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Qualitative Phytochemical Analysis from some Medicinal plant in Akola and allied regions of Maharashtra

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ABSTRACT:

The phytochemical screening of the medicinal plants is significant and have marketable attention in collectively research organizations and pharmaceutical companies for the progress of the novel drugs in management of various diseases. With rich biodiversity of medicinal plants in and around of Akola district of Maharashtra; the current analysis on four medicinal plants such as *Achyranthus aspera*, *Erythrina indica* Linn., *Curculigo orchioides* Gaertn., and *Rauvolfia sarpentina* (L.) Benth. ex Kurz, were carried out. The total of six phytochemicals such as alkaloids, flavonoids, phenolic compound, steroids, saponins and carbohydrates were trialed in two different plant extracts, showed presence and absence of their activity. While screening of phytochemicals, Ethanol (ET) and Methanol (ME) extracts were used. Conducting qualitative trial, different customary techniques were adapted in order to validate the activity of relevant chemical compounds. With qualitative phytochemical estimation, it found that 60.41% were present, however 39.58 % were absent in selected four plant species with both the extracts. Furthermore it was substantiate that the positive trails of phyto constituents detection were more specially in *Erythrina indica* and *Rauvolfia sarpentina* plant samples, on the other hand, it was less in *Achyranthus aspera* and *Curculigo orchioides.* It was found that occurrence of phytochemicals were very less detected in *Achyranthus aspera* comparatively than selected other plant samples in the study. All these phytochemicals have impending therapeutic or physiological actions on human system, for that the selected plant species can stand as a potential supply of some vital drugs.

Keywords: Phytochemicals, biodiversity, ethanol, alkaloids, vital drugs

Introduction:

The phytochemistry is linked with numerous species of secondary metabolites formed in plants by biosynthesis and the natural combination of the entire these secondary metabolites provides the general beneficial therapeutic outcomes of that particular plant (Kharchouf et al., 2017; Verpoorte et al., 2017). The phytochemicals classified as primary constituents comprises the general sugars, amino acids, chlorophylls, purines and pyrimidines of nucleic acids and proteins etc. (Akram et al., 2014; Awuchi and Twinomuhwezi, 2021). Others categorized as the secondary constituents are the chemicals consisting of alkaloids, flavonoids, terpenes, phenolics, lignans, plant steroids, curcumines, saponins, glucosides (Awuchi and Twinomuhwezi, 2021; Zahnit et al., 2022). Of these secondary constituents, phenolics are seen to be the most frequent consisting of 45% of the secondary phytochemical constituents of plants, terpenoids and steroids 27%, alkaloids 18% and others 10% (Prakash et al., 2011). Phytochemicals holds nutraceutical importance (Palai et al., 2021). The phytochemicals are not necessary nutrients and are not mandatory by the human body for supporting existence, however have significant properties to avoid or to struggle several general diseases. Numerous of these benefits recommend a probable function for phytochemicals in the prevention and handling of disease. Because of this property; many researchers have been carry out to expose the advantageous health effects of phytochemicals (Deepa and Giri, 2018). Several phytochemicals have been scientifically confirmed to acquire medicinal qualities like anti-inflammatory, antibacterial, antioxidant, and anti-helminthic ones, among others. As a consequence, numerous parts of the plant have indeed been successfully used to treat a variety of human ailments (Chandra et al., 2017; Kutama et al., 2018; Kawamura and Muraoka, 2018; Nwozo et al., 2023). The secondary metabolites formed also are an essential attribute for our food plants (taste, colour, scent, etc.) and ornamental plants. Additionally, several plant secondary metabolites such as flavonoids, alkaloids, tannins, saponins, steroids, anthocyanins, terpenoids, rotenoids etc. have found profitable application as drug, dye, flavour, fragrance, insecticide, etc. Such fine chemicals are isolated and purified from plant materials (Das *et al.*, 2010).

Despite the progress of different major therapies, the tilt toward herbal medicine is gaining thrust due to the increasing concerns of the escalating toxicities connected with main line therapies (Akram et al., 2014; Khalid et al., 2022). According to WHO (World Health Organization), any plant or its parts containing constituents that can be used therapeutically or can be used as raw material for chemical or pharmaceutical production is classified as a drug (Kumari et al., 2011). In recent times, the utilization of medicinal plants is measured as a complementary and substitute therapies in combination with other managements (Kawamura and Muraoka, 2018). Since the beginning of time, plant products have been employed in phytomedicines. The barks, fruits, flowers, roots, leaves, and seeds can the entire be used to formulate this. The competence to synthesize complex chemical materials will benefit from information of the chemical constituents of plants (Parekh and Chanda, 2007; Parekh and Chanda, 2008). Nowadays about 300 species of medicinal and aromatic plants are used universally in the pharmaceutical, food, cosmetics and fragrance industries (Harisaranraj, 2009; Robber and Tyler, 1996; Deshmukh, 2012).

Considering the broad efficacy of plants in diverse fields such as phytochemical, medicinal, economical and many more significances were one of the aim to undertake current investigation; likewise, very less documents on phyotochemical screening of selected plants in general and region in particular were available in literature. Therefore, current study with chosen plants were carried out to screen secondary metabolites primarily.

Material and Methods:

Study Region and Plant Materials:

The plant sample were collected from the diverse regions of Akola and allied regions of Maharashtra. The Akola is a district in the Indian state of Maharashtra. The town of Akola is the district headquarters. The Akola district forms the central part of Amravati Division, which was the previous British Raj Berar province. The vicinity of the district is 5,428 km². It is enclosed on the north and east by Amravati District, to the south by Washim District, and to the west by Buldhana District. The Akola district comprises seven talukas which are Akola, Akot, Telhara, Balapur, Barshitakli, Murtijapur and Patur.

The morphological character clarification and taxonomic classification were confirmed with the support of different floras and proficient persons. The morphology of various parts of plant were carefully observed and declared in order to accurate identifications. The characters from the available literatures, several applications of plant parts and chemical metabolites occurs in them were also documented. The information of taxonomic positions counting family, genus and common name of four medicinal plants chosen in the current analysis were documented in table 1

Preparation of Extracts:

The leaves of selected therapeutic plant in present study such as *Achyranthus aspera, Erythrina indica* Linn., *Curculigo orchioides* Gaertn., and *Rauvolfia sarpentina* (L.) Benth. ex Kurz cut into smallest sections, shade dried and powdered. The consequential crush was afterward subjected for successive extraction through ethanol and methanol with Soxhlet apparatus. The extracts were subsequently concentrated in vacuum under condensed pressure using revolving flash evaporator, dried up in desiccators and maintenance in refrigerator at 4^{o}C till further use (Tanwer*et. al.*, 2010). The extractive standards were deduced with the following formula: Yield (%) = Dry weight of extract/Dry weight of plant powder×100.

Phytochemical Screening:

The detection of the phytochemical components in plant extracts, standard techniques were conducted. To formulate assured qualitative test, the consequent reagents and chemicals were used to ensure the existence of chemical constituents in crude extracts of plant part such as concentrated HCl for Flavonoids, Mayer's reagent for Alkaloid, Foam formation trial for Saponins, Sulphuric acid for Steroids, Folin-Ciocalteu reagent for Phenolic compound and Molish reagent with sulphuric acid for Carbohydrate (Ghani, 2003; Trease and Evans, 1978). In each examination 10% (w/v) solution of extract was taken unless otherwise affirmed in specific test. The phytochemical components were recognized by precise observing the characteristic color transformations and other notable incidence.

Qualitative phytochemical analysis:

Determination of Alkaloids: Mayer's test: The combination of the extract and dilute hydrochloric acid (each 0.2 ml) were use in a test pipe. Afterward 0.1 ml of Mayer's reagent was added. The precipitate of yellow color was formed that designated the incident of alkaloids.

Determination of Flavonoids: A little drops of strong hydrochloric acid was mixed on in 1 ml of relevant plant mixture isolate. The express development of a red color designated the incidence of flavonoids.

Determination of Phenolics: The whole phenolic import in different extracts of chosen plants sample were predictable using customaries methods such as Folin-Ciocalteu reagent consequently. The 20 µl of the plant extracts (suspended in the particular solvents) were taken in a test pipe and ready up to the amount of 1.0 ml using distilled water. Consequently 0.5 ml of freshly prepared Folin-ciocalteu phenol reagent (1:1 with water) and 2.5 ml of 20 % sodium carbonate mixture were added sequentially in each tube. Subsequently the solution was mixed comprehensively and left in the dark area for 40 min for color development.

Determination of Steroids: Sulphuric acid Examination: The equal amount of solution of plant extracts and Sulphuric acid was thoroughly mixed, instant appearance of red color specifies the occurrence of steroid.

Determination of Saponins: The solution of the 1 ml extracts was diluted with distilled water upto 25 ml and shaken in a graduated cylinder for 20 minutes. Consequently, development of foam confirmed the incidence of saponins.

Determination of gums and Carbohydrate: The 2 ml solution of the particular plant extracts was used in trial tubes and subsequently Molish reagent and sulphuric acid were added with thoroughly combination. If the red violet sphere was not observed at the connection of two fluids, therefore it was clear that carbohydrate was not present in the extracts. However, if it appeared considered as positive test.

Table 1. Taxonomical classification of some selected medicinal plant

S. N.	**Name of medicinal plant**	***Achyranthus aspera***	***Erythrina indica* Linn.**	***Curculigo orchioides* Gaertn.**	***Rauvolfia sarpentina* (L.) Benth. ex Kurz**
1	Kingdom	Plantae	Plantae	Plantae	Plantae
2	Division	Mangoliophyta	Magnoliophyta	Magnoliophyta	Magnoliophyta
3	Class	Mangoliophsida	Magnoliopsida	Liliopsida	Magnoliopsida
4	Order	Caryophyllales	Fababales	Liliales	Gentianales
5	Family	Amaranthaceae	Fabaceae	Liliaceae	Apocynaceae
6	Genus	*Achyranthes*	*Erythrina*	*Curculigo*	*Rauvolfia*
7	Species	*Aspera*	*indica*	*orchioides*	*sarpentina*
8	English/ common name	Prickly chaff flower/Aaghada	Indian Koral tree/ Pangara	Golden Eye-Grass/Kali Musli	Indian snakeroot/Devil peppers

Results and Discussion:

The account on phytochemical provides the indication for encourage study of crude drug. The ethanol, and methanol solvents were used in order to extract the plant secondary metabolites that can be solubilized in these two diverse solvents. The Soxhlet extraction practice is proficient technique to achieve complete metabolites since of repetitive extract of the substance with the solvent system. The crude extracts were subjected for chemical group trials and recognized numerous class of important chemical constituents. The different group

tests and results are presented in table 2. Total of six phytochemicals were examined in two different plant extracts displayed presence and absence of their activity.

With qualitative phytochemical estimation in current investigation, it found that 60.41% were present, however 39.58 % were absent in selected four plant species with both the extracts (Table 2). Furthermore, it was substantiate that the positive trails of phyto constituents detection were more specially in *Erythrina indica* and *Rauvolfia sarpentina* plant sample, on the other hand it was less in *Achyranthus aspera* and *Curculigo orchioides.* It was found that occurrence of phytochemicals was very less detected in *Achyranthus aspera* comparatively than selected other plant samples in the study (Table 2).

Table.2. Qualitative estimation of different phytochemicals in Ethanol and Methanol extracts of selected medicinal plants

SN	**Phyto-chemicals**	***Achyranthus aspera***		***Erythrina indica* Linn**		***Curculigo orchioides* Gaertn.**		***Rauvolfia sarpentina* (L.) Benth. ex Kurz**	
		Methanol	Ethanol	Methanol	Ethanol	Methanol	Ethanol	Methanol	Ethanol
1	Alkaloids	-	+	-	+	+	+	+	+
2	Flavonoids	+	-	+	+	-	-	+	+
3	Phenolic compound	+	-	+	+	+	+	-	+
4	Steroids	-	-	-	+	-	-	-	+
5	Saponins	-	+	+	-	+	-	-	+
6	Carbohydrates	+	-	+	+	+	-	+	+

The medicinal plants are extremely rich in antioxidants. Antioxidants extensively holdup or avoid oxidation of oxidizable substrates while present at minor concentrations than the substrate. These are the special phytoconstituents which can trap the free radicals and delay the oxidative harm (Yamagishi and Matsui, 2011). Hence, they are superior supply of natural produce for the management of age-connected sicknesses (Wu et al., 2011). The flavonoids are water soluble phytochemical showing the antioxidant, anticancer and anti-inflammatory activities. These avoid cells from oxidative damage and carcinogenesis. Flavonoids are additionally used to treat several heart connected diseases (Hussain *et al*., 2011). However, flavonoids are chemical phenylbenzopyrones, which, typically conjugated with sugars, are present in every vascular plants (Zanoli et al., 2000). Flavonoids were found in the aqueous extracts of plant and are potent water soluble antioxidants (Borhade, 2012). The phenols and phenolic compounds avoid the platelest from clumping and have the capability to obstruct particular enzyme that cause inflammation; these are antioxidant, immune enhancer andhormone modulators and are furthermore used for curing skin infection and other wounds (Hussain *et al*., 2011). The incidence of phenols is believed noxious for the growth and development of various pest and pathogens (Singh and Sawhney, 1988). The alkaloids and their derived are used as fundamental medicinal mediators for their analgesic, antispasmodic and bactericidal activities (Harisaranraj *et al*., 2009). Saponins are glycoside of both triterpenes and sterols and have been distinguished in over 70 families of plants. Several of the characteristics of saponins comprise formation of foams in aqueous solutions, hemolytic activity, cholesterol binding properties and bitterness (Sodipo et al., 2000).

E. indica leaves extract shows the presence of glycosides, flavonoids, saponins, tannins, alkaloids, steroids and phenol. In earlier studies, the presence of alkaloids, flavonoids, sterols, triterpenoids and carbohydrates were also reported by phytochemical analysis (Pandaya, *et al.*, 2012; Amir *et al.*, 2011). The major constituents found in *Curculigo* species comprise phenols, phenolic glucosides, terpenoids, and norlignans (Nie *et al*., 2013). Accordingly, the phenolic compound was positively tested in the current study (Table 2). Preliminary phytochemical screening of methanolic extract of *Phlogacanthus thyrsiflorus* exposed the presence of different bioactive ingredients such as tannin, saponins**,** phenol and flavonoids (Afrin et al., 2024). Many were tested positively in the present investigation in both the extracts. Phytochemical screening of ethanol and aqueous extracts of *Pteropyum scoparium* exposed the presence of alkaloids, glycosides, carbohydrates, amino acid, fats & fixed oils, phenolic compounds and tannins, proteins, phytosterols, saponins, gum & mucilage, terpenoids, coumarins and anthocyanins (Settaluri et al., 2024).

Conclusions :

To treat huge number of people there is an insistent need for an herbal drug that can be utilized to care for various diseases with enhanced cultural acceptability, compatibility with the physical body and minor side effects (Kumari et al., 2013). The medicinal plants were found prosperous in context of secondary metabolites, which are usually employed in conventional medicine to treat and battle a extensive range of illnesses. The consequences of this study again declare us that herbal plants have the prospective to become valuable medicines to substitute synthetic medicines. However, further study is still necessary to validate its efficacy as a harmless herbal remedy.

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