroleum fractions, and then all of them were tested against *Aspergillus niger Curvalaria Rhizoctonia* and *Rhizopus* for antifungal activity. The same extracts were utilized against selected bacterial species i.e. *Erwinia caratovora, Ralstonia solanarcearum, Pseudomonas aeruginosa,* and *Escherichia coli* to find out their competence against it. For both, the activities paper disc method was used. After finding the results, analysis reveals that the extract shows significant results against the respective species. The chloroform extract was most sensitive against *Escherichia coli* with 0.001 LD_{50} value and N-hexane was most resistive against it with 3.938 LD_{50} value petroleum ether was most resistive against *Ralstonia solanacearum* LD_{50} value 9.027. *Erwinia caratovora* was most resisted by n-hexane having an LD_{50} value of 82.933. Chloroform having an LD50 value of 3.422 prevented *Pseudomonas aeruginosa* in the medium. The anti-fungal analysis showed that N-hexane was most active against *Rhizoctonia* lowest LD_{50} value of 0.293 and *Rhizopus* was prevented by chloroform with an LD_{50} value of 0.032. *Curvalaria* and *Aspergillus niger* was mostly inhabited by chloroform with an LD_{50} value of 0.182 and 0.032 respectively. Analysis of the results revealed the presence of Hugh amount of phytochemicals which can be utilized in large-scale production for the preparation of antiseptic and anti-microbial drugs. The anti-microbial potential is certainly clear from the above-mentioned results.

Keywords: antimicrobial, antibacterial antifungal, phytochemicals, *Pistia Stratiotes* L

INTRODUCTION

Different secondary metabolites have been synthesized naturally by plants which are remedies for a lot of diseases but they are active against specific disease-causing agents. The study and proper arrangements of such metabolites are referred to as Pharmacognosy (Evans, 2009). Different plants, animals, and microbes are sources of a lot of therapeutic agents (Shimizu, 1996), for which specific extraction techniques are comprised in the medicinal science which lies the foundation of drugs and is the fundamental and historical features of the said science (Hamayun et al. 2021). The accessibility of actual medicinal plants is diminishing (Srithi et al. 2009; Farzaneh and Carvalho, 2015). Due to an increase in its biological research mainly focusing on the useful metabolites involved in different drug preparation (Srithi et al. 2009; Kyei et al. 2012). The identification of the actual part used by plants is a pioneer in the production of specific drugs since plants are sources of numerous useful drugs. The standard part used of plants involved in medicine formation is of utmost importance to maintain the quality and effect of the extracted medicine. Medicinal plants tend to get rid of pain and diseases due to their potent therapeutic agents (Rehman et al. 2022). Phytochemicals are a diverse array of chemical compounds produced in different parts of

plants or sometimes all parts of the plant which mainly include tannins, carotenoids, steroids, terpenoids, glycosides, and alkaloids. Every year 14 million people are dying due to infectious diseases out of which bacterial infections stand at the top of the list (Mead et al. 1999). It can only be resisted by anti-biotic or other preventive remedies but due to certain factors bacterial pathogens are becoming resisted against the currently available antibiotics and therefore it's the needs time to find and synthesize new medicines to cope with the pathogenic bacteria (Lieberman, 2003; Rehman et al. 2020).

MATERIALS AND METHODS

Collection of plant material

The plant was collected from standing water of Naguman River Peshawar

Drying of plant material

The whole plant was washed periodically with the first freshwater then distill water and after that with 70% v/v ethanol to remove dust particles and microbes. They were then shade dried after which with the help of an electric grinder they are ground to powder, which was used for further investigating study.

Preparation of the crude extract

100g of powder was dissolved in 150 ml methanol and placed on an orbital shaker for 72 hours to mix them thoroughly. After 72 hours passed, the solvent is passed from a filter paper. The filtrate was further put at 60 ºC in a rotatory vacuum evaporator to obtain extract free from residual methanol. After the rotary evaporator, the extract was dried by putting it in a water bath at 55ºC for 3-5 days. Filtered extract was first dissolved in n-Hexane and was kept in a separating funnel for 15-20 minutes. Then filtration of n-Hexane separated and the remaining solution was mixed with Ethyl acetate and kept in a separating funnel for fractionation. These four extracts were obtained i-e chloroform, N-hexane, Ethyl acetate, and petroleum ether. These four extracts were used for different types of activities (Kwon and Jewett, 2015).

Preliminary Phytochemical Screening

For determining different primary and secondary metabolites existent in the whole plant of *Pistia Stratiotes,* The extract was subjected to several qualitative chemical tests.

Alkaloid detection test (Wagner's reagent)

According toTroje et al. (1997), the sample solution was checked for the presence of alkaloids by the addition of a few beads of Wagner's reagent. Brownish red particles settling down in the solution indicate the presence of alkaloids in the sample.

Phenol detection test

Ferric chloride test

Dahiru and Dikko (2013) poured 2 ml ferric chloride into the extract solution. A deep bluish-green colored solution revealed phenol presence.

Tannin detection tests

Ferric chloride test

added Ferric chloride to the extract solution which exhibited Blue-green precipitates denoting the presence of tannins.

Saponin detection test:

According to Chaouche et al. (2011) when water is added to 5 ml of an extract, froth is formed and remains for a specific time which indicates the occurrence of Saponin.

Test for terpenoids

Devika and Koilpillai (2015), stated that adding 2 ml of concentrated sulphuric acid and chloroform to 0.5ml of extract carefully. The presence of terpenoids was indicated by the formation of red-brown color.

Test for quinones

Formation of red color by extract by the adding of 1 ml of conc. Sulphuric acid indicated the presence of Quinone (Devika and Koilpilla 2015)

Test for coumarins. 1ml of 10% NaOH was added to 1 ml of extract which Formed yellow color that indicated the presence of coumarins (Devika and Koilpilla 2015).

Test for glycosides

Chloroform (3ml) and ammonium solution (10%) was added to the extract (2ml). the pink color was formed due to the occurrence of glycosides.

Antibacterial activity

Four different bacterial strains i.e. *Escherichia coli*(gram-negative), *Pseudomonas-aeruginosa*(gram-negative), *Erwinia Caratovora* (ECC), and *Ralstonia solanacearum* (RS) were employed for the testing of anti-bacterial activity of whole plant extract of fan palm for which four different solvent extracts i.e. Chloroform, petroleum, N hexane, ether, and Ethyl acetate were already prepared. They are all employed through the agar disc diffusion method. Ciprofloxacin was used as a control.

Sample preparation

A sample was organized by liquefying 20g of each extract in 2ml dimethyl sulfoxide (DMSO) to form a stock solution. From which, different concentrations were taken i.e. 6, 12, 18, 24.

Determination of antibacterial activities

Disc diffusion method was used for the investigation of the antibacterial activity of the selected plant extract against selected bacterial strains. For performing the activity, a paper disc was prepared (6mm in diameter). Potato dextrose agar (PDA) was prepared by dissolving 38g grams of media in 1000 ml distilled water. All apparatus was covered in aluminum foil and autoclaved to remove germs. Media was placed in an autoclave at extract was determined by disc diffusion method in Petri dishes. The paper discs () were prepared. All the apparatus was sterilized in autoclaved at 121 ºC for 1 hour. After the temperature falls to 50 ºC, then 20ml was dissolved in each Petri dish upon which solidification, selected strains of bacteria were applied and spread with the help of a sterilized spreader. All this process is performed inside a laminar flow hood. Paper discs were placed at equal distances from each other and the extract was applied. Careful labeling was performed after sealing the dishes with a tap and then placed in an incubator at 37ºC for 24 hours. Each extract was applied separately against each strain. Reading was measured by drawing lines at right angles and then the zone of inhibition was measured accordingly (Valgas et al. 2007).

Antifungal activity

For antifungal activity, four different infectious fungal strains were selected i.e., *Aspergillus, Rhizoctonia*, *Rhizopus,* and *Carvularia.* The activity of the extract was investigated by utilizing the disc diffusion method.

Preparation of sample

2 ml of DMSO was utilized to dissolve 20 grams of extract to form a stock solution. From this stock solution four different concentrations that 6, 12, 18, and 24 were taken.

Determination of Antifungal activity

Disc diffusion method was utilized for exhibiting the resistance of extract against the selected fungus. PDA media was prepared by dissolving 38 gm of PDA in 1 liter distilled water and then shaking it to dissolve. All apparatus has been covered in aluminum foil and put in autoclave along with media at 121 ºC for an hour. After sterilization, media was poured into Petri plates and allowed to cool down. Paper discs were placed and infused individually with 6, 12, 18, and 24µl concentrations(Pinto et al. 2009). Separate Petri plates were prepared for each fungal strain. All plates were placed in an incubator for 48 hours after which the zone of inhibition was determined for each plate(Zaidan et al. 2005; Rehman et al. 2021).

RESULTS AND DISCUSSION

Qualitative Phytochemical screening

The whole plant of *Pistia Stratiotes* upon phytochemical screening showed certain important secondary metabolites. It mainly includes glycosides, phenols, tannins, cumairnes, Saponin, and terpenoids but some important ones were absent during the research i.e. cardiac glycosides, alkaloids, and flavonoids. Similar studies were done by other workers whose results supported the present work. phytochemical analysis of *Phoenix dactylifera L.* by using four solvent extracts i.e. chloroform, ethyl alcohol, ethyl acetate, and petroleum, and detected the presence of alkaloids, carbohydrates, glycosides, saponins, phenols, flavonoids, proteins, and diterpenes Table1.

Table 1: Qualitative Analysis of Phytochemical of the *Pistia Stratiotes* (methanolic extracts)

S/No	Solvent Test	Leaves	(Fruit)
1	Alkaloid	+	-
2	Tannins	+	+
3	Saponins	+	+
4	Quinones	+	+
5	Glycosides	+	+
6	Terpenoids	+	-
7	Phenols	+	+
8	Camarines	+	+
9	Cardiac glycosides	+	-
10	Flavonoids	+	+

KEY: (+) indicate the presence of compounds. (-) indicate the absence of compounds.

Antibacterial activity of *Pistia Stratiotes*

Among all the bacterial strains the highest antibacterial activity was shown against *Escherichia coli* by chloroform fraction with 87.5% inhibition, which was followed by ethyl acetate with 95.8% inhibition which is in turn followed by petroleum ether fraction with the highest percentage of 89.7%. All these highest percentages are exhibited at 4 mg/ml. the lowest activity was exhibited by N-hexane which is 60% at 4 mg/ml respectively Table 2. The highest antibacterial activity against *Ralstonia solanacearum* was displayed by the chloroform fraction with an LD_{50} value of 1.967, which was significant. It has a significant percent inhibition of 59,6%(17.3±0.7), 58%(17±1), 48.2%(14±1.52), and 25.1%(7.3±0.57) at the doses of 1, 2, 3 and 4mg/ml, respectively. This was followed by the significant bacterial activity of n-hexane with an LD_{50} value of 3.418 with percent inhibition of 37.9 % (11±1), 40%(11.6±1.52), 32.1%(9.33±0.57), 64.1%(18.6±0.57) at the dose of 1, 2, 3 and 4 mg/ml, respectively. This was followed by significant antibacterial activity of the ethyl acetate fraction with an LD_{50} value of 4.500 with significant percent inhibition of 55.1% (16±1), 49.3% (14.3±0,57), 52.7%(15.3±1.52), 51.7%(15±2.64) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was followed by petroleum ether fraction with an LD_{50} value of 9.027 and having significant percent inhibition of 66.5 % (19.3±1.52), 65.5% (19±1.73), 64.1% (18.6±0.57), 52.7% (15.3±1.52) at the doses of 1, 2, 3 and 4 mg/ml, respectively with control being 29 for all the doses. The

highest antibacterial activity against *Erwinia caratovora* was displayed by the chloroform fraction with an LD_{50} value of 0.181 which was significant with percent inhibition of 57.7 % (15.5±0.57), 64 % (17.3±2, 08), 67.7 % (18.3±1.15), 62.9% (17±1.00) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was followed by significant antibacterial activity of petroleum ether with an LD_{50} value of 2.943 with percent inhibition of 61.4% (16.6±2.08), 35.5%

(9.6±0.57), 54% (14.6±0.57), 59.2% (16±1) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was followed by the ethyl acetate with an LD50 value of10.339 and having percent inhibition of 37%(10±1.00), 30.3%(8.33±0.57), 35.7%(9.66±0.57), 38.2%(10.33±0.57) at the doses of 1, 2, 3 and 4 mg/ml, respectively, followed by the n-hexane fraction with an LD50 value of 82.933, and having percent inhibition is 30.7%(8.3±1.15), 45.5%(12.3±1.52), 34.5%(9.33±0.57), 37%(10±1.00) at the doses of 1, 2, 3 and 4 mg/ml, respectively with control being 27 for all the doses. The highest antibacterial against Pseudomonas aeruginosa was displayed by the n-hexane fraction with a significant LD50 value of 0.826 with percent inhibition of 29.7% (8.33±0.57), 35.7 %(10±1.00), 37.8%(10.6±2.30), 25%(7±0.00) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was followed by the ethyl ether fraction with an LD50 value of 3.0071 and having percent inhibition of 40.3 % (11.3±1.15), 43.9 % (12.3±0.57), 51.1 % (14.3±1.15), 54.7 % (15.3±2.51) at the doses of 1, 2, 3 and 4 mg/m, respectively. This was followed by ethyl acetate fraction with LD50 value of 3.247 with percent inhibition of 52.1 % (14.6±1.15), 45% (12.6±1.15), 48.5 % (13.6±1.14), 53.5 % (15±2) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was followed by chloroform fraction with an LD50 value of 3.422 and having percent inhibition of 53.5 % (15±1.0), 59.2 % (16.6±1.52), 45% (12.6±0.57), 52.1% (14.6±1.54) at the doses of 1, 2, 3 and 4 mg/ml, respectively with control of being 28 for all the doses. The overall results were analyzed to be significant and they indicated the presence of various active therapeutic agents which can serve as natural anti-biotic against different diseases. Various researchers performed similar activities with a variety of medicinal plants against selected bacterial species and the results came out to be similar to the current outcomes. Mako et al. (2012) performed antibacterial activity of extract obtained from *Calotropis procera* root and stem part which was resistive to all bacterial strains employed, which include Streptococcus pyogen, Escherichia Coli, Pseudomonas aeruginosa, and Staphylococcus aureus. Ahmad and Beg (2001) accompanied L.inermis, Eucalyptus spp., C. sinensis, H. antidysentrica, T. belerica, T. chebula, E.officinalis, Indicus, S.aromaticum, P. granatum, and. Equistifolia resistance against B.subtilis, E.coli, , S.aureus, Shigella dysenteriae, Salmonella paratyphi and Candida albicans. The results were significant for whole plants employed. Usman et al. (2016)checked the resistance of Luffa cylindrical and Momordica charantia against various bacterial species related to humans which showed resemblance to the current outcomes. Rehman et al. (2022) utilized methanolic, ethanolic, chloroform, benzene, and acetonic extracts against bacterial strains that include P.aeruginosa, S. aureus, and E. coli B.subtilis and K.pneumonia. the most resisted bacterium was E. coli with 14mm inhibition zone, P.aeruginosa with 13 mm, and B.subtilis with 11 mm inhibition zone respectively. The palm root methanolic extract has exhibited significant results against various bacterial strains in several attempts, which opens the door for researchers to identify and isolate the therapeutic substances present in them.

Antifungal activity of *Pistia Stratiotes*

The methanol crude extract along with the n-hexane, chloroform, ethyl acetate, and petroleum ether of fruit of *Pistia Stratiotes* was screened for the antifungal potential against *Rhizoctonia, Rhizopus, Curvalaria, and Aspergillus* species at the doses of 1, 2, 3 and 4 mg/ml.*Rhizopus* sp. is a pathogen (Figures 1-4). The highest antifungal activity against *Rhizoctonia* spp was displayed by the n-hexane fraction with an LD_{50} value of 0.293 which was significant and had percent inhibition of 69.5% (14.60±0.57), 47.6% (10±1.00), 76.1 %(16±1.00) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was followed by the chloroform against with a significant LD_{50} value of 1.868 and having percent inhibition of 31.4 %(6.60±0.57), 50.4 %(10.60±1.52), 55.2 %(11.60±0.57), 88.5 %(18.6±0.57) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was in turn followed by the ethyl acetate fraction with an LD_{50} value of 1.916 and having percent inhibition of 40.9 % (8.60±1.52), 50.4%(11.60±0.57), 58.5%(12.3±0.57), 61.9%(13±1.00) at the doses of 1, 2, 3 and 4 mg/ml respectively. This was followed by the petroleum ether fraction with an LD_{50} value of 4.542 and having the highest percent inhibition of 68 % (14.3±0.57), 50.4 %(10.60±0.57), 57.1 %(12±1.73), 53.8 %(11.3±1.52), respectively with control being 21 for all the doses.The highest antifungal activity against *Rhizopus* spp was displayed by the chloroform fraction with an LD_{50} value of 0.032, which was significant and had percent inhibition of 87.8 % (12±1.00), 92.8 % (13±1.00), 92.8 % (13±1.00), 95%(13.3±0.57) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was followed by the ethyl acetate fraction with a significant LD_{50} value of 0.5422 and having percent inhibition of 61.4 % (8.6±0.57), 66.4%(9.3±0.59), 73.5%(10.3±1.0), 80.7%(11.3±1.52) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was in turn followed by the petroleum ether fraction with LD_{50} value of 0.762 and percent inhibition of 50 % (7.0±1.00), 100 % (13±1.0), 81.2 % (13±0.57), 89.3 % (14.3±0.57) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was followed by the n-hexane with an LD_{50} value of 15.202 and having percent inhibition of 73.5 % (10.3±0.57), 95 % (13.3±1.52), and 97.1 % (13.6±2.08), 42.8 % (6±4.35) at the doses of 1, 2, 3 and 4 mg/ml, respectively, with control

being 14.The highest antifungal activity against *Curvularia* spp was displayed by the chloroform fraction with an LD_{50} value of 0.182, which was significant and had percent inhibition of 72.3 % (12.3±0.57), 84.1 % (14.3±0.57), 76.4 % (13±1.70), 90%(15.3±0.57) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was followed by the ethyl acetate fraction with an LD_{50} value of 0.658 and having percent inhibition of 62.3% (10.6±1.15), 76.4% (13±1.70), 84.1% (14.3±0.57), 90%(15.3±0.57) at the doses of 1, 2, 3 and 4 mg/ml. This was in turn followed by the n-hexane fraction with an LD_{50} value of 1.358 and having percent inhibition of 43.1%(7.33±0.57), 58.8%(10±1.00), 68.2%(11.6±0.57), 60.5%(10.3±0.57) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This petroleum ether did not display any antifungal activity against *Curvularia* spp at the doses of 1, and 2 mg/ml and showed antifungal activity against *Curvularia* at the doses of 3 and 4 mg/ml, with control being 17.The highest antifungal activity against *Aspergillus*spp was displayed by the chloroform fraction with an LD_{50} value of 0.032, which was significant and had percent inhibition of 74.2 % (15.6±1.52), 79% (16.6±1.52), 80% (17±2.00), 82.3%(17.3±0.57) at the doses of 1, 2, 3 and 4 mg/ml respectively. This was followed by n-hexane with LD_{50} value of 0.1137 and having percent inhibition of 73% (15.3±0.57), 71.4% (15±1.00), 69.5% (14.6±1.52), and 88.5% (18.6±0.57) at the doses of 1, 2, 3 and 4 mg/ml, respectively. This was followed by the petroleum ether fraction with an LD_{50} value of 0.578 and has a percent inhibition of 63.3 % (13.3±2.08) at the doses of 1, 2, 3, and 4 mg/ml. This was followed by the ethyl acetate with an LD_{50} value of0.977 and having percent inhibition of 63.3 %(13.3±1.15), 58.5 %(12.3±2.08), 76.1 %(16±1.00), 80.9 %(17±1.00) at the doses of 1, 2, 3 and 4 mg/ml, respectively, with control being 21. Results of antifungal shown in (figures 1-4)Diseases caused by several fungus species which are imposing an alarming threat to the human population as they are causing several infectious diseases. In developing countries, inaccessibility and unaffordability of allopathic medicines against fungus cause the abrupt spreading of these diseases. Therefore, medicinal plants are affordable and provide resistance to such fungal strains (Hafidh et al. 2011). The present study is showing resemblance to many types of research performed before. worked on the four different extracts obtained from *Sapium sebiferum* leaves against three different fungal species i.e. *Aspergillus flavus, A.flatoxigenic,* and *Aspergillus niger*. Satish et al. (2007) presented their work of fifty-two plants aqueous extract employed against eight infectious fungal strains in which petroleum ether turns to be the most resistive extract. Nkya et al. (2014) and other investigators worked on the whole plant, leaves, and stem extracts of *Moringa oleifera* against infectious pathogens to investigate the fungicide's properties (Mahmood et al. 2010; Rehman et al. 2020). In vitro evaluation revealed that all extracts have broad-spectrum activity against the said pathogen, which triggers the researchers to isolate therapeutic agents from the said plant. worked on methanolic and chloroform leaf and root extract of *solanum nigrum L*. against *Aspergillus niger*. The extract in different concentrations retard spore germination. The other fractions were more effective and somewhat less antifungal and their order of effectiveness was ethyl acetate>n-hexane>n-butanol. Analysis of the present findings revealed significant results that can be used in the future to identify and isolate such anti-fungal agents from the focused plant (figure1-4).

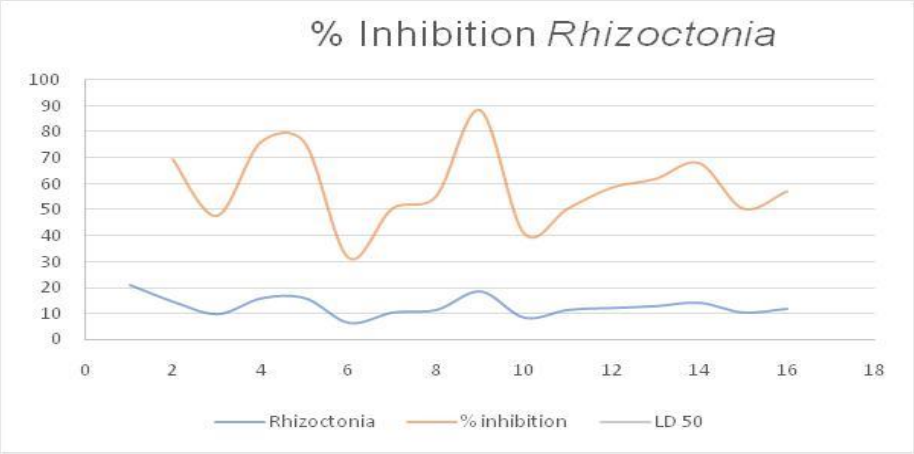

Figure1: Antifungal activity on *Rhizoctonia*

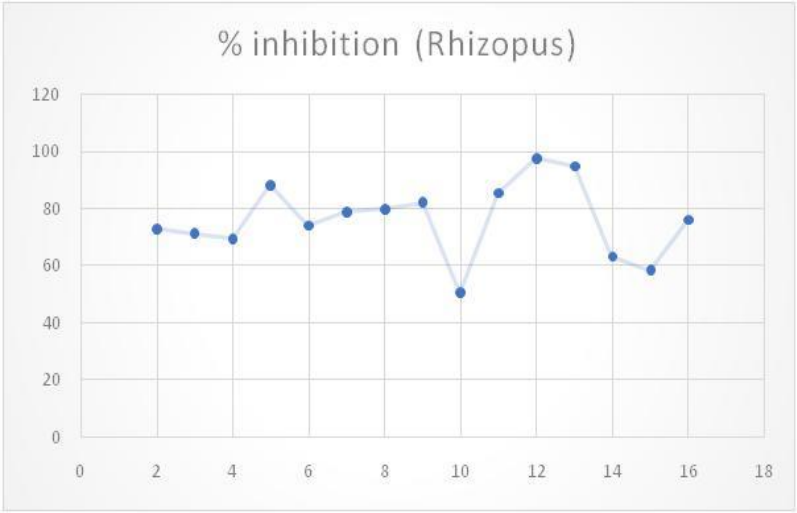

Figure.2: Antifungal activity on *Rhizopus*

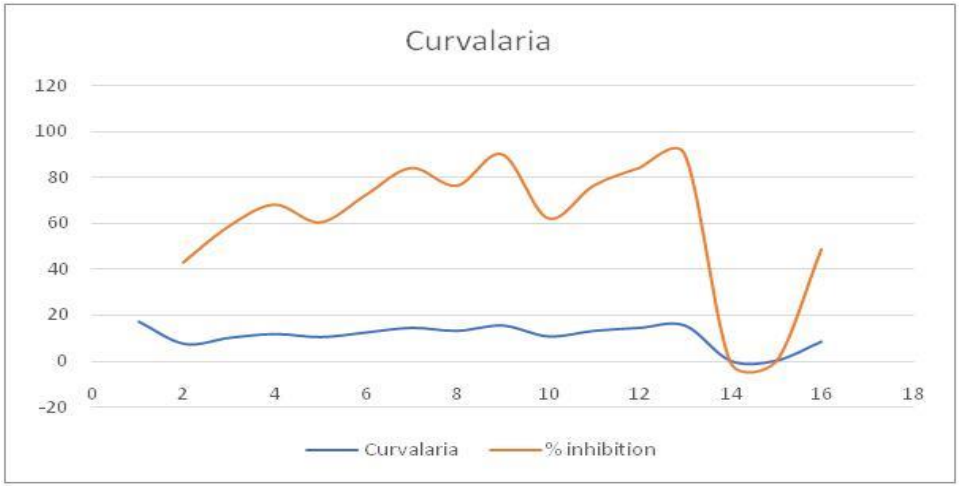

Figure 3: Antifungal activity on *Curvalaria*

Figure4: Antifungal activity on *Aspergillus*

Table 2: Antibacterial activity at different concentrations of extracts *of P. Stratiotes*

		E. Coli	LD $_{50}$	R. Solanacearum	% inh	LD $_{50}$	E.caratovora (ECC)	LD $_{50}$	P. aeruginosa	LD $_{50}$
Streptomycin (Control)	0.05mg/ml	16		29			27		28	
Whole plant n-hexane	1mg/ml	0±0	3.938	11±1.	37.9	3.418	8.3±1.15	82.933	8.33±0.57	0.826
	2mg/ml	0±0		11.6±1.52	40		12.3±1.52		10±1.00	
	3mg/ml	0±0		9.33±0.57	32.1		9.33±0.57		10.6±2.30	
	4mg/ml	9.6±2.30		18.6±0.57	64.1		10±1.00		7.0±0.00	
Whole plant choloroform	1mg/ml	12.6±0.57	0.0001	17.3±0.7	59.6	1.967	15.6±0.57	0.181	15.00±1.0	3.422
	2mg/ml	12.3±0.57		17±1	58		17.3±2.08		16.6±1.52	
	3mg/ml	11.0±1.0		14.3±1.52	48.2		18.3±1.15		12.6±0.57	
	4mg/ml	14.0±0.1		7.3±0.57	25.1		17±1.00		14.6±1.54	
Whole plantethyle acetae	1mg/ml	13.0±1.0	0.142	16±1	55.1	4.500	10±1.00	10.339	14.6±1.15	3.247
	2mg/ml	14.66±0.57		14.3±0.57	49.3		8.33±0.57		12.6±1.15	
	3mg/ml	14.33±1.15		15.3±1.52	52.7		9.66±0.57		13.6±1.14	
	4mg/ml	15.33±02.51		15±2.64	51.7		10.33±0.57		15±2	
Whole plant petroleum ether	1mg/ml	11.3±1.15	0.397	19.3±1.52	66.5	9.0278	16.6±2.08	2.943	11.3±1.15	3.0071
	2mg/ml	12.3±0.57		19±1.73	65.5		9.6±0.57		12.3±0.57	
	3mg/ml	14.3±0.57		18.6±0.57	64.1		14.6±0.57		14.33±1.15	
	4mg/ml	14.2±1.0		15.3±1.52	52.7		16±1		15.33±2.51	

CONCLUSION

The present results conclude that the preliminary phytochemical screening is a useful diagnostic tool for the identification of the plant. Consumption of food and beverages rich in these compounds may help prevent diseases. From the antibacterial and antifungal activity, it can be concluded that the plant can be used as an antiseptic. Overall the plant has a useful impact against pharmacological pathogens and can be worked on in the future in detail. It is a high-value medicinal plant and should be further exploited. These outcomes can play a major role in preparing new drugs against many pathogens.

CONFLICT OF INTEREST

The authors declared that the present study was performed in absence of any conflict of interest.

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'AUTHOR CONTRIBUTIONS

KUR and ZAB designed and performed the experiments and also wrote the manuscript. QA, HAB, HR, SK, GS, and ZR performed antibacterial activity, antifungal activity, and data analysis. KUR and GS designed experiments and reviewed the manuscript. All authors read and approved the final version.

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