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PHYTOCHEMICAL ANALYSIS OF SOME SELECTED MEDICINAL PLANTS IN NANDURBAR DISTRICT(M.S)

Milind Kashinath Patel[1]*, Anil Gokul Beldar[2]

[1*]Associate Professor,Department of Chemistry,P.S.G.V.P.Mandal's S.I.Patil, G.B.Patel Science and S.T.K.V.S.Commerce College, Shahada, (M.S.)-425409

[2]Assistant Professor,Department of Chemistry,P.S.G.V.P.Mandal's S.I.Patil, G.B.Patel Science and S.T.K.V.S.Commerce College,Shahada,(M.S.)-425409

ABSTRACT:
Many bioactive compounds present as phytochemicals in plants are commonly used as traditional herbs by local people to cure many disorders of infectious, non-infectious, genetic, metabolic, neoplastic that do not currently have a cure. The phytochemical research approach is considered to be effective in discovering bioactive profile of plants of therapeutic importance.The objective of the present study was to screen such bioactive compounds and mineral content in three selected plants like *Abutilon indicum(L.), Aegle marmelos (L.),Vitex negundo.* Flavonoids,saponins, tannins, coumarins, minerals are present abundantly in all the three plant species. In conclusion, the plants studied are found to be rich in phytochemicals and can be used for significant pharmacological applications.This article also reviews the research work performed on the plants to publish its phytochemistry. Further research of these plants can prove to be beneficial for the improvement of human health and help in combating several other disorders.

KEYWORDS: bioactive compounds, phytochemicals, coumarins, flavonoids, tannins,minerals.

INTRODUCTION:

Plants are source of natural products for developing therapeutic agents. The traditional Indian Ayurveda system and Chinese medicines have such reports[1]. Around 75,000 plants from lichens to trees are having the potential to treat various illnesses[2]. As per WHO, 21,000 medicinal plants are used by traditional practitioners in rural areas. More than 100 genera of plants used in medicinal practices belong to India. So India provides the best quality and quantity of medicinal plants and ranks second in terms of export. It is one of the 12 mega biodiversity hot spots of the world with 16 agro-climatic zones. Out of 45,000 plants, 7000 plant species are recognized as medicinal plants[3].A continuous utilization of natural drugs has increased their impact globally in healthcare and modern medical services[4]. About 80% of the global population depends on medicines derived from natural products . So many developing countries are exploring the use of herbal medicines for the last few decades. The practice of herbal medicines in China, Egypt, India and Syria for more than 5000 years shows the importance. Hence, it becomes necessary to bring a broad interdisciplinary approaches for the development of novel drugs. The classical Indian texts like Rigveda, Atharva Veda, Charaka Samhita and Sushruta Samhita also depicts the uses of herbal medicines[5].

In this paper, we put an overview of the locally found plants *Abutilon indicum (L.), Aegle marmelos (Linn.), Vitex negundo* and describe the phytochemicals and pharmacological benefits of these three Indian medicinal plants. (Table 1.)

Table 1 : Ethnobotanical information of selected medicinal plant species

S.No.	Plant species	Local name	Parts used
1	Abutilon indicum	Atibala	Leaves
2	Aegle marmelos	Bael	Fruits
3	Vitex negundo	Nirgudi	Leaves

Plant metabolites are of two types; primary and secondary. Primary metabolites such as amino acids, proteins, sugar, nucleic acids and polysaccharides are involved in growth and development. The secondary metabolites are derived from the primary metabolic pathways but not involved in growth. These secondary metabolites are widely used as traditional medicines[6]. Many drugs derived from the secondary metabolites are simple modifications of these naturally obtained substances[7]. Nicotine, pyrethrins, and rotenone are commonly used as pesticides[8].Tannins acts as an astringent[9]. Quinones are used as antimicrobial agents[10] while some of the secondary metabolites are used as a pharmacological tools to study various biochemical processes[11].Commercial importance of secondary metabolites has acquired a great interest in analysis as well as in production of these natural products and is extensively investigated as a source of medicinal agents[12]. In the present study, three medicinally important plant species *Abutilon indicum (L.), Aegle marmelos (L.), Vitex negundo* were qualitatively screened for phytochemicals using standard tests.

Abutilon indicum (L.) is an aromatic herb in the Malvaceae family locally known as Atibala or Country mallow and found in arid regions of India, Bangladesh,Pakistan and Srilanka.(Fig.1)The extracts are used to treat wounds, ulcers, urinary infections, diabetes, piles. Locally it is also used in treatment of cold, fever, tuberculosis, bronchitis, diarrhea[13]. The leaves are demulcent and hence used as an eyewash, mouthwash, toothache, tender gums and gonorrhea[14].

Fig. 1- Plant parts of *Abutilon indicum (L.)*

Leaves of Abutilon indicum (L.)

Aegle marmelos (L.) belongs to Family Rutaceae and locally known as Bael.**(Fig.2)** It has a tremendous therapeutic potential in cure of diarrhea, dysentery, constipation, peptic ulcer and respiratory infections. Plant is also used as anti-diabetic, anti-microbial, anti-inflammatory, anti-pyretic, analgesic, cardio-protective, anti-spermatogenic, anti-cancer and radio-protective[15].Bioactive components like eugenol, lupeol, cineol, citronellal, fagarine, limonene, citronellal, betulinic acid, imperatorin and cineole cuminaldehyde, marmesin,auraptene, skimmianine, citral, luvangentin, anhydromarmelin, aegeline, marmesinine, marmelosin, marmelin, marmelide, psoralen, scopoletin were found to be present in the plant.

Vitex negundo (Family: Verbenaceae) is usually called as Nirgundi **(Fig.3)**. In India it is widely grown in wastelands at hotter zones, ascending to an altitude of 1500m in outer western Himalayas[16]. The decoction of leaves is used in the cure of leucoderma, toothache inflammation, eye-disease, enlargement of the spleen, skin-ulcers, in catarrhal fever, gonorrhea, rheumatoid arthritis and bronchitis. The extracts also exhibit antioxidant, antibacterial, anti-inflammatory, anti-pyretic and anti-histaminic properties[17].

Fig. 2- Plant parts of *Aegle marmelos (L.)*	Fig. 3- Plant parts of *Vitex negundo*
	
Fruits, Seeds, Leaves	**Leaves, Flowers**

MATERIALS AND METHODS:

Plant Material

The required plant parts of the selected sps. were collected from Shahada region of Nandurbar district, Maharashtra and authenticated by Department of Botany, PSGVP Mandal's ASC College, Shahada, Dist-Nandurbar (MS), India.

Extraction of plant material

Dried plant material was ground to powder and kept in labeled bottles. 10 gm of ground material was weighed and dissolved in a 50 ml of sterile water and then boiled at 60-70°C for 50 minutes on water bath. Then the extract was filtered through Whatman filter paper and centrifuged at 2500 rpm for 20 minutes. Finally the extract was stored in sterile bottles at 4-8°C for further analysis using standard methods of Phytochemical Analysis for secondary metabolites[18,19,20].

Phytochemical analysis

Preliminary qualitative screening for phytochemicals was carried out using the following methods.

Test for Coumarins

2 ml of extract was treated with 3 ml of 10% NaOH. The formation of yellow color indicated the presence of coumarins**.**

Test for Anthocyanins

2 ml of extract was treated with 2 ml of 2N hydrochloric acid and ammonia was added to it. The appearance of pink-red color turning blue-violet indicated the presence of anthocyanins.

Test for Leucoanthocyanins

5 ml of extract was allowed to react with 5 ml of isoamyl alcohol. Appearance of upper layer red in color indicated the presence of leucoanthocyanins.

Test for Fatty acids

0.5 ml of extract was added to 5 ml of ether and allowed to evaporate on filter paper. Then the filter paper was dried and observed. The appearance of transparency on filter paper indicated the presence of fatty acids.

Test for Steroids *(Libermann Burchard Test)*

1 ml of extract was dissolved in 10 ml of chloroform. To this mixture equal volume of concentrated sulfuric acid was added by sides of the test tube. The upper layer becomes red while lower layer of sulfuric acid turns yellow in color with green fluorescence indicating the presence of steroids.

Test for Saponins *(Foam test)*

2 ml of extract was taken in a test tube and 6 ml of distilled water was added to it. The mixture was then shaken vigorously. The persistence of foam indicated the presence of saponins.

Test for Terpenoids *(Salkowski test)*

2 ml of extract was treated with 2 ml of acetic anhydride. Few drops of concentrated sulfuric acid was then added to this solution and observed. The formation of blue, green rings indicates the presence of terpenoids.

Test for Quinones

1 ml of extract was added to the 2 ml of dilute NaOH. Formation of blue green or red coloration confirms the presence of quinones.

Test for Tannins *(Braymer's test)*

2 ml of extract was allowed to react with 10% alcoholic ferric chloride solution. Formation of blue or greenish color of the solution indicated of the presence of the tannins.

Test for Phlobatannins *(Precipitate test)*

About 2 ml of extract was added to 2 ml of 1% aqueous hydrochloric acid and the mixture was boiled. Deposition of a red precipitate confirmed the presence of phlobatannins.

Test for Phenolic Compounds *(Ferric chloride test)*

Few drops of the extract were treated with 5% aqueous ferric chloride. Formation of deep blue or black color indicated the presence of phenolic compounds.

Test for Flavonoids *(Alkaline reagent test)*

2 ml of extract was treated with few drops of 1N NaOH solution and observed.The formation of intense yellow color becomes colorless on addition of dil. HCl, indicating the presence of flavonoids.

Test for Alkaloids *(Mayer's Test)*

2 ml of extract was treated with 2 drops of Mayer's reagent. Presence of white creamy precipitate indicated the positive test.

Determination of Ash content

5 g of each plant sample was taken and weighed accurately in a clean silica dish. The dish was first heated over a low flame. Then the dish was transferred to a muffle furnace maintained at 300^0C-450^0C for 3-5 hours. The ash residue obtained was then cooled in desiccator and weighed. The percentage of total ash content was calculated[21].

RESULTS AND DISCUSSION:

Three plants *Abutilon indicum (L.), Aegle marmelos (L.), Vitex negundo* were screened for their phytochemical constituents and percent ash content. All the plants were found to have phytochemicals that were easily detected by qualitative tests. The analysis revealed that *Abutilon indicum* is rich in phytochemicals like flavonoids, phenolic acids, sterols, triterpenes, coumarins, quinones, coumarins, alkaloids, lactones, tannins etc. *Aegle marmelos* is rich in constituents like alkaloids, coumarins, polysaccharides, tannins flavonoids, saponins etc.,whereas *Vitex negundo* is rich in favonoids, diterpenes, flavonoids, phenolic acids.**(Table 2)**.

All plant samples contained abundant amount of flavonoids. From the literature survey it was found that Flavonoids are associated with a broad spectrum of health-promoting effects and are an components in a variety of nutraceutical, pharmaceutical, medicinal and cosmetic applications. This may be due to their antioxidative, anti-inflammatory, anti-mutagenic and anti-carcinogenic properties. They are also known to be potent inhibitors for several enzymes, such as xanthine oxidase, cyclo-oxygenase, lipoxygenase and phosphoinositide 3-kinase[22-24].

According to literature, it has been concluded that coumarins possesses pharmacological properties like anticoagulant, antimicrobial, anti-inflammatory, analgesic, antidiabetic, antioxidant, hepato-protective, antioxidant, anticancer, antiviral and antimalarial activities.[25] Quercetin, plays an important role in diabetes.It could be used to successfully prevent some of the clinical complications of diabetes. It also regenerates pancreatic islets and increases insulin levels by stimulating Ca^{2+} uptake from isolated islet cells[26]. Alkaloids and phenolic compounds are associated with antidiabetic properties[27] as well as anti-inflammatory, antimicrobial, and antioxidant effects[28].Tannins are reported to have cardio-protective, antimutagenic, anti-inflammatory, anti-carcinogenic properties and are also involved in treatment of non-insulin dependent diabetes mellitus[29].Saponins also show antidiabetic properties, lowers the serum cholesterol levels[30] and has cytotoxic effects on malignant cells[31].Quinones has the most striking feature that it shows antitumor and immunomodulatory activities[32]. And also has antimicrobial, anticancer, antiviral and antibacterial properties[33].

The main purpose to work out the ash content was to find the total amount of minerals present in plant samples. Among the three plants tested, *Aegle marmelos* showed highest percentage of the ash content **(Table 3)**. Minerals are used as coenzymes and cofactors in the biochemical processes[34]. Therefore it was necessary to evaluate the mineral values in the extract.

Table 2: Preliminary phytochemical analysis of screened medicinal plant species

S.No	Phytochemicals	*Abutilon indicum*	*Aegle marmelos*	*Vitex negundo*
1	Alkaloids	-	+	-
2	Phenolic Compounds	+	-	+
3	Flavonoids	+	+	+
4	Saponins	+	+	-
5	Tannins	+	+	+
6	Phlobatannins	-	-	-
7	Coumarins	+	+	+
8	Anthocyanins	-	-	-
9	Leucoanthocyanins	-	-	-
10	Terpenoids	+	-	+
11	Steroids	+	-	-
12	Fatty acids	-	-	-
13	Quinones	+	-	-

Table 3: Analytical data for ash content of screened medicinal plant species

Sr. No	Plant sps.	Ash Content
1	*Abutilon indicum*	2.5
2	*Aegle marmelos*	5.1
3	*Vitex negundo*	3.0

CONCLUSION:

The existing literature of Indian herbal plants is used to describe effectiveness against a particular disease. In this paper, we have discussed commonly used plants which can grow in all seasons with special mention to the therapeutic efficacy of its parts and screened metabolites. Among the plants studied, *Abutilon indicum* (root, leaves, seeds, and bark), *Aegle marmelos* (leaves, fruits and stem), *Vitex negundo* (leaves, fruits, flowers, and seed) have accounted for the majority of plant part benefits. The plant parts such as leaves and flowers are the main source of phytochemicals, whereas the fruits, seeds, stem, root, and rhizome are considered as an ancillary source having a broad spectrum of benefits. The increasing awareness among people today about the unwanted side effects of allopathy medicines is a step for better understanding and exploiting natural plant products for human welfare.Further research of these plants is necessary to isolate the active phytoconstituents and standardize the drugs for the betterment of human health in this modern era.

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