

PHYTOCHEMICAL ANALYSIS OF MEDICINAL PLANTS FROM LONAR CRATER

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Abstract

Medicinal plants are important source of bioactive compounds used as a herbal drugs traditionally. Different types of Phytochemicals have been reported from many of the plants including Terpenoids, Steroids, Saponin, Cumarin, Glycocides, Reducing sugar, Tannins, Phenols, Flavonoids and Alkaloids. These secondary metabolites have antifungal, antibacterial and anti-inflammation activities. The present study focus on phytochemical screening of some selected medicinal plants from a large meteorite impact lake 'Lonar Crater'. The ten different ethno-medicinal plants, *Cassia auriculata*, *Achyranthus aspera*, *Tridax procumbence*, *Balanites aegyptica*, *Cassia fistula*, *Wrightia tinctoria*, *Solanum xanthocarpum*, *Caesalpinia bonducella*, *Calotropis procera*, *Datura metel* was phytochemically analyzed. It is revealed that the important medicinal phytochemicals such as steroids, reducing sugar, terpenoids and alkaloids were commonly present in most of the plants. The plants *Tridax procumbence* & *Solanum xanthocarpum* shows presence of all the phytochemicals. This phytochemical analysis of the plants has great importance in pharmaceutical formulation for production of the new drugs. Also, the eco-friendly extraction of these bioactive molecules is more significant than the laboratory synthesis.

Keywords: Bioactive molecules; herbal drug plants; eco-friendly extraction

1. INTRODUCTION

The world famous third biggest meteoritic impact crater 'Lonar crater' is mysterious because it is a saline & alkaline lake located at Lonar in Buldhana district in Maharashtra, India. The salinity of crater is higher than the ocean & the surrounding soil sediments have different mineral composition. This unique characteristic of lake attracts the Biologists, Geologists, ecologists, archaeologists and astronomers from the world for investigation (Maluet.*al.*,2000;Tambekaret.*al.*,2010; Bhise & Borul, 2017). The mineral composition at crater shows great impact on existing life-forms. Biologists have reported the presence of primitive life forms like chemotropic, photo-trophic organisms & this area rich with economically & medicinally important plants. Therefore, forest department declare this area as a smallest 'Wild Life Sanctuary' to conserve this biodiversity (Ahirrao *et al.*,2009;Tambekar *et al.*,2010).

These plants possess various types of pharmacological drugs and can be used as the medicine in various ayurvedic preparations. The medicinal plants are the plants whose parts (leaves, seeds, stem, roots, fruits, foliage etc.) extracts, infusions, decoctions, powders are used in the treatment of different diseases of humans as well as for plants and animals. Besides the use of medicinal plants by local individuals as their raw material, the demand for medicinal plants has also increased day by day by the modern pharmaceutical industries (Patil *et al.*,2010; Dabhadkar & Borul,2013). From the thousands of years, natural products have been used in traditional medicine all over the world and predate the introduction of antibiotics and other modern drugs (Maheshwari,2000; Tambekar *et al.*, 2012). Phytochemicals are naturally occurring in the plant parts of medicinal plants that have defense mechanism and protect from various diseases. Particularly the secondary metabolites have terpenoid, steroids, glycosides, reducing sugar, saponines, alkaloids and

phenolic compounds are extracted & used in pharmaceutical products (Krishnaiah *et al.*, 2007). The bioactive compound like Steroids are the natural or synthetic organic compound characterized by 17 carbon atoms arranged in four rings. This group includes all the sex hormones, adrenal cortical hormones, bile acids, sterols of vertebrates, molting hormones of insects and many other physiological active substances of animals & plants. The steroids have therapeutic values used as in large number of anti-inflammatory agent, anabolic (growth-stimulating) agents and oral contraceptive. Terpenoids exhibit as an anti-inflammatory, anti-cancer, anti-malarial, inhibition of cholesterol synthesis, anti-viral & anti-bacterial activities (Mahato & Sen, 1997; Wadood 2013). Alkaloids are used as painkiller, anesthetic agents & are occur in all medicinal plants (Herouart, 1988).

The ten potential medicinal plants having ethno-medicinal properties are selected for analysis of phytochemicals. The present study reveals to analyze the presence or absence of different phytochemicals in the selected medicinal plants used for healing and curing of various diseases from Lonar Crater.

2. MATERIALS AND METHODS:

Selection of Plant materials

For the present study the ten potential medicinal plants having ethno-medicinal value have been selected for analysis of phytochemicals (TABLE NO 1).

Sr. No.	Botanical Name	Local Name	Plant Part Used	Ethno-medicinal Use
01	<i>Cassia auriculata</i> L.	Tarota	Plant twig/ Leaves	Plant part used for rheumatism
02	<i>Achyranthus aspera</i> L.	Aghada	Seed	Seeds used for kidney stone
03	<i>Tridax procumbence</i> L. (Fig. 6)	Tongalmodi	Entire Plant	Past of plant used for wound healing, antibiotic, bone fracture
04	<i>Balanites aegyptica</i> (L.) Delile (Fig. 3)	Hinganbet	Fruit	The past of fruit is used for Headache & improve Lactation; past is also used for washing the cloths
05	<i>Cassia fistula</i> L. (Fig. 5)	Bahava	Pods/ Fruit	Aqueous past is used to healing wounds
06	<i>Wrightia tinctoria</i> R. Br. (Roxb.) (Fig. 1)	Kala Kuda	Stem Bark	Past of bark is used for skin diseases, hair fall & kidney stone
07	<i>Solanum verginianum</i> L. (Fig. 4)	Ranvangi/ Ringani	Entire plant/ Seed	Decoction of plant part is given for asthma, kidney stone, snake bite, skin diseases
08	<i>Caesalpinia bonducella</i> (L.)Roxb. (Fig. 2)	Sagargota	Seed	Aqueous past is given to children as a tonic
09	<i>Datura metel</i> L.	Kala Dhotra	Seed	Seeds used for increase sex hormones in pet animals
10	<i>Calotropis procera</i> (Aiton) W. T. Aiton	Rui	Leaf/stem latex	Leaf latex is used for wound healing, swelling

Sample collection

The selected medicinal plants were collected from the Lonar Crater & its surrounding area. The collected plants were firstly identified botanically in department of Botany by using botanical literature (Singh *et al.*, 2000; 2001; Diwakar & Sharma, 2000; Patil *et al.*, 2007). Fresh material of each plant part used in medicine were collected & preserved in hygienic condition for phytochemical analysis.

Chemicals used:

Fehling solution A & B, ethanol, distill water, aqueous HCl, Ammonia solution, picric acid methanol, chloroform, concentrated Sulphuric acid, Hexane.

Preparation of plant extract

The crude plant material of each plant sample were selected & washed under running tap water to remove dust. The plant samples were then air dried for few days and the plant part were crushed into powder & stored in hygienic condition for further use.

The equal quantity of plant powder of each sample plant was taken in a separate conical flask & 100 ml distilled water was added to each conical flask for soaking purpose. Shake it well to make homogeneous

mixture & then filtered it with the help of Whatman filter paper. Filtrate of each sample were taken, stored at 4⁰C temperature and used for further phytochemical analysis.



Fig. 1 *Wrightia tinctoria*



Fig. 2 *Caesalpinia bonducella*



Fig. 3 *Balanites aegyptica*



Fig. 4 *Solanum virginianum*



Fig. 5 *Cassia fistula*



Fig. 6 *Tridax procumbens*

Tests for Phytochemical analysis

The screening tests for various bioactive substances are taken by following biochemical methods (Harborne, 1973; Sadashiv & Manikam, 2000)

Test for terpenoids

An amount of 0.8 g of selected plant parts were taken in a test tube, poured 10 ml of methanol in it, shaken well and filtered to take 5 ml extract of plant sample. The 2 ml of chloroform were mixed in extract & 3 ml of H₂SO₄ (Sulphuric acid) were added in selected plant sample. Reddish brown color form in a test tube shows the presence of terpenoids.

Test for Steroids

The crude extract of plant was mixed with 2ml of CHCl₃ and con. H₂SO₄. A reddish colour formation in lower chloroform layer shows that the steroids are present. Other test was also performed by taking crude plant extract with 2ml of CHCl₃. The 2ml of conc. H₂SO₄ & Acetic acid was poured into the mixture. The Presence of greenish color in test tube shows the presence of Steroids.

Test for Alkaloids

The 0.2 g of the selected plant samples were added in each test tube & 3 ml of hexane were mixed in it, shaken well and filtered. Then taken a 5 ml of 2% HCL & mixed in test tube containing plant extract and hexane. Gently heated the test tube containing the mixture then filtered & poured 5-6 drops of Picric acid in a mixture. It observed that the mixture having yellow color precipitation it shows that alkaloids is present.

Test for flavonoids

The crude plant extract was mixed together with few fragments of magnesium ribbon & addition of Conc. HCL drop wise. The Pink or magenta red color appeared after 5-8 minutes it shows that the flavonoids are present.

Test for Saponins

The 5ml of dist. water added in a crude Plant extract in a test tube & shaken it well for 30 seconds. Then stable foam formation at (1 cm height) even after 30minutes, it shows Saponins present

Test for Glycoside

The 4 ml of Plant extract dried to make 2 ml. Then it was added 1-2 ml of NH_4OH & shaken well thoroughly. Formation of dark red color solution, shows that the glycosides is present.

Keller-Kilani test:

Crude extract of plant was mixed with 2ml of glacial acetic acid containing 1-2 drops of 2% solution of Ferric Chloride. The mixture is then poured into other test tube which containing 2ml of Conc. H_2SO_4 . A brown ring appeared at the interface shows the presence of cardiac glycosides.

Test for reducing Sugar

An amount of 0.50g of selected plant sample was added in 5ml of distilled water in 100 ml Beaker. Then 1 ml of Ethanol is added in plant extract & shaken well. After that 1 ml of Fehling solution A and 1 ml of Fehling solution B is taken in test tube, heated it to boil & poured in the aqueous ethanol extract in a beaker. Then color of the reaction was observed, it shows a positive result.

Test for Coumarins

The residue after concentrating the plant extract is dissolved in hot water. After cooling pour the solution in two test tubes. The 10% (w/v) of NH_4OH is added in one test tube & another test tube is used as control. Fluorescence color indicates the presence of coumarins.

Test for polyphenols and tannins

The crude extract was mixed with 2ml of 2% solution of Ferric chloride. A blue-green color or blue-black color shows the presence of polyphenols and tannins.

3. RESULTS AND DISCUSSION

In the present study the screening of phytochemicals are detected which are considered as bioactive chemical constituents. The important medicinal phytochemicals such as Terpenoids, Steroids, Alkaloids, Flavonoids, Saponins, Glycosides, reducing sugar, Coumarins, Polyphenols & Tannins were present in the selected medicinal plants. The result of the test for phytochemical analysis shows that at least one of Steroid, Alkaloids, flavonoids, terpenoids, saponins & reducing sugars are present (**Table 2**).

In present investigation, the Reducing sugar, Alkaloids & Tannins are present in all the selected 10 medicinal plants. Terpenoids are present in *Cassia auriculata*, *Achyranthus aspera*, *Balanites aegyptica*, *Cassia fistula*, *Wrightia tinctoria*, *Solanum xanthocarpum*, *Caesalpinia bonducella*, *Calotropis procera*, & *Datura metel*. Steroids & Coumarin have been reported for its anti-inflammatory and analgesic properties (Ayinde, 2007) present in *Cassia auriculata*, *Achyranthus aspera*, *Cassia fistula*, *Wrightia tinctoria*, *Solanum xanthocarpum*, *Caesalpinia bonducella*, *Calotropis procera*, & *Datura metel*. Saponins are toxic glucosides having catalytic property for foaming & emulsifying agent in detergents, present in *Balanites aegyptica*, *Solanum xanthocarpum*, *Caesalpinia bonducella* & *Calotropis procera* plants. Traditionally these plants are used for washing purpose (Bhise & Borul, 2017). Coumarins are used in cosmetics, present in *Cassia auriculata*, *Achyranthus aspera*, *Tridax procumbence*, *Cassia fistula*, *Caesalpinia bonducella*, *Datura metel* & *Calotropis procera*. Glycosides are generally used in heart diseases, arrhythmia, present in plants like *Cassia auriculata*, *Achyranthus aspera*, *Balanites aegyptica*, *Cassia fistula*, *Wrightia tinctoria*, *Solanum xanthocarpum*, *Caesalpinia bonducella*. Flavonoids are anti-oxidant & anti-aging effect (Pietta, 2000), is present in *Cassia auriculata*, *Tridax procumbence*, *Cassia fistula*, *Solanum xanthocarpum*, *Datura metel* plants. Alkaloids are antibacterial, analgesic & protective substance against the biotic stress in plants. These are used in drugs for reducing muscular pains, headache (Pietta, 2000). All the selected plants having an antibacterial, wound healing & pain relief properties contain alkaloid is a bioactive component.

TABLE 2. Result of preliminary qualitative phytochemical analysis

Sr.No.	Plant species	Terpenoids	Steroids	Saponin,	Coumarin	Glycocides	Reducing sugar	Tannins/ Phenols	Flavonoids	Alkaloids.
1	<i>Cassia auriculata</i>	+	+	-	+	+	+	+	+	+
2	<i>Achyranthus aspera</i>	+	+	-	+	+	+	+	-	+
3	<i>Tridax procumbence</i>	-	+	-	+	-	+	+	+	+
4	<i>Balanites aegyptica</i>	+	-	+	-	+	+	+	-	+
5	<i>Cassia fistula</i>	+	+	-	+	+	+	+	+	+
6	<i>Wrightia tinctoria</i>	+	+	-	-	+	+	+	-	+
7	<i>Solanum verginianumm</i>	+	+	+	-	+	+	+	+	+
8	<i>Caesalpinia bonducella</i>	+	+	+	+	+	+	+	-	+
9	<i>Datura metel</i>	+	+	-	+	-	+	+	+	+
10	<i>Calotropis procera</i>	+	+	+	+	-	+	+	-	+

‘+’ Indicate Presence and ‘-’ Indicate Absent

4. CONCLUSION

The ten plants were selected from Lonar crater having medicinal properties containing source of secondary metabolism & bioactive substances like, Terpenoids, Steroids, Saponins, Coumarin, Glycosides, Reducing sugar, Tannins, Phenols, Flavonoids & Alkaloids. The medicinal plants play crucial role to prevent various diseases & act as anti-fungal, anti-analgesic, anti-viral anti-malarial, anti-bacterial, anti-diuretic, anti-inflammatory activity. This curing activity of medicinal plants due to these active components, play an important role in curing diseases. The selected plants from local area having ethno botanical potential traditionally used for treating various diseases. Phytochemical Analysis of the plants is very important for discovering the new drugs. In general when we are synthesizing a drug molecule in laboratories or in industries are very difficult & hazardous to the environment, because the drug synthesis is a multistep reaction. It requires different chemicals having different properties cause environmental pollution. The plant based phyto-extraction of bioactive substance is an eco-friendly method, definitely controls the pollution. Such medicinal plants are naturally available, can be cultivated commercially to promote the economy of farmers. The eco-friendly extraction helps to clean the environment & sustainable utilization of natural sources. The present research work reveals that phytochemicals are important for pharmaceuticals R & Ds, research institutes for manufacture the new innovated drugs. In future, the extraction or screenings of medicinal bioactive components are characterized by using NMR & Spectroscopic studies.

5. ACKNOWLEDGMENT

Authors are grateful to the all the local healers, local vendors & forest officials, Lonar Wild Life Sanctuary, Lonar for their valuable cooperation. Authors are also grateful to the Principal, Late Ku. Durga K. Banmeru Science College, Lonar & Principal, Gokhale Education Society's Arts, Comm., & Science College, Jawhar for regular inspiration and providing laboratory facilities.

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