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Medicinal Plants and Qualitative Phytochemical Studies

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ABSTRACT

A scientific study was conducted to identify, select, and define plants that are often utilised for medical purposes in and around Patna. Additionally, the potential medicinal efficacy of these plants was evaluated by conducting a phytochemical analysis. Several different plants are used for the phytochemical bioactive ingredients that they contain. These constituents are incorporated into traditional medicine because it is recognised that they have a positive impact on human health and are reasonably inexpensive. It is the secondary metabolites in plants that are responsible for their therapeutic properties. Studies of these plants using qualitative phytochemical methods have uncovered the presence of a number of different phytochemicals. In this category are substances such as saponins, terpenoids, steroids, anthocyanins, coumarins, fatty acids, tannins, leucoanthocyanins, emodins, and others. This list is not exhaustive. These findings imply that phytochemicals are useful in the treatment of a wide range of ailments and that they include powerful antioxidants. This could result in the isolation of novel secondary compounds, which could then be utilised in the production of innovative pharmaceuticals. It is essential to have a good understanding of the phytochemical components of plants in order to be able to produce new and more complicated molecules. The researchers classified 50 therapeutic plants from most powerful to least powerful using phytochemicals found in leaf extracts of secondary metabolites. They discovered that 11 of the plants had extremely high potential, 18 had moderate potential, and 21 showed no promise at all.

Key-words-Phytochemical screening; Medicinal plants; Secondary metabolites

INTRODUCTION

In recent years, traditional medical practises and the science that supports them have seen a rebirth all around the world. As a direct result of this, nations have sought out to one another in an effort to discover methods by which they might securely incorporate the beneficial components of traditional medicine into their own healthcare systems. Since people have been researching nature, particularly plants, in search of new treatments ever since ancient times, there are numerous medicinal plants with therapeutic powers that have been used to cure a wide variety of disorders. These plants have been used to treat a wide range of conditions. [Alkhatani.J.et al ., 2022]. Unani, Ayurveda, Homoeopathy, and Siddha are among of the ancient practises that have contributed to the development of practically all of India's herbal treatments that are currently in use. [Nowk.J.z.,2022] The plant's primary and secondary metabolites are utilised by a variety of plant tissues. [Kabrathok.P.et.al.,2022] Because of the important functions that they play in a wide variety of biological processes, amino acids, simple sugars (glucosides), proteins, and lipids are all regarded to be major metabolites. Secondary metabolites are compounds that have chemical activity. Some examples of secondary metabolites are flavonoids, alkaloids, and terpenoids. Primary metabolites are the building blocks from which secondary metabolites, such as steroid-like substances and saponins, are constructed. Secondary metabolites are structurally more complex and have a more specific distribution than primary metabolites. Plants create natural compounds, which are often referred to as secondary metabolites, and these metabolites can have a number of effects on living organisms. [E.I.Abdali.et al.,2022] Plants and plant extracts have been utilised for medicinal purposes for a very long time. As a result of researching the distribution, variety, and usage of herbal flora in the state of J&K (Rajouri), researchers found that local people, such as the Gujjar, Bakarwals, and Paharies, make extensive use of numerous ethanomedicinal plants for the treatment of a wide range of illnesses. [Ahangar.N.et.al.,2022] According to reports, similar discoveries were made in the M.P. area. The state of Madhya Pradesh is home to a total of 35 different plant species, 23 of which have been identified as having therapeutic potential for various conditions. [Brabdao.R.B.et.al.,2022] These can be extracted from the bark of the plant, as well as the leaves, flowers, seeds, and other parts of the plant. This suggests that any portion of the plant could contain active components. Understanding the chemical components of plants is significant since having the ability to synthesise complicated chemicals needs having such information. This is why having such knowledge is necessary. Researchers from a wide variety of institutions have cited having carried out phytochemical studies on a variety of plants. In the qualitative phytochemical research of ten different medicinal plants from the state of M.P., secondary metabolites like alkaloids, phytosterols, glycosides, phenol, flavonoids, and diterpenoids were found. Secondary metabolites, which are also commonly referred to as phytochemicals, have been proven to possess anti-oxidant, anti-allergic, antibacterial, hypoglycemic, and anti carcinogenic qualities. These are just some of the many important pharmacological activities that secondary metabolites

exhibit. [Chen et al.,2022] A qualitative phytochemical investigation was carried out on the medicinal plants that are frequently discovered in and around Udhampur, Jammu, for the purpose of this study.

MATERIALS AND METHODS

Between the years 2013 and 2016, fifty distinct kinds of fresh leaves were collected from six distinct regions in the Jammu district of the Indian state of Jammu. Plants were classified on a taxonomic level before being compared to the herbarium maintained by the Department.

Extraction: The leaves of fifty different plants were picked at random and then thoroughly washed three to four times with running tap water. The leaf material was then air dried in the shade . (Latitude:25º11'N&Longitude:85º32E).A total of fifty different kinds of plants from a variety of families that are well-known for the medicinal properties they possess were analysed for their phytochemical properties.

After thoroughly drying in the shade, the plant material was ground in a mixer, and the resulting powder was stored in little plastic bags that were labelled with paper.The ground leaves material of 5 grammes was weighed using an electronic scale and then crushed in 25 millilitres of sterile water. After being cooked at 50–60 degrees Celsius for 30 minutes on a waterbath, the liquid was filtered with whatman No. 1 filter paper.After that, the filter underwent centrifugation at 2500 rpm for 15 minutes, and the resulting filtrate was stored in a sterile vial at 5 degrees Celsius for subsequent use.

The screening of phytochemicals: The following procedures were utilised in order to carry out the preliminary qualitative phytochemical screening:

Steroids: An equivalent volume of concentrated sulphuric acid was poured around the walls of the test tube after one millilitre of the extract was dissolved in ten millilitres of chloroform. The upper layer changes colour to red, while the sulphuric acid layer displays yellow and green fluorescence. This indicated the presence of steroids.[12] Terpenoids: Two millilitres of extract were mixed with two millilitres of acetic anhydride and four millilitres of concentrated sulfuric acid. The appearance of a blue and green ring is a telltale sign of the presence of terpenoids.[13] Fatty acids: 0.5 millilitres of extract and 5 millilitres of ether were combined and stirred. On filter paper, these extracts were permitted to evaporate, and then the filter paper was dried.On filter paper, the presence of fatty acids can be identified by the translucent look of the paper.[13]

Tannins: a few drops of lead acetate diluted to 1% were added to 2 millilitres of the extract. Tannins were present when there was a precipitate with a yellowish colour.[14]

Saponins: 5 millilitres of extract was combined with 20 millilitres of distilled water, and the mixture was shaken for 15 minutes in a graduated cylinder.The formation of amino acids as a result of the presence of saponins.[15] Anthocyanins: Two millilitres of aqueous extract are mixed with two millilitres of 2N hydrochloric acid and ammonia. The presence of anthocyanins can be identified by the colour transition from pink-red to blue-violet.[16] Leucoanthocyanins: add 5 millilitres of aqueous extract to 1 millilitre of isoamyl alcohol. Upper layer appears red in colour indicates for presence of leucoanthocyanins. [16] Coumarins: A yellow colour was observed after adding 3 millilitres of 10% sodium hydroxide to 2 millilitres of aqueous extract. This result shows the existence of coumarins.[17] Emodins were added to the extract along with 2 millilitres of NH4OH and 3 millilitres of benzene. The presence of emodins can be identified by the appearance of a red colour.[17]

RESULTS AND DISCUSSION

Preliminary screening of secondary metabolites

The phytochemical screening and qualitative evaluation of fifty medicinal plants revealed that the leaves contain a high concentration of anthocyanins, coumarins, fatty acids, emodins, leuco-anthocyanins, tannins, terpinoids, steroids, and saponins.

(+)=Present&(-)=Absent

Anthocyanins can be found in a wide variety of plant species, including Murrayakoenighii, Momordica charantia, Cannabis sativa, Achyranthis aspera, Parthenium hysterophorus, Duranta plumier, and B. auhinia acuminate, to name just a few. [Zareiyan.F.et al.,2022] Anthocyanins improve the efficiency of the immune system, making it more capable of fending off illnesses caused by viruses. The fact that some anthocyanins may have a virucidal influence adds another layer of complexity to the situation because it means that they could stop the influenza virus from entering human cells and from spreading to new hosts. [19] There are six different plants that contain coumarins; they are Murrayakoenighii,

Momordica charantia, Cassia corymbosa, Polyalthialongi-folia, and Coccinia indica. Catharanthus roseus also contains coumarins. The ability of coumarins to both bind metal ions and scavenge free radicals has been demonstrated through a number of different studies, leading researchers to conclude that this compound may function as an antioxidant. [Murugan.R.et.al.,2022]

Fatty acids can be found in Murrayakoenghii, Moras alba, Heliotropium indicum, Oxalis corniculata, and an additional ten different plants. Compounds of emodin can be found in the following four different plants: Momordica charantia, Gnephallium indicum, Cassia corymbosa, and Thevetia peruviana. Emodin is a potent component that may be derived from a wide range of plant sources, and it possesses a number of advantageous properties. Emodin has been the subject of a substantial amount of pharmacological investigation, which has led to the discovery of a wide variety of biological activities, such as its anticancer, antibacterial, and anti-inflammatory qualities. [Bouyaha et al., 2022] There are just five plant species that have been shown to possess leucoanthocyanins; these include the well-known medicinals Coccinia indica, Terminalia catappa, Thevetia peruviana, Ficus religiosa, and Catharanus roseus. The top 50 medicinal plants all contain tannins or tannin derivatives, with 29 of those species ranking in the top 10. Tannins were able to inhibit the growth of a number of different fungi, yeasts, bacteria, and viruses. [Ali.S.K.et al.,2022] found that the terpenoids were present in 28 of the 50 medicinal plants that were selected. Tannins and terpenoids are responsible for the analgesic and anti-inflammatory properties of the plant. In addition, the astringency of tannins helps wounded tissues heal more quickly and calms inflammation in the mucous membranes [Khanal.L.N.et al.,2022]. There was evidence of the presence of saponins in a total of 24 out of the 50 plant species that were analysed. Saponins have traditionally found considerable usage in the industrial sector as detergents, insecticides, molluscicides, foaming agents, and surface active agents; in addition, they have beneficial effects on human health. Saponins can be found in a variety of plants. Steroid compounds are present in the majority (Mendoza.Leon.et.al.,2022) of the 50 plants that are utilised for medical purposes (Mumed.H.S.et.al.,2022). [Mumed.H.S.et.al.,2022]. Steroidal compounds are of interest and relevance in the field of pharmacy due to the link they have with sexual hormones. The majority of the medicinal plants that were investigated here were found to contain unusually high levels of steroid and terpenoid compounds, in addition to tannins and saponins. There were a total of 25 of these plants that were examined. The presence of bioactive compounds in the plants is evidence of their possible application in the field of medicine. Both the scientific community and the food industry have recently become interested in the antioxidant and antimicrobial/antibacterial capabilities of various extracts from a variety of plants as a result of recent trends towards replacing synthetic antioxidants and antimicrobials with natural alternatives. These trends have been brought about by recent movements towards using natural alternatives to synthetic antioxidants and antimicrobials. []

Finding bioactive principles through the use of a straightforward qualitative preliminary test [27] has the potential to pave the road for the creation of new medications.

The processes of creation and invention. [Fakhri.S.et.al.,2022] As part of our efforts to promote Indian herbs, we evaluated 53 medicinal plants for their phytochemical characterisation. Our goal was to gain a better understanding of the therapeutic potential of pharmaceuticals in accordance with the recommendations established by the WHO.
[Divekar.et.al.,2022] Studies on botanical medicine indicate that natural products account for approximately 30 percent of the market for pharmaceuticals worldwide. The so-called "Little traditions" of indigenous medicine, so-called because they are only practised in extremely small communities and areas, are a great resource for learning about the healing potential of plants. These "Little traditions" are so-called because they are practised only in very small communities and regions. It is vital to conduct phytochemical screens on medicinal plants in order to find new sources of compounds that are essential for both medical treatment and industry. There are pharmaceutical and nutraceutical products that are noteworthy in terms of their commercial value that contain it. It is possible that initiatives to save native plants and animals and produce native species may result in a significant rise in the standard of living of rural populations. [Mumeed.H.S.et.al.,2022]

Just recently, investigations into the phytochemical and pharmacological significance of the genus Impatiens were finished. These investigations included a discussion of the structural activity relationship of several compounds as well as prospects for further study.[31]

CONCLUSIONS

Medicinal plants, which are defined as plants that are rich in chemical compounds referred to as secondary metabolites, have been used as a form of treatment in complementary and alternative medicine for a very long time. Some of the plants that are currently being explored for their medicinal properties have been utilised for therapeutic purposes in the ancient Indian medical discipline of Ayurveda for thousands of years. Among the many bioactive chemical components that were discovered in the numerous extracts of leaves from medicinal plants, anthocyanins, steroids, terpenoids, coumarins, fatty acids, tannins, saponins, leucoanthocyanidins, and emodins were only few of the compounds that were discovered. Medicinal plants include a variety of active chemicals, some of which have anti-inflammatory,

antispasmodic, antianalgesic, and diuretic characteristics. These active compounds include steroids, tannins, terpenoids, saponins, and glycosides. It has been utilised in the therapy of a wide range of medical ailments, including as an aphrodisiac, a neuroprotective, a liver tonic, and an astringent. Additionally, it has been utilised in the treatment of bronchitis, asthma, ulcers, emaciation, sleeplessness, and senile dementia. There is a need for additional clinical research to back up the use of medicinal herbs in Ayurvedic medicine, despite the fact that this discipline has been used successfully for many years. 11 of the 50 medicinal plants that were screened had a high potential (the presence of 5 or more phytochemicals), 18 had a moderate potential (the presence of 3 or 4 phytochemicals), and 21 had a low potential (the presence of 0-2 phytochemicals). This was determined by the presence of phytochemicals in the leaf extract of secondary metabolites.

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