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Research Article

PHYTOCHEMICAL SCREENING OF DASAMOOLA – AN AYURVEDIC DRUG

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ABSTRACT

Dasamoola is a combination of ten medicinal plants of which principally roots are employed in compounding of Ayurvedic medicines. The traditional medicine involves the use of different plant extracts or the bioactive constituents. Secondary metabolites are responsible for medicinal activity of plants. Hence in the present study phytochemical screening of Dasamoola powder was carried out. Qualitative phytochemical analysis of the powder confirm that the presence of various phytochemicals like anthraquinons, flavonoids, leucoanthocyanins, phenols, reducing sugars, steroids, tannins and triterpenoids. Aqueous extracts of the drug showed more number of secondary metabolites than that of various organic solvents. The results suggest that the drug have phytochemical properties for curing various ailments and possess potential antioxidant activities.

Keywords: Dasamoola plants, Secondary metabolites, Organic solvents, Phytochemical screening

INTRODUCTION

Dasamoola is a combination of ten medicinal plants of which principally roots are employed in compounding of Ayurvedic formulations. Dasamoola invariably means ten roots that are categorized as Mahapanchamoola (great roots) comprising 5 trees and Laghupanchamoola (small roots) comprising 5 smaller plants. Each of the plants is endowed with incredible medicinal properties and they act synergistically in combination. Dasamoola is collectively used in pacify vitiated tridosha, pain, arthritis, fever, cough, bronchitis, general weakness, neuropathy, nervine weakness, urinary tract diseases, boosts immune power, colic pain, intermittent fever, respiratory disease and as an expectorant[1]. These medicinal plants are highly demanded for preparation of Ayurvedic medicines due to the magical medicinal properties and extensively utilized in preparation of various Ayurvedic formulations like Dasamoolarishtam, Cyavanaprasam and Agasthyarasayanam etc. The decoction of Dasamoola is used in pain, hysteria, rheumatism, asthma and heart diseases. The decoction of Laghupanchamoola is benevolent in the treatment of urinary calculi (stones) and dysuria[2].

The roots of ten plants, *Aegle marmelos* (Rutaceae) is deciduous thorny trees, the dried root is used in disorders of nervous system, edema, colic, dyspepsia, vomiting, dysuria, rheumatism, seminal weakness, stomachalgea, swellings uropathy, beneficial in intermittent fever, melancholia and palpitation of heart[3]. *Gmelina arborea* (Verbenaceae) is unarmed deciduous tree the root and bark is astringent, bitter, digestive, cardiotonic, diuretic, laxative and pulmonary and nervine tonic. It promotes digestive powder, improves memory and overcomes giddiness[4]. *Oroxylum indicum* (Bignoniaceae) is deciduous tree, the root is bitter, hot, astringent, carminative, diuretic, stomachic, aphrodisiac and strength giving. It stimulates digestion, cures fever, cough and other respiratory disorders[5]. *Premna corymbosa* (Verbenaceae) is deciduous tree, the roots are traditionally valued for its anti-inflammatory, carminative, laxative, cardiotonic, astringent, stomachic and improves digestive power[6]. *Stereospermum colais* (Bignoniaceae) is large deciduous tree the root and root bark are used as astringent, cardiotonic, cooling, diuretic and tonic[4], these five plants are called Mahapanchamoola.

Aerva lanata (Amaranthaceae) is erect or prostrate herb, the whole herb is medicinal though the roots are often preferred. It is used in diabetes lithiasis, headache and strangury. Pharmacological studies confirmed the diuretic, anti-inflammatory, anthelmintic, antibacterial and mild analgesic effects[2]. *Desmodium gangeticum* (Fabaceae) is sub-shrub, branchlets are siliceous, the plant is used for anticatarrhal and the root is used to prepare tonic and cures vomiting, fever, asthma and dysentery[4]. *Pseudarthria viscida* (Fabaceae) is small-shrub the roots are overcomes intermittent fever, urinary diseases, edema, tumours and difficult breathing. It is a keen stimulant for digestive system and is used in digestive ailments like anorexia, flatulence, diarrhoea, vomiting and piles[6]. *Solanum surattense* (Solanaceae) it cures dyspepsia, fever, respiratory and cardiac disorders, skin ailments, vomiting, ulcers and poisonous affections[4]. *Tribulus terrestris* (Zygophyllaceae) is prostrate villous herb, it is the only plant among Dasamoola of which the fruits are used. The fruits are cooling diuretic and are used medicinally in painful menstruation, calculus affections, urinary discharges and impotency. Roots are used to be stomachic, appetizer, diuretic and carminative[4]. These five plants are called Laghupanchamoola.

Plant synthesizes a wide variety of chemical compounds, which can be sorted by their chemical class, biosynthetic origin and functional groups into primary and secondary metabolites. Secondary metabolites do not seem to be vital to the immediate survival of the organism that produces them. These are not an essential part of the process of building and maintaining living cells. With the development of natural product chemistry, the potential of chemotaxonomy is now becoming increasing by obvious. The application of chemical data to systematic has received serious attention of a large number of biochemists and botanists during the last three decades[7].

Phytochemical constituents are the basic source for the establishment of several pharmaceutical industries. The constituents present in the plant play a significant role in the identification of crude drugs. Phytochemical screening is very important in identifying new sources of therapeutically and industrially important compounds like alkaloids, flavonoids, phenolic compounds, saponins, steroids, tannins, terpenoids etc[8]. Previously the crude drugs were identified by comparison only with the standard descriptions available, but recently due to advancement in the field of pharmacognosy various techniques have been following for the standardization of crude drugs[9]. The Dasamoola drug is used extensively to treat different ailments but chemical compounds present in the mixture not studied so far. Hence present work has been carried out to know the phytochemical constituents of the Dsasamoola.

MATERIAL AND METHODS

Roots of Dasamoola plants were collected from different locations of Tirumala hills, Tirupati, Andhra Pradesh, India, during Jan-Mar, 2011. The roots were washed thoroughly and shade dried. The shade dried roots were ground to fine powder and mixed equal ratio of each plant root powder, this mixed powder was used for screening of secondary metabolites

Extraction of Plant Material

Aqueous extraction: Ten grams of air dried powder was added to distilled water and boiled for 2 hours. The supernatant was collected and this procedure was repeated twice. The collected supernatant at an interval of every 2 hours were pooled together and concentrated

to make the final volume into one-fourth of the original volume. It was then autoclaved at 121^{0}C and at 15 lbs pressure and stored at 4^{0}C [10].

Preparation of other extracts:

10 g of air dried powder was taken in 100 ml of hexane, chloroform, diethyl ether, ethyl acetate, petroleum ether, methanol, alcohol. Plugged with cotton wool and then kept on a rotary shaker at 190-220 rpm for 24 hours. After 24 hours the supernatant was collected and the solvent were evaporated to make the final volume into one-fourth of the original volume and stored at 4^{0}C in air tight containers[10].

Preliminary Phytochemical Screening

The condensed extracts were used for preliminary screening of phytochemicals such as flavonoids[11], steroids and phenols[12], terpenoids, glycosides and fatty acids[13], tannins, leucoanthocyanins and emodins[14], saponins[15], reducing sugars[16], anthocyanins[17], anthraquinons[18] and coumarins[19].

RESULTS AND DISCUSSION

The present study carried out the phytochemical screening of Dasamoola drug showed that the presence of anthraquinons, flavonoids, leucoanthocyanins, phenols, reducing sugars and tannins in aqueous extract (Table 1). Anthocyanins, coumarins, emodins, fatty acids, glycosides and saponins are totally absent in all extracts of the Dasamoola powder.

Tannins are present in all extracts of the roots powder. The growth of many fungi, yeasts, bacteria and viruses was inhibited by tannins[20]. Apart from this tannins contribute property of astringent activity, i.e. fasten the healing of wounds and inflamed mucous membrane[21]. Anthraquinons are present only in aqueous extract, which are used as better stomachic and in the treatment of diarrhoea[22], these are an important chemical raw material and organic intermediates that are broadly applied in the fields of dyestuff, papermaking, medicines, agricultural chemicals[23]. Flavonoids are compounds found in aqueous extract of Dasamoola powder have been reported to possess may useful properties, including anti-inflammatory, oestrogenic, enzyme inhibition, antimicrobial[24], antiallergic, antioxidant, vascular cytotoxic and antitumour activities[25]. Except aqueous extract all other solvents devoid of leucoanthocyanins. These compounds are occupy an important position among the water-soluble organic compounds. They have been implicated as being responsible for the astringent taste of unripe fruits, they are responsible for the chill haze that develops in beer and for the browning of white wines. They influence the storage stability of wines and juices[26]. Phenols compounds are found in aqueous and methanolic extracts, primarily phenolic compounds are of great importance as cellular support material because they are from the integral part of cell wall structure by polymeric phenolics[27], bioactive polyphenols have attracted special attention because they can protect the human body from the oxidative stress which may cause many diseases including cancer, cardiovascular problems and ageing[28]. Reducing sugars compounds are found in aqueous and chloroform extracts. Steroids are present in benzene and ethyl acetate extracts of Dasamoola powder. It should be noted that steroidal compounds are of importance and of interest in pharmacy due to their relationship with sex hormones[29]. Triterpenoids compound are present in benzene and methanol extracts.

The presence of bioactive compounds indicates the medicinal value of the plants. Antioxidants and antimicrobial properties of various extracts from many plants have recently been of great interest in both research and food industry, because their possible use as natural additives emerged from a growing tendency to replace synthetic antioxidants and antimicrobials with natural ones[30]. Preliminary qualitative test is useful in the detection of bioactive principles and subsequently may lead to drug discovery and development[31].

According to previous studies leaves of *Andrographis paniculata* and *Murraya koenigii*[32], *Pterospermum canescens*[33], *Butea monosperma*[34], *Ficus hispida*[35]; stem of *Cardiosperumum halicacabum*[36], stem bark of *Michelia champaca*[37]; roots of *Strychnons potatorum*[31], root tuber of *Curculigo*[38]; leaves, bark, root and galls of *Pistacia*[39] and leaves, stem, roots and seed of *Jatropha*[40] are rich in secondary metabolites.

In order to promote Indian herbal drugs, there is an urgent need to evaluate the therapeutic potentials of the drugs[41]. Patwardhan *et al*[42] mentioned that 30% of the world wide sales of drugs are based on natural products. Traditional indigenous medicine is limited to small tribal and geographical areas called "little traditions" are excellent repository of knowledge about medicinal properties of botanical sources. Bioactive extracts should be standardized on the basis of phytochemical compounds[43]. Phytochemical screening of medicinal plants is very important in identifying new sources of therapeutically and industrially important compounds. It is imperative to initiate urgent steps for screening of plants for secondary metabolites. The present communication is to assess the status of phytochemical properties in roots powder of Dasamoola plants to improve the health status of people and also to use in pharmaceutical and nutraceutical products of commercial importance.

Table 1: Screening for secondary metabolites from Dasamoola powder

S. No.	Secondary metabolites	Petroleum ether	Methanol	Chloroform	Benzene	Ethyl acetate	Aqueous
1.	Anthocyanins	-	-	-	-	-	-
2.	Anthraquinons	-	-	-	-	-	+
3.	Coumarins	-	-	-	-	-	-
4.	Emodins	-	-	-	-	-	-
5.	Fatty acids	-	-	-	-	-	-
6.	Flavonoids	-	-	-	-	-	+
7.	Glycosides	-	-	-	-	-	-
8.	Leucoanthocyanins	-	-	-	-	-	+
9.	Phenols	-	+	-	-	-	+
10.	Reducing sugars	-	-	+	-	-	+
11.	Saponins	-	-	-	-	-	-
12.	Steroids	-	-	-	+	+	-
13.	Tannins	+	+	+	+	+	+
14.	Triterpenoids	-	+	-	+	-	-

Note: '+' indicates presence '- ' indicates absence

CONCLUSION

Dasamoola powders are widely used in Ayurvedic medicine to combat and cure various ailments thus appear to be rich in secondary metabolites. These are collectively used in pacify vitiated tridosha, pain, arthritis, urinary tract and respiratory diseases can be attributed to their high flavonoids, steroids, tannins and triterpenoids. Exploitation of these pharmacological properties involves further investigation and identification of these active ingredients by implementation of techniques like extraction, purification, separation and crystallization.

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