Phytochemical Screening of Medicinal Plants from Lonar Lake

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Abstract

Lonar Lake is an alkaline lake situated in Buldhana district of Maharashtra (India). It is surrounded by dense forest constituting many plants that have medicinal values. I have selected this area because of the diverse atmospheric conditions. This present investigation deals with the Phytochemical studies of different parts of various medicinal plants viz; *Syzigium cumini, Ficus benghalensis, Cynodon dactylon, Justicia adhatoda, Calotropis gigantean, Ficus racemosa, Tinospora cordifolia, Achyranthes aspera, Ficus religiosa, Santalum ovatum* and Ziziphus oenoplia. Aqueous extracts of these plants have been screened for qualitative determination of different secondary metabolites like Starch, Alkaloids, Flavonoids, Tannins, Reducing sugars, Amino acids, Lignins by specific chemical reaction tests. The Phytochemical analysis showed the presence of Carbohydrates and Proteins in all the selected plants while Amino acids, Steroids, Glycosides, Flavonoids, Alkaloids and Tannins were also found in some of the plants. According to the findings it was concluded that all the economically affordable, easily available medicinal plants that possesses the antibacterial activity against the enteric pathogens is due to the secondary metabolites (Phytochemicals) present in these plants.
KEYWORDS: Phytochemical Screening, Medicinal plants, Secondary metabolites, Lonar Lake.

1. Introduction

Lonar Lake is a salt water lake created due to the impact of massive meteorites. It is a unique saline water lake in Asia. It is situated in Buldhana district of Maharashtra (India). The Lake is surrounded by the dense forest. It preserves innumerable valuable plants with medicinal values (Malu *et al*, 2000). The value of these medicinal plants was passed traditionally from one generation to other and that too without any documentation. Most of the population of the area largely depends on plant resources in their vicinity for health care and other necessities of life (Almas, 2001). Medicinal plants contain substances that can be used for therapeutic purposes or which are used as a precursors for the synthesis of useful drugs. They are of great importance and play great role in providing primary health care services to rural people. They also serve as therapeutic agents as well as important raw material for the production of traditional and modern drugs. The plants are rich in wide variety of secondary metabolites that have been found in vitro to have antimicrobial activity (Garba and Dkeniyi, 2012). These secondary metabolites are phytochemicals. Phytochemicals are the organic chemical compounds secreted by the plants on a large scale (Ahmedulla and Nayar, 1999). The accumulation of Phytochemicalin the plant cell cultures had been studied for more than thirty years and the generated knowledge had helped in realization of using cell cultures for the production of desired Phytochemical (Castello *et al*, 2002). Recent research demonstrated that many of the Phytochemicals act as natural antioxidants and can protect human against diseases (Umamaheshwari *et al*, 2012). In January 5, 2009, issue of "African

journal of Biotechnology", researchers reported that the medicinal plants used to fight against bacterial infection, does indeed contain antibacterial Phytochemicals that were effective in the laboratory against enteric pathogens. According to June 2006, issues of "Piribo" there are approximately 200,000 known higher order plants but only 5 – 15% of these plants have been analyzed for their Phytochemical bioactive properties. The global market for the plants derived drugs was worth $18 billion in 2005 and analysts expect this figure to continue to grow. Phytochemical analysis of medicinal plants has shown that numerous compounds in plants traditionally used for medicinal purposes have chemical properties effective at treating illness. In the book, "Modern Phytomedicine Turning Medicinal Plants into Drugs", the authors state that Phytochemicals extracted from medicinal plants include, Alkaloids, Tannins, Flavonoids, Sterols and numerous other chemicals that are known to have antibacterial properties. Analyzing the Phytochemicals in medicinal plants provides scientists with insight into how effective plants are medicinally and understanding how and why they are effective can lead to the development of new advanced medicines. The aims of this paper are to evaluate the preliminary phytochemical characters such as determination of pharmacognostic principal of some medicinal plants of different families. In recent years, chemical analysis and biological assay have begun to play an important role in ethnobotanical studies (Jana *et al*, 2009).

Table 1:- MEDICINAL PLANTS SELECTED FOR STUDY

Botanical name	**Local name**	**Plant part used**	**Medicinal use**
Syzigium cumini	Jamun	Bark	Diarrhea, Dysentery
Ficus benghalensis	Vad	Bark	Diabetes, Leaucorrhea
Cynodon dactylon	Durva	Whole	Skin disease, Haematuria, Conjuctivitis
Justicia adhatoda	Adulsa	Leaves	Cough, Nasal infection, Throat infection
Calotropis gigantea	Rui	Leaves	Elephantiasis, in wounds, boils
Ficus racemosa	Umbar	Fruit	Visceral obstructions, dysentery
Tinospora cordifolia	Gulvel	Whole	Chronic fever, Diabetes
Achyranthes aspera	Aghada	Leaves	Antiviral, Diarrhea, Dysentery
Ficus religiosa	Pipal	Leaves	Asthma, Cough, Gastric problem
Santalum ovatum	Chandan	Leaves	Nausea, Cystitis, Gonorrhea
Ziziphus oenoplia	Kanher	Leaves	Leprosy, Ringworm, Diuretic

2. Materials and Methods

2.1 Selection of Medicinal plants and their extract preparations:

Initially plants from the dense forest around the Lonar Lake were collected during 2012-2013. Medicinal plants via *Syzigium cumini* (bark), *Ficus benghalensis (*bark), *Cynodon dactylon*(whole), *Justicia adhatoda* (leaves), *Calotropis gigantean*(leaves), *Ficus racemosa*(Fruit), *Tinospora cordifolia*(whole), *Achyranthes aspera*(leaves), *Ficus religiosa*(leaves), *Santalum ovatum*(leaves) were collected. These plants are used by the local people against diarrhea, coughing, abdominal discomforts and skin and intestinal

infections. Selected plants were firstly cleaned with water and disinfected by 0.5% mercuric chloride, dried in shadow and powdered in mixer grinder. 10 gm of the powder of each plant was soaked in 100ml of water and then refluxed in Soxhlet apparatus, filtered and then kept for evaporation under controlled conditions of temperature i.e. at 50^0C.

2.2 Phytochemical Screening:
The aqueous extracts of the selected medicinal plants were freely prepared and divided into different test tubes and various chemical constituents were screened. The different constituents tested for included Carbohydrates, Proteins, Amino-acids, Steroids, Glycosides, Flavonoids, Alkaloids and Tannins.

2.3 Tests for reducing sugars:
Felhing's test: Mix 1 ml Fehling's A and 1 ml Fehling's B Solutions, boil for 1 minute. Add equal volume of test solution. Heat it in boiling water bath for 5-10 min. First yellow, then brick red precipitate is observed.
Benedict's test: Mix equal volume of Benedict's reagent and test solution in a test tube. Heat in boiling water bath for 5 min. Solution appears green, yellow, or red depending on amount of reducing sugar present in test solution.

2.4 Tests for protein:
Millon's test: Mix 3 ml test solution with 5 ml Millon's reagent. White precipitate was occurred. Warm precipitate turn brick red or the precipitate dissolves giving red colored solution.

2.5 Tests for Amino Acids:
Ninhydrin test: Heat 3 ml test solution and 3 drops of 5% Ninhydrin solution in boiling water bath for 10 min. Purple or bluish color appears.

2.6 Tests for Steroids:
Salkowski reaction: To 2 ml of extract, add 2 ml chloroform and 2 ml conc. H_2SO_4. Shake well. Chloroform layer appears red and acid layer shows greenish yellow fluorescence.

2.7 Test for Cardiac glycosides:
Keller-Killani test: To 2 ml extract, add glacial acetic acid, one drop 5% $FeCl_3$ and conc. H_2SO_4. Reddish brown color appears at junction of the two liquid layers and upper layer appears bluish green.

2.8 Tests for Flavonoids:
Shinoda Test: To dry powder or extract, add 5 ml 95% ethanol/ t-butyl alcohol, few drops conc. HCl and 0.5 g magnesium turnings. Orange, pink, red to purple colour appears.

2.9 Tests for Alkaloids: Evaporate the aqueous, alcoholic and chloroform extracts separately. To residue, add dilute HCl. Shake well and filter. With filtrate perform the following tests:

Dragendorff's test: To 2-3 ml filtrate, add few drops Dragendorff's reagent. Orange brown precipitate is formed.

Mayer's test: 2-3 ml filtrate with few drops Mayer's reagent gives precipitate.

Test for Tannins: To 2-3 ml of aqueous or alcoholic extract, add few drops of acetic acid solution. It gives red color solution.

3. Result and Discussion

All the selected plants for the study showed the presence of carbohydrates. *Syzigium cumini* showed the presence of amino acids and Alkaloids. Panchavarnikili *et al*, (2012) observed the presence of proteins in the aqueous extracts of *Syzigium cumini* where as in present study it showed absence of protein. *Ficus benghalensis* showed the presence of carbohydrate and proteins. *Ficus racemosa* showed the presence of protein and Flavonoids. *Ficus religiosa* showed the presence of Proteins, Glycosides and Alkaloids. Manimozhi *et al*, (2012) observed the presence of Tannins and Flavonoids in the methanol extracts of *Ficus benghalensis, Ficus racemosa and Ficus religiosa. Cynodon dactylon* showed presence of Tannins and Proteins. Parekh and Chanda (2007), showed that Alkaloids was present in *Cynodon dactylon*, but in present study there were no presence of Alkaloids in its aqueous extract. The phytochemical analysis had shown that phenols, Tannins, Alkaloids, Flavonoids and reducing sugars were found in the leaves of *Justicia adhatoda* but the present study showed the presence of proteins, Steroids and Flavonoids in the aqueous extract of *Justicia adhatoda. Calotropis gigantea* showed the presence of carbohydrates and proteins while Murugan, (2012) observed that methanol extract of *Calotropis gigantea* contains amino acids, Steroids and Tannins. *Achyranthes aspera* showed the presence of proteins, amino acids, Steroids and Alkaloids. Sharma *et al*, (2013) observed the presence of Steroids in *Achyranthes aspera*. *Tinospora cordifolia* showed the presence of Alkaloids along with carbohydrate. *Santalum ovatum* showed the presence of carbohydrate, proteins, Steroids, Flavonoids, Alkaloids and Tannins (Table 2). *Ziziphus oenoplia* showed the presence of carbohydrates, proteins and Steroids. Eswari *et al*, (2013) observed that aqueous extract of *Ziziphus oenoplia* contains Alkaloids, Flavonoids, amino acids, Tannins.

Table 2: Phytochemical analysis of selected medicinal plants(Khandelwal, 2001)

Tests	***Syzigium cumini***	***Ficus benghalensis***	***Cynodon dactyl***	***Justicia adhatod***	***Calotropis gigantea***	***Ficus racemosa***	***Tinospora cordifolia***	***Achyranthes aspera***	***Ficus religio***	***Santalum ovatum***	***Ziziphus oenoo***

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Carbohydrates	Fehling's test	+	-	-	+	-	+	+	+	+	+	+
	Benedict's test	+	+	+	+	+	+	+	+	+	+	+
Proteins	Million's test	-	+	+	+	+	+	-	+	+	+	+
Amino acids	Ninhydrin test	+	-	-	-	-	-	-	-	+	-	-
-Steroids	Salkowski reaction test	-	-	-	+	-	-	-	+	-	+	+
Glycosides	Keller-Killani test	-	-	-	-	-	-	-	-	+	-	-
Flavonoids	Shinoda test	-	-	-	+	-	+	-	-	-	+	-
Alkaloids	Dragendorff's test	-	-	-	-	-	-	+	+	+	-	-
	Mayer's test	+	-	-	-	-	-	+	+	+	+	-
Tannins	Acetic acid solution test	-	-	+	-	-	-	-	-	-	+	-

4. Conclusion

According to the present study of phytochemical screening of selected plants, it was concluded that, all the selected plants from the forest around Lonar Lake contains various phytochemicals and might be due to the presence of these phytochemicals, these plants shows antibacterial properties, as used by the local people for treating their illness. These plants are economically affordable, easily available and possesses medicinal values with secondary metabolites, so these plants can be used for the therapeutic purposes, drug productions etc.

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