Research Article

Phytochemical Analysis of Two Medicinal Plants *Dicorea bulbifera* and *Apium graveooslons*

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ABSTRACT

All Medicinal plants have bioactive compounds which are used for curing of various human diseases and also play an important role in healing. Phytochemical basically have two categories i.e., primary and secondary constituents. Primary constituents include chlorophyll, proteins sugar and amino acids. Secondary constituents include terpenoids and alkaloids. Medicinal plants also have antifungal, antibacterial and anti-inflammation activities. The main objective of the research work was to check the presence or absence of the phytochemical constituents in the selected medicinal plants. The results of the phytochemical analysis of these medicinal plants showed that the terpenoids, phlobatannins, reducing sugar, flavonoids and alkaloids were found to be present in afore mentioned medicinal plants. In the present work, phytochemical screening of 2 medicinal plants- *Apium graveleons* and *Discorea bulbifera. Apium graveolens* (celery) contained carbohydrates, flavonoids, alkaloids, steroids, glycosides, phenols, fatty acids and wide range of trace elements. *Dioscorea bulbifera*; presence of carbohydrate, proteins, alkoids phenols were detected. Medicinal property of the plant is due to the presence of secondary metabolites such as alkaloids, glycosides and tannins.

Keywords: phytochemical analysis, apium graveolens, Discorea bulbifera

INTRODUCTION

Nature has provided many invaluable things for humankind over the years, including the tools for the first attempts at therapeutic intervention. Ancient civilization depended on plant extracts as a treatment of various ailments. Today, plant materials remain an important resource for combating illnesses, including infectious diseases and many of these plants have been investigated for novel drugs or used as templates for the development and advancement of new therapeutic agents, food additives, agrochemicals and industrial chemicals[1]. The phytochemical is a natural bioactive compound that is found in plants, such as vegetables, fruits, medicinal plants, flowers, leaves and roots that work with nutrients and fibers to act as an defense system against disease or more accurately, to protect against disease. Phytochemicals are divided into two groups, which includes primary and secondary constituents; according to their functions in plant metabolism. Primary constituents such as common sugars, amino acids, proteins and chlorophyll while secondary constituents consists of alkaloids, terpenoids and phenolic compounds and many more such as flavonoids and tannins etc[2]. About 80% of individuals from developed countries use traditional medicines, which has compounds derived from various medicinal plants. However, such plants should be investigated for better understanding of their properties, safety, and efficiency[3].

Apium graveolens is classified as a member of the *Apiaceae* family and is known as celery[4]. It is a biennial herb that has been used consistently throughout history in medicinal preparations, food flavoring and preparation, and is known in the vernacular as celery. The seeds are typically cultivated in order to form an extract, to make a tea or to mix with salt for use as a flavoring agent; the plant itself (root, foliage and stem) is ingested as part of a normal diet in preparations such as salads, soups, etc. *A. graveolens* has a worldwide distribution of growth, including most of the United States, many countries within the Europe, Asia, Africa and parts of India[5]. *A. graveolens* is widely cultivated in the temperate zones as a very important garden crop and the bleached leaf stalks are relished as popular vegetables. It has wide commercial significance all over the world especially in Europe, North America, India, Iran and Pakistan[6]. Celery has a long history of medicinal and food value and practiced by traditionally as well as scientifically. *A. graveolens* is very rich in β –carotene, folic acid, vitamin C, magnesium, potassium, silica, sodium, chlorophyll and fiber. The major components of *A. graveolens* -alkaloids, glycosides, terpenoids, flavonoids, tannins and phenols. The plant has antimicrobial, anticancer[7], antidiabetic and as well as reduced cholesterol, high fever and blood pressure[8,9], larvicidal, hepatoprotective activity[10].

D. bulbifera commonly known as yam or air potato and it is also a medicinal plant which is extensively used in treatment of gastric cancer and carcinoma of rectum, goiter and sore throat. Various extracts of bulbs have been reported to be antihyperlipidemic, antitumor, antioxidant, anorexiant, analgesic, anti-inflammatory, plasmid curing and antihyperglycemic in activity[11,12]. The Plant is found commonly in India. In Maharashtra it is cultivated on a small scale in Warud and parts of Achalpur tahasils. It is a perennial large climber, Tubers very large roundish, white from inside, Stem 4 angled, Leaves opposite, broadly ovate 6-15 x 4-10 cm, base cordate, acute.

The bulbils grow at the base of its leaves. Flowers greenish white. Capsules of 2 semicircular, flat lobes, seeds winged all round. Plant is anthelmintic, aphrodisiac. Cooling, diuretic, sweet and tonic. It is also used in diabetes, gonorrhoea, helminthiasis and leprosy[13]. Bulbils are more important food product. It is used in the treatment of rheumatis arthritis[14].

In the present work, qualitative phytochemical analysis were carried out in two plants, *Apium graveolens* and *D. bulbifera.*

MATERIALS AND METHODS

Collection of Plant Materials

Preparation of Plant Extracts

Hot Water Extraction

5gm of dried finely powdered plant material was taken in a beaker and 200ml of distilled water was added. The mixture was heated on a hot plate with continuous stirring at 30-40°C for 20 minutes. Then the water extract was filtered through filter paper and the filtrate was used for the phytochemical analysis. The water extract was kept in refrigerator when not in use.

Qualitative phytochemical analysis: The extract was tested for the presence of bioactive compounds by using following standard methods[15-17].

Test for Proteins

Millon's Test

Extract when mixed with 2ml of Millon's reagent, white precipitate appeared which turned red upon gentle heating that confirmed the presence of protein.

Ninhydrin Test

Extract when boiled with 2ml of 0.2% solution of Ninhydrin, violet colour appeared suggesting the presence of aminoacids and proteins.

Test for Carbohydrates

Fehling's Test

Equal volume of Fehling A and Fehling B reagents were mixed together and 2ml of it was added to dry extract and gently boiled. A brick red precipitate appeared at the bottom of the test tube indicated the presence of reducing sugars.

Benedict's Test

Extract when mixed with 2ml of Benedict's reagent and boiled, a reddish brown precipitate formed which indicated the presence of the carbohydrates.

Molisch's Test

Extract was mixed with 2ml of Molisch's reagent and the mixture was shaken properly. After that, 2ml of concentrated H_2SO4 was poured carefully along the side of the test tube.

Appearance of a violet ring at the interphase indicated the presence of carbohydrate.

Iodine Test

Dry extract was mixed with 2ml of iodine solution. A dark blue or purple coloration indicated the presence of the carbohydrate.

Test for Phenols and Tannins

Dry extract was mixed with 2ml of 2% solution of FeCl3. A blue-green or black coloration indicated the presence of phenols and tannins.

Test for Flavonoids

Alkaline Reagent Test

Dry extract was mixed with 2ml of 2% solution of NaOH. An intense yellow colour was formed which turned colourless on addition of few drops of diluted acid which indicated the presence of flavonoids.

Test for Glycosides

Liebermann's Test

Dry extract was mixed with each of 2ml of chloroform and 2ml of acetic acid. The mixture was cooled in ice. Carefully concentrated H_2SO_4 was added. A colour change from violet to blue to green indicated the presence of steroidal nucleus, i.e., glycone portion of glycoside.

Salkowski's Test

Dry extract was mixed with 2ml of chloroform. Then 2ml of concentrated H_2SO_4 was added carefully and shaken gently. A reddish brown colour indicated the presence of steroidal ring, i.e., glycone portion of the glycoside.

Keller-Kilani Test

Dry extract was mixed with 2ml of glacial acetic acid containing 1-2 drops of 2% solution of $FeCl_3$. The mixture was then poured into another test tube containing 2ml of concentrated H_2SO4. A brown ring at the interphase indicated the presence of cardiac glycosides.

Test for Steroid

Dry extract was mixed with 2ml of chloroform and concentrated H_2SO_4 was added sidewise. A red colour produced in the lower chloroform layer indicated the presence of steroids.

Another test was performed by mixing crude extract with 2ml of chloroform. Then 2ml of each of concentrated H_2SO_4 and acetic acid were poured into the mixture.

The development of a greenish coloration indicated the presence of steroids.

Test for Terpenoids

Dry extract was dissolved in 2ml of chloroform and evaporated to dryness. To this, 2ml of concentrated H_2SO_4 was added and heated for about 2 minutes. A grayish colour indicated the presence of Terpenoids.

Test for Alkaloids

Dry extract was mixed with 2ml of 1% HCl and heated gently. Mayer's and Wagner's reagents were then added to the mixture.

Turbidity of the resulting precipitate was taken as evidence for the presence of alkaloids.

RESULTS AND DISCUSSION

The phytochemical characteristics of seven medicinal plants tested were summarized in Table 1. The results revealed the presence of medically active compounds in the two plants studied.

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From the table, it could be seen that, proteins, carbohydrates, phenols and tannins, flavonoids and saponins were present in all the plants.

Phytochemical analysis conducted on the plant extracts revealed the presence of various constituents which are known to exhibit medicinal as well as physiological activities[15].

Analysis of these plant extracts revealed the presence of phytochemicals such as phenols, tannins, flavonoids, saponins, glycosides, steroids, terpenoids and alkaloids. Moreover phenolic compounds are one of the largest and most ubiquitous groups of plant metabolites[18]. They possess various biological properties such as anti-apoptosis, anti-aging, anti-carcinogen, anti-inflammation, anti-atherosclerosis, cardiovascular protection and improvement of endothelial function, as well as inhibition of angiogenesis and cell proliferation activities[19]. Numerous studies have described the antioxidant properties of medicinal plants which are rich in phenolic compounds[20,21]. Natural antioxidant mainly come from plants which are in the form of phenolic compounds such as flavonoid, phenolic acids, tocopherols etc[22]. Tannins bind to proline rich protein and they also interfere with protein synthesis. Flavonoids are hydroxylated phenolic substances known to be synthesized by plants in response to microbial infection and also they have been found to be antimicrobial substances against wide array of microorganisms *in vitro*. Their activity is probably due to their ability to complex with extracellular and as well as soluble proteins and to complex with bacterial cell wall[23]. They also are effective as an antioxidant and show strong anticancer activities[24-26]. Alkaloids have been associated with various medicinal uses for centuries and one of their common biological properties is their cytotoxicity[27]. Several workers have reported and depict the analgesic[28,29], antispasmodic and antibacterial[30,31] properties of alkaloids. Glycosides are also known to lower the blood pressure according to many reports[32]. The results which are obtained in this study thus suggest the identified phytochemical compounds may be the bioactive constituents and these plants are proving to be an increasingly valuable reservoir of bioactive compounds of substantial medicinal merit.

CONCLUSION

The results revealed the presence of medicinally important constituents in the plants that were studied. Many evidences have been gathered in earlier studies which confirmed the identified phytochemicals to be bioactive. Several studies confirmed the presence of these phytochemicals contribute medicinal as well as physiological properties to the plants studied in the various treatment of different ailments. Therefore, extracts from these plants could be seen as a good source for many useful drugs. Thereby, the traditional medicine practice is recommended strongly for these plants as well as it is suggested that further work should be carried out to isolate, purify and characterize the active constituents responsible for the activity of these plants.

Also additional work is encouraged to elucidate the possible mechanism of action of these extracts in detail.

Table 1: Phytochemical constituents

Plants	Proteins	Carbohydrates	Phenols/Tannins	Flavonoids	Steroids	Terpenoids	Alkonoids
Dioscorea bulbifera.	+	+	+	-	+	+	+
Apium graveolens	+	+	+	+	+	+	+

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