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Preliminary Phytochemistry of Grangea Maderaspatana L. From Family Asteraceae

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Abstract:
Grangea maderaspatana L. is a popular Indian medicinal plant belonging to the Asteraceae family. This plant is commonly known as Madras Carpet growing in sandy lands and waste places. It is reported to contain flavonoids, diterpenes, sesquiterpenoids, steroid, and essential oil. The herb is good for pain in the eyes and ears. The root is an appetizer; astringent to the bowels, diuretic, anthelmintic, Emmenagogue, galactagogue, stimulant; useful in griping, in troubles of the chest and lungs, headache, Paralysis, rheumatism in the knee joint, piles, pain in the muscles, diseases of the spleen and the liver, the troubles of the ear, the mouth and the nose; lessens perspiration (Unani). The plant is stomachic and uterine stimulant. Secondary metabolites are also differing from primary metabolites in having restricted distribution in the plant kingdom. Secondary metabolites are found throughout the plant kingdom. Herbal medicines play an important role in health care programs in the developing countries.

Keywords: Madras Carpet, astringent, galactagogue, secondary metabolites, medicinal plants, etc.

Introduction:

Phytochemicals (Greek: phyton = plant) are chemical compounds naturally present in the plants attributing to positive or negative health effects. Medicinal plants used in different diseases and ailments are the richest bio reservoirs of various phytochemicals. The medicinal properties of the plants are determined by the phytochemical constituents. Some of the important phytochemicals include alkaloids, flavonoids, phenolics, tannins, saponins, steroids, glycosides, terpenes, etc. which are distributed in various parts of the plants. Nature is a unique source of structures of high phytochemical diversity representing phenolics (45%), terpenoids and steroids (27%) and alkaloids (18%) as major groups of phytochemicals. Although, these compounds seem to be non-essential to the plant producing them, they play a vital role in survival by mediation of ecological interactions with competitors, protect them from diseases, pollution, stress, UV rays and also contribute for colour, aroma and flavour with respect to the plant. The metabolites produced by the plants to protect themselves against biotic and abiotic stresses have turned into medicines that people can use to treat various diseases.

Photochemistry is a branch of science that deals with the study of chemicals obtained from plants with desirable biological activities. These phytochemicals are mainly the secondary metabolites offering medicinal attributes to the plants. Amongst the indefinite plants claimed for their medicinal potential, *Grangea maderaspatana* L. belonging to family Asteraceae is screened for its biochemical Contents.

It will be recalled that in the food chain, plants are referred to as the producers because they had the ability to trap energy from sunlight, harness and assemble some basic units which they transform through some chemical process in to complex high energy-yielding compounds that are readily available to

organisms. Their generosity became overwhelmingly and practically complex to comprehend at a glance. A field has to emerge – "phytochemistry." Phytochemistry is the study of chemicals produced by plants, particularly the secondary metabolites. It takes into account their structural composition. The biosynthetic pathways, functions, and mechanisms of actions in the living system. The study of phytochemicals has been instrumental in the discovery of new plant natural products which are of commercial values in various industries such as the traditional and complementary medicine Systems, pharmaceutical industries, nutraceuticals, and dietary supplement Industries (Hopkins 1995).

Unlike the primary metabolites the secondary metabolite absence does not leads to instantaneous fatality. However, there may be an impairment of organism survivability and fecundity in long term. They are often constrained to a narrow set of species with in a poly-genetic group and often play a vital role in plant defense against other species and herbivores. They are also useful to human beings as recreational drugs, medicines and flavorings. Most of the secondary metabolites of interest to human kind fit into categories which classify secondary metabolites based on their bio-synthetic origin (Adcock et.al. 2001).

The literature survey revealed that the phytochemical analysis of seeds has been studied thoroughly, whereas no work has been done on the other plant parts such as leaves, stem and root of peanut. Hence, the present investigation has been under taken to find out the various phytochemicals present in them for the purpose of using these bioactive substances in different food items as supplements to reduce the anti-nutritional effects (Stump 2000, Gibson 1998).

Review of Literature:

Oke and Dinesh D. Khedkar in 2013 worked on was carried out with five different solvent extracts. Overall analysis revealed absence of tannins in almost all plant parts with the exception of water and ethanol extracts from the leaf. The alkaloids, steroids, Terpenoids, cardiac glycosides, flavonoids, triterpenoids, etc. were reported in various plant parts in different extraction systems. Varsha J. Galani1 in 2015 worked on *Grangea maderaspatana* L. is a popular Indian medicinal plant belonging to the Asteraceae family. He observed the Phytochemical analysis of aqueous, petroleum ether and dichloromethane extracts were positive for alkaloids, phenol, steroid's, flavonoids in all the extracts. Sindhu. V et.al., in 2012 worked on Preliminary Phytochemical screening of *Grangea* maderaspatana L. (Asteraceae) found that the Phytochemical screening of various extracts show the presence of flavonoids, alkaloids, glycosides, protein and amino acid in benzene extract.

Prabhavathi R.M et.al., in 2016 worked on studied on Qualitative and Quantitative Phytochemical analysis of Cissus quadrangularis observed that the Phytochemical analysis of Cissus quadrangularis was carried out as these plants have been proved to be one of the important medicine for treatment of bone fractures. Tamanna Talreja et.al., in 2016 worked on the Preliminary Phytochemical analysis of Achyranthes aspera and Cissus quadrangularis revealed that the extracts of A.aspera seeds and C. quadrangularis stem contain alkaloids, phenolic compounds and tannins, steroids and terpenoids, flavonoids, reducing sugars and saponins in appreciable, moderate and trace amount.

Saranyal et.al., 2017 worked on the Preliminary Phytochemical and biochemical studies of Cissus quadrangularis, Linn (Family- Vitaceae) revealed the presence of phenols, proteins, tannins, flavonoids and starch. Biresh Kumar Sarkar et.al., in 2018 worked on Antimicrobial and Phytochemical evaluation of Cissus quadrangularis L. In view of the result of study indicated that the methanolic extract possessed most potent antibacterial activity as compared to other extract.

Cezary Toma et. al., in 2019 worked on Interdisciplinary research was carried out on the impact of climate on the diversity and morphology of Stratiotes alkaloids. The objectives of the research were: 1. To determine whether the climate influences the diversity of emergent forms, 2. To determine the diversity of morphological and anatomical traits and chemical composition of S. aloides specimens in poland and Russia, 3. To examine the content of, and determine the correlation between phenols, phenolic acids, flavonoids, anthocyanins, And tannins in S. aloides. The research demonstrated the substantial diversity of 13 morpho-anatomical traits, and 5 phytochemical traits, both between regions, and individual habitats. Rajeswara Reddy Erva1 et. al., in 2020 worked on the aqueous extract of velvet bean (Mucuna pruriens) leaves and roots revealed the presence of alkaloids, saponins, flavonoids, phytosterols, carbohydrates, proteins, terpenoids and anthraquinones while tannins, glycosides were found absent. Similarly, the aqueous roots extract revealed all the phytochemical tested except flavonoids, terpenoids. were absent in the roots of velvet bean (*Mucuna pruriens).* Results of this study may provide a foundation for designing new drugs for several diseases.

Camil Rex M et.al. in 2020 worked on a review on Cissus quadrangularis L. as herbal medicine showed the extract from roots and stem of the plant consist of various medicinal efficacies and are known to have antioxidants, accelerate the process of bone fracture healing, wound healing, antimicrobial activity and antiulcer activity.

Susan A. Timmons et al., in 2020 worked on Morphological and anatomical development in the vitaceae. X. Comparative ontogeny and phylogenetic implications of *Cissus* quadrangularis L. observed the comparison of C. Antarctica and C. quadrangularis supports the division of Cissus into two clades based on supernumerary buds, stipule connectivity, uncommitted primordium shape, and inflorescence branching patterns.

MATERIAL AND METHODS

Collection of plant: -

The plants selected for the study Grangea maderaspatana L. belonging to the family Asteraceae were collected in the month of February 2023 From Akola city.

Identification:

Samples were brought to laboratory and were identified by using standard floras of Naik (1989), Singh and Kartiyeyon (2000).

Drying:

The collected plant part was shade dried for 8-10 days and grinded well to obtain homogeneous fine grade powder.

Extraction:

Material was subjected to solvent extraction. Four different solvent i.e., Distilled Water, Acetone, Ethanol, Chloroform were used. The sample: solvent ratio was 1:10(w/v) Solvents were soaked for 72 hrs. with regular shaking followed filtration with Whatmann's filter paper no.1. Extract thus obtained were subjected to quantitative analysis using standard protocols

Material used:

Plants belongs to Asteraceae family are used for preliminary test of phytochemistry.

Grangea maderaspatana L.:

Grangea maderaspatana, L. commonly known as Madras carpet, is a flowering plant in the family Asteraceae.

Grangea maderaspatana L. (Asteraceae), a popular Indian medicinal plant is traditionally used for rheumatism in the knee joint and pain in the muscles.

Systematic Classification of plant selected for study:
Grangea maderaspatana L.

Kingdom -	Plantae
Order -	Asterales
Family -	Asteraceae
Genus -	*Grangea*
Species -	*maderaspatana L.*

Phytochemical Analysis:
Tannins :
To the 2 ml of extract, 2 ml FeCl3 was added. Color change from blue to black indicates presence of tannin.

Alkaloids :
2 ml extract was hydrolyzed by 1% HCl, addition of Mayer's, Wagner's, Dragendorff's Reagent individually to each of sample produces creamish, brown, red / orange precipitates indicates presence of alkaloids.

Saponins :
0.5ml of extract was shaken well with 5 ml of distilled water, persistent frothing indicates presence of saponins.

Terpenoids (Salkowski test):
2 ml of Chloroform was added to 0.2 ml of extract and concentrated H2so4 was added from sides of the test tube. Appearance of reddish – brown coloration at interface denotes presence of terpenoids.

Cardiac glycosides (Keller – Killiani test) :
To the 2 ml of extract, 1ml of glacial acetic acid and a few drops of FeCl3 were added and concentrated H2SO4 added from the sides of test tube, green, blue precipitate shows the presence of cardiac glycosides.

Steroids (Salkowski test) :
To the 2 ml chloroform and 0.5 ml extract, concentrated H2SO4 was added from sides of the test tube to form lower layer, reddish – brown coloration at interface reveals the presence of steroids.

Flavonoids:
When dilute sodium hydroxide was added to 0.2 ml of extract creates intense yellow colour, which on addition of HCl turns colourless suggests
Tri-Terpenoid: 100roform and later 1 ml of acetic anhydride was added followed by 2 ml of concentrated H2SO4 from sides of the test tube creating reddish violet color, infers the presence of triterpenoids.

Glycosides:
Extract was hydrolysed by HCl and neutralized with NaOH followed by addition of fehling's solution A and B in 1:1 proportion, produces a red precipitate, indicating presence of glycosides.
Reducing Sugars (Fehling's Test):
Extract shaken with distilled water and filtered, it was boiled on the addition of Fehling's solution A and B in equal quantity, appearance of orange red precipitate positively detects reducing sugars.

Phlobatannins:
Distilled water was added to extract, shaken and filtered, 2% HCl added and boiled, development of red color confirmed phlobatannins.

Anthraquinones (Borntrager's test) :
To the 1 ml extract 10 ml benzene was added and shaken vigorously followed by filtration and the addition of 5 ml of 10% ammonia and shaken again, the appearance of pink/red/violet coloration in ammonia layer indicates anthraquinones in the extract.

Leucoanthocyanins:
5 ml of isoamyl alcohol was added to an equal volume of extract, if an upper layer turns red, shows that leucoanthocyanins reside here.

Fatty acid:
5 ml of extract was added to 5 ml of ether and poured on filter paper placed in petri dish, on evaporation of ether, if filter paper becomes transparent it indicates presence of fatty acids.

Coumarins:
To the 2 ml of extract, 3 ml of 10% NaOH was added; appearance of yellow colour indicates Presence of coumarins.

Emodins:
2ml of ammonium hydroxide and 3 ml of benzene were added to the extract, a color change to red indicates presence of emodins

OBSERVATION & RESULTS

Table No.1 Aerial phytochemistry of *Grangea maderaspatana* L.

Sr. No.	Phytochemicals	Water	Acetone	Ethanol	Chloroform
1	Tannins	+	-	-	-
2	Alkaloid	-	+	-	+
3	Saponin	+	+	+	+
4	Terpenoid	-	+	-	+
5	Cardiac glycoside	+	-	-	+
6	Steroids	+	-	-	-
7	Flavonoid	-	-	-	+
8	Triterpenoid	-	-	-	-
9	Glycosides	-	-	-	-
10	Red.sugar	-	+	-	+
11	Phlobatannins	-	-	-	-
12	Anthocumerins	-	-	-	-
13	Leucoanthacyanins	-	-	-	-
14	Fatty acids	-	-	-	-
15	Coumarins	-	-	-	-
16	Emodins	-	-	-	-

Table No.2 Root phytochemistry of *Grangea maderaspatana* L.

Sr. No.	Phytochemicals	Water	Acetone	Ethanol	Chloroform
1	Tannins	-	-	-	-
2	Alkaloid	-	+	-	+
3	Saponin	+	+	+	+
4	Terpenoid	-	+	-	+
5	Cardiac glycoside	-	-	-	-
6	Steroids	-	-	-	-
7	Flavonoid	+	+	-	+
8	Triterpenoid	-	-	+	-
9	Glycosides	-	-	-	-
10	Red.sugar	-	-	+	-
11	Phlobatannins	-	-	-	-

12	Anthocumerins	-	-	-	-
13	Leucoanthacyanins	-	-	-	-
14	Fatty acids	-	+	-	-
15	Coumarins	-	+	-	-
16	Emodins	-	-	-	-

DISCUSSION

The phytochemical analysis was studied for aerial parts and roots of plant sps. *Grangea maderaspatana* L. for the analysis four solvents were analyzed. The saponins were found present in both aerial parts and root in all four solvents. Alkaloids and Terpenoids are prominently seen in both aerial and underground parts only in acetone and chloroforms. In solvent chloroform as a solvent phytochemical besides alkaloids, terpenoids and Saponins, flavonoids were also seen. While the presence of reducing sugar was seen in solvent acetone and chloroform in aerial parts. In Phlobatannins, Anthocumerins, leucoanthocyanins, fatty acids, coumarins, Emodins these phytochemicals were not seen in any of four solvents prominently.

CONCLUSION

The saponins were found present in both aerial parts and root in all four solvents. Alkaloids and Terpenoids are prominently seen in both aerial and underground parts only in acetone and In solvent chloroform as a solvent phytochemical basides alkaloids, terpenoids and Saponins, flavonoids were also seen. While the presence of reducing sugar was seen in solvent acetone and chloroform in aerial parts. Presence of Alkaloid showed that they are used in medicine as stimulant, diuretic, and as muscle relaxant. Phytochemical constituents such as tannins, flavonoids, alkaloids and several other aromatic compounds are secondary metabolites of plants that serve as defence mechanism against predation by many micro-organisms' insect and herbivores. The present study was concluded that the extract of *Grangea maderaspatana* L. which of phytochemical compounds especially in acetone and chloroform extract of aerial part shows maximum number of phytochemical compounds.

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