

Original Research Article

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Phytochemical Characterization of Different Extracts Isolated from *Tamarindus indica* L. in and around Durg District of Chhattisgarh State, India

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ABSTRACT

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Tamarindus indica L. is a multipurpose tropical tree used primarily because its fruits and leaves have eatable properties. Both parts of the plant have also medicinal uses, but in the specific case of the leaves, little information about their chemical composition is available. The study was conducted to determine the phytochemical composition and antibacterial activity. Extract of *Tamarindus indica* leaves, fruit and seed coat powders were prepared in different solvent media viz. aqueous, aqueous methanol. The result of phytochemical screening of the advocated the presence of alkaloid, glycoside, saponin, tannin, and phenol are present in leaves, fruit pulp and seed coat in hydromethanolic extract as compare to aqueous one.

Introduction

India is blessed with rich heritage of plant kingdom due to its tropical and subtropical weather. Plants have been the basis of many

ethno medicine systems played a key role in the treatment of different ailment human and animals and provide mankind with new remedies (Mahalaxmi and Nidawani, 2014). Plant kingdom harbors an inexhaustible

source of valuable active ingredients used in the management of many different diseases (Maghrani, *et al.*, 2005). The uses of various plant materials were considered as preventive and therapeutic (Padma *et al.*, 2019). Over the last two decades there has been an increasing interest to study the phytochemistry of medicinal plants, like leaves, fruit, seed, bark, roots etc (Kala *et al.*, 2011).

Tamarindus indica L. (Family: Leguminosae) commonly known as Tamarind, has a wide geographical distribution in the subtropical and tropical areas (Soni *et al.*, 2012). *Tamarindus indica* (*T. indica*) is a multipurpose tree because its fruits and leaves have eatable properties. The plant has extraordinary medicinal properties which keep the attention of the scientific community (Rana and Sharma, 2018). Mostly the fruit pulp of tamarind is used for a wide variety of domestic and industrial purposes. It is an excellent source of potassium which is essential for controlling the effect of sodium in the body; thereby regulate the heart rate and blood pressure and also used in the treatment of a number of ailments, including the alleviation of sunstroke and the intoxicating effects of alcohol sore throats, dressing of wounds and is said to aid the restoration of sensation in cases of paralysis (Caluwe and Halamova, 2010, Yushau *et al.*, 2014).

The leaves have a proven antimicrobial, antifungal and antiseptic and hepatoprotective effects activity associated with the presence of polyhydroxylated compounds (Jouyex *et al.*, 1995). Many other properties have been also reported like hypolipemic and antioxidant anti-inflammatory, antimicrobial, cytotoxic, against gastrointestinal spasms and modifying the complement system (Gomathinayagam *et al.*, 2017). The phytochemical screening of the plants gives the general idea about the class of compounds

present in those plants. Though the medicinal utility of plants depends on active principles and therefore chemical tests are essential to identify the various constituents or groups present in the plants (Sinha *et al.*, 2017).

It is well known concept that the chemical composition of the plant can be modified qualitatively and quantitatively by climatic and growing conditions therefore its pharmacological uses. Considering the above mentioned remarks, the purpose of our research is to determine a phytochemical explanation of the use of different plant parts of tamarind in many traditional remedies.

Materials and Methods

Plant material collection and extract preparation

Tamarindus indica leaves and fruit pods were collected from different areas of Chhattisgarh. Seed were collected from fruit pod, and processed further to obtain seed coat powder. Plant materials (leaves and fruit pulp) were washed and rinsed with distilled water to remove dust dirt, dried in shade and grinded into powder form using sterile mortar and pestle under laboratory. The powder samples were bagged in a black polythene bag and stored in air tight container for further work. Approximately fifty (50) gram each of powdered plant parts were each macerated in 500ml of distilled water and 70% Methanol (v/v) respectively for period of 24 hour at room temperature as described by Okoli *et al.*, (2014).

Phytochemical screening

Qualitative method of screening was carried out so as to test the presence of the bioactive ingredients Alkaloid, saponin, glycoside, flavonoid, phenol and tannin. Phytochemical screening was carried out for all the extracts

as per the standard methods described by Harborne (1998).

Test for alkaloids

In a test tube 1ml of 1% HCl was added to 2ml of extract in and was treated with few drops of Mayer's reagent. A creamy white precipitate indicated the presence of alkaloids.

Test for flavonoids

Few drops of 1% NH₃ solution was added to 2 ml of extract in a test tube. Yellow colouration confirmed the presence of flavonoids.

Test for glycosides

2ml of 50% H₂SO₄ was added to the 2ml of plant extract in a boiling tube. Mixture was heated in boiling water bath for 5 min. Add 10ml of Fehling's solution. Boiling results in brick red precipitate, indicates presence of glycosides.

Test for phenolic groups

Take 1ml extract add 2ml distilled water followed by few drops of 10% Ferric chloride. The formation of blue or black colour indicates presence phenolic groups.

Test for saponins

2ml of extracts were shaken vigorously after addition of 5ml distilled water to obtain stable persistent foam, indicates presence of saponins.

Test for tannins

To 2ml extract add 1ml of distilled water and 1-2 drops of ferric chloride(1%) solution and observed for brownish green or a blue black coloration.

Results and Discussion

The Medicinal plants are rich in secondary metabolites, which are the non-nutrient compounds like, alkaloids, flavonoids, saponins and other active metabolites which are of great preventive and therapeutic value and have been extensively used in the drug and pharmaceutical industry. (Singh and Chouhan, 2014).

Present study recorded the presence of alkaloid in aqueous extract of leaves and fruit pulp of *Tamarindus indica* plant. The result of this study was inconformity with that of Sravanthi *et al.*, (2017) who revealed the presence of tannins, saponins, alkaloids and saponins. Abdulla, and Ali (2018) also reported the presence of tannins, saponins, alkaloids in *Tamarindus indica* leaves and fruit extract.

Furthermore, Mansour, *et al.*, (2019) reported the absence of alkaloids in the aqueous leaves extract, but in contradiction, it was present in this study. These differences may be due to the difference in geographical locations, environmental conditions of the place where the plant materials were obtained or the use of different method of extraction.

Alkaloids are known to play biological roles and control the development in living system. It consists of large group of nitrogenous compound which are widely used as defense mechanism and acts as phytoprotective agent, hypoglycemic activities, anti-inflammatory effects and central nervous stimulants. The presence of alkaloids in the *Tamarindus indica* leaves and fruits also interfere in cell division and could account for their use as antimicrobial agents (Akindele and Adeyemi, 2007).

Flavanoids and phenols were reported as phytochemical constituents in studied extracts

of leaves and seed coat, confirmed the antioxidant activity of *T. indica* plant (Table1). Nurhanani *et al.*, (2012) observed that aqueous and hydroalcoholic extract of seeds and leaves of *T. indica* are having different therapeutic and antioxidant activity. Nurhanani *et al.*, (2015) have found a rich present of flavanoids, polyphenols and other biological essentials with in seed and advocated their antibacterial and antistress potential.

Fruits, leaves and seeds are natural sources of antioxidants and advocated replacing synthetic antioxidants with *Tamarindus indica* (Reis *et al.*, 2016). The presence of flavanoids and phenolic compounds allow them to be reducing agents, hydrogen donors and singlet oxygen scavengers, among other reaction mechanisms (Escalona-Arranz *et al.*, 2016).

From the results of this work, it is evident that leaves and fruit of *T. indica* containing glycosides which is also the most promising biologically active compound. Glycosides as antihyperglycemic, anti-inflammatory, immunomodulatory and antioxidant are known to exert a beneficial action on immune system by increasing body strength and hence are valuable as dietary supplements.

Glycosides also have vast therapeutic efficacy and they are found in almost all medicinal plants (Yadav *et al.*, 2014)

Table 1 confirmed the presence of tannins in extracts of leaves and seed coat of *T. indica*. Tannins as the main components are astringent in nature and are used for training intestinal disorders such as diarrhea and dysentery. Sinha *et al.*, (2017) reviewed the biological activity of tannins and observed that tannins have anticancer activity and can be used in cancer activity and can be used in cancer prevention, thus suggesting that *Tamarindus indica* have potential as a source of important bioactive molecule for the treatment and prevention of cancer (Rana and Sharma, 2018).

The Current study concluded the occurrence of saponins in all studied plant extracts that is leaves, fruit pulp and seed coat. Additionally, saponin is equally used in medicine and pharmaceutical industries because of its foaming ability with the production of frothy effect. Saponin is used in the preparation various drugs and synthesis of steroid hormones (Okwu, 2004). Phytochemical studies by Sravanthi *et al.*, (2017) revealed the presence of tannins, saponins, and alkaloid.

Table.1 Phytochemical screening for leaves, fruit pulp and seed coat of *Tamarindus indica* L. plant

Phytoconstituents	Leaves		Fruit		Seed coat	
	Aqueous	Hydro methanolic	Aqueous	Hydro methanolic	Aqueous	Hydro methanolic
Alkaloids	+	+	+	+	+	-
Phenols	+	+	-	-	+	+
Flavonoids	+	+	-	-	+	+
Tannins	+	+	-	-	+	+
Glycosides	+	+	+	+	-	-
Saponin	-	+	+	+	+	+

+ present; - absent

Herbal extracts contain different phytochemicals with biological action that can be of valuable therapeutic index. The phytoconstituents alkaloids, tannins, phenols, flavonoids, glycosides present in *T.indica* plant parts make it useful against multiple biological effects like anti-inflammatory, anti-allergic, antioxidant, anti-diabetic, anti-viral and anti-cancer, anti-leprosy activities, antimicrobial activity etc.

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