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Preliminary Phytochemical Screening of some Medicinal plants Around Akola district of Maharashtra

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ABSTRACT :

The phytochemical screening of the therapeutic plants are significant and have commercial attention in together research organizations and pharmaceutical companies for the improvement of the new drugs for management of various diseases. With rich biodiversity of medicinal plants in and around of Akola district of Maharashtra; the present investigation on four medicinal plants such as *Cissus quadrangularis*, *Vitex negundo* L, *Tinospora cordifolia* and *Ricinus communis*, were carried out. Total of six phytochemicals such as Flavonoids, Alkaloids, Saponins, Steroids, Phenolic compound and Carbohydrate were tested in two different plant extracts, showed presence and absence of their activity. For the screening of phytochemicals, Ethanol (ET) and Methanol (ME) extracts were used. During qualitative test, different standard methods were conducted in order to confirm the activity of relevant chemical compounds. The phytochemical screening showed that carbohydrates was found in entire plants in both the Ethanol and Methanol extracts. It was found that occurrence of phytochemicals were more in ethanol than methanol extract. Furthermore it was substantiate that the negative trails of alkaloid detection were more specially in *Tinospora cordifolia* and *Ricinus communis* plant sample. The present investigation supports the therapeutic importance of this selected plant and demonstrates that plant may be used as nutraceuticals for disease prevention and health promoting benefits.

Keywords: Antioxidants, phytoconstituents, ethanol extract, medicinal properties, synthetic drugs

Introduction

The phytochemistry is associated with several species of secondary metabolites produced in plants by biosynthesis and the natural combination of all these secondary metabolites gives the general advantageous therapeutic outcomes of that specific plant (Kharchouf et al. 2017); Verpoorte et al. 2017). The World Health Organization (WHO) states that the best source for a broad range of medications would be medicinal plants. In developed country, conventional medicines with constituents derived from medicinal plants are used by about 80% of citizens. To find out further about these plants' characteristics, protection, and usefulness, however, more investigation should be done (Arunkumar and Muthuselvam, 2009). Plants contain several dynamic compounds such as alkaloids, steroids, tannins, glycosides, volatile oils, phenols and flavonoids which are found in their definite parts such as leaves, flowers, barks, seeds, fruits, roots etc. Secondary metabolites play valuable role in treatment of diseases (Tonthubthimthong et al. 2001). However the tannins, steroids, sugars, terpenoids, alkaloids, and flavonoids are only a some of the chemical components found in therapeutic plants that have defined physiological effects on humans (Edoga et al. 2005; Mojab et al. 2003). 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 capability to synthesize complex chemical substances will advantage from information of the chemical components of plants (Parekh and Chanda, 2007; Parekh and Chanda, 2008a). The medicinal plants usually referred to as plants in which one or more of its parts contains essential phytochemicals that may be exploited for remedial reasons, or such that may be used as precursors in chemo-pharmaceutical synthesis (Bentley and Trimen, 2007). The occurrence of these phytochemicals in plants have been found to be very advantageous to human systems as most food consumed by human often enclose less amount of these biomolecules. Moreover their utilization consequences in far less side effects when compare to pharmaceutical synthetic drugs (Kennedy and Wightman, 2013). However the distribution of these phytochemical substances in different sections of the plant is different (Abdel-Mageed et al. 2019). Because of their diversity, dynamic chemicals vary among plants, and they have a distinct physiological effect on humans (Jithesh et al. 2006).

Photochemical analysis showed to comprise of metal ions, resveratrol, piceatannol, pallidol, parthenocissus, 31 methyl triacontanoic acid, taraxeryl acetate, taraxerol, phenol, tannin,

carotene, and vitamin. It also possesses novel flavonoids and indanes, phytosterols and keto- steroids which are useful and effective antioxidants (Zenebe et al., 2017; Sharp et al., 2007).

In view of broad usefulness of therapeutic plants in diverse fields especially phytochemically, medicinally, economically significance was one of the aims to undertake current phytochemical screening; Additionally very less accounts on phyotochemical evaluation of present selected medicinal plant in general and Akola region in particular, were published in literature. Therefore present study with selected four plant was conducted to screen secondary metabolites primarily.

Material and Methods

Study Region and Plant Materials

The plant sample were collected from the various regions of Akola district (Maharashtra) area. Akola is a district in the Indian state of Maharashtra. The city of Akola is the district headquarters. The Akola district forms the central part of Amravati Division, which was the former British Raj Berar province. The Area of the district is 5,428 km². It is bounded on the north and east by Amravati District, to the south by Washim District, and to the westby Buldhana District. The Akola district includes seven talukas which are Akola, Akot, Telhara, Balapur, Barshitakli, Murtijapur and Patur.

The morphological character observations and taxonomic classification were confirmed with the assistance of different floras and expert persons. Morphology of various parts of plant were observed and mentioned in order to precise identifications. The characters from the published literatures, numerous applications of plant parts and chemical metabolites occurs in them were also documented. The details of taxonomic positions including family, genus and common name of four medicinal plants selected in the present investigation were documented in table 1.

Preparation of Extracts

The leaves of chosen medicinal plant in current study such as *Cissus quadrangularis, Vitex negundo* L**,** *Tinospora cordifolia* and *Ricinus communis* cut into smallest pieces, shade dried and powdered. The resultant crush were subsequently subjected for successive extraction with ethanol and methanol with Soxhlet equipment. The extracts were afterward concentrated in vacuum under condensed pressure using revolving flash evaporator, dried up in desiccators and keeping in refrigerator at 4^{o}C till further use (Tanwer*et. al.*, 2010). The extractive values were deduced using following formula: Yield (%) = Dry weight of extract/Dry weight of plant powder×100.

Phytochemical Screening

The detection of the chemical constituents in plant extracts, standard methods were carried out. To make certain qualitative trial, the subsequent reagents and chemicals were used to ensure the existence of chemical constituents in crude extracts of plant material such as Concentrated HCl for Flavonoids, Mayer's reagent for Alkaloid, Foam formation test 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 every trial 10% (w/v) solution of extract was taken unless otherwise declared in particular test. The components were identified by precise observing the characteristic color changes and other remarkable incidence.

Qualitative phytochemical analysis

Determination of Flavonoids: A little drops of strong hydrochloric acid was add on in 1 ml of relevant plant mixture extracts. The rapid progress of a red color designated the presence of flavonoids.

Determination of Alkaloids: Mayer's test: The mixture of the extract and dilute hydrochloric acid (each 0.2 ml) were use in a test tube. Subsequently 0.1 ml of Mayer's reagent was added. The Precipitate of yellow color was

produced that designated the occurrence of alkaloids.

Determination of Saponins: The 1 ml solution of the extracts was diluted with distilled water to25 ml and shaken in a graduated cylinder for 20 minutes. Subsequently development of foam confirmed the incidence of saponins.

Determination of Steroids: Sulphuric acid trial: The identical quantity of solution of plant extracts and Sulphuric acid was thoroughly mixed, immediate emergence of red color indicates the occurrence of steroid.

Determination of Phenolics: The total phenolic substance in dissimilar extracts of selected plants were predictable using customaries procedure such as Folin-Ciocalteu reagent accordingly. The 20 µl of the plant extracts (suspended in the particular solvents) were taken in a test tube and made up to the quantity of 1.0 ml using distilled water. Subsequently 0.5 ml of recently prepared Folin-ciocalteu phenol reagent (1:1 with water) and 2.5 ml of 20 % sodium carbonate combination were added successively in each tube. Afterward the solution were mixedcomprehensively and left in the dark area for 40 min for color development.

Determination of gums and Carbohydrate: The 2 ml solution of the respective extracts was used in test tubes and then Molish reagent and sulphuric acid were added with thoroughly combination . As red violet circle was not observed at the connection of two fluids, therefore it was clear that carbohydrate were not present in the extracts.

Table 1. Taxonomical classification of some selected medicinal plant

S. N.	**Name of medicinal plant**	***Cissus quadrangularis***	***Vitex negundo*** L	***Tinospora cordifolia***	***Ricinus communis***
1	Kingdom	Plantae	Plantae	Plantae	Plantae
2	Sub-kingdom	Tracheobionta	Tracheobionta	*Traceophytes*	Tracheobionta
3	Division	Magnoliophyta	Magnoliophyta	Magnoliophyta	Magnoliophyta
4	Class	Magnoliopsida	Magnoliopsida	Magnoliopsida	Magnoliopsida
5	Order	Rhamnales	Lamiales	Ranunculales	Malpighiales
6	Family	Vitaceae	Lamiaceae	Minispermaceae	Euphorbiaceae
7	Genus	*Cissus*	*Vitex*	*Tinospora*	*Ricinus*
8	Species	*quadrangularis*	*negundo*	*cordifolia*	*communis*
9	English/ common name	Ghanasvel, Hadjod	Nirgundi	Guduchi	Castor bean

Results and Discussion

The phytochemical report provides the indication for promote 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 different solvents. The Soxhlet isolation procedure is competent technique to obtain entire metabolites since of repetitive extract of the material with the solvent system. The crude extracts were subjected for chemical group trials and identified severalcategory of significant chemical ingredients. The outcome of different group tests are given in table 1. Total of six phytochemicals were tested in two different plant extracts showed presence and absence of their activity. The phytochemical screening showed that carbohydrates was foundin entire plants in both the Ethanol and Methanol extracts (Table 2). It found that occurrence of phytochemicals were more in ethanol than methanol extract. It also substantiate that the negative trails of alkaloid detection were more specially in *Tinospora cordifolia* and *Ricinus communis* plant sample (Table 2). It was found that incidence of

confirmations of phytochemical in *Vitex negundo* and *Tinospora cordifolia* were more than *Cissus quadrangularis* and *Ricinus communis.*Among the six phytochemical trial, very less positive test were detected in alkaloids.

Table.2. Different Phytochemicals present in Ethanol and Methanol extracts of some medicinalplants

S. N.	Test	*Cissus quadrangularis*		*Vitex negundo* L.		*Tinospora cordifolia*		*Ricinus communis*	
		Ethanol	Methanol	Ethanol	Methanol	Ethanol	Methanol	Ethanol	Methanol
1	Flavonoids	+	+	+	-	+	+	+	+
2	Alkaloids	+	+	+	+	-	-	-	-
3	Saponins	+	+	-	+	+	+	+	-
4	Steroids	-	-	+	+	+	+	+	+
5	Phenolic compound	+	-	+	+	+	+	+	+
6	Carbohydrates	+	+	+	+	+	+	+	+

The medicinal plants possess therapeutic properties due to the occurrence of different complex chemical substance of several composition, which are found as secondary plant metabolite foundin one or more part of the plant (Patil et al. 2009). The findings was also reported a wide diversity in secondary metabolite spread among the 23 medicinal plants used in traditional medicine in Al Jouf. Furthermore, the ethnomedicinal significance of such 23 plants can be attributed to their content of secondary metabolites (Alhaithloul, 2023). There is constant and insistent need for innovation of new antimicrobial compounds with diverse chemical constitutions and novel mechanisms of action since of alarming increase in the prevalence of new and re-emerging communicable diseases (Parekh and Chanda, 2008b). The natural producesare recognized to play an important role in both drug discovery and chemical biology. In fact, several of the existing drugs either mimic naturally occurring molecules or have structures that are entirely or in part derived from natural motifs (Parekh and Chanda, 2008b).

The phenolic composites are one of the major and most ubiquitous groups of plant metabolites (Singh et al. 2007). They possess biological properties such as antiapoptosis, antiaging, anticarcinogen, antiinflammation, antiatherosclerosis, cardiovascular protection and improvement of endothelial function, as well as inhibition of angiogenesis and cell proliferation activities (Han et al., 2007). However, alkaloids are essential in medicine and several aspects of human life as diet constituents, supplements, and medications. The alkaloids are also significant substances in organic production for the improvement of novel semi synthetic and synthetic drugs with potentially superior biological activity than their parent compounds (Patel et al. 2012). However the phenolic compounds are one of the major and most ubiquitous groups of plant metabolites (Singh et al, 2007). They possess biological properties such as antiapoptosis, antiaging, anticarcinogen, antiinflammation, antiatherosclerosis, cardiovascular protection and improvement of endothelial function, as well as inhibition of

angiogenesis and cell proliferation activities (Han et al, 2007). Several reports have described the antioxidant properties of medicinal plants which are rich in phenolic compounds (Brown and Rice-Evans, 1998; Krings and Berger, 2001). Natural antioxidant mostly come from plants in the form of phenolic compounds such as flavonoid, phenolic acids, tocopherols etc. (Ali et al, 2008).

Several investigations have expressed the antioxidant properties of medicinal plants which are rich in phenolic compounds (Brown and Rice-Evans, 1998; Krings and Berger, 2001). The symptoms of COVID-19 such as cough, cold, and tonsil are prevented by this medicinal plant with its anti-inflammatory properties (Rais et al. 2020). However *Vitex negundo* has been conventionally used in ayurvedic medicine to treat numerous disorders such as catarrh, headache, neck gland sores, tubercular neck swellings, sinusitis, sexual debilities, nervous debility, liver complaints, inflammation of uterus, fever, diarrhea etc (Ladda and Magdum, 2014). The polarity of extraction solvent influence the composition of phytochemicals in the crude extract (Abdel- Aal et al., 2015; Awotedu et al., 2020) and methanol is a good extraction solvent to isolate phytochemicals (Abdel-Aal et al., 2015; Rajkumar and Bhavan, 2017; Ramarajan and Janakiraman, 2019). Moreover in same way report also confirmed that majority of phytochemicals were extracted by the methanol (Munir et al, 2020). The present investigation also documented slight similar outcomes in the confirmation of saponins, phenolic compound and carbohydrates.

Conclusion

The preliminary phytochemical analysis of selected four medicinal plants had exposed thepresence of various phytoconstituents such as alkaloids, flavanoids saponin, steroid, carbohydrate, and phenolic compounds. The account may be useful in the separation and characterization of active phytoconstituents for bioactivity and have immense significance as therapeutic agents (Amin *et al.*, 2017). The pharmacological activity of every plant is useful due to existence of chemical constituents. The conclusion of the study could be useful in setting several diagnostic indices for the identification and preparation of a monograph of the plant. Additionally, future investigations need to focus on identifying bioactive molecules present in medicinal plant extracts and its molecular mechanisms underlying the cytotoxic, antioxidant and more functions.

References

Abdel-Aal E.I., Haroon A.M. and Mofeed J. (2015) Successive solvent extraction and gc–ms analysis for the evaluation of the phytochemical constituents of the filamentous green alga *spirogyra longata*. Egypt J Aquat Res., 41: 233-246.

Abdel-Mageed A.M., Osman A.K.E., Awad N.S. and Abdein M.A. (2019) Evaluation of Antidiabetic Potentiality of Truffles and Balanites Aegyptiaca among Streptozotocin Induced Diabetic Rats. International Journal of Pharmaceutical Research and Allied Sciences, 8:53-58.

Alhaithloul H.A.S. (2023) Phytochemical Screening of Some Medicinal Plants in Al Jouf, KSA.Open Journal of Ecology. 13: 61-79. https://doi.org/10.4236/oje.2023.132006

Ali S.S., Kasoju N., Luthra A., Singh A., Sharanabasava H., Sahuand A. and Bora U. (2008) Indian medicinal herbs as source of antioxidants. Food Res. Int., 41: 1-15.

Amin Henna, Wakode Sharad and Tonk R.K. (2017) *Feronia limonia* –a wonder drug. World Journal of Pharmacy and Pharmaceutical Sciences, 6(4):1982-1994.

Arunkumar S. and Muthuselvam. (2009) Analysis of phytochemical constituents and antimicrobial activities of *aloevera* L. against clinical pathogens. World J. Agril. Sc., 5(5): 572- 576.

Awotedu O., Okeke U., Ogunbamowo P., Ariwoola O. and Omolola T. (2020). Extraction of phytochemical compounds of *Leea guineensis* (g. Don) leaves using non-polar and polar solvents. Eur J Med Plants., 24-31.

Bentley R. and Trimen H. (2007) Medicinal Plants. International Journal of PharmTech Research, 4 (4):478–480.

Brown J.E., Rice-Evans C.A. (1998) Luteolin rich artichoke extract protects low density lipoprotein from oxidation in vitro. Free Radical Res., 29: 247-255.

Edoga H.O., Okwu D.E. and Mbaebie B.O. (2005) Phytochemicals constituents of some Nigerian medicinal plants. Afr. J. Biotechnol., 4 (7): 685-688.

Ghani A. (2003) Medicinal Plants of Bangladesh. Asiatic Society of Bangladesh, 2nd edition, pp.1-16,138.

Ghani A. (2003) Medicinal Plants of Bangladesh. The Asiatic Society of Bangladesh, Dhaka, Bangladesh, 2nd edition, pp 603.

Han X., Shen T., Lou H. (2007) Dietary polyphenols and their biological significance. Int. J. Mol. Sci., : 950-988.

Jithesh M.N., Prashanth S.R., Sivaprakash K.R. and Parida A.K. (2006) Antioxidative Response Mechanisms in Halophytes: Their Role in Stress Defense. Journal of Genetics, 85: 237. https://doi.org/10.1007/BF02935340.

Kennedy D.O. and Wightman E.L. (2013) Herbal Extracts and Phytochemicals: Plant SecondaryMetabolites and the Enhancement of Human Brain Function. Advances in Nutrition, 2: 32–50.

Kharchouf S., Bouchador A., Drioiche A., Khiya Z., Hilali F.E. and Zair T. (2017) Étude phytochimique et évaluation de l'activité antioxydante de *Stevia rebaudiana*. Phytothérapie. 2nd ed. Lavoisier.:1-7. https://doi.org/10.1007/s10298-017-1163-7

Krings U. and Berger R.G. (2001) Antioxidant activity of roasted foods. Food Chem., 72: 223- 229.

Ladda P., Magdum C.S. (2014) *Vitex negundo* Linn: ethanobotany, phytochemistry and pharmacology-a review. Int J Adv Pharm Biol Chem;1:111-20.

Mojab F., Kamalinejad M., Ghaderi N. and Vanidipour H.R. (2003) Phytochemicals screening ofsome species of Iranian plants. Iran. J. Pharm. Res., 3: 77-82.

Munir M., Khan A. M., Qureshi R., Murtaza S., and Munazir M. (2020) Preliminary Phytochemical Screening, Proximate Analysis, Antioxidant and Antibacterial Activities of an Algal Species of *Hydrodictyon Reticulatum.* Journal of Bioresource Management, 7 (4). https://doi.org/10.35691/JBM.0202.0147

Parekh J. and Chanda S. (2007a) Antibacterial and phytochemical studies on twelve species ofIndian medicinal plants. Afr. J. Biomed. Res., 10: 175-181.

Parekh J. and Chanda S. (2008a) Phytochemicals screening of some plants from western regionof India. Plant Arch., 8: 657-662.

Parekh J. and Chanda S. V. (2008b) Antibacterial activity of aqueous and alcoholic extracts of 34 Indianmedicinal plants against some *Staphylococcus* species. *Turk J Biol* 32: 63-71.

Patel K., Gadewar M., Tripathi R., et al. (2012) A Review on Medicinal Importance, Pharmacological Activity and Bioanalytical Aspects of Beta-Carboline Alkaloid ‘‘Harmine’’. Asian Pacific Journal of Tropical Biomedicine, 2:660-664. https://doi.org/10.1016/S2221- 1691(12)60116-6

Patil S B., Naikwade M. N. S., Magdum C. S. (2009) Review on phytochemistry and pharmacological aspect of *Euphorbia hirta* Linn. *JPRHC* 1:113-133.

Rais A., Kumar T., Yadav A, Negi D.S. (2020) Management of a mild COVID-19 infection through Ayurvedic intervention: A case report. J Ayurveda Case Rep;3:91.

Rajkumar G. and Bhavan P.S. (2017) Phytochemical characterization of the marine brown alga *Turbinaria ornata*. Res J Chem and Environ., 21(3): 54-63.

Ramarajan S. and Janakiraman V. (2019). Quantitative phytochemical analysis of differentsolvent extracts of *Turbinaria ornata-a* marine macroalgae. Res J Pharm Tech., 12(1): 108-112.

Sharp H., Hollinshead J., Bartholimew B.B., Oben J., Watson A., and Nash R.J. (2007) Inhibitory effects of *Cissus quadrangularis* L. derived components on lipase, amylase and a- Glucosidase activity in vitro. Nat. Prod. Commun. 2, 817–822. https://doi.org/10.1177/1934578X0700200806.

Singh R., Singh S.K., Arora S. (2007) Evaluation of antioxidant potential of ethyl acetateextract/fractions of *Acacia auriculiformis* A. Cunn. Fod Chem. Toxicol., 45: 1216-1223.

Singh Y., Mishra P., Kannojia P., Singh P.K. and Gangwar A.K. (2022) Phytochemical screening of different extracts of *Vitex Negundo* Leaves. European Journal of Molecular and Clinical Medicine, 09(7): 8448-8453.

Sureshkumar V. (2021) Phytochemical Screening and Thin Layer Chromatography Profiling of Various Extracts of *Achyranthes aspera* and *Cissus quadrangularis.* The Journal of Phytopharmacology; 10(4):225-229.

Tanwer B.S., Choudhary R. and Vijayvergia R. (2010) *In-vivo* and *in-vitro* comparative study of primary metabolites and antioxidant activity of *Andrographis paniculata*. J chem Pharm Res. 2(2);489-495.

Tonthubthimthong P., Chuaprasert S., Douglas P., Luewisuttichat W. (2001) Supercritical CO_2extraction of nimbin from neem seeds an experimental study. J Food Eng;47:289-293.

Trease M.T. and Evans S.S.E. (1978) The Phytochemical analysis and antibacterial screening ofextracts of *Tetracarpetum conophorum*. J. Chem. Sci Nig. 26: 57-58.

Undal V. S. (2019) Preliminary phyotochemical screening of *Limonia acidissima* Linn. Reviewof Research. 1(3):66-70.

Verpoorte R., Choi Y.H. and Kim H.K. (2017) NMR-based metabolomics at work inphytochemistry. Phytochemistry Reviews. 6(1):3-14. https://doi.org/10.1007/s11101-006-9031-3

Zenebe S., Feyera T. and Assefa S. (2017) In vitro anthelmintic activity of crude extracts of aerial parts of *Cissus quadrangularis* L. and leaves of *Schinus molle* L. against *Haemonchus contortus.* Biomed Res. 190598. https://doi.org/10.1155/2017/1905987