

**A REVIEW ON TRADITIONAL, PHARMACOLOGICAL, AND THERAPEUTIC  
PROPERTIES OF TAMARINDUS INDICA**<sup>1</sup>\*Dr. M. J. Patil, <sup>2</sup>Ms. Vibhuti S., Shirsat, <sup>3</sup>Mr. Akshay M. Nar, <sup>4</sup>Dattatray Prakash Patil<sup>1</sup>M. Pharm, Ph.D (Principal, ASPM College of Pharmacy).<sup>2</sup>M.Pharm (Project Guide, ASPM College of Pharmacy).<sup>3</sup>M. Pharm (Co-guide, ASPM College of Pharmacy).<sup>4</sup>(Student, ASPM College of Pharmacy).**\*Corresponding Author: Dr. M. J. Patil**

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**❖ ABSTRACT**

Tamarind (*Tamarindus indica*) is a fruit-bearing member of the leguminous family and a potentially therapeutic plant. It is native to the subcontinent, has long been grown extensively in India, and is referred to as "imli" in Hindi and Urdu. Tamarind is a huge, long-lived tree that grows slowly and can reach a height of 24 to 30 meters even in extremely adverse weather conditions. In our nation, there are often two varieties of tamarind—one with a sweeter flavor and the other with a bitter one. Tamarind can thrive in a variety of climates and environmental changes. The essential ecological elements for its maximum yield are the right amount of warmth, sunlight, and moisture. Traditionally, plant materials have been utilized as medicine to treat illnesses and maintain health. One of the plants used in traditional herbal treatment is *Tamarindus indica*. The Leguminosae family (subfamily: Caesalpiniaceae) includes the tamarind species. Originally from Africa, this evergreen tree is now widely found in other tropical and subtropical regions of the world. The pharmacological characteristics of tamarind are described in Ayurvedic literature as accountable for the effectiveness of treatment. It is used to a variety of foods and drinks as a flavoring. Tamarind fruit has a mild antioxidant effect and is high in flavonoids and polyphenols. Vitamins, phytochemicals, and essential amino acids are abundant in tamarind.

**KEYWORDS:** *Tamarindus indica*; Caesalpiniaceae, leguminous family, Africa.**❖ INTRODUCTION**

The tamarind, or *Tamarindus indica* L. of the Fabaceae, subfamily Caesalpinoideae, is a staple meal throughout the tropics. It is a multipurpose tree, and almost every part of it serves a purpose, be it medicinal or nutritional. While tamarind is indigenous to tropical Africa, it has been introduced to and naturalized in over five countries globally.<sup>[1]</sup> It has long been grown on the Indian subcontinent and is said to be native there<sup>[2]</sup>, where it is known as "imli" in Urdu and Hindi.<sup>[3]</sup> Since there is just one species in the genus *Tamarindus*—*Tamarindus indica* L., or "Tamarind"—it is a monotypic taxon. In addition to Cameroon, Sudan, Tanzania, and Nigeria, it grows wild throughout Africa. There are several types of *Tamarindus indica*, which can be divided into two categories: sweet and acidic. Since acidic tamarinds are common in many nations, they thrive in warm, sunny

climates. Sweet varieties, however, are difficult to find.<sup>[4]</sup> Various components have been found to contain vital amino acids, proteins, lipids, carbs, tannins, phytochemicals, vitamins, and minerals. Phenolic chemicals found in tamarind include catechin, epicatechin, procyanidin B2, and other components such as mucilage, pectin, arabinose, xylose, galactose, glucose, uronic acid, tartaric acid, and triterpenes. It has a lot of vitamins B and C, which strengthen the immune system.<sup>[5]</sup> At its maximum potential, the tree can grow to a height of 25 meters and a crown diameter of 12 meters. The tamarind crop grows best in arid, dry regions, especially those that are vulnerable to prolonged drought.

Almost any setting since it can survive droughts lasting five to six months. The tamarind tree requires little upkeep and is easy to cultivate. It may live for 80–200

years, is usually free of serious pests and diseases, and can yield 150–500 kg of pods a year at age 20. Every season, the tree covers its branches with a profusion of curved fruit pods.<sup>[6]</sup>

#### ❖ Plant Profile

#### ❖ Biological Source

Tamarind consists of dried ripe fruits (freed from the brittle epicarp) of *Tamarindus indica* Linn., belonging to family Leguminosae.

#### ❖ Images

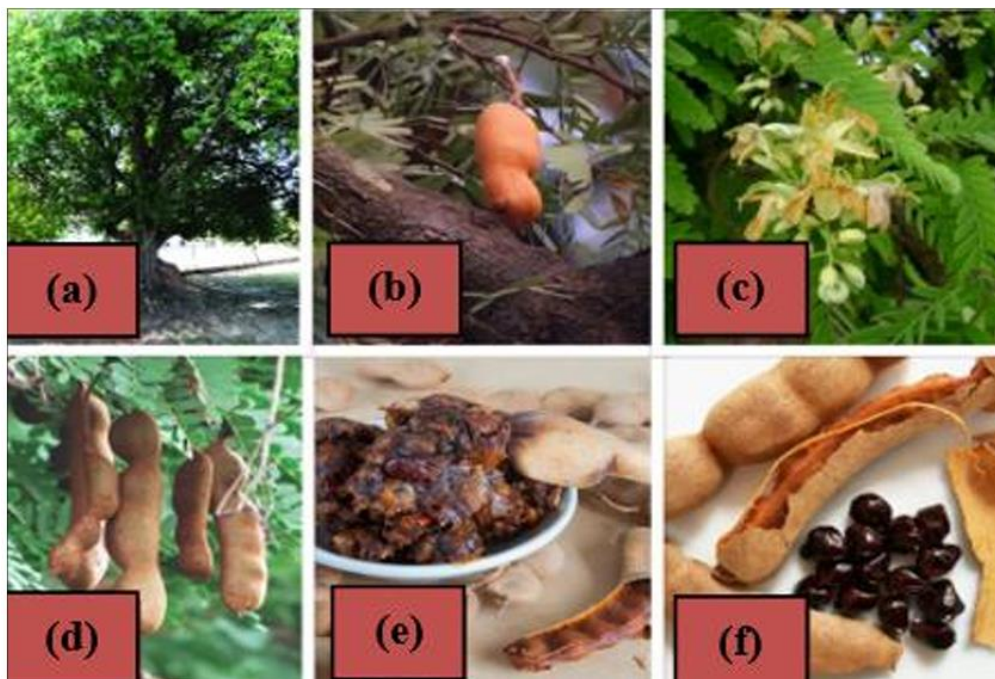


**Fig 1:** (a) *Tamarindus indica* tree (b) Stem bark of *T. indica*. (c) Leaflets, leaf and flowers of *T. indica*. (d) *T. indica* fruits. (e) Rusty-brown pulp of *T. indica*. (f) Irregularly shaped, shiny, and smooth seeds of *T. indica*.

#### ❖ Morphology

The tamarind tree can reach a maximum crown height of 12 to 18 meters, and it has a long lifespan and a medium growth rate. Around the crown, dense foliage creates an amorphous, vase-like look. Direct sunshine is ideal for the tree's growth. Sandy, acidic, clay, loam, and soil types with a strong resistance to drought are preferred. The evergreen leaves are naturally lobed and arranged alternately. The leaflets are naturally veined, bright green, elliptic-ovular, and shorter than 5 cm. In agriculture, trees are often trimmed to increase tree density and make fruit picking easier. As a tree ages, its branches droop from a single, central stem. At night, the pamphlets fold up. It is susceptible to frost because it is a tropical species.<sup>[13]</sup>

#### ❖ Taxonomical classification<sup>[12]</sup>

- **Kingdom:** Plantae
- **Division:** Angiospermae
- **Class:** Dicotyledoneae
- ❖ **Order:** Fabales

#### ❖ Synonyms

Imali, Puli, Chinch, Kolpuli, Amali.

#### ❖ Family: Fabaceae(Leguminosae)

#### ❖ Subfamily: Caesalpiniceae

#### ❖ Genus: Tamarindu

#### ❖ Species: T.indica

#### ❖ Botanical and Geographical Distribution

Tamarind is a large, 12–14 m tall, evergreen or semi-evergreen tree with a thick trunk that may reach a diameter of 1.5–2 m and a circumference of up to 8 m. The alternating, even pinnate leaves range in length from 5 to 12.5 cm. They have short petioles that are either glabrous or puberulent. The leaflets are oblong, obtuse, glabrous, reticulately veined, subsessile, and closely spaced on the rachis in ten to twelve pairs. The lateral flowers are drooping, and the few flowers are carried in racemes at the tips of branches. Flowers are irregular, bisexual, and joined at the tip by a pedicel (5–10 mm). Bracts are oval oblong and early caduceus. There are two tiny, reddish, boat-shaped bracteoles. The calyx is 8–15 mm long, imbricate, oblong, and membrane-like, with a very narrow turbinate tube and four uneven sepals.<sup>[14]</sup>

❖ **Phytochemical Evaluation****Table 1: Qualitative analysis off T. indica leaves and tender shoots in three different solvents.**

| Sl.No. | Phytoconstituents      | Leaves extracts |            |                 | Shoot extracts |            |                 |
|--------|------------------------|-----------------|------------|-----------------|----------------|------------|-----------------|
|        |                        | Methanol        | Chloroform | Petroleum ether | Methanol       | Chloroform | Petroleum ether |
| 1.     | Alkaloids              |                 |            |                 |                |            |                 |
|        | Mayer test             | ++              | +          | -               | ++             | +          | -               |
|        | wagner test            | ++              | -          | -               | ++             | -          | -               |
| 2.     | Flavonoids             |                 |            |                 |                |            |                 |
|        | Alkaline reagent test  | +++             | ++         | -               | +++            | -          | -               |
| 3.     | Phytosterols           |                 |            |                 |                |            |                 |
|        | Lebermannburchard test | ++              | +          | -               | +              | +          | -               |
|        | Salkowski test         | +++             | +          | -               | ++             | +          | -               |
| 4.     | Amino acids            |                 |            |                 |                |            |                 |
|        | Ninhydrin              | -               | -          | -               | +              | -          | -               |
| 5.     | Carbohydrates          |                 |            |                 |                |            |                 |
|        | Benedict's test        | +++             | ++         | -               | ++             | -          | -               |

+++ (highly present), ++ (moderately present), + (low present), - (Absent)

❖ **Chemical constituent<sup>[7]</sup>**

1. Leaves: Invert sugar, citric acid, pipelic acid, nicotinic acid, 1-malic acid, and volatile oils (limonene, geraniol) are all present in pulps. Benzyl benzoate (40.6%), lupanone, lupeol, orientin, isoorientin, vitamin B3, vitamin C, vitexin, isovitexin, cinnamates, serine, 1-malic acid, beta alanine, proline, phenylalanine, leucine, potassium, tannin, and glycosides.
2. Fruits: Fruits: carboxylic acid and furan derivatives. Apple acid, grape acid, tartaric acid, succinic acid, citric acid, pectin, and phenolotannins
3. Seeds: Palmitic acid, oleic acid, linoleic acid, eicosanoic acid,  $\beta$ -amyrin,  $\beta$ -sitosterol, and campesterol. Additionally discovered were mucilage, arabinose, xylose, galactose pectin, glucose, and uranic acid. The seed extract yielded a cardioid (uzarigenin-3-O- $\beta$ Dxylopyranosyl (1-2)- $\alpha$ -L rhamnopyranoside) and a novel bufadienolide (Scilliroside 3-O- $\beta$ -D glucopyranosyl-(1-2) Lrhamnopyranoside). Amyloids, cellulose, albuminoid, phytohemagglutinins, and chitinase.
4. Stem bark : Lipids, peroxidase, glycosides, tannins, and saponins
5. Root bark: Octacosanyl ferulate, n-hexacosane, eicosanoic acid,  $\beta$ -sinosterol, (+)-pinitol, and 21-oxobehenic acid.

❖ **Therapeutic Uses**

1. The medication Imli (Tamarindus indica) was used in traditional medicine to cure a variety of ailments.
2. It has been thoroughly documented in ethnobotanical literature and has been utilized for a number of purposes.
3. A pessary of seed kernels should be used to treat vaginal atony. After positioning the tract, a paste made from fried seeds was placed to the anus to treat rectal prolapse.
4. Acute or chronic constipation, liver and gall bladder problems, bilious vomiting, alcohol intoxication,

fever, pharyngitis, stomatitis, and hemorrhoids are all treated with tamarind. (Anonymous, 2000).<sup>[8]</sup>

5. It is used to treat splenomegaly, bilious fever, scorpion bite, and scurvy (Nadkarni, 1954<sup>[21]</sup>; Kirtikar and Basu, 1991).<sup>[9]</sup>

❖ **Advantages**

1. Tamarind is a classic therapeutic ingredient for arthritis because of its antibacterial, anti-inflammatory, and antioxidant qualities.<sup>[10]</sup>
2. Tamarind is a classic therapeutic ingredient for arthritis because of its antibacterial, anti-inflammatory, and antioxidant qualities.<sup>[11]</sup>
3. Conjunctivitis is a disease of the eyes that is treated using eye drops made from tamarind pulp. Another eye problem that can be addressed with tamarind seeds is dry eye syndrome.

❖ **REVIEW OF LITERATURE****1. Antidiabetic and Hypolipidemic Activity**

In rats given a diet high in cholesterol, tamarind pulp and fruit extracts exhibit hypolipidemic and antioxidant properties.<sup>[15]</sup> In cafeteria diet and sulphuride-induced obese mice, ethanolic extract (50 mg/kg) of tamarind fruit pulp significantly reduced body weight, blood cholesterol, triglycerides, and elevated HDL cholesterol.<sup>[16]</sup> The primary outcomes of diabetes mellitus, metabolic syndrome, and cardiovascular issues are hyperglycemia, hyperlipidemia, and obesity. Tamarind regulates certain metabolic disorders.<sup>[16]</sup>

**2. Analgesic Activity**

A hot plate test and an acetic acid-induced writhing test were two appropriate models used to screen for analgesic efficacy in various tamarind bark extracts. When compared to the conventional medication pentazocine (10 mg/kg, i.p.), the petroleum ether extract shown noteworthy effects at 50 mg/kg, i.p. Certain triterpenes and sterols have analgesic and anti-inflammatory properties.<sup>[17]</sup>

## 2. Wound Healing

*Tamarindus indica* is frequently used to treat cuts, wounds, and abscesses. *Tamarindus indica* leaves and bark are mostly administered to wounds as a powder, decoction, or poultice, either alone or in combination with other species. The primary use of tamarind bark in the Dakar medicinal plant market is for wound healing. However, other tamarind plant parts, such as fruit, gum, or pod husks, are utilized in therapeutic treatment. Another useful remedy for wounds caused by Guinea worm infections is a decoction made from *Tamarindus indica* leaves.<sup>[18]</sup>

## 3. Anti-Asthmatic and Hepato-Protective Activity

In male rats with diabetes caused by streptozotocin, the aqueous extract of *tamarindus indica* seeds demonstrated a potent anti-diabetogenic effect. When rats with severe and mild diabetes were given an aqueous extract of *tamarindus indica* seeds, hyperglycemia was significantly reduced. This was determined by measuring blood glucose levels while the rats were fasting. Similarly, it was discovered that the amount of hyperlipidemia was considerably decreased by monitoring the various cholesterol contents. The foundation of traditional Indian herbal medicine is similarly explained by this rat model.<sup>[19]</sup>

## 4. Anti-Inflammatory Activity

After 15 days of therapy, the 95% ethanolic extract of *Tamarindus indica* seed was found to be a powerful reducer of pro-inflammatory mediators, arthritis-mediated cartilage, and bone disintegration in adult Wistar rats at a dosage range of 25–50 mg/kg per day.<sup>[29]</sup> *Tamarindus indica* L. seeds were used to extract a trypsin inhibitor. Additionally, compared to non-treated animals, mice treated with trypsin inhibitor isolated from tamarind (TTIp) showed lower plasma concentrations of this cytokine and less TNF- $\alpha$  immunostaining in adipocytes.<sup>[20]</sup>

## 6. Peptic ulcer

The dose-dependent protective impact on ulcer models caused by alcohol, ibuprofen, and pylorus ligation at doses of 100 mg/kg and 200 mg/kg body weight of methanolic extract given orally to rats in various groups. The typical medication for these gastric ulcer models was ranitidine at a dose of 50 mg/kg.<sup>[21]</sup>

## ❖ CONCLUSION

This review provides general information on ethnopharmacology, therapeutic applications, and bioactive ingredients. Tamarind has a wide range of nutritional qualities with positive benefits on human health and potential uses in the textile and pharmaceutical sectors. It has a number of bioactive substances in its leaves, seeds, bark, fruit pulp, and flowers. The fruit's components give it a distinctive, simultaneously sweet and sour taste that is frequently utilized in cuisine. Determining which use is more crucial—natural medicine or food and drink—is

frequently more challenging. This demonstrates the plant's medicinal value. This review is a straightforward attempt to gather the traditional literature on tamarind and, ideally, spark more investigation into the plant's advantages for human health.

## Future Scope

Due to its many uses in a variety of industries, such as food and drink, pharmaceuticals, cosmetics, and industrial raw materials, the tamarind (imli) plant has a robust and varied future. With substantial economic potential, the global market for tamarind extract alone is expected to increase from USD 1.145 billion in 2024 to about USD 2 billion by 2034.

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