PHYTOCHEMICAL PROFILING OF TAMARIND (*TAMARINDUS INDICA LINN*) SEEDS, LEAVES AND PULP

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Abstract

All plants contain phytochemicals which possess antioxidant activity, due to this property natural herbs and plants are widely used as a source of medicine today. The natural remedies are more beneficial as compare to use synthetic medicines those are very expensive. In this research, various tests performed to determine the presence or absence of alkaloids, saponnins, tannins and other phytochemical tests and antioxidant potential by DPPH method. For this purpose tamarind leaves were collected from Lahore College for Women University, Lahore, in front of hockey ground. The tamarind fruit was purchased from local market of Akbari Mandi, Lahore, while seeds were isolated from pulp. Extracts were prepared by using Methanol & Ethanol solvents. Results showed that alkaloid and saponnins were present in seed and leaves of tamarind but absent in its pulp. Tannin, phablobotannins, anthocyannins, glycoside and carbohydrate were present in all samples, however, quinine was present only in seeds. Methanolic extracts of these all samples showed more excellent results as compare to ethanolic extracts. Radical scavenging activity showed that antioxidant activity of ethanolic extract of tamarind (seeds, leaves and pulp) was in this order ascorbic acid >Seeds >pulp >leaves.

Key words: Antioxidant activity, Tamarind (seeds, leaves and pulp), Photochemical screening.

Introduction

Tamarindus indica Linn. (Tamarind) belongs to the dicotyledonous family Leguminosae, sub-family Caesalpiniaceae, which is the third largest family of flowering plants with a total of 727 genera and 19,327 species (Adeola *et al*., 2010). Tamarind, commonly called as Imli in Hindi, is known as Chincha or Amlika in Ayurveda. The tree averages 20-25 m in height and 1 m in diameter, slow growing, but long lived, with an average life span of 80-200 years (Panara *et al*., 2014).

Tamarindus indica is probably indigenous to tropical Africa, but has been cultivated for so long on the Indian subcontinent that it is sometimes also reported to be indigenous there. It is widely distributed throughout the tropical belt, from Africa to South Asia, Northern Australia, and throughout Oceania, Southeast Asia, Taiwan and China. In the 16th century, it was heavily introduced to Mexico, and to a lesser degree to South America, by Spanish and Portuguese colonists, to the degree that it became a staple ingredient in the region's cuisine. Today, India is the largest producer of tamarind. The consumption of tamarind is widespread due to its central role in the cuisines of the Indian subcontinent, South East Asia and the Americas, particularly in Mexico (Gomathinayagam *et al*., 2017).

Tamarind is helpful in gastric disorders, bilious vomiting, scurvy, datura poisoning, alcoholic intoxication, scabies, and pharyngitis, stomatitis, constipation, haemorrhoids and eye diseases. The fruits are reported to have hypolipidemic, anti-inflammatory, anti-fungal and antibacterial properties (Panara *et al*., 2014).

Like the fruit, tamarind leaves also have antimicrobial activity against gram positive and negative bacteria (Sravanthi *et al*., 2017). Due to their antimicrobial, antifungal and antiseptic effects; tamarind leaves have a great ethno botanical use (Gupta *et al*., 2014).

Numerous studies on aqueous extracts of tamarind seeds have shown a strong antidiabetic effect in rats. In Cambodia and India, it has been reported that the seed extracts are used to treat boils and dysentery. Boiled, pounded seeds are reported to treat ulcers and bladder stones whereas powdered seed husks are used to treat diabetes. Tamarind seeds contain antioxidant activity as determine by (Khairunnuur *et al*., 2009).

Tamarind is mostly used in Pakistan as a food and used extensively in cuisines around the world. It also source of vitamin C. Due to enormous effects of Tamarind plant on health and its devastating contribution of improving the taste of food, this plant

was selected for current study. So, the purpose of present study was to compare the tamarind seed, leaves and pulp by their phytochemical analysis. These parts of tamarind were also compared of their antioxidant activity by using DPPH.

Materials and Methods

Collection of plant materials: The Tamarind leaves were collected from Lahore College for Women University, Lahore, in front of hockey ground. The Tamarind fruit was purchased from local market of Akbari Mandi, Lahore, while seeds were isolated from pulp.

Drying and grinding of leaves: Tamarind leaves were dried in shade for two to three weeks, after drying the leaves were ground by electric blender to form fine powder.

Grinding of seeds: Seeds were dried in oven at 100^{o}C for 5 minutes and were ground to make its powder by pestle and mortar.

Storage of leaves pulp and seeds: These all material were stored in sterilized containers separately to avoid contamination and to prepare extract for further use.

Extraction of materials:

I) **Maceration**: For this purpose of 500ml capacity were taken and 50 g of seeds powder was added in two flasks. Then 170ml of ethanol in one flask and 170ml methanol was added in other flask and both flasks were properly labeled. Similar procedure followed for leaves and pulp.

2) **Filtration**: After maceration 6 beakers of 500ml capacity were taken and were properly labeled as extract of seed extraction in ethanol and methanol and same was done for leaves and pulp extract. These extracts were filtered by using of what's man filter paper to store for further use.

Phytochemical screening:
Preliminary Phytochemical Screening of the dried seeds, leaves and pulp ethanolic and methanolic extract extracts were subjected to preliminary phytochemical testing to detect for the presence of different chemical groups of compounds. Powdered plant material was screened for the presence of Alkaloid, saponnins, tannins, terpenoids, glycosides, quinones, carbohydrates, phablobotannins and anthocyannins.

1)Estimation of alkaloids contents: 5 mL of extract was diluted gradually with few drops of iodine solution.

2) Estimation of Saponnins contents: 2 mL of extract was mixed with 1ml of distilled water.

3) Estimation of Tannins contents: 5 mL of extract was diluted with 5 ml of distilled water; afterwards few drops (4, 5) of 5 % ferric chloride ($FeCl_3$) were poured slowly.

4) Estimation of Phablobotannins contents: 2ml extract was mixed with 1ml of 1% HCl and boiled for 5 min.

5) Estimation of Terpenoids contents: 3 ml of the extract was diluted with chloroform and filtered. The residue on the filter paper was treated with the concentrated sulfuric acid in a separate flask. The flask was shaken and allowed to stand for sometimes.

6) Estimation of Glycolysis contents: 2 ml of extract was diluted with 1ml of 2 N NaOH and heated for 5 min.

7) Estimation of Anthocyannins contents: 5 mL of extract was mixed with 2 mL of 2N NaOH.

8) Estimation of Quinines contents: 5 mL of organic extract was diluted with 3 mL of concentrated hydrochloric acid (HCl).

9) Estimation of Carbohydrates contents: 5 mL of extract was diluted with 3 mL of Benedict's solution (mixture of Sodium carbonate, Sodium citrate and copper (II) Sulphatepentahydrate).

DPPH radical scavenger activity:
1 ml of all the dilutions i.e. 1 mL, 0.5 mL and 0.25 mL of all extracts were taken in separate glass vials and 2 ml of freshly prepared DPPH was poured in each vial. Solution (0.1 mM) of DPPH was prepared in methanol. After 30 minutes absorbance was measured at 517 nm, by using spectrophotometer. The percent DPPH antioxidant activity (by scavenging activity) was calculated by using following equation:
Antioxidant activity (%) = [(A C – A S / A C)] × 100
A C =Absorbance Control
A S = Absorbance sample

Results and Discussion

Results showed that alkaloid and saponnins were present in seed and leaves of tamarind but absent in its pulp. Tannin, phablobotannins, anthocyannins,

glycoside and carbohydrate were also present in all samples. However, quinine was present in seeds and absent in both leaves and pulp. Methanolic extracts of these all samples showed more excellent results as compare to ethanolic extracts. Radical scavenging activity was also observed via DPPH (2,2diphenyl 1 picrylhydrazyl hydrate) method by using different dilutions of methanolic and ethanolic extracts, ascorbic acid was used as standard. Results showed that antioxidant activity of ethanolic extract of tamarind (seeds, leaves and pulp) was in this order: ascorbic acid>Seeds>pulp >leave.

Table 1: Study of Phytoconstituents of Tamarind Seeds, Leaves and Pulp in Ethanolic Extracts

Tests	**Seeds**	**Leaves**	**Pulp**
Alkaloid	+	++	**-**
Saponnin	++	+	**-**
Tannin	+++	++	+
Phablobotanin	+++	++	+
Terpenoid	++	+	+
Glycosides	+++	++	++
Anthocyannin	+++	++	+
Quinone	++	**-**	**-**
Carbohydrate	+++	++	+

Table 2: Study of Phytoconstituents of Tamarind Seeds, Leaves and Pulp in Methanolic Extracts.

Tests	**Seeds**	**Leaves**	**Pulp**
Alkaloid	++	+++	**-**
Saponnin	+++	++	**-**
Tannin	+++	++	+
Phablobotanin	+++	+	+++
Terpenoid	+++	++	+
Glycosides	+++	++	++
Anthocyannin	+++	++	+
Quinone	++	**-**	**-**
Carbohydrate	+++	++	+

Note:
+++ = indicate the excellent results
++ = indicate good result
+ = indicate accurate result
-- = indicate dreadful result

Table 3: Comparative Analysis of Percentage Absorbance of Methanolic Extract of Tamarind Seeds, Leaves and Pulp with Ascorbic Acid

Concentration of extracts (mg/mL)	**Absorbance of dilutions (%)**			
	Seed	Leaves	Pulp	Ascorbic acid
1	82.6	48.2	76.4	88.4
0.5	69.9	47.6	69.9	88.36
0.25	68.7	46.6	60.5	88.31

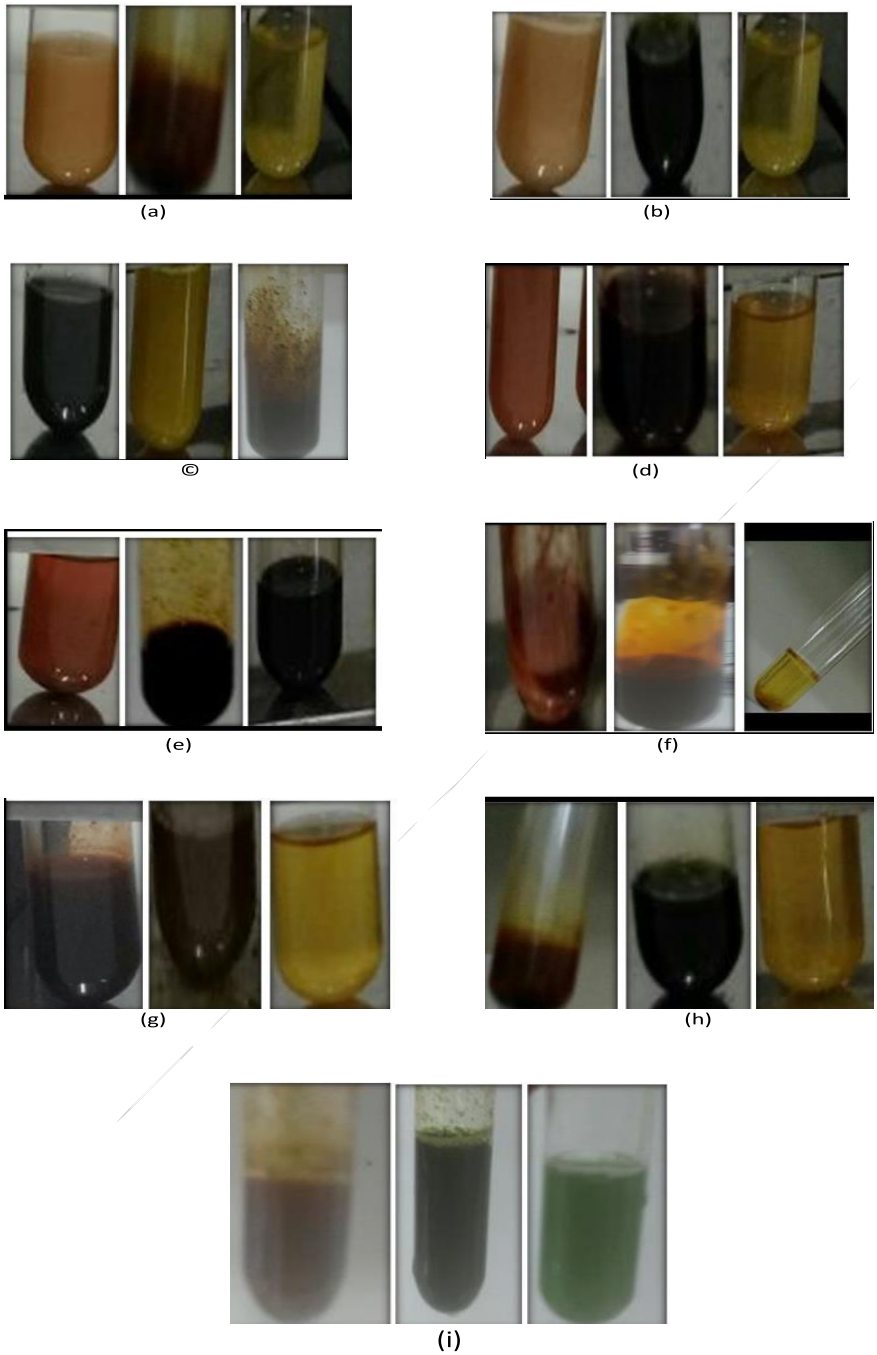
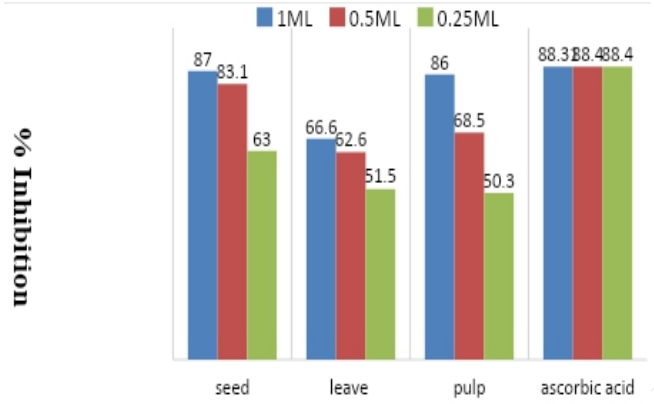


Fig 1: Illustration of Phytochemical tests. (a) Alkaloid test, (b) Saponin test. (c) Tannin test, (d) Phlobatannin test, (e) Terpenoid test. (f) Glycoside test, (g) Anthocyanin test, (h) Quinone test, (i) Carbohydrate test



Graph 1: Comparative Analysis of Inhibition Percentage of Ethanolic Extract of Tamarind Seeds, Leaves and Pulp with Ascorbic Acid.

Conclusion

Tamarindus indica which is the member of Fabaceae family is important source of phytochemicals and antioxidants. Tamarind seeds, leaves and pulp represents an important source of bioactive compounds. These bioactive compounds are important for organic medicines as exhibiting potential source of antioxidants.

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