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AN ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED BY THE TRIBALS

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ABSTRACT

Ethnobotany is the study of the many ways in which various ethnic cultures make use of plants in their day-to-day lives. Dr. John Harsberger of the University of Pennsylvania used the term "ethnobotany" for the first time in 1895 to describe the study of plants used by primitive and aboriginal people. The term was widely accepted and first adopted by J. Walter Fewnes in 1896. Ethnobotany is the study of plants used by primitive and aboriginal people. The field of ethnobotany is subdivided into a large number of disciplines in accordance with the subgroups of the plant kingdom. Some of these subdisciplines include ethnoalgalogy, ethnomycology, ethnobryology, ethnopteridology, and ethnolichenology. Other aspects of botany, such as classification systems, medicinal uses, palaeobotany, and ecology, are referred to as ethnotaxonomy, ethnomedico botany, palaeo (Jain, 1987). Even as far back as prehistoric times, practically all human civilizations have used medicinal plants to cure a variety of human ailments. The sages of India possessed an unrivalled depth of knowledge on the plants used in medicine. The "Rig Veda" is the oldest storehouse of medical knowledge, with its origins dating back to between 4500 and 1600 BC. The "Atharva Veda" came after the "Rig Veda," and it is in this text that a variety of medicinal and spiritual benefits of plants are described. A holistically focused practise or system of health treatment, known as "Ayurvedic medicine," has developed over the years from the traditional Indian medicine that has been practised for

many years and has been very well codified. India is blessed with a diverse environment, ranging from alpine in the Himalayas to tropical wet parts in the south and dry regions in Rajasthan. This range of climates allows India to reap the benefits of each. Due to the existence of such climatic circumstances, the Indian subcontinent is home to a flora that is both diverse and abundant (Rawat and Uniyal, 2003).

INTRODUCTION

According to Rajasekharan (2002), India has officially acknowledged the therapeutic use of more than three thousand different plants. It is commonly accepted that about 6,000 plants in India are used in traditional, folk, and herbal medicine, and that these plants account for around 75% of the medical requirements of nations in the third world. Indigenous medical practises such as Ayurveda, Siddha, and Unani have all, in one way or another, included the use of medicinal plants into their practises (Kumar and Singh, 2001). The original habitat of medicinal plants has already suffered irreparable harm as a direct result of deforestation. On top of that, the unexpected shift in climate that has resulted from deforestation has turned into a danger for the important asset of medicinal plants as well. From ancient times, various diseases and conditions have been treated with medicines made from plant sources. In the past couple of decades, plant-based medicines have found their way back into the centre of attention, both in terms of research and the production of products with added value (Alagesaboopathi et al., 1999). Throughout the past several decades, people all over the world have been devoting a significant amount of attention to the research of a relatively new field of science called "Ethnobiology," in particular to Ethnomedicine and Tribal medicine. There are also a significant number of researchers and academics in India engaged in these emerging areas of knowledge. This research has seen a significant expansion since the 1960s. India, with her 45,000 plant species and 550 tribal communities belonging to 160 linguistic groups, is populated in numerous geographic and climatic zones, and boasts an ethnobotanical emporia due to her diverse plant species, varied culture, rich traditional knowledge system, and wisdom.

The majority of our information regarding medicinal plants was historically passed down to us. It is not just common knowledge among medical professionals that certain plants may treat a variety of illnesses; many people's homes also have medicinal plants on hand. Those who gather medicinal plants typically have a wealth of knowledge to share, much of which may be quite fascinating and even astounding at times. It is therefore vital to the continued existence of humanity to disseminate and save this information regarding therapeutic plants and the applications to which they may be put. There is an increasing trend all across the world to move

away from synthetic products and towards natural products, mostly because natural items are more readily available and need less financial investment. Sometimes the negative affects that come along with taking synthetic drugs are far worse than the illness they are treating. Also, the price is rather high. Again, even if such an expensive medication is administered, it will often only provide a partial cure. As a result, there is no way to know for certain whether or not the disorders can be cured. In contemporary medicine, the active principles are extracted from medicinal plant species that have been shown to exhibit certain activities. This allows researchers to find novel therapeutic medicines to treat a variety of disorders. For the purpose of developing medically viable products, these plant species are subjected to screening and testing in a variety of diverse systems. The "Central Drug Research Institute" (CDRI), located in Lucknow, is now involved in the screening of medicinal plants to validate the ethnic claims and considers them to be a priority area within the routine biological screening programme. This is specifically for this reason. Although synthetic drugs and antibiotics have brought about a revolution in the control of various diseases, plants continue to play a very significant role in modern medicine as raw materials for important drugs. This is despite the fact that plants occupy a very significant role in modern medicine. On the other hand, millions of individuals do not have access to these synthetic pharmaceuticals. Those who live in extremely distant areas are reliant on traditional healers, who they are familiar with and trust. The prudent application of medicinal plants can even heal fatal diseases that have, for a long time, been resistant to treatment with synthetic medications.

The contemporary system of medicine makes use of more than one hundred different plants known to have therapeutic properties. There are around 500 distinct plant species that are utilised in various traditional medical practises. The vast majority of the basic ingredients used in traditional medicine come from wild sources, and these sources are harvested by pharmaceutical companies. These days, a large number of plants with medicinal properties are grown on a commercial scale so that their key active components may be extracted and utilised in contemporary medical practise. Several species of Dioscorea, Solanum, and Agave are farmed in order to produce steroidal hormones. These hormones are manufactured from diosgenin, hecogenin, and salasodine. Diosgenin may also be obtained from the Costus speciosus plant. A number of various alkaloids, including morphine, codeine, papaverine, and nascopine, can be derived from the Papaver somniferum plant, which serves as a source for these compounds. Quinine and quinidine are the two alkaloids that are considered to be of the utmost significance among the several alkaloids that are found in the bark of various Cinchona

species. There are several species of Datura, Hyoscyamus, Atropa, Duboisia, and Physochlaina that contain the tropane alkaloids. These tropane alkaloids, which include hyoscyamine, hyoscine, and atropine, are often utilised in contemporary medical practise. Digoxin and lanatoside-C-glycocides are two of the compounds that may be found in the useful plant known as digitalis lanata. Rauvolfia serpentina, Rauvolfia canescens and Rauvolfia vomitoria contain reserpine, resinamine and deserpidine correspondingly. Catharanthus roseus has emerged as an essential component in contemporary medical practise. This plant includes more than one hundred different alkaloids, the most notable of which being ajmalicine (Ranbasine). The leaves of this plant contain two different alkaloids that have anticancer properties, including vincristine and vinblasline. Both Camelia sinensis and Erythroxylum coca are plants that may be used to make caffeine and cocaine, respectively.

ETHNOMEDICIAL STUDIES-ABROAD

It was noted in Balick.M.J et al., (2000) that Latina healers in New York City employ certain medicinal plants for the treatment of women's health problems. Ivancheva and Stantcheva (2000) compiled a list of around 73 medicinal plants from 30 families that are utilised by the people native to Bulgaria, which is located in South-East Europe. Istro-Romanians are the smallest ethnic group in Europe; Pieroni et al., (2003) brought attention to the sixty different herbal treatments that they use in their everyday lives. Guarrera (2003) documented 126 entities that were utilised by the people living in Central Italy for folk alimentary and/or medicinal food purposes. These entities were dispersed among 39 households. Ranjan (2003) compiled a list of 80 different angiosperm plant species that Nepalese tribes, namely the Ojhas and the Hakims, utilised to treat a variety of human illnesses. On the basis of a survey that was carried out in Bulgaria during the months of December 1998 and March 1999, Ploetz and Orr (2004) highlighted the widespread usage of 15 different plants throughout the country of Bulgaria, largely for therapeutic purposes.

In an area of Atlantic woods in Pernambuco, Northeastern Brazil, Gazzaneo et al. (2005) identified around 125 medicinal plants that belonged to 61 families and were widely employed in the treatment of respiratory and digestive systems associated diseases by the local specialist. In the districts of Dolpa, Humla, Jumala, and Mustang in Nepal, Kunwar et al. (2006) catalogued 84 medicinal plants that belonged to a total of 75 different genera and 39 different families. These plants were utilised by the locals to treat a variety of illnesses. Local people in the Zingo region of northeastern Brazil have been using a total of 187 plant species, which belong to a total of 128 genera and 64 families, to treat a variety of ailments, including the

common cold, bronchitis, cardiovascular problems, kidney problems, and inflammations, according to a study that was conducted by Cecilia de Fatima et al., (2006).

Hamayun (2006) provided a list of seventy different medicinal plants that the local people who live in the Burner district of Pakistan utilise to treat a variety of illnesses. According to Joshi and Joshi (2007), the people who live in the Likhu Sub-Watershed in the Nuwkcot area of Nepal employ 116 different kinds of plants that belong to 66 different families to treat a variety of illnesses. Yusuf et al., (2007) found 53 plant species belonging to 33 families that were utilised by the Chakma tribe in the Rangamati area in Bangladesh to cure a variety of conditions.

STUDIES-INDIA

Jain (1963) identified 27 medicinal plants that the Gond tribe of Madhya Pradesh used to cure a variety of illnesses. Jain's research was published in the year 1963. According to Jain and Tarafder (1970), the Santals, who are one of the largest tribes in India and can be found primarily in the Santhal Pargana district of Bihar as well as neighbouring districts in Eastern India, use approximately 377 different medicinal plants as part of their indigenous medical practise. The Khasia Rajputs, who sub-montane part of the Kumaon region of India, and the Bhotias, who lived in the mountainous region, each had their own traditional medicine made from one of more than 75 different plants. Jain et al., (1973) compiled a list of 32 medicinal plants that come from 29 different genera and 21 different families of angiosperms. These plants are used by certain Adivasi tribes, such as the Chenchus, Reddis, Valmikis, and Gonds in the state of Andhra Pradesh, as well as the Soras and Kondh in the state of Orissa, to treat various human ailments. In the year 1973, Malhotra and Moorthy compiled a list of around 126 medicinal plants that were utilised by the indigenous people who lived in the Chandrapur area of Maharashtra. Chaudhuri et al., (1975) compiled a list of the 34 medicinal plants that the indigenous people of Orissa use. Saxena and Dutta (1975) named 69 medicinal plants that the indigenous people of Orissa, including the Kondhs, Gonds, Santals, Saoras, Mundas, Kolhas, Shabars, Parojas, Gadabas, and Kols, utilise to cure a variety of illnesses. Brothakur (1976) detailed the medical practises of the Mikir people who inhabit the Karbi Anglong area in Assam. These practises involved the usage of 43 different plants. Chaudhuri and Tribedi (1976) made a suggestion that the people who lived in the 24 Parganas district of West Bengal utilised the medicinal properties of 39 different plant species. Bedi (1978) documented the utilisation

of around 51 plants by the Bhils people of Ratan Mahal and the hills surrounding it in Gujarat to treat a variety of human ailments. A preliminary assessment of the economic plants utilised by the Kanikar people of south India was conducted by Janaki Ammal and William Jebadhas (1978).

MATERIALS AND METHODS

COLLECTION OF PLANT MATERIAL

The people who live in the rural areas of the Marathwada region shared their knowledge with the researchers about the medicinal qualities of a variety of plants. This data was utilised as a guide for the researchers while they collected these plants over the years 2010 and 2011. In addition, for the purpose of validation, the information was contrasted with other recorded usage by Naik (1998), Grewal (2000), Kirtikar and Basu (1975 and 1991).

Plant materials

The plant specimens that were collected were afterwards identified with the aid of floras that were authored by Naik (1979), Naik et al., (1998), Singh and Kartekeyan (2001), and Yadav and Sardesai (2002). The Botanical Survey of India in Pune provided verification that the plants in question are in fact the ones that had been identified. The voucher specimens were stored at the herbarium of the Department of Botany at Dnyanpasak College in Parbhani for the purpose of maintaining their integrity.

List of selected plants

Name of the plant	BSI No	Place of collection
Pergularia daemia (Forsk.) Chiov.	SVB 04	Mangrool Tq. Pathari Dist: Parbhani
Cascabela thevetia (L.) Lippold	SVB 02	Garkheda, Aurangabad city
Wrightia tinctoria (Roxb.) R.Br.	SVB 05	Ambadi forest, Tq.: Mahur Dist: Nanded
Cardiospermum halicacabum Linn.	SVB 01	Kumtha (B.K) Tq.: Ahmedpur Dist: Latur
Soymida febrifuga (Roxb.) A. Juss.	SVB 03	Lalwadi, Tq.: Ambad, Dist: Jalana

PHARMACOGNOSTIC STUDIES

Macroscopic study

Using macroscopic techniques, the shape, colour, smell, taste, and texture of the drug portion were observed and analysed. Macroscopic techniques were used. The most fundamental methods of analysis were utilised over the course of these examinations. The shown images were taken using a digital camera manufactured by Olympus and designated as model DP-73.

Microscopic study

According to Kokate et al. (2008), Kokate and Gokhale (2006), and Rangari's recommendations, pharmacognostical research such as stem anatomy, leaf anatomy, epidermal study, vascular study, and so on were carried out (2003).

a) Anatomy of leaf

The free hand sectioning method was used to conduct the anatomical study, and the fresh leaf was used for the evaluation of the specimen. Examining the sections required first having them stained using the double stained differential process (Johnson, 1940) and then having them mounted in DPX. In order to obtain photographs of the anatomical characteristics, an Olympus DP-73 digital camera was used. This camera was used to capture the photos.

b) Quantitative Microscopy of leaves

After treating the fresh leaves with a solution of 5% potassium hydroxide (KOH), the stomatal number, stomatal index, vein islet number, vein let termination number, and palisade ratio were determined (Salisbury, 1927). In order to prepare the fresh material for microscopic examination, it was first cleaned by boiling with chloral hydrate solution. For the purpose of determining the number of stomata and epidermal cell complexes, both the upper and lower epidermal peels were used.

1. Stomata

Utilizing the fresh leaves is how the stomatal analysis is carried out. After the fresh leaves were peeled off, they were dyed with 1% safranin, mounted in glycerine, and then converted into semi-permanent slides by having DPX mountant ringed around the edges.

2. Determination of stomatal number

The stomatal number was determined by calculating the average number of stomata present in a given area of the leaf's epidermis (upper and lower). It was determined for both of the surfaces, taking into account the different types of leaves (Salisbury, 1927).

3. Determination of stomatal index

Stomatal index was determined by the use of the formula..

Stomatal index (S.I) = $\frac{S}{E+S} \times 100$

Where, S- Number of stomata per unit area

E- Number of epidermal cells in that area

Calculated as a percentage, it is expressed as the ratio of the number of stomata to the total number of epidermal cells.

4. Determination of epidermal cell frequency

To determine the epidermal cell frequency on both the adaxial and abaxial leaf surfaces, a calculation was made for each square millimetre of surface area.

5. Determination of palisade ratio

It refers to the typical number of palisade cells that are found underneath an epidermal cell on a leaf. Using a formula, it was determined that it was the average number of palisade cells found underneath each epidermal cell.

Palisade ratio = $\frac{\text{Average palisade cells}}{\text{Epidermal cell}}$

6. Determination of vein islet number

Small regions of green tissue that are surrounded by veins and are known as vein islets are what we mean when we talk about vein islets. Between the leaf's midrib and its margins, it refers to the average number of vein islets that may be found in a given area of the leaf's surface. In order to determine it, the researchers counted the number of vein islets in an area of the leaf that was 4 millimetres square.

7. Determination of vein let termination number

It refers to the amount of veins that end between the midrib and the border of the leaf in a certain area measured in millimetres squared. A free termination of a vein let is what's known as a vein let termination. The amount was determined by counting the number of vein let terminations in an area that was 4 millimetres squared in the leaf's middle section.

8. Trichome

In order to examine trichomes, the top and lower epidermis of the leaf were meticulously scrubbed. The sample was washed and then placed on a slide before being dyed with 1% safranin, mounted in glycerine, and made semi-permanent by using DPX mountant. The DP 73 Olympus digital camera was utilised in order to capture the cellular structures seen in the

figures and images.

c) Anatomy of stem

For the anatomical investigation, fresh material of the stem was used, and it was cut using the free hand section method. After being stained with the double stained differential procedure (Johnson, 1940) and mounted in DPX, the sections were examined. The DP 73 digital camera from Olympus was utilised in order to get the images of the anatomical features.

1) Stem vessels

Jeffery's fluid approach was utilised in order to do research on the stem vessels. Jeffery's fluid was used to macerate the slices of stem that were provided. The composition of Jeffery's fluid consists of an equal amount of nitric acid and potassium dichromate solution, both at a concentration of 10%. After soaking the vessels in an aqueous solution of 1% safranin for half an hour, the vessels were dyed. Washing the area with water, mounting it in glycerine, and ringing it with DPX were all used to remove any excess stain. The cellular drawings that are included in the figures were captured with an Olympus DP 73 digital camera. After measuring between 15-20 vessel components, we were able to establish the length and breadth of the vessels.

3.2.3 Preliminary phytochemical screening of selected plants

a) Preparation of powder

After being rinsed with water and left to dry for a predetermined amount of time, the various plant parts of the plants that were chosen were dried in the shade to remove any possibility of contamination.

The dried plant samples were then ground into a powder in a grinder and kept in containers that were airtight. According to Johansen (1940) and Harborne's recommendations, a preliminary phytochemical screening was carried out (1984).

b) Preparation of plant extracts

Using a Soxhlet apparatus, 10 grammes of dried powdered samples were extracted in stages using 100 millilitres of various solvents of varying polarities. These solvents included petroleum ether (at temperatures ranging from 60 to 800 degrees Celsius), ethanol (at temperatures ranging from 60 to 800 degrees Celsius), methanol (at temperatures ranging from 65.5 to 70.50 degrees Celsius), acetone (at temperatures ranging from 56 to 600 degrees Celsius), and distilled water (at temperatures After filtering and evaporating the extracts in a hot water bath, they were then weighed (Daniel, 1991).

c) Qualitative phytochemical analysis

All of the extracts were put through a phytochemical screening, which involved dissolving them in their respective solvents at a concentration of 1 gm/ml and then utilising a variety of reagents in order to identify the phytochemicals.

1. Test for Alkaloids

After being dissolved in dilute hydrochloric acid, the extracts were filtered. For the following series of experiments, the filtrates were utilised.

i. Mayer's test

A few of drops of Mayer's reagent were subsequently added to the test solution. The presence of alkaloids can be determined by the formation of a cream-colored precipitate.

ii. Dragendroff's test

To the filtrate 1 ml of dragendroff reagent added, the formation of reddish brown precipitate indicates the presence of alkaloids.

iii. Wagner's test

One half millilitre of Wagner's reagent was used to process the filtrate. The presence of alkaloids can be deduced by the production of a precipitate with a reddish-brown colour.

2. Test for flavonoids

After adding 5 ml of a diluted ammonia solution to the test solution for each extract, the next step was to add 1 ml of concentrated hydrogen peroxide. The presence of flavonoids may be identified by their characteristic yellow colour in each extract.

3. Test for Tannins

A few drops of 0.1% FeCl3 were added to the test solution, and the creation of a coloration that was either brownish green or blue black indicated the presence of tannins.

4. Test for Saponins (Foam test)

After rapidly shaking 1 millilitre of extracts that had been diluted in 5 millilitres of distilled water, the presence of saponins was determined by the production of a stable persistent foam.

5. Test for Terpenoids

To the test solution 2 ml of chloroform and 3 ml of concentrated H_2SO_4 was carefully added. Formation of reddish brown colour at the interface indicates the presence of terpenoids.

6. Test for Carbohydrates

After adding 5 ml of Benedict's reagent and continuing to boil for another 5 minutes, the test solution was brought to a boil on a water bath. The appearance of a colour that is bluish-green with a hint of blue suggests the presence of carbohydrates.

7. Test for Amino acids

The addition of a few drops of strong nitric acid to the test solution results in the production of a yellow colour, which indicates the presence of amino acids.

3.2.4 Detection of Inorganic constituents

To the freshly manufactured plant ash, fifty percent HCl by volume was applied. After being stored for one to two hours, it was filtered. In order to determine the presence of inorganic components, chemical analysis was performed on the filtrate.

a) Test for Calcium

A single drop of a solution that had been saturated with ammonium oxalate and diluted with NH4OH was added to the filtrate. A deposit of calcium oxalate, which is white in colour, develops. If, on the other hand, the precipitate dissolves in hydrochloric acid but not in acetic acid, this suggests that calcium is present.

b) Test for Magnesium

After performing the calcium test, the white precipitate that was collected was filtered and separated. After heating and cooling, the filtrate was used. The formation of a white crystalline precipitate in the filtrate after adding a solution of sodium phosphate and ammonia in diluted form shows the presence of magnesium.

c) Test for Sodium

The 10 millilitres of ash extract had 2 millilitres of potassium pyroantholate added to them.

The presence of Sodium can be determined by the formation of a white precipitate.

d) Test for Potassium

A few drops of a solution containing sodium cobalt nitrate were added to the 3 millilitres of extract solution. When potassium is present, a yellow precipitate of potassium cobalt nitrate forms. This indicates that potassium is present.

e) Test for Iron

A few drops of potassium ferro-cyanide were added to the extract solution that was 5 millilitres in volume. The presence of iron can be determined by the formation of a dark blue colour.

3.2.5 Physicochemical analysis

a) Moisture content of crude drug

In order to assess the amount of moisture that is present in the crude medication 1.5 grammes of the powdered medication, which was measured out in a thin porcelain dish and taken as a (IW). After being dried in an oven at temperatures ranging from 100^0c to 150^0c degrees Celsius, the product is weighed after being cooled in desiccators (DW). The formula was used to calculate the amount of moisture present in the medication.

Moisture content = $\frac{(IW - DW)}{IW} \times 100$

Where, IW- Initial weight

DW- Dry weight

b) Determination of ash content

Inorganic radicals are present in the ash of crude pharmaceuticals. These include phosphate, carbonates, and silicates of sodium, potassium, magnesium, and calcium, among other elements. The amount of inorganic constituents present in the crude medication, such as calcium oxalate, silica, and carbonate, has an effect on the total ash value. After that, these variables are eliminated by being treated with acid since they are soluble in HCl, and finally, the value of the acid-insoluble ash was calculated.

c) Determination of total ash value

The amount of ash that is left over after the substance has been burned is determined by the residue that is left. 10 grammes of powdered drug were added, and the mixture was burned in a crucible made of silica over a burner. In a muffle furnace, the burnt material was heated for six hours at temperatures ranging from 500^0 to 600^0 degrees Celsius. Ash is the name given to the charred remains of the sample after it has been burned. Desiccators are used to bring the temperature of the crucible down. Calculations were done with reference to the air-dried form of the medication in order to determine the percentage of total ash content.

Where,

X- Weight of empty petridishY- Weight of used crude drug

Z- Weight of ash with petridishWeight of total ash (A) =

Weight of ash with petridish (Z) – Weight of empty petridish (X)So, A = (Z – X) gm

Y gm of the crude drug gives (Z – X) gm of the ash.

100 gm of crude drug gives $\frac{100}{Y} X$ (Z − X) gm of the ash.

Crude drug gives

Total ash value of sample = $\frac{100\ (Z-X)}{Y}$ %

d) Determination of acid insoluble ash

It is a component of total ash that does not dissolve in dilute hydrochloric acid. The ash was heated for five minutes in 25 millilitres of diluted hydrochloric acid, and then, once it had cooled, the mixture was filtered through ash-free filter paper and washed in boiling water. The substance caught fire before being measured. Calculations were done with reference to the air-dried drug sample in order to determine the proportion of acid-insoluble ash.

Where,

X- Weight of empty petridish

Y- Weight of used crude drug

Z- Weight of ash with petridishWeight of total ash (A) =

Weight of ash with petridish (Z) – Weight of empty petridish (X)So, A = (Z – X) g

Y gm of the crude drug gives (Z – X) gm of the ash.

100 gm of crude drug gives $\frac{100}{Y}$ X (Z − X) gm of the ash.

'a' gm = Weight of the residue (acid insoluble ash)

Y gm of the air dried drug gives 'a' gm of acid insoluble ash.

Acid insoluble ash value of the sample = $\frac{100x\ a}{Y}$ %

e) Determination of water soluble ash

After the ash had cooled, it was heated for five minutes with 25 ml of distilled water, filtered through an ash-less filter paper, and washed with hot water. The ash paper was then burned, and the ash was measured. A deduction was made from the weight of the ash to account for the weight of the insoluble particles. The difference in weight gives an indication of the percentage of water solubility. It was determined with reference to the medicine after it had been air dried. A procedure very similar to that used to detect acid insoluble ash is utilised.

f) Determination of extractive values

The estimated proportion of various chemical ingredients that are present in the extracts taken from the plant parts are listed. These extracts were obtained from the parts of the plant. Therefore, the extractive values can be helpful in determining how the crude medication should be evaluated. In addition, it is helpful for the determination of the amounts of particular

components that are soluble in a variety of solvents.

g) Water soluble extractives

In a conical flask, 5 grammes of powdered medication were mixed with 100 millilitres of distilled water and allowed to macerate for twenty-four hours while being shaken at regular intervals. After filtering the solution, 25 millilitres of the resulting filtrate were evaporated in a shallow porcelain dish. Evaporate the liquid until it is dry on a water bath, then finish drying it in an oven at 100^0 degrees Celsius, after which it is weighed after being cooled in desiccators. When calculating the percentage of extractive, the medication that had been air dried was used as a reference.

The amount of residue in 25 millilitres of water extract is equal to x grammes. Four times as much residue is produced by 100 millilitres of water extract.

Therefore, there will be four times as much alcohol-soluble residue for every five grammes of air-dried medication. One hundred grammes of the air-dried medication produces eighty times that amount in water-soluble residue. The extractive value of the sample, which is water soluble, equals 80x%

h) Determination of alcohol soluble extractive

In a conical flask containing shaking at regular intervals, 5 grammes of powdered medication were macerated with 100 millilitres of distilled water for twenty-four hours. The solution was filtered quickly while taking precautions against the loss of alcohol, and then 25 millilitres of the filtrate were evaporated, measured, and weighed in a thin porcelain dish before being dried at 100^0 degrees Celsius and having their final weight taken. In order to determine the proportion of alcohol-soluble extractive, the air-dried medication served as a reference point.

25 millilitres of alcohol extract yields an amount equal to x grammes of residue 100 millilitres of alcohol extract yields four times that much in grammes of residue.

Therefore, 5 grammes of air-dried medication produces an equal amount of residue that is soluble in alcohol. Therefore, one hundred grammes of air-dried medication produces eighty times that amount in alcohol-soluble residue. The alcohol-soluble extractive value of the sample is equal to 80 percent.

3.3 ANTIBACTERIAL ASSAY

3.3.1 Test Micro-organisms

The standard microbial pure cultures of human pathogenic bacteria were obtained from the Institute of Microbial technology (IMTECH) in Chandigarh. These bacteria include

Escherichia coli MTCC (443), Salmonella typhi MTCC (734), Klebsiella pneumonae MTCC (2653), Pseudomonas aeruginosa MTCC (424), Staphylococcus aureus MTCC (96), and Shig

3.3.2 Method of preparation of test organisms

On a medium called 4^0c slant, which contains 20 mg of nutritional agar per 100 ml, the organisms were kept alive and well. These slants were kept in an incubator at 37^0 degrees Celsius for twenty-four hours, after which the organisms were placed in the refrigerator.

3.3.1 Antibacterial assay

The agar disc diffusion technique was used to measure the degree of antibacterial activity exhibited by extracts of the plant components made from petroleum ether, ethanol, methanol, acetone, and distilled water (Kirby, et al, 1996). In preparation for the experiment, nutrient agar was made. Using sterilised glass spreaders, each bacterial strain was swabbed onto a separate plate of nutritional agar. Each plate inoculate with 20 µg/ ml bacterial suspension with a concentration of 1x 10^6/ ml. The organisms to be tested were spread out on the solid agar plate using a spreader made of sterilised glass. On the surface of the plate that had been infected, the soaking dried discs were put. After allowing the plates to diffuse for thirty minutes, they were placed in an incubator set to 37^0 degrees Celsius for twenty-four hours. In addition, standard discs of amoxicillin were positioned at the positive control, and acetone was utilised for the role of the negative control. The antibacterial activity was evaluated by calculating the diameter, in millimetres, of the zone of inhibition produced by the sample.

CONCLUSION

Antioxidant analysis of the current study indicates that the largest DPPH antioxidant activity percentage was seen in Pergularia daemia root, which is equal to 62.140.52, and Cascabela thevetia root, which is equal to 59.781.25; this activity is more than that of standard ascorbic acid. Both the bark of Soymida febrifuga and the leaf of Pergularia daemia had the highest levels of DPPH activity, with respective values of 54.001.47 and 35.000.87. The current research comes to the conclusion that, in pharmacognosy, plants have the potential to be transformed into phytomedicines. They are able to be justified from a business perspective,

which has culminated in a growing interest from a variety of companies and scholars. The study record is extremely inconsistent up to this point, and the implications of these findings for clinical practise need to be carefully considered. An impediment that prevents the results of studies from being expressed is the natural variety in the quality of plants, as well as the uncontrolled nature of the market. Therefore, countries with stringent regulations regarding herbal medicines have generated the finest clinical studies. In a similar vein, many phytomedicines need further research in order to determine whether or not they are useful in clinical settings, while others need additional research in order to determine whether or not they pose any possible health hazards or interact negatively with other medications. The pharmacognostic method has the potential to offer hope for an alternative way to tackle the issue. In the days ahead, we have high hopes that this topic will call for a more multidisciplinary approach and that it will continue to advance. However, despite the fact that a significant amount of information has already been published, there is still a great deal more work to be done before the folkloric knowledge can be effectively employed to determine or discover novel pharmacological substances. Studies in pharmacology, phytochemistry, and antibacterial activity should be carried out in the medical field in order to break new ground in the field of phytomedicine.

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