



ISSN Print: 2664-9926
 ISSN Online: 2664-9934
 NAAS Rating: 4.82
 IJBS 2025; 7(6): 304-307
www.biologyjournal.net
 Received: 15-03-2025
 Accepted: 19-04-2025

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Qualitative phytochemical screening of some crude drugs from bhimashankar wildlife sanctuary, Pune, MS. India

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DOI: <https://www.doi.org/10.33545/26649926.2025.v7.i6e.390>

Abstract

Crude drugs are rich in bioactive components that are utilized to treat various human ailments. They play crucial role in human beings' life. The medicinal qualities of plant species belong to their phytochemical elements. Phytochemical screening is an important step in identifying bioactive compounds present in particular crude drugs. Hence, in this present work, phytochemical screening of some crude drugs extract, namely *Gymnema sylvestre* (Retz.) R.Br. ex-Schultes, *Terminalia chebula* Retz., *Holarrhena pubescens* Buch. Ham.) Wall. ex G. Don, *Phyllanthus emblica* L., *Terminalia cuneata* Roth was carried out. The solvent extracts of the leaves, Rhizome, stem, whole plant of respective crude drugs were prepared using cold extraction method with methanol, ethanol, acetone, chloroform, petroleum ether, and aqueous solvents. Qualitative phytochemical analysis of plants included tests for alkaloids, starch, flavonoids, steroids, saponins, tannins, terpenoids, lipids. In all solvent extracts, all eight phytoconstituents that were examined present in all five plants. Preliminary phytochemical screening in all five plants methanolic extract showed the active compounds presence in high concentration, such as alkaloid, steroids, terpenoids, starch, lipids flavonoids, tannin compounds and tannins. Also, the active compounds presence in low concentration in aqueous extracts, such as saponins.

Keywords: Crude drugs, phytoconstituents, therapeutic, phytochemical screening

Introduction

The Bhimashankar Wildlife Sanctuary (BWS) is one of the wildlife sanctuaries located along the northern Western Ghats in Maharashtra. It was notified on 10 October 1985 by the Government of Maharashtra (1985) as a step to conserve the state animal, the Giant Squirrel *Ratufa indica* spp. elphinstonii. The sanctuary is named after the Bhimashankar temple (one of the twelve jyotir-linga (self-emerged) Shiva temples in the country) located inside the sanctuary and surrounded by a sacred grove. It is rich in Flora (Herb, Shrubs, Climbers, trees, Medicinal Plants) as well as Fauna. Jagdale (1994) studied the ecology of the BWS area and concluded the ecosystem of the sanctuary is unique and very fragile, so it requires priority for conservation and minimize local use of natural resources and documentation of some ethno-medicinal plants of BWS area. Rahangdal *et al.*, (2017) focus on Floristic diversity of Bhimashankar Wildlife Sanctuary.

Medicinal plants contain some organic compounds which provide definite physiological action on the human body and these bioactive substances include tannins, alkaloids, carbohydrates, terpenoids, steroids and flavonoids ^[5,11]. These bioactive compounds are synthesized by primary and secondary metabolism of living organisms. Secondary metabolites are chemotaxonomically diverse compounds with obscure function. They are widely used in the human therapy, veterinary, agriculture, scientific research and countless other areas ^[17]. A large number of phytochemicals belonging to several chemical classes have been shown to have inhibitory effects on all types of microorganisms *in vitro* ^[3]. Bioactive compounds can be derived from barks, leaves, flowers, roots, fruits, seeds ^[8]. Knowledge about phyto constituents of plants is desirable because such information will be value for synthesis of chemical substances present in plants. ^[9,10,11]. In the present work, qualitative and phytochemical analysis were carried out in five plants of Bhimashankar Wildlife Sanctuary, pune.

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Materials and Methods

Collection of Plant Materials: Crude drugs samples were collected from tribes of Bhimashankar wildlife sanctuary in different seasons of 2024 year. Some tribal communities marketed crude drugs Near Bhimashankar Jyotirlinga Temple, BWS, Pune. The samples were identified by botanist.

Extraction of Plant Material: Various organic solvents such as methanol, ethanol, petroleum ether, acetone, chloroform and water were used for the extraction of bioactive compounds. The crude drugs powders (10g) of selected crude drugs extracted with organic solvents by cold extraction method. The extracts obtained were completely evaporated by using vacuum rotary evaporator. The concentrated extracts were subjected to qualitative test for the identification of various phytochemical constituents as per standard procedures (Brindha *et al.*, 1981)^[1].

Phytochemical screening

The prepared extract of all the plants was used to test various phytoconstituents present in them. Different chemical reagents were prepared and specific test, for specific phytochemicals was done. These various tests were qualitative and hence termed phytochemical screening. The tests were done by following standard procedures based on journal articles.

Test for alkaloids: Meyer's test: Take 2 mL of plant extract, 1 mL of Meyer's reagent was added. The presence of pale yellow precipitate indicated the presence of alkaloids.

Test for saponins: 2 g of powdered sample was boiled in 20 mL of distilled water. 10 mL of filtrate, 5 mL of distilled water were quivered vigorously. The appearance of frothing indicated the presence of saponins.

Test for tannin / polyphenol: To the diluted extract, 3-4

drops of 10% FeCl₃ were added, blue color was seen for Gallic tannins and the presence of catechol tannin turned the solution green.

Test for steroids: Dissolve 1 ml plant extract in 2 ml chloroform. Carefully add few drops of concentrated sulfuric acid along the sides of the test tube, allowing it to form a layer below the chloroform layer. A reddish-brown color at the interface between the two layers indicates the presence of steroids.

Test for flavonoids: Take 1-2 mL of the plant extract. Add a few drops of dilute sodium hydroxide (NaOH) solution. Observe the color change. Add a few drops of dilute hydrochloric acid (HCl). Observe the color change again. An intense yellow color appears upon adding NaOH, and this color becomes colorless upon adding HCl.

Test for terpenoids: 0.2 g of each sample was mixed with 2 ml chloroform, 3 ml conc. H₂SO₄. Reddish-brown coloration indicated the presence of terpenoids.

Test for Starch: Take 1 ml of plant extract. add drops of iodine solution for some time. If it turns blue-black afterwards, it contains starch.

Test for Lipid: Take a small amount of the sample in a test tube. Add a few crystals of potassium bisulfate (KHSO₄). Heat the mixture gently and then strongly. A pungent, irritating odour of acrolein indicates the presence of glycerol or fats.

Results

Preliminary phytochemical screening in all five plants methanolic extract showed the active compounds presence in high concentration, such as alkaloid, steroids, terpenoids, starch, lipids flavonoids, tannin compounds and tannins. Also, the active compounds presence in low concentration in aqueous extracts, such as saponins shown in Table no 1 to Table no 5.

Table 1: Preliminary phytochemical screening of leaf extract of *Gymnema sylvestre* (Retz.) R.Br. ex-Schultes

Sr. No.	Presence/absence of bioactive components	Test	Methanol	Ethanol	Petroleum ether	Chloroform	Acetone	Aqueous
1	Alkaloids	Mayer's test	+	+	+	-	-	-
2	Saponins	Foam test	-	-	-	-	-	+
3	Tannins	Ferric Chloride test	+	+	-	+	+	+
4	Steroids	Salkowski test	+	+	+	+	+	-
5	Flavonoids	Alkaline Reagent test	+	+	+	-	-	+
6	Terpenoids	Salkowski test	+	+	+	+	+	-
7	Lipid	Acrolein test	+	+	-	+	+	-
8	Starch	Iodine test	+	+	-	+	+	-

Table 2: Preliminary phytochemical screening of bark extract of *Terminalia cuneata* Roth.

Sr. No.	Presence/absence of bioactive components	Test	Methanol	Ethanol	Petroleum ether	Chloroform	Acetone	Aqueous
1	Alkaloids	Mayer's test	+	+	-	-	+	-
2	Saponins	Foam test	-	-	-	-	-	+
3	Tannins	Ferric Chloride test	+	+	-	-	+	+
4	Steroids	Salkowski test	+	+	-	-	+	+
5	Flavonoids	Alkaline Reagent test	+	+	-	-	+	-
6	Terpenoids	Salkowski test	+	+	-	-	+	+
7	Lipid	Acrolein test	+	+	-	+	+	-
8	Starch	Iodine test	+	+	-	-	+	-

Table 3: Preliminary phytochemical analysis of *Terminalia chebula* Retz. fruit extract

Sr. No.	Presence/absence of bioactive components	Test	Methanol	Ethanol	Petroleum ether	Chloroform	Acetone	Aqueous
1	Alkaloids	Mayer's test	+	+	-	+	+	-
2	Saponins	Foam test	-	+	-	-	-	+
3	Tannins	Ferric Chloride test	+	+	-	-	+	+
4	Steroids	Salkowski test	+	+	-	-	+	-
5	Flavonoids	Alkaline Reagent test	+	+	-	+	+	-
6	Terpenoids	Salkowski test	+	+	-	-	+	-
7	Lipid	Acrolein test	+	+	-	-	+	-
8	Starch	Iodine test	+	+	-	-	-	-

Table 4: Preliminary phytochemical analysis of *Holarrhena pubescens* (Buch.-Ham.) Wall. ex G.Don ark extract

Sr. No.	Presence/absence of bioactive components	Test	Methanol	Ethanol	Petroleum ether	Chloroform	Acetone	Aqueous
1	Alkaloids	Mayer's test	+	+	-	+	+	+
2	Saponins	Foam test	-	-	-	-	-	+
3	Tannins	Ferric Chloride test	+	+	-	-	-	-
4	Steroids	Salkowski test	+	+	-	-	-	+
5	Flavonoids	Alkaline Reagent test	+	+	-	-	+	-
6	Terpenoids	Salkowski test	+	+	-	-	-	+
7	Lipid	Acrolein test	+	+	+	+	-	+
8	Starch	Iodine test	-	-	+	+	-	-

Table 5: Preliminary phytochemical analysis of *Phyllanthus emblica* L. fruit extract

Sr. No.	Presence/absence of bioactive components	Test	Methanol	Ethanol	Petroleum ether	Chloroform	Acetone	Aqueous
1	Alkaloids	Mayer's test	+	+	-	-	-	-
2	Saponins	Foam test	-	-	-	-	-	-
3	Tannins	Ferric Chloride test	+	+	-	-	+	+
4	Steroids	Salkowski test	+	+	-	-	+	+
5	Flavonoids	Alkaline Reagent test	+	+	-	-	+	-
6	Terpenoids	Salkowski test	+	+	-	-	+	+
7	Lipid	Acrolein test	+	+	-	-	+	-
8	Starch	Iodine test	+	+	+	+	-	+

Conclusion

The results revealed the presence of medicinally important compound in the plants studied. Many evidences gathered in earlier studies which confirmed the identified phyto constituents to be bioactive. Several studies confirmed the presence of these phyto constituents contribute medicinal as well as physiological properties to the plants studied in the treatment of different ailments. Therefore, extracts from these plants could be seen as a good source for useful drugs. The traditional medicine practice is recommended strongly for these plants as well as it is suggested that further work should be carried out to isolate, purify, and characterize the active constituents responsible for the activity of these plants.

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