

## Tamarindus Indica an Appraisal on Its Uses in Traditional Medicine and Its Antinutritional Components-Mini Review

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### Abstract

Traditional medicine predated the man history and it is the combined knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures in different part of the world. *Tamarindus indica* popularly known as Tsamiya in Hausa Language of Northern Nigeria is an arboreal fruit and it is very abundant in Tropical countries like Nigeria and Pakistan. It is a rich source of most essential amino acids and phytochemicals. The plant fruit pulp and seed are commonly uses for their potentials in traditional medicines and also for the suitability of its fruits pulp in making local beverages.

The aim of this review is to give an appraisal on the traditional medicinal values of *T. indica* particularly its application as laxative, in the management of constipation, relief for peptic ulcer disease, as anti-spasmolytic, antibacterial and antifungal effect, anti-inflammatory and antioxidant properties. We also provided some insights into anti-nutritional factors usually contained in *T. indica* such as Phytic acid, saponins, oxalates, tanins for proper understanding of other constituents mostly found in this treasured plant. It is therefore worthy to understand that despite its enormous potentials in traditional medicine with respect to essential phytochemicals it contains, *T. indica* also contains some anti-nutritional factors that could retard its usages due to their interference in some essential biochemical processes in humans.

**Keywords:** *Tamarindus indica*; Traditional medicine; Anti-nutritional factors

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### Introduction

According to World Health Organization (WHO), Traditional medicine is the combined knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the, diagnosis, prevention, improvement or treatment of physical and mental illness [1]. Traditional medicines (TMs) make use of several natural products and are of great importance. Various forms of TMs do exist, the most popular includes; Ayurveda as being practiced in India for over 3,000 years, Traditional Chinese medicine (TCM), Kampo as being practiced in Japan, Traditional Korean medicine (TKM), and Unani used in most Arab Nations.

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These employ natural products and have been practiced all over the world for several thousand years, and they have blossomed into well regulated systems of medicine globally [2]. *Tamarindus indica* also known as Tsamiya in the popular Hausa Language of Nigeria, belongs to the family leguminosea (fabacea), commonly known as Tamarind tree. Its fruit is mostly used as traditional medicine. Tamarind is found in the sub continental Africa and Asia in countries like Nigeria and Pakistan among other Tropical countries. It is used for abdominal pain, diarrhea and dysentery, and also some bacterial infections and parasitic infections, wound healing, constipation and inflammation.

It is a rich source of most essential amino acids and phytochemicals, and hence the plant is reported to possess anti-diabetic, antimicrobial, antioxidant, laxative and anti-hyperlipidemia activity [3]. *T. indica* has ameliorative effects on many diseases. It can be prepared as nutritious support for malnourished patients as it is cheap and easy to access. As a case in medicine, on the contrary of pharmacotherapy, it can be easily accessible and ready to use especially in tropical countries, so it has an important role in first line approach particularly among many rural communities.

Every part of *T. indica* (root, body, fruit, and stem) not only has rich nutritional value and bound usage area in TMs, but also has industrial economic importance. Tamarind can be the most acidic and sweet fruit according to its growing season [4]. This mini review aimed to provide some appraisal on the traditional medicinal values of *T. indica* and also to provide some insights into some of its anti-nutritional factors to serve as markers and suggested some channels on enhancing its local utilization to improve safety to the consumers.

### **Plant Description**

*Tamarindus indica* is a very large tree with long, heavy drooping branches and dense foliage. Completely grown-up tree might reach up to 80 feet in height. During each season, the tree bears curved fruit pods in abundance covering all over its branches. Each pod has hard outer shell encasing deep brown soft pulp enveloping around 2-10 hard dark-brown seeds. Its pulp and seeds are held together by extensive fiber network [5].

### **Scientific Classification**

Kingdom Plantae

Order Fabales

Family Fabaceae

Subfamily Caesalpinioideae

Genus Tamarind Species

Specie *Tamarindus indica*

### **Importance/Uses of *T. indica***

In most African countries, *T. indica* can be used as popular beverages, i.e. Kunun Tsamiya, a recipe that some people used to brake their fast [6], also used in wound healing, abdominal pain, diarrhea, dysentery, parasitic infestation, and respiratory problems [7].

### **Nutritional Benefits of *T. indica***

According to the World Health Organization report (2014), Tamarind fruit is an ideal source of all essential amino acids except tryptophan. Its seed also have similar properties so it becomes an important accessible protein source especially in countries where protein malnutrition is a common problem.

### **Health Related Benefits of *T. indica***

**Laxative:** *T. indica* fruit is used as a laxative in traditional medicine because of its high malic acid, tartaric acid and potassium content [8].

**Constipation:** *T. indica* fruit is also used for the treatment of constipation by mixing small quantity of the fruit to a large quantity of water for oral consumption [9].

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**Peptic ulcer:** Peptic ulcer is a painful gastro intestinal ailment in the stomach. It has been shown that *T. indica* seed extract has dose dependent protective effect for ulcer treatment. The protective effect of *T. indica* seed comes from its polyphenolic compounds mainly procyanidin, epicatechin and polymeric tannins. These compounds have antioxidant effect and protective role against free radicals. Tannins also prevent the ulcer development by causing protein accumulation and vasoconstrictions [10].

**Anti-spasmodic effect:** Tamarind fruit content causes smooth muscle relaxation via calcium channel blockage. This also explains the usage of *T. indica* in diarrhea treatment [11].

**Antimicrobial characteristics:** Increasing antibiotic resistance among bacteria and toxic effects of antibiotics has led to seeking of newer effective agents. Medicinal plants are preferred by local people because of their easy accessibility and tolerability. *T. indica* has many potential antimicrobial properties. *T. indica* extract has antibacterial properties against *Burkholderia Pseudomallei*, *Klebsiella*, *Pneumonia*, *Salmonella typhi*, *Salmonella paratyphi*, *Bacillus subtilis*, *Escherichia coli*, *Staphylococcus aureus*, among others; these are linked with its lupeol content [12].

**Anti-inflammatory effect:** When lysosomal damage occurs, phospholipase A2 appears and stimulates the production of inflammatory agents via hydrolysis of phospholipids. Prevention of cell damage causes cytoplasm content preservation and decrease inflammatory response. Polyphenol and Flavonoid content of *T. indica* are associated with anti-inflammatory effects [13].

**Antioxidant properties:** Antioxidant properties of *T. indica* seed and leaves have been shown in many studies, and also the heat dried seed has antioxidant properties. Phenol rich food and beverages like red wine, grape seed, green tea and tamarind have hypolipidemic, anti-atherosclerotic, antioxidant, anti-inflammatory and immunomodulatory effect. *T. indica* fruit is rich in organic acid, pectin, vitamins, mineral content, polyphenol and flavonoid content. Rich polyphenol content exists in seed and fruits and show regulatory effect on neutrophils [14].

### **Antinutritional Factors**

Anti-nutrients are natural or synthetic compounds that interfere with the absorption of essential nutrients in humans and animals. Nutrition studies focus on these anti-nutritional factors commonly found in food sources and beverages [15]. Many plants and their fruits contain anti-nutritional factors that can affect the bioavailability of nutrients required by the body. The anti-nutritional factors interfere with the metabolic processes so that growth and bioavailability of nutrients are negatively influenced [16]. The anti-nutritional factors commonly found in *T. indica* include the following.

#### **Phytates**

Phytic acid (inositol hexaphosphate) is an organic acid found in plant materials [17]. Phytic acid combines with some essential elements such as iron, calcium, zinc, and phosphorus to form insoluble salt Phytates which are not absorbed by the body thereby reducing the bioavailability of these elements [18].

#### **Saponins**

Saponins are naturally oily glycosides occurring in wide variety of plants. They are also nontoxic to humans and get their name from their soap-like qualities. Eating saponins may help lower the cholesterol level and also reduce the risk of heart diseases [19]. The immune system benefits from these plant compounds as well and also risk of developing certain form of cancer or tumors may decrease from eating more saponins. They are among several plant compounds which have beneficial effects. Among the various biological effects of saponins are antibacterial and antiprotozoal [20]. The structural intricacy of saponins led to a number of their chemical, physical, and biological peculiarities, which include foaming, emulsifying, bitterness, sweetness, pharmacological and haemolytic properties [21]. Saponins interfere with the uptake of certain nutrients including glucose and cholesterol at the gut through intra-luminal biochemical interactions. In chickens saponin have been reported to reduce growth, feed efficiency and reduce the absorption of dietary lipids and vitamins A and E [22].

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### **Oxalate**

Oxalates are naturally occurring substances found in wide variety of foods and play a supportive role in the metabolism of many plants and animals. So in terms of our overall health and diet, oxalates are neither rare nor undesirable. Oxalates can become detrimental to human health if they over accumulate in the body. The main site for this accumulation is the kidney which as a result may lead to high amount of oxalate concentration in the urine with an overly high amount of calcium leading to calcium oxalate kidney stone formation due to super saturation of urine with calcium oxalate salt [23].

### **Tanins**

Tanins commonly referred to as tannic acid are water soluble polyphenols that are present in many plant foods. They have been reported to be responsible for the decrease in feed intake, net metabolizable energy and protein digestibility in experimental animals. Therefore food rich in tannins are considered to be of low nutritional value [24].

### **Recommendations**

There is no doubt that the overall objectives for recognizing traditional medicines among the community of Nations are to improve the standards of healthy living and to provide an alternative means of cure, management and prevention of diseases. However, the aspects of safety and regulations of such TMs can never be over emphasized. It is therefore of paramount importance that Professional Organizations and Government regulatory Agencies among the countries that are chiefly involved in the utilization of *T. indica* as TMs or use in preparing beverages to make provisions for standards to regulate particularly the anti-nutritional factors of *T. indica* and where possible package the various parts used traditionally as powder, tablets, lozenges, syrup or any other suitable dosage form in order to improve its suitability, safety and stability for easy consumption.

### **Conclusion**

It is evident that the use of *T. indica* in the traditional medicine is scientifically proven based on the scientific data available on its phytochemical constituents. However, other components contained in this plant especially the various parts that found uses in TMs, the anti-nutritional factors do interfered in most cases with the bioavailability and absorption of other essential nutrients and also retard some biochemical processes in the body. Hence, standardization and packaging of the utilizable components of this precious plant will ensure safety to the consumers.

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