

## TAMARINDUS INDICA: PLANT WITH MULTIPLE HEALTH BENEFITS

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### ABSTRACT

*Tamarindus indica* is a crucial medicine which has been used in Unani system of Medicine since time long-established as an cardiac tonic, stomachic, effective demulcent, carminative, digestive, laxative, antiscorbutic, antibilious and antiseptic. It belongs to family Caesalpinaceae. It is a leguminous tree innate to tropical Africa. In India it is found in forestry land in Madhya Pradesh. In Unani system of Medicine it is beneficial in stomach and intestinal disorders, loss of Appetite, excessive thirst, liver disorders, fevers, bilious sicknesses and sore throat. The active compounds vitexin, isoorientin, isovitexin,

tartaric acid and malic acid are reported to be having anti snake venom, hepatoprotective, analgesic, weight reducing, anti-helminthic, and anti inflammatory activities. In this article an attempt has been made to recapitulate the vast traditional Unani work and current researches on *Tamarindus indica*.

**KEYWORDS:** *Tamarindus indica*, Imlī, *Tamar ul hindi*, Unani.

### INTRODUCTION



**Tamarindusindica tree**

Tamarindis a leguminous tree of genus *Tamarindus* a monotype taxon with only specie *indicum*. *Tamarindus* is medieval latinization of the Arabic name for the fruit, meaning Indian date.<sup>[1]</sup> The fruits of the tamarind were traded widely in ancient times. Records from the eastern Mediterranean show *Tamarindus indica* was already in cultivation there in the fourth century B.C. On encountering the fruit in western India, Arab sea-traders thought the sticky black pulp and seeds of the fruit resembled their native date palm, so they combined their common name for date palm ‘*Tamr*’, along with the Arabic name for India (‘*hindi*’), to arrive at the common name *tamr hindi* on which the scientific name *Tamarindus* is based.<sup>[2]</sup> The Arab introduced it into Europe.

**VERNACULAR NAMES**

**Arabic-** *Tamar hindi*<sup>[4]</sup>

**Unani-** *Tamar Hindi*<sup>[3]</sup>

**Oriya-** *Tentuli, Konya*<sup>[6]</sup>

**Persian-** *Ambala*<sup>[7,8]</sup>

**Sanskrit-** *Amlika*<sup>[9]</sup>

**German-** *Tamarandi*

**English-** Tamarind.

**Gujrati-** *Anvali*.

**Konkani-** *Chinch*.

**Siddha/Tamil-** *Puli, Aanvilam*<sup>[3]</sup>

**Telegu-** *Cintapandu, Amlaki, Cintacettu*<sup>[10]</sup>

**Ayurvedic-** *Suktaa, Chukraa, Chukrikaa, Amla, Amlikaa, Tintidika. Chinchaa, Chandikaa,*

**Bengali-** *Tentul, Anbli*<sup>[5]</sup>

**FAMILY:** Caesalpiniaceae.<sup>[3]</sup>

**Habitat and Distribution**

Tamarindis inherent to steamy Africa where it grows wild throughout Sudan. It was described in history that in some books it is also reported native to India. Because of its numerous usages its agriculture has increased its coverage around the world in tropical and subtropical zones. This perennial tree is cultivated throughout India, Burma,<sup>7</sup> Yemen and Basra.<sup>4</sup> In India it is found in forestry land in Madhya Pradesh.<sup>11</sup> It is self-sown in left-over places and is also considered as street tree.<sup>[8]</sup>

**Part Used**

Blend of the fruit<sup>[7,12,13]</sup> kernels<sup>[7,14,15]</sup> leaves,<sup>[12]</sup> blossom<sup>[7]</sup> bark<sup>[7]</sup> and timber.<sup>[15]</sup>

**Description**

It is a huge tree, attaining 70 feet in elevation and bearing a very bulky, widely spreading head of greenery, stem with a dark rough bark, youngest branches are flat or slightly teenage;<sup>[1]</sup> florae are in lots, buttery in shade and boat molded;<sup>[9]</sup> kernels are roseate brown, profuse; the compressed sides of the seeds are noticeable by a centrally placed grey portion;<sup>[2]</sup> berryflesh occurs as a reddish-brown, moist, tacky mass, in which yellowish-brown threads are freely seen; aroma is pleasing, flavor is sugary and tart;<sup>[95]</sup> bark of the stem is flaking;<sup>[16]</sup> leaves are par pinnate.<sup>[17]</sup>

**THERAPEUTIC ACTIONS****Pulp**

Mufarrh

Daf e khafkaan haar<sup>[14]</sup>

Mubarrid<sup>[6,19,20]</sup>

Mukhrij e Ahlat fasida

Musakkin dam<sup>[4,18]</sup>

Mafesammiyat waba<sup>[18]</sup>

Kasir riyah<sup>[6]</sup>

Mulattif

Hazim<sup>[6]</sup>

Mulayyin<sup>[4,19,21,20]</sup>

Daf e Matli,

Antiscorbutic,

Antibilious<sup>[7]</sup> and Antiseptic.<sup>[5]</sup>

Muqawwi qalb<sup>[4,18]</sup>

Muqawwi meda,

Mulayyin taba, Mushil e safra,<sup>[4,14,18]</sup>

**Leaves:** *Qabiz*<sup>[7]</sup>



**Florae**



*Mubarrid,*

*Qate safra,*

*Qabiz,*

*Musakkin*<sup>[18]</sup>

Anti-viral.<sup>[12,13,15]</sup>

**Bark**



*Qabiz*

*Muqawwi*<sup>[7,3,10]</sup>

*Mudirr e haiz*<sup>[10]</sup>

### Seeds



*Muqawwi baah*

*Muqawwi meda*

*Muqawwi*,<sup>[10]</sup>

*Mumsik*<sup>[18]</sup>

*Mubarrid*

*Kasirriyah*

*Hazim*

*Qabiz*<sup>[1,7]</sup>

*Mulayyin*

**Seed-kernel:** *Qabiz*<sup>[7]</sup> and *Muharrik*.<sup>[3]</sup>

### Medicinal Uses

A gargle with infusion of tamarind is useful for sore throat.<sup>5</sup> The fruit of tamarind preserved with sugar is a useful gentle laxative. Ripe fruit is used in scurvy, atony of liver, stomach and intestine, constipation. It is also useful in intoxication from *dhatura*,<sup>[7]</sup> anorexia, polydipsia, indigestion and liver disorders.<sup>[9]</sup> Pulp is prescribed in conjugation with mild cathartics<sup>[1]</sup>. Leaves are useful in swellings, fevers, scalding of urine, gastropathy, helminthiasis, wound, ulcers, jaundice, scabies, tumours, ringworm, boil, smallpox, otalgia and conjunctivitis. Seeds are useful in giddiness, vertigo, hepatopathy, diabetes, general debility,<sup>[10]</sup> vaginopathy and in

burning sensation.<sup>[24]</sup> According to Prosper Alpines these were employed by the Arabians as an antihelmintic.<sup>[19]</sup> The ash of the bark is given in colic and indigestion. The ash is also used in gargles and mouthwash for aphthous sores.<sup>3</sup> Hot water poured on it acquires sweet, subacid, agreeable taste and is a very palatable drink; it allays thirst, and is cooling in its effects.<sup>[23]</sup> Hakims consider the pulp useful for purging the system of bile and to adjust humour.<sup>[7]</sup> According to *Ibn E seena* it is used in *kharish* (pruritis), *khafkaan* (palpitation), *qula* (stomatitis).<sup>[4]</sup> It is also used in *safravi qae* (bilious vomiting),<sup>[22]</sup> *dawar*,<sup>[18]</sup> *humma safravi*, *jarab* (scabies) and *hikka*.<sup>[14,5]</sup> as in the confection of senna.<sup>[1]</sup> Its infusion is employed as a drink in febrile diseases.<sup>[5,6,11]</sup> It is commonly prescribed in bilious disorders.<sup>[5,6]</sup>

### CORRECTIVE

Unnab,<sup>[14,18]</sup>

Badam,

Akhrot.<sup>[26]</sup>

Loab behdana,<sup>[25]</sup>

Banafsha,<sup>[18,25]</sup>

Kateera,

Khashkhash,

Shakar,

### SUBSTITUTE

*Aalobukhara* (*Prunus domestica* Linn)<sup>[14,18,25]</sup>

### DOSE

Fruit pulp without seeds 4-10 gm.<sup>[3,8]</sup>

Infusion: 10 – 15 darham (35- 52gm).<sup>[22]</sup>

Decoction: 200 ml<sup>4</sup>

### Famous Compound Formulations

1. Jawarish tamarhindi.

### Chemical Constituents

The fruit pulp yielded amino acids—serine, beta-alanine, proline, pipecolic acid, phenylalanine and leucine.<sup>[3]</sup> A bitter principle, tamarindial is isolated from the fruit pulp.<sup>[3]</sup>

Kernel yields polysaccharides composed of D-glucose, D-xylose, D-galactose and L-

arabinose. The leaves gave flavone C-glycosides orientin, vitexin, isoorientin and isovitexin. The leaves and fruits gave tartaric acid and malic acid.

## PHARMACOLOGICAL STUDIES

Leaf extract of *Tamarindus indica* completely inhibits spore germination of *Ustilago tritici* and *U. horrida*.<sup>[27]</sup> Polysaccharides showed immunomodulatory activities such as phagocytic enhancement, leukocyte migration inhibition and inhibition of lymphocyte proliferation. Tamarindial, isolated from the fruit pulp, showed fungicidal and bactericidal activity against *Aspergillus niger*, *Candida albicans*, *Bacillus subtilis*, *Staphylococcus aureus*, *E. coli* and *Pseudomonas aeruginosa*.<sup>[3]</sup>

### Anti Inflammatory and Analgesic Activity

In a study the effects of methanolic extract of *Tamarindus indica* seeds on anti-inflammatory and analgesic activities in vivo using rat as an animal model at the doses of 100 mg/kg, 200 mg/kg and 400 mg/kg body weight was investigated. The anti-inflammatory activities were investigated by utilizing carrageenan induced paw edema in rat. The analgesic activity was examined against tail immersion method in rats. The results showed that *Tamarindus indica* significantly ( $p < 0.01$ ) reduced carrageenan induced paw edema in rats. In tail immersion method, methanolic extract of *Tamarindus indica* has shown significant ( $p < 0.01$ ) increase in reaction time of tail in water maintained at 55°C indicating analgesic activity. Preliminary phytochemical screening of the extract revealed the presence of alkaloids, tannins, saponins, glycosides and flavonoids. These results demonstrated that the methanolic extract of *Tamarindus indica* seed exhibited significant analgesic and anti-inflammatory activities.<sup>[32]</sup>

### Analgesic Activity

The effects of *Tamarindus indica* L. aqueous fruit extract on the antinociceptive activity in rodent models was evaluated in a study. The analgesic effect was evaluated using acetic acid-induced writhing, hot plate and formalin tests. The extract (60–600 mg/kg) significantly ( $p < 0.05$ ) inhibited the writhing test in a dose-dependent manner with the percentage of analgesia recorded between 51.8 and 74.1%. In addition, the extract also significantly ( $p < 0.05$ ) increased the latency time in the hot plate test in a dose-dependent manner. Further study showed that the extract elicited inhibitory activity in both the early and late phases of the formalin test. Moreover, pretreatment with 5 mg/kg naloxone, a nonselective opioid receptor antagonist, significantly ( $p < 0.05$ ) modified the antinociceptive effect of the extract in all tests. The results indicated that the aqueous extract of *T. indica* possesses potential

antinociceptive activity at both the peripheral and central levels, which are mediated via activation of the opioidergic mechanism.<sup>[30]</sup>

### **Hepatoprotective Effect**

In a study protective effect of *Tamarindus indica* was evaluated by intoxicating the rats with paracetamol (1 g/kg p.o.) for seven days. The aqueous extracts of different parts of *Tamarindus indica* such as fruits, leaves (350 mg/kg p.o.) and unroasted seeds (700 mg/kg p.o.) were administered for 9 days after the third dose of paracetamol. Biochemical estimations such as aspartate transaminase, alanine transaminase, alkaline phosphatase, total bilirubin and total protein were recorded on 4<sup>th</sup> and 13<sup>th</sup> day. Liver weight variation, thiopentone-induced sleeping time and histopathology were studied on 13<sup>th</sup> day. Silymarin (100 mg/kg p.o.) was used as a standard. A significant hepato regenerative effect was observed for the aqueous extracts of tamarind leaves, fruits and unroasted seeds ( $p < 0.05$ ) as judged from the parameters studied.<sup>[29]</sup>

### **Hypolipidemic and Weight Reducing Activity**

In a study the effect of ethanolic extract of fruit pulp of *Tamarindus indica* on obesity in rats using cafeteria diet-induced obesity and antipsychotic drug (sulpiride)-induced obesity was evaluated. Cafeteria diet was administered for 40 successive days to male Wistar rats and sulpiride (20 mg/kg, i.p.) was administered for 28 successive days to female Wistar rats. In separate groups of animals, the ethanolic extract (50 and 100 mg/kg p.o.) of *Tamarindus indica* fruit was administered along with cafeteria diet for 40 successive days to Wistar male rats and along with sulpiride for 28 successive days to Wistar female rats. Cafeteria diet alone significantly increased body weight, serum total cholesterol, triglycerides, and glucose levels and decreased HDL cholesterol in male rats as compared to control. Sulpiride significantly increased the levels of glucose, triglycerides, cholesterol and there was no significant effect on HDL-cholesterol in female rats as compared to control. Ethanolic extract showed a significant decrease in body weight, serum cholesterol, and triglycerides and a significant increase in HDL-cholesterol in cafeteria diet- and sulpiride-induced obese rats as compared to their respective control groups. Thus, the ethanolic extract of *Tamarindus indica* fruit pulp showed a significant weight-reducing and hypolipidemic activity in cafeteria diet- and sulpiride-induced obese rats.<sup>[31]</sup>

### **ANTI-HELMINTHIC ACTIVITY**



Das et al., reported the anti-helminthic activity of the leaf and bark extract of *Tamarindus Indica* Linn. The alcohol extract of the bark of *Tamarindus indica*, caused paralysis at 22.33 min and time of death at 45.00 min, for *Pheretima posthuma* and 14.66 min as paralysis time and 20.66 min as death time for *Tubifex* worms respectively. With the aqueous fractions treatment of earthworm *Pheretima posthuma* and worm *Tubifex* resulted in a paralysis time of 58.33 and 23.00 min. Results indicated that *Tamarindus indica* Linn has significant anti-helminthic activity.<sup>[32]</sup>

### **Antibacterial Activity**

In a study Ethanolic and aqueous (hot and cold) extracts of the fruit pulp, stem bark and leaves of *Tamarindus indica* were evaluated for antibacterial activity, in vitro, against 13 Gram negative and 5 Gram positive bacterial strains using agar well diffusion and macro broth dilution techniques, simultaneously. The fruit pulp extracts exhibited a wide spectrum of activity; the cold water extract against 95.5% of the test bacterial strains; and the hot water and ethanolic extracts against 90.9% and 86.4%, respectively. In contrast the cold water extract of the leaves and stem bark, each was active against 16.7%; while the ethanolic extract of each was active against 75% of the test strains. The minimum inhibitory concentrations (MIC) ranged from 7.81 mg/mL against *Bacillus subtilis* ATCC 6051 to 31.25 mg/mL against *Escherichia coli* ATCC 11775; and the minimum bactericidal concentration (MBC) ranged from 125 mg/mL against *Pseudomonas aeruginosa* ATCC 10145 to 250 mg/mL against *Bacillus subtilis* ATCC 6051.<sup>33</sup>

### **Antimicrobial Activity**

In a study performed by Doughari his results of the phytochemical studies revealed the presence of tannins, saponins, sesquiterpenes, alkaloids and phlobatamins and the extracts were active against both gram positive and gram negative bacteria. The activity of the plant extracts were not affected when treated at different temperature ranges (40°C, 30°C, 60°C and 100°C), but was reduced at alkaline pH. Studies on the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of the extracts on the test organisms showed that the lowest MIC and the MBC were demonstrated against *Salmonella paratyphi*, *Bacillus subtilis* and *Salmonella typhi* and the highest MIC and MBC was exhibited against *Staphylococcus aureus*. *Tamarindus indica* has broad spectrum antibacterial activity and a potential source of new classes of antibiotics that could be useful for infectious disease chemotherapy and control.<sup>[34]</sup>

## CONCLUSION

*Tamarindus indica* is known to possess hepatoprotective, analgesic, weight reducing, anti-helminthic, and anti-inflammatory activities that is why it gained interest in the field of medicine. It might be concluded that *Tamarindus indica* has emerged up as novel therapeutic agent and treats variety of ailments very efficiently. So the use of *Tamarindus indica* should be encouraged.

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