



## A Review on Pharmacological Activities of *Tamarindus indica*

Mehathaz<sup>1\*</sup>, Ashoka Shenoy M<sup>1</sup>, Dr.AR Shabaraya<sup>2</sup>

1. Department of Pharmacology, Srinivas College of Pharmacy, Valachil, Post-Farangipete, Mangalore-574143, Karnataka, India.
2. Department of Pharmaceutics, Srinivas College of Pharmacy, Valachil, Post-Farangipete, Mangalore-574143, Karnataka, India.

\*Corresponding author's E-mail: [mehathaz37@gmail.com](mailto:mehathaz37@gmail.com)

Received: 04-11-2019; Revised: 17-12-2019; Accepted: 25-12-2019.

### ABSTRACT

*Tamarindus indica* tree which belongs to the family Fabaceae. This plant was tropical evergreen tree native to Africa and Southern Asia. It is a large Evergreen tree, up to 30 m in tall with dense, and beautiful spreading crown and having a short trunk. It is a multipurpose tree almost every part of this plants finds at least some use either nutritional or medicinal. India and Thailand are the world's largest producers of tamarinds and generate 300,000 and 140,000 tons per annum. It has various chemical properties and is abundant in phytochemicals so it has anti-diabetic activity, anti-microbial activity, anti-venomic activity, anti-malarial activity, anti-oxidant activity, hepatoprotective activity, anti-asthmatic activity, laxative activity, and anti-hyperlipidemic activity. Each part of the plant is useful for human needs, from leaf to root tips. It is used traditionally in abdominal pain, diarrhoea and dysentery, helminthic infections, wound healing, malaria and fever, constipation, inflammation, cell cytotoxicity, gonorrhoea, and eye diseases.

**Keywords:** Plant description, phytochemical constituents, Pharmacological activities.

### INTRODUCTION

**T**amarind or *Tamarindus indica* L. of the Fabaceae, subfamily Caesalpiniaceae, is an important food in the tropics. It is a multipurpose tree Almost every part of this plants finds at least some uses of either nutritional or medicinal hence it is called as multipurpose tree.<sup>1</sup>

Due to a combination of high tartaric acid content and reduced sugars, tamarind fruit pulp has a sweet acid taste. Pulp is used as a major ingredient in juices and other drinks for seasoning, in prepared foods, for flavoring confections, curries and sauces. Commercial tamarind-based drinks are available from many countries.<sup>2</sup> Various parts of this plants such as seeds, root, leaves, bark and fruits have been extremely used in traditional India and African medication. There are two different varieties of tamarind that is sweet are sour. Sweet tamarind is a harvested ripe and it can directly consumed. Sour tamarind is a sour in taste and it is processed into a range of value-added product. In India tamarind tree was estimated that 300,000 tons are produced annually and India is one of the world largest producer of tamarind.<sup>3</sup>

**Family:** Fabaceae

**Synonyms:** *Tamarindus erythraeus* Mattei, *Tamarindus officinalis* Hook, *Tamarindus umbrosa* Salisb.

### BOTANICAL DESCRIPTION<sup>4</sup>

*Tamarindus indica* tree is medium to large in size, it is a large evergreen tree, up to 12-18 m in height and 7m in width. It is a large Evergreen tree, up to 30 m in tall with dense, and beautiful spreading crown and having a short trunk.

### Leaves

The leaves are up to 15 cm in height, Leaflets: Subset, 10-20 pairs of leaflets, tolerably closely set on the rachis, 8-30 by 5-8 mm. oblong, obtuse, glabrous reticulately veined, long, alternate and compound with 8-18 pairs of leaflets, each 1-3.5 cm long.

### Flowers

Flowers are having glamorous pinkish or pale yellow. Few flowers are arranged like bunches, pedicel is having 6-10 mm in long. Presence of Ovary stalked and stamens. Pods are 7.5 -20 cm in long and by 2.5 cm in broad and having about 1 cm in thick, it is slightly curved, sub compressed.

### Fruit

Fruit is an indehiscent pod, brittle, and 5-15 cm in long, more or less curved in shape and compressed between the seeds. There are 1-10 seeds are present in per pod.

### Seed

Seeds are up to 18 mm in long, it is irregular in shape and, reddish, dark brown or shiny black in colour, and is coated with hard and smooth testa. There are 1800-2600 seeds are weighed in per kg.

### Bark

Barks are 15 cm in length.

### DISTRIBUTION OF PLANT

*T. indica* has a wide geographical distribution in the subtropics and semi-arid tropics where it is cultivated.<sup>5</sup> Tamarind grows naturally all over Asia up to an altitude of about 500 m that is from Burma to Afghanistan. In the Indian subcontinent, it is distributed continuously in

southern and central regions (which have similar wet and semi-arid climatic characteristics of tropical regions).<sup>6</sup> It also occurs in sparse patches up in northern India. In Africa, *T. indica* is commonly found in woodlands, and is well adapted to the arid and semi-arid zones. Essentially a tree of the tropics, it tolerates temperatures up to 47°C but is very sensitive to frost.<sup>7</sup>

## CHEMICAL CONSTITUENTS

Phytochemical study on *T. indica* indicate the presence of constituents, like; phenolic compounds, cardiac glycosides, Tartaric acid, the mucilage, pectin, fatty acids. The leaf oil is made up of 13 elements most of which were limonene and benzyl benzoate. Phytochemical investigation of the root bark of *T. indica* showed the presence of n-hexacosane, eicosanoid acid,  $\beta$ -sitosterol, octacosanyl ferulate, 21-oxobehenic acid, and (+)-pinitol. For the first time the presence of the bioactive compound (+) -pinitol is reported in this plant. The fruit pulp's volatile constituents were the total volatile furan derivatives (44.4%) and carboxylic acid (33.3%). The major fatty acids of seeds were palmitic acid, oleic acid, linoleic acid, and eicosanoid acid. The unsaponifiable issue of *T. indica* seed oil showed presence of  $\beta$ -amylin, campesterol,  $\beta$ -sitosterol and seven hydrocarbons.<sup>8</sup>

## PHARMACOLOGICAL ACTIVITIES

### 1. Antidiabetic activity

Hydroalcoholic and aqueous extract of seeds of *Tamarindus indica* having significant antidiabetic activities. The extract was administered to moderate diabetic and serious diabetic rats, and hyperglycemia was significantly reduced by fasting blood glucose levels.<sup>9</sup>

### 2. Antimicrobial activity

Concentrated extracts (aqueous, ethanolic, acetone) antimicrobial activity were tested using the agar disk diffusion to determine the diameter of the inhibition area against both gram-positive and gram-negative bacteria and fungi.<sup>10</sup>

### 3. Analgesic activity

Aqueous fruit extract of *T. indica* it proven to have both central and peripherally acting analgesic property.<sup>11</sup>

### 4. Anti-inflammatory activity

Aqueous ethanolic and aqueous chloroform extracts of *T. indica* anti-inflammatory properties of mice (ear oedema induced by arachidonic acid) and rats (subplantar oedema induced by carrageenan) were tested for *indica* follow topical or i.p administration, respectively. And Results was showing that the plant is having anti-inflammatory activity.<sup>12</sup>

### 5. Hepatoprotective

*T. indica* flower ethanol extracts were shown to have a hepatoprotective role in Wistar rats with isoniazid and rifampicin-induced hepatotoxicity.<sup>13</sup>

### 6. Antipyretic activity

Polysaccharide from *Tamarindus indica* significant antipyretic activity was shown against bacterial pyrogen and pyrexia-induced polysaccharide.<sup>14</sup>

### 7. Anti-emetic activity

Methanolic and butanolic extract of *Tamarindus indica* leaves were possesses anti-emetic activity equivalent to that of marketed medicine product of Chlorpromazine.<sup>15</sup>

### 8. Laxative activity

Because of the presence of tartaric acid and malic acid in the salt form, it improves the movement of the bowel and also it is a mild laxative.<sup>16</sup>

### Drug interaction:

Drug	Effects
Aspirin, Anticoagulant (Warfarin or Heparin) antiplatelet (Clopidogrel), NSAIDs (ibuprofen or naproxen) and herbs like <i>Ginkgo biloba</i>	Increased risk of bleeding
Hypoglycemic drug in diabetic patients	Hypoglycemic
Topical ophthalmic antibiotic	May result in synergistic effect

## CONCLUSION

This review provides comprehensive information on bioactive constituents and ethnopharmacology along with scientifically claimed medicinal uses of *Tamarindus indica*. *Tamarindus indica* possesses a wide range of medicinal applications in human health care, it also possesses a large amount of vitamin B and C that is responsible for improving the immune system. In various parts of *Tamarindus indica*, several carbohydrates, fat, proteins and tannins, acids and minerals have been reported to be present. The plant shows different types of activities such as antidiabetic, hypolipidemic, antioxidant, hepatoprotective, antimicrobial, anti-snake venom analgesic and anti-inflammatory properties that may be triggered by the existence of the active chemical constituents investigated. It also uses in vitro and in vivo as a flavoring agent to impart flavor to different dishes and to impart a flavor to the pharmacological studies to date. Therefore, the numerous phytoconstituents present and their pharmacological profile need to be examined and quantified.

## REFERENCES

1. De Caluwé E, Halamová K, Van Damme P, *Tamarindus indica* L.: a review of traditional uses, phytochemistry and pharmacology, *Afrika focus*, 23(1), 2010, 53-83.
2. Meher B, Dash DK, and Roy A, A review on: Phytochemistry, Pharmacology and Traditional uses of *Tamarindus indica* L, *WJPPS*, 3(10), 2014, 229-40.
3. S Zohrameena, M Mujahid, P Bagga, M Khalid, H Noorul, Nesar, P Saba, 'Medicinal uses & pharmacological activity of *Tamarindus indica*', Atom and cell publishers, 2017, 122.
4. Meher B, Dash DK, and Roy A, A review on: Phytochemistry, Pharmacology and Traditional uses of *Tamarindus indica* L, *WJPPS*, 3(10), 2014, 229-40.
5. El-Siddig K, Gunasena HPM, Prasad BA, Pushpakumara DKNG, Ramana KVR, Viyayanand P and Williams JT, *Tamarind (Tamarindus indica L.)*, Fruits for the future, revised, International centre for underutilized crops, Southampton, 2006, 188.
6. Isha D, Milind P, Imli: A craze Lovely, *International research Journal of pharmacy*, 3(18), 2012, 110-115.
7. Coronel RE, *Tamarindus indica* L, Plant Resources of South East Asia, Wageningen, Pudoc. No.2, Edible Fruits and Nuts, (Eds.) Verheij, E.W.M, and Coronel, R.E., PROSEA Foundation, Bogor, 1991, 298-301.
8. Bhadoriya SS, Ganeshpurkar A, Narwaria J, Rai G, Jain AP, *Tamarindus indica*: Extent of explored potential, *Pharmacognosy reviews*, 5(9), 2011 Jan, 73.
9. Maiti R, Jana D, Das UK, Ghosh D, Antidiabetic effect of aqueous extract of seed of *Tamarindus indica* in streptozotocin-induced diabetic rats, *Journal of ethnopharmacology*, 92(1), 2004 May 1, 85-91.
10. Doughari JH: Antimicrobial Activity of *Tamarindus indica* Linn, *Tropical Journal of Pharmaceutical Research*, 5,2006, 597-603.
11. Khalid S, Mossadeq WS, Israf DA, Hashim P, Rejab S, Shaberi AM, Mohamad AS, Zakaria ZA, Sulaiman MR, In vivo analgesic effect of aqueous extract of *Tamarindus indica* L. fruits, *Medical principles and practice*, 19(4), 2010, 255-9.
12. Rimbau V, Cerdan C, Vila R, Iglesias J, Antiinflammatory activity of some extracts from plants used in the traditional medicine of North-African countries (II), *Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives*, 13(2), 1999 Mar, 128-32.
13. Mahesh KM, Rao KM, Rajeswari G, Ravindra RK, Jyothi B, Hepatoprotective activity of ethanolic flower extract of *Tamarindus indica* in Wistar rats hepatotoxicity induced by isoniazide and rifampicin, *IJAPR*, 1(1), 2010, 17-20.
14. Izquierdo T, Garcia-Tamayo F, Soto C, Castrillon LE, A *Tamarindus indica*, Linn Pulp Polysaccharide Inhibits Fever In Vivo, And IL-1 $\beta$  Release by Murine Peritoneal Exudate Cells, *Pharmaceutical biology*, 45(1), 2007 Jan 1, 22-30.
15. Khan RA, Siddiqui SA, Azhar I, Ahmed SP. Preliminary screening of methanol and butanol extracts of *Tamarindus indica* for anti-emetic activity, *Journal of basic and applied sciences*, 1(2), 2005, 22-29.
16. Havinga RM, Hartl A, Putschner J, Prehsler S, Buchmann C, Vogl CR, *Tamarindus indica* L, (Fabaceae): patterns of use in traditional African medicine, *Journal of ethnopharmacology*, 127(3), 2010 Feb 17, 573-88.

Source of Support: Nil, Conflict of Interest: None.