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Preliminary Qualitative and Quantitative Phytochemical Analysis from *Brachypterum scandens*

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ABSTRACT
Bioactive substances found in medicinal plants are used to treat a variety of human ailments and are crucial to the healing process. Alkaloids, Flavonoids, Phenol, Saponin, Steroids and Tannins are examples of secondary components. Anticancer, antibacterial, antidiabetic, antidiuretic and anti-inflammation properties are all present in medicinal plants. The present study involves three extracts (Ethanol, ethyl acetate and hexane) from *Brachypterum scandens*. The three extracts of *Brachypterum scandens* samples were used for the phytochemical analysis to find out the Qualitative and Quantitative phytochemical constituents in the plant. The results of the sample's phytochemical examination revealed the presence or absence of alkaloids, flavonoids and phenol as well as their quantitative (mg g^{-1}) content. The ethanolic extract has the largest proportion of phenolic content and more phytoconstituents according to the qualitative phytochemical activity. We anticipate that the significant phytochemical features of the native medicinal plant *Brachypterum scandens* have been identified via our research.

INTRODUCTION

Many plant species have recently undergone scientific evaluation for potential therapeutic uses. As they are regarded as being safe for both human usage and the environment and are known to be rich sources of lead compounds, the traditional method of herbal treatment has gained international attention. Certain phytochemical components found in plants have therapeutic significance and may be used to treat human ailments[1,2]. Everyone agrees that plants are an integral part of the biodiversity of the earth and one of its most valuable natural resources. The history of human civilisation may be traced back to the dawn of the healing arts. Some of the plant's chemical constituents, which have a clear physiological effect on the human body, have medical significance.

Primary and secondary metabolites called phytochemicals are present in leaves, vegetables and roots naturally and act as defensive mechanisms to ward against many illnesses. A plant's survival, growth and development depend on the primary metabolites produced during photosynthesis, which include proteins, carbohydrates, chlorophyll, lipids and simple sugars[3]. The plant produces secondary metabolites, such as tannins, flavonoids, phenolics, saponins and alkaloids, which are time, tissue and organ-specific[4]. A natural product is essential in the research and development of novel pharmaceuticals because of its low toxicity, accessibility and affordability. The World Health Organization (WHO) states that the greatest place to get a range of medications is from medicinal plants.

Acetogenins, isoprenoids and nitrogenous chemicals can all be used to screen these phytoconstituents. With the help of these chemical substances, many biological processes and physiologic effects on the human body may be easily transported across the cell membrane[5]. Nitrogenous substances, such as alkaloids and amino acids, are essential to life and play a variety of metabolic roles. They are often employed in the food sector and technology[6,7]. A number of compounds known to have antioxidant, anti-inflammatory, immuno-modulating, anticancer and antibacterial properties were included in the acetogenin screening, including phenolics, flavonoids, tannins, coumarins, emodins, anthocyanidins, anthocyanins and anthraquinones[8]. Saponins, cardiac glycosides, iridoids, steroids and carotenoids with anti-inflammatory effect were selected from isoprenoids during screening[9]. Due to the pathogenic bacteria' built-up resistance to antibiotics, plant extracts have been created and proposed in recent years as a means of targeting biologically active chemicals for the eradication of those germs[10]. The ancient and modern systems of medicine, pharmaceutical intermediates and lead compounds in synthetic pharmaceuticals all use substances derived from medicinal plants, which are a rich source of innovative medications. They are used as medication because they contain chemical elements that have medicinal significance. These substances are naturally found in the roots, leaves and vegetables of medicinal plants that act as defence mechanisms against a variety of ailments. The chemical components in plants (often secondary metabolites) that have a clear physiological effect on the human body are what give them their therapeutic value.

The plant employed in the current study, Brachypterum scandens, is a member of the Fabaceae family. Liana with juvenile stems puberulent and glabrescent, leaves 9-11(-19)-foliate and leaflets to approximately 30 m high (1.5-) Fruit is sessile, 5.5-8 cm long, approximately 9-13 mm broad, 1-5 seeded and about 1-5 mm wide on the wing. Seeds are reniform, dark brown and measure about 9-10 mm long. Inflorescences are axillary, racemose and about 25-45 cm long. In the area of biomedical research, comprehensive plant screening with the goal of finding novel bioactive chemicals is a common activity. Thus, a crude extract of *B. scandens* was utilised to analyse phytochemical components both qualitatively and quantitatively.

MATERIALS AND METHODS

Collection of plant materials: The fresh root samples of *B. scandens* were collected randomly from the Veeramalai hills, Pochampalli, Krishnagiri, Tamil Nadu. Sample materials were washed under running tap water, air dried and then homogenized to fine powder and stored in airtight bottles in refrigerator.

Preparation of extracts: Crude Sample extract was prepared by Soxhlet extraction method. About 20 g of powdered sample material was uniformly packed into a thimble and extracted with 250 mL of different solvents hexane, ethyl acetate and ethanol separately. The process of extraction has to be continued for 24 hrs or till the solvent in siphon tube of extractor become colourless. After that the extract was taken in a beaker and kept on hot plate and heated at 30-40°C till all the solvent got evaporated. Dried extract was kept in refrigerator at 4°C till future use.

Phytochemical screening: Preliminary phytochemical analysis was carried out for *B.scandens* ethanol, ethyl acetate and hexane extracts as per standard methods described by Brain and Turner[11] and Evans *et al*.[12].

Quantitative phytochemical analysis

Estimation of alkaloids: Alkaloid determination using Harborne[13] method. Five milliliter of the ethanolic extract of *B. scandens* sample was measured into a 250 mL beaker and 200 mL of 10% acetic acid in

ethanol was added and covered and allowed to stand for 4 hrs. This was filtered and the extract was concentrated on a water bath to one quarter of the original volume. Concentrated ammonium hydroxide was added drop wise to the extract until the precipitation was complete. The whole solution was allowed to settle and the precipitated was collected and washed with dilute ammonium hydroxide and then filtered. The residue is the alkaloid, which was dried and weighed.

Estimation of flavonoids: Five milliliter of *B. scandens* ethanol, ethyl acetate and hexane extract was repeatedly extracted with 100 mL of 80% aqueous methanol at room temperature. The mixture was then filtered through a filter paper into a pre-weighed 250 mL beaker. The filtrate was transferred into a water bath and allowed to evaporate to dryness and weighed. The percentage flavonoid content was calculated by difference in weight[14].

Determination of total phenols: The fat free sample was boiled with 50 ml of ether for the extraction of the phenolic component for 15 min. Five milliliter of *B. scandens* ethanolic and ethyl acetate extract was pipetted into a 50 ml flask, then 10 mL of distilled water was added. Two milliliter of ammonium hydroxide solution and 5 mL of concentrated amyl alcohol were also added. The *B. scandens* samples were made up to mark and left to react for 30 min for colour development. This was measured at 505 nm[15].

RESULTS AND DISCUSSION

Ethiopia is one of the developing nations where traditional medicine is used extensively and medicinal plants are an important component of this system of care[16]. The phytochemical analysis was carried out for qualitative and quantitative analysis for *B. scandens* extracts (ethanol, ethyl acetate and hexane). The qualitative phytochemical analysis of *B. scandens* ethanol extract shows the presence of alkaloids, flavonoids, steroids, terpenoids, phenols and tannin, in ethyl acetate extract flavonoids, steroids, terpenoids, phenols and carbohydrates where as in hexane extract flavonoid, steroids, terpenoids, carbohydrates, oils and resins were found. In *B. scandens* ethanolic extract major phytoconstituents were found when compared to other two extracts (Table 1).

Examination of the medicinal plants' phytochemical qualities was utilized to identify and separate the medication, lead compounds and component parts from the plant's parts. The characteristics of a plant's phytochemicals can be used to pinpoint its particular biological activity. Leaves, roots, stem barks and fruits made up the majority of plant components employed for the examination of the phytochemical characteristics (Fig. 1).

The current investigation identified the presence of alkaloids, saponins, tannins, flavonoids, glycosides, coumarins, flavonoids, carbohydrates and protein. These results are consistent with a prior study by Yadav and Agarwala[17] who used various extraction techniques on plant parts to produce a noticeable difference in the yield and time of extraction. Their findings showed that the tested plants' crude aqueous and organic solvent extracts contained medicinally significant bioactive compounds, which supports their use in traditional medicines for the treatment of various diseases.

Quantitative phytochemical analysis: The quantitative phytochemical analysis of *B. scandens* Extract were carried out for three phytoconstituents, they are alkaloid, flavonoid and phenols. In ethanolic extract (13% alkaloids, 18.50% flavonoids and 35.70% phenols) were found. In ethyl aetate extract 15.70% flavonoids and 24.40% phenols were present, whereas in hexane extract 10.80% in flavonoid. Alkaloids are one of the main and largest components produced by plants and they are metabolic byproducts that are derived from the amino acids (Table 2)[2].

According to the findings that are now available, flavonoids and other secondary phenolic metabolites are primarily responsible for the wide range of pharmacological activity[18,19]. Plants are known to produce flavonoids, which are hydroxylated phenolic compounds, in response to microbial infection[20].

Table 1: Qualitative phytochemical analysis of *B. scandens*

Phytochemicals	Observations	Ethanol extract	Ethyl acetate extract	Hexane extract
Alkaloids				
Mayer's test	Cream colour	+	-	-
Flavonoids				
H_2SO_4 test	Reddish brown/orange colour precipitate	+	+	+-
Steroids				
Liebermann-Burchard test	Violet to blue or green colour formation	+	+	+-
Terpenoids				
Salkowski test	Reddish brown precipitate	+	+	+-
Arthroquinone				
Borntrager's test	Pink colour	-	-	-
Phenols				
Ferric chloride test	Deep blue to black colour formation	+	+-	-
Saponin	Stable persistent	-	-	-
Tannin	Brownish green/blue black	+-	-	-
Carbohydrates	Yellow/brownish/blue/green colour	-	+	+
Oils and resins	Filter paper method	-	-	+

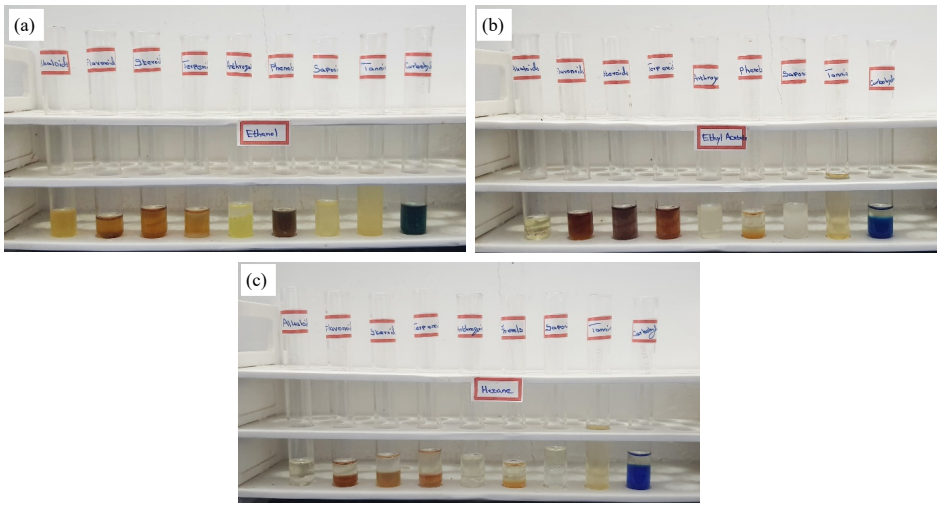

Fig. 1(a-c): Qualitative phytochemical analysis of *Brachypterum scandens* (a) Ethanolic extract (b) Ethyl acetate extract and (c) Hexane extract

Table 2: Quantitative phytochemical analysis of *Brachypterum scandens* extract

Phytoconstituents	Ethanol extract (%)	Ethyl acetate (%)	Hexane (%)
Alkaloids	13.00	-	-
Flavonoids	18.50	15.70	10.80
Phenols	35.70	24.40	-

A complex, big biomolecule of the polyphenol type that has enough hydroxyls and other appropriate groups, such carboxyl, to form powerful complexes with a variety of macromolecules is commonly referred to as tannin[21]. The plant kingdom is dedicated to a significant collection of secondary metabolites known as saponins. Phytochemicals called saponins are primarily present in most vegetables, legumes and herbs[22,23].

Sterol, a naturally occurring or artificially produced chemically active element that resembles a hormone, is whence the name "steroid" originates. A steroid is one of many different chemical compounds that are categorised by a certain carbon structure. Prednisone, cortisone, vitamin D and various sex hormones, such as testosterone and estradiol, are examples of medications that reduce edoema and inflammation[24]. The most common kind of natural products are likely terpenoids, which are tiny molecules produced by plants. Terpenoids have notable pharmacological properties, including antiviral, antibacterial, antimalarial, anti-inflammatory, cholesterol synthesis inhibition and anti-cancer properties[25].

Pentose phosphate and plant shikimic acid undergo phenylpropanoid metabolism, which results in the formation of secondary metabolites such phenolic compounds[26]. Because the therapeutic properties of the medicinal plant originate in these phytochemical substances, which have a clear and particular effect on the human body, these secondary metabolites are known to be biologically active and play key roles in the bioactivity of medicinal plants.

CONCLUSION

According to the study's findings, the plant can be utilised to cure infectious disorders brought on by resistant microbes. These plants can also be explored to find bioactive natural substances that might be used as a starting point for the creation of novel medications. The existence of many bioactive components, including polyphenols, flavonoids, phenolic compounds alkaloids, saponins, tannins, phlobatannins, glycosides, anthraquinones, steroids and terpenoids, was discovered through tables generated from phytochemical analyses of diverse medicinal plants. Secondary metabolites are groups of chemicals that have been found to have therapeutic effects on a number of human diseases, which may help to explain why some diseases are still treated using traditional medicinal plants. For a very long time, people have dedicated their careers to finding new drugs that can be used to identify, stop and treat a variety of ailments. From the many components of the plant, a novel and potent medication must be identified and created to protect people from deadly illnesses. The availability and worth of information are essential for encouraging the development of novel medication formulations and the extraction of bioactive components from plant parts in the future.

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