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Review Article

TAMARINDUS INDICA: AN OVERVIEW

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Abstract

Tamarindus indica is an essential drug which has been used in Unani system since time immemorial as an effective demulscient, cardiac tonic, stomachic, carminative, digestive, laxative, antiscorbutic, antibilious and antiseptic. It belongs to family Caesalpiniaceae. It is a leguminous tree native to tropical Africa. In India it is found in forest land in Madhya Pradesh, India. In Unani system it is useful for liver, stomach and intestine, constipation, anorexia, polydipsia, indigestion and liver disorders, febrile diseases, bilious disorders and sore throat. The active compounds vitexin, isoorientin, isovitexin, tartaric acid and malic acid are reported to be having anti snake venom, hepatoprotective and analgesic, weight reducing, anti-helminthic and anti-inflammatory activities. In this article an attempt has been made to summarize the enormous classical Unani literature and modern researches on *Tamarindus indica*.

Keywords: *Tamarindus indica*, tamar hindi, Unani.

INTRODUCTION

History

Tamarind is a leguminous trees of genus *Tamarindus* a monotype taxon with only specie *indicum*. *Tamarindus* is medieval latinization of the Arabic name for the fruit, meaning Indian date.¹ 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 tamrhindi on which the scientific name *Tamarindus* is based.² The Arab introduced it into Europe.

Family: Caesalpiniaceae.³

Vernacular Names

Arabic- Tamar hindi⁴, Ayurvedic- Amlī, Amlīkaa, Suktaa, Chukraa, Chukrikaa, Chinchaa, Chandikaa, Tintidika. Bengali- Tentul, Anbli.⁵ English- Tamarind. German- Tamarandi. Gujrati- Anvali. Konkani- Chinch. Oriya-Tentuli, Konya.⁶ Persian- Ambala^{7,8} Sanskrit- Amlīka.⁹ Siddha / Tamil- Puli, Aanvilam³ Telegu- Cintapandu, Amlaki, Cintacettu¹⁰ Unani- Tamar Hindi.³

Habitat and Distribution

Tamarind is native to tropical Africa where it grows wild throughout Sudan. It was so long ago introduced into India that it is also reported indigenous to India. Because of its many uses its cultivation has spread around the world in tropical and subtropical zones. This evergreen tree is cultivated throughout India, Burma,⁷ Yemen and Basra.⁴ In India it is found in forest land in Madhya Pradesh, India¹¹ It

is self sown in waste places and is also planted as avenue tree.⁸

Part Used

Pulp of the fruit^{7,12,13}, seeds^{7,14,15}, leaves¹², flower⁷, bark⁷ and wood.¹⁵

Description

It is a large tree, attaining 60-80 feet in height and bearing a very large, widely spreading head of foliage, trunk with a dark rough bark, youngest twigs smooth or slightly pubescent;¹ flowers are in bunches, yellow in color and boat shaped;⁹ seeds are reddish brown, thick; the flattened sides of the seeds are marked by a centrally placed dull area;² fruit pulp occurs as a reddish-brown, moist, sticky mass, in which yellowish-brown fibers are readily seen; odour is pleasant, taste is sweetish and acidic;⁹⁵ bark of the trunk is scaly;¹⁶ leaves are paripinnate up to 15 cm long.¹⁷

Therapeutic Actions

Pulp: Mulattif (demulscient), muqawwi qalb (cardiac tonic),^{4,18} muqawwi meda (stomachic), dafē matli (antiemetic), mulayyan taba, mushil e safra,^{4,14,18} mukhrij ikhlāt fāsida, musakkin dam,^{4,18} dafē samiyat waba,¹⁸ mufarreh (exhilarant), dafē khafkaan haar,¹⁴ mubarrid (cooling),^{6,19,20} kasir riyah (carminative),⁶ hazim (digestive),⁶ mulayyan (laxative)^{4,19,21,20}, antiscorbutic, antibilious⁷ and antiseptic.⁵

Leaves: Qabiz (astringent).⁷

Flowers: Mubarrid (cooling), qate safra (antibilious), qabiz (constipative), musakkin (sedative)¹⁸ and anti-viral.^{12,13,15}

Bark: Qabiz (astringent), tonic (muqawwi),^{7,3,10} and mudirr e haiz (emmenagogue).¹⁰

Seeds: Qabiz (astringent),^{1,7} mubarrid (cooling), kasir riyah (carminative), hazim (digestive), mulayyan (laxative),⁷ muqawwi baah (aphrodisiac), muqawwi meda (stomachic), muqawwi (tonic),¹⁰ and mumsik (retentive).^{1,18}

Seed-kernel: Qabiz (mild astringent)⁷ and muharrik (stimulant).³

Medicinal Uses

According to Avicenna it is used in kharish (pruritis), khafkaan (palpitation), qula (stomatitis).⁴ It is also used in safravi qae (bilious vomiting),²² dawar,¹⁸ humma safravi, jarab (scabies) and hikka.¹⁴ Ripe fruit is used in scurvy, atony of liver, stomach and intestine, constipation. It is also useful in intoxication from datura,⁷ anorexia, polydipsia, indigestion and liver disorders.⁹ Pulp is prescribed in conjugation with mild cathartics^{1,5} as in the confection of senna.¹ Its infusion is employed as a drink in febrile diseases.^{5,6,11} It is commonly prescribed in bilious disorders.^{5,6} A gargle with infusion of tamarind is useful for sore throat.⁵ The fruit of tamarind preserved with sugar is a useful gentle laxative. 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.²³ Hakims consider the pulp useful for purging the system of bile and to adjust humour.⁷ 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,¹⁰ vaginopathy and in burning sensation.²⁴ According to Prosper Alpines these were employed by the Arabians as an antihelmintic.¹⁹ The ash of the bark is given in colic and indigestion. The ash is also used in gargles and mouthwash for apthous sores.³

Corrective

Kateera (*Sterculia urens* Roxb.), khashkhash (*Papaver somniferum* Linn seeds), loab behdana (*Cydonia oblonga* Mill mucilage),²⁵ banafsha (*Viola odorata* Linn.),^{18,25} shakar (sugar), unnab (*Zizyphus jujube* Mill),^{14,18} badam (*Prunus amygdalus* Batsch var.), akhrot (*Juglans regia* Linn).²⁶

Substitute

Aalobukhara (*Prunus domestica* Linn)^{14,18,25} and zarishk (*Berberis vulgaris* Linn).¹⁴

Dose

Fruit pulp without seeds 4-10 g.^{3,8}

Kheesandah (Infusion): 10–15 darham (35- 52 g).²²

Joshandah (Decoction): 200 ml.⁴

Famous Compound Formulations

- Jawarish tamarhindi.
- Saikanjabeen tamarhindi.¹⁴

Chemical Constituents

Kernel yields polysaccharides composed of D-glucose, D-xylose, D-galactose and L-arabinose. The leaves gave flavone C-glycosidesorientin, vitexin, isoorientin and isovitexin. The leaves and fruits gave tartaric acid and malic acid. The fruit pulp yielded amino acids—serine, beta-alanine, proline, pipercolinic acid, phenylalanine and leucine.³ A bitter principle, tamarindial is isolated from the fruit pulp.³

Pharmacological Studies

Leaf extract of *Tamarindus indica* completely inhibits spore germination of *Ustilago tritici* and *U. horde*.²⁷ 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 nigar*, *Candida albicans*, *Bacillus subtilis*, *Staphylococcus aureus*, *E. coli* and *Pseudomonas aeruginosa*.³

Anti Snake Venom Activity

The effect of *Tamarindus indica* seed extract on the pharmacological as well as the enzymatic effects induced by *V. russelli* venom was evaluated in a study. Tamarind seed extract inhibited the PLA (2), protease, hyaluronidase, l-amino acid oxidase and 5'-nucleotidase enzyme activities of venom in a dose-dependent manner. Furthermore, the extract neutralized the degradation of the beta chain of human fibrinogen and indirect hemolysis caused by venom. It was also observed that the extract exerted a moderate effect on the clotting time, prolonging it only to a small extent. Edema, hemorrhage and myotoxic effects including lethality, induced by venom were neutralized significantly when different doses of the extract were pre incubated with venom before the assays. On the other hand, animals that received extract 10 minutes after the injection of venom were protected from venom induced toxicity. Since it inhibits hydrolytic enzymes and pharmacological effects, it might be used as an alternative treatment to serum therapy and in addition, as a rich source of potential inhibitors of PLA (2), metalloproteinases, serine proteases, hyaluronidases and 5 cent-nucleotidases, the enzymes involved in several physiopathological human and animal diseases.²⁸

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 4th and 13th day. Liver weight variation, thiopentone-induced sleeping time and histopathology were studied on 13th day. Silymarin (100 mg / kg p.o.) was used as a standard. A significant hepatoregenerative effect was observed for the aqueous extracts of tamarind leaves, fruits and unroasted seeds (p < 0.05) as judged from the parameters studied.²⁹

Analgesic Activity

The effects of *Tamarindus indica* L. aqueous fruit extract on the antinociceptive activity in rodent models were 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 *Tamarindus indica* possesses potential antinociceptive activity at both the peripheral and central levels, which are mediated via activation of the opioidergic mechanism.³⁰

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.³¹

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 minutes and time of death at 45.00 minutes for *Pheretima posthuma* and 14.66 minutes as paralysis time and 20.66 minutes as death time for *Tubifex tubifex* worms respectively. With the aqueous fractions treatment of earthworm *Pheretima posthuma* and worm *Tubifex tubifex* resulted in a paralysis time of 58.33 and 23.00 minutes. Results indicated that *Tamarindus indica* Linn. has significant anti-helminthic activity.³²

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.³²

CONCLUSION

Tamarindus indica is known to possess an anti snake venom, 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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