Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
https://www.phytojournal.com
JPP 2023; 12(1): 303-308
Received: 18-09-2022
Accepted: 28-11-2022

Ashvini V Joshi
R.S.M's. N.N. Sattha College of Pharmacy, Ahmednagar, Maharashtra, India

Aware Urmila
R.S.M's. N.N. Sattha College of Pharmacy, Ahmednagar, Maharashtra, India

Gaikwad Swapnil
R.S.M's. N.N. Sattha College of Pharmacy, Ahmednagar, Maharashtra, India

Sheikh Shahrukh
R.S.M's. N.N. Sattha College of Pharmacy, Ahmednagar, Maharashtra, India

Corresponding Author:
Ashvini V Joshi
R.S.M's. N.N. Sattha College of Pharmacy, Ahmednagar, Maharashtra, India

Review on *Tamarindus indica*

Ashvini V Joshi, Aware Urmila, Gaikwad Swapnil and Sheikh Shahrukh

Abstract
The family Fabaceae (Leguminosae) includes the tamarind (*Tamarindus indica* L.).In Asia, Africa, and America, tamarind is frequently used as a herbal treatment. It has a wide range of applications, including research on how well tamarind seeds heal wounds. The gum made from tamarind seed extract. Tamarind seeds are employed as a mucoadhesive polymer in the pharmaceutical, textile and food sectors. Skin elasticity is increased by tamarind seeds. Hydrate the skin and make it smooth. It contains hyaluronic acid, which moisturises the skin and reduces wrinkles and fine lines. Tamarind seeds are used in serums, gels, and face toners since they are water-soluble. Crude protein makes up 16.2% of tamarind seed kernel flour, along with fats, crude fibre, 57.88% of nitrogen-free extract and 1.16% of ash.

Keywords: *Tamarindus indica*, fabaceae, herbal treatment, mucoadhesive polymer, hyaluronic acid

Introduction
A staple food in the tropics is the tamarind, or *Tamarindus indica* L. of the Fabaceae, subfamily Caesalpinioideae. It is a multifunctional tree, and practically every portion of it has some sort of utility, whether it be nutritional or medicinal. Although tamarind is native to tropical Africa, it has been brought to and naturalised in more than 5 nations worldwide [1]. One of the native fruit tree species that historically supports both environmental stability and food security in sub-Saharan Africa is *Tamarindus indica* L. We assumed that the indigenous people of Eastern Uganda had long used *T. indica* and had created customs that favoured its preservation. We anticipated that the majority of them have planted the species and that they have a sophisticated indigenous knowledge (IK) system [2]. Imli, often known as a "Indian date" is the name of the tamarind tree, also known as the "Assam tree". The pulp's gummy acidity. The tamarind fruit has been used for long years as a culinary and medical ingredient. The pulp of the eatable fruits, in particular, can be used to make sherbet, curries, pickles, etc. or eaten raw. The starch-containing seeds are consumed raw or boiled and are also used in textile factories. The fruit was sold for two dirhams per seer and was known as ambli during the reign of Akbar the Great, the Mughal king. Since practically all of a tamarind tree's parts have some value, it is a versatile kind of tree. The fruit has about the pulp (55.0%), seed (34.0%), shell (11.0%) and fibre in a pod.

It is primarily grown for its fruit pulp, which is used to make beverages, flavour desserts, curries, and sauces, as well as being recognised as a herbal remedy in many areas of the world. The reddish or purple-brown tamarind seeds are extremely tough, glossy and hard [4]. The tree can reach a height of 25 m and a crown diameter of 12 m at its full potential. It is best for arid, dry locations, particularly those that are prone to extended drought the tamarind crop can grow in any environment since it can withstand five to six months of drought. The tamarind tree is simple to grow and needs little maintenance. It has a lifespan of 80-200 years, is typically free of significant pests and illnesses and at 20 years old, a healthy tree can produce 150-500 kg of pods annually. The tree produces abundant curving fruit pods that cover its branches in every season [5]. The two main varieties of tamarind are sweet and sour, respectively (mostly comes from Thailand). Tamarind can be consumed raw (ripe or unripe), processed into various products or both [6]. The sweet tamarind trees produced noticeably more fruit pulp, seed, seed size, and seed weight than the sour ones, according to a study conducted in Ethiopia. They also noticed that tamarind fruit might be straight or curved. The fresh pulp and pods of the sour type are a light brown colour, while those of the sweet kind are typically a deep brown colour. Fruits that are ripe are loaded with a fibrous, yellowish or brown pulp that has an acidic but palatable flavour is its sweet acidic taste due to the presence of tartaric acid (10%). The author describes tamarind to be simultaneously the most acidic and sweetest fruit. According the World Health Organization (WHO) tamarind can be considered a source of all essential amino acids, with the exclusion of tryptophan. It contains also other organic acids as tartaric, succinic and malic acid [10].

Tamarind is an introduced plant, not a native one, according to Indian botanist Brandies (1906). Native to Burma (Myanmar) and India, and was brought over by sea. Richie (1979) asserts that Arab traders brought the plant to India and other Asian nations in antiquity. If so, where was it originally from since it cannot grow in Arabian nations. One group of traders from Arabia used to travel by sea to Gujarat, while the other group, known as the Sabaeans, travelled by land from the Nile to the Indus River. They were from the southwest corner of the Arabian Desert and engaged in trade with India. They had a monopoly on the market because their rivals were unaware of the desert routes [3].

Origin:-Although tamarind trees are widely grown in Africa, Asia, and South America, India is the world's leading producer. Maker of tamarind-related goods. In the Indian states of Madhya Pradesh, Bihar, Andhra Pradesh, Karnataka, Tamil Nadu, West Bengal, Orissa, and Kerala, tamarind is in plentiful supply [7].

Description

Scientific classification

1. Kingdom : Plantae
2. Subkingdom : Tracheobionta
3. Superdivision : Spermatophyta
4. Division : Magnoliophyta
5. Class : Magnoliopsida
6. Subclass : Rosidae
7. Superorder : Rosanae
8. Order : Fabales
9. Family : Fabaceae
10. Subfamily : Caesalpinoideae
11. Tribe : Detarieae
12. Genus : Tamarindus
13. Species : *Tamarindus indica*

Tamarind's introduction to Ayurveda

The question therefore becomes: When was it that the plant was first introduced to India? Was first used in Ayurveda? It is referred to as "amla" in early Ayurvedic literature such as the Caraka Samhita, and the Sushruta Samhita. Additionally, it is believed that the acidic plant that Caraka may have referenced and used was kokam rather than *Tamarindus indica*. Additionally, it is referred to as tintidi, cinca and amlika in Amarsimha's Amarkosha. The names tintidi, tintdik, and vriksha amla, which also stand for tamarind, are used to refer to the Garcinica species (Guttiferae) *G. cambojia* or *G. indica* (kokam) [3]. Although practically every part of the tamarind tree has a function and is commercially significant, the fruit is the tree's most well-known product, and its marketability has steadily increased through time. Asia is the region with the highest production of tamarind, with India regarded the top producer with a 300,000 tonne yearly output. The Indian Spice Board claims that in 2006-2007, the production area was 58 624 hectares, and 10 200 tonnes were exported. The potential for Indian export during the last five years indicates that there is a sizable market for tamarind, particularly in the Gulf States and Europe. With 140 thousand tonnes produced in 1995, Thailand is the second-largest producer of tamarind and the country exported roughly 7000 tonnes in 1999. In 1997, 6903 tonnes of tamarind were exported from Sri Lanka. Compared to India and Thailand, other Asian nations grow and export tamarind on a far lower scale.

Costa Rica is a significant producer of tamarind in the Americas, producing around 220 tonnes of the fruit each year. 37 tonnes of tamarind are produced annually in Mexico and 23 tonnes in Puerto Rico. Asia, Europe and North America are the primary markets for the export of Asian tamarind, whereas North America and Europe are the major export destinations for American tamarind. Tamarind is often grown in private gardens or the wild rather than on a large scale in the majority of the producing nations. Despite being widely grown throughout Africa, no African nation engages in commercial tamarind cultivation, and the majority of the fruit is consumed locally. Similar to this, the majority of tamarind produced in Thailand and India is consumed domestically. The sour tamarind, which accounts for 95% of global output, is the most common. Thailand produces 30% of the world's sweet tamarind, making it the top producer.

Morphology

The tamarind tree has a long lifespan and a medium growth rate; its maximum crown height ranges from 12 to 18 metres. Dense foliage forms an amorphous, vase-shaped appearance around the crown. The tree thrives in direct sunlight. It favours sandy, acidic, clay, loam and soil types with a strong to drought.

The innately lobed, alternately placed evergreen leaves. The leaflets are less than 5 cm long, bright green, elliptic-ovular, and innately veined. As a tree ages, its branches droop from a single, central stem and are frequently clipped in agriculture to maximize tree density and facilitate fruit harvesting. The leaflets fold up at night. Being a tropical species, it is vulnerable to frost. The opposite-sided, pinnate leaves create a billowing effect in the breeze. Although inconspicuous, the tamarind produces elongated red and yellow blooms. Small racemes of 2.5 cm diameter, fivepetaled and yellow flowers with orange or red streaks are produced. The four sepals on the flower's four buds, which fall off when the flower blooms, are also pink. Under ideal conditions, the tamarind tree, which has a sluggish growth rate and a long lifespan, can grow as tall as 24 to 30 metres, have a spread of 12 metres, and have a trunk circumference of 7.5 metres. Strong, flexible branches with beautifully falling terminals and dark-gray, rough, fissured bark give this tree great wind resistance. The mass of fine, feathery, bright-green foliage is made up of pinnate leaves that are 7.5-15 cm long and have 10-20 pairs of oblong leaflets that are 1.25-2.5 cm long and 5-6 mm wide. The leaflets fold at night. In severely dry places during the hot season, the normally evergreen leaves may briefly fall off. Small racemes of unassuming, inch-wide blooms with five petals. The four sepals that are shed when the flower opens give the flower buds their characteristic pink colour [8].

Botany

Tamarindus indica is a member of the monotypic genus Tamarindus in botany (Caesalpinoideae). As a diploid species, tamarinds have chromosomal numbers of 2n = 24 (x = 12). It is a huge, spiky, evergreen tree with a spreading crown up to 12 metres in diameter and a good canopy of shade that grows up to 20 to 30 metres in height. Due to its broad crown, it offers cover and shade. Additionally, because of its storm resilience, it is frequently used as a windbreaker. Additionally, it is known to have allopathic effects, which prevent any other plants from growing underneath or next to it. It is a great evergreen decorative tree with lovely flowers, making it appropriate for planting as an avenue in parks, alongside roadways and along riverbanks. The stem is thick, brief, fissured, colored grey and brown, and it is also extremely rough and scaly. Compound leaves are arranged in

pairs along a central axis and can be up to 15 cm long. They are made up of numerous small leaflets that close at night. When in bloom, the flower buds are rose-red, lovely, and tiny. They are about 2.5 cm across and have three golden petals with veins that are either pinkish-red or yellowish-red, as well as two teeny, barely perceptiblthread-like petals. The tree typically produces fruit after 8 to 10 years. It bears fruit from June to September in Asad-Bhado and ripens in Magh-Chait (January to April) [3].

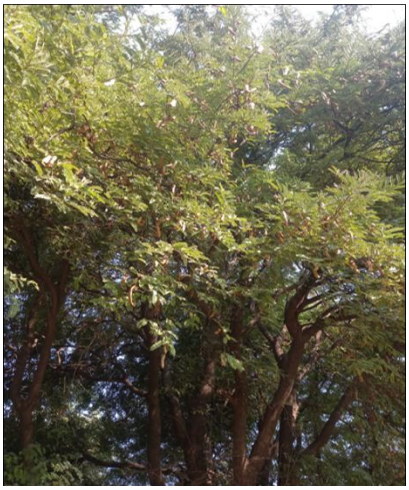


Fig 1: Tamarind tree

Collection of tamarind

Tamarind pods were once collected by farmers by scaling trees. By striking with a small wooden item, they will remove the shell. It takes a lot of work to do this, and a time-consuming task. Every member of the family used to participate in this pastime. Once the seed and shell have been removed. To soften the pulp, they will strike it with a piece of wood. To remove the tamarind cover and seed from the pods, a machine was created. The ability to the machine has a 100 kg/h capacity and a 90% efficiency rate [08].

Tamarind seed

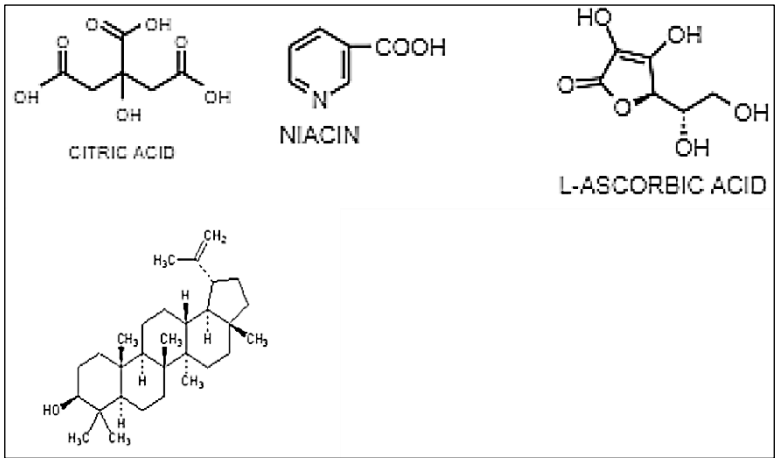
Fig 2: Tamarind seed

Tamarind seed is regarded as a by-product of the use of the fruit pulp for commercial purposes. The seed is made up of the endosperm (70-75%) and the testa (20-30%), also known as the seed coat. The tannin found in the seed testa is used to make ink and fix colures, among other things. IN some regions of India, tamarind's immature seed pods are used to flavour meals and snacks, and the blooms are also pickled and served as a side dish. The viscosity and texture of processed foods can be improved by adding tamarind, which is widely marketed as a food additive. Notes that "jellose" has been suggested as a name for the seed because it encompasses both of its jelly forming characteristics. Because seeds have a high protein content, they are used as cattle feed. The tamarind fruit's roasted seeds are pulverised and used as coffee replacements, and its flour is frequently fed to some ruminants and pigs. Among the many uses for tamarind seeds, it was determined that tamarind seed powder might work as a reasonably priced bio-adsorbent to remove fluoride from water. During off-seasons and times of food scarcity, tamarind seeds are consumed either roasted or boiled. The testa from the edible kernel is often decorticated after the seeds have been roasted. Coffee can also be substituted with roasted tamarind seeds. The seed oil can be used in cooking and is edible. A gel-forming component known as jellose or polyose, which has various uses in the food sector, makes about 46 to 48% of the tamarind seed kernel. Jellose, which is primarily a polysaccharide, can be used to thicken, stabilize, and gel meals Instead of fruit pectin [13], Jellose of tamarind seeds. Tamarind seeds have occasionally been used as food. They include roughly 63 percent starch, 14 to 18 percent albuminoids, and 4.5 to 6.5 percent of a semidrying oil. They can be reduced to a flour or starch, roasted, and then soaked to remove the seed coat before being boiled or fried.

Although projected to equal to 132,000 tonnes annually in India, the most majority of the byproduct seeds have historically been wasted. Two Indian scientists, T. P. Ghose and S. Krishna, reported in 1942 that the decorticated kernels contained 46-48% of a gel-forming substance. As a result of their research, the Indian textile industry began using tamarind kernel powder. Other industrial uses include the production of a structural plastic and a glue for wood, as well as the colour printing of textiles, paper size, leather treatment, and leather treatment.Usually, it is used to dress handcrafted blankets. A process for producing a purified product known as "pectin,"polyose" or "jellose" which has been shown to be superior to fruit pectin in the making of jellies, jams, and marmalades, has been patented by Dr. G. R. Savur of the Pectin Manufacturing Company, Bombay. It gelatinizes with sugar concentrations even in cold water or milk and can be used in fruit preservation with or without acids. It is suggested for use as a stabilizer in cheese, mayonnaise, ice cream [14].

Table 1: Phytochemistry

Parts	Chemical constituents
Leaves	Pulps contains invert sugar, citric acid, pipecolic acid nicotinic acid, 1-malic acid, volatile oils (geraniol, limonene), pipecolic acid, lupanone, lupeol, orientin, isoorientin, vitamin B3, vitamin C, vitexin, isovitexin, benzyl benzoate (40.6%), cinnamates, serine, pectin, beta alanine, proline, phenylalanine, leucine, potassium, 1-malic acid, tannin, glycosides.
Fruits	Fruits Furan derivatives and carboxylic acid. Phlorotannins, apple acid, grape acid, succinic acid, citric acid, tartaric acid, pectin, invert sugar.
Seeds	Campesterol, β-amyrin, β-sitosterol, palmitic acid, oleic acid, linoleic acid and eicosanoic acid. The Mucilage, arabinose, xylose, galactose pectin, glucose and uranic acid was also found. A new bufadienolide (Scilliroside 3-O-β-D glucopyranosyl-(1-2)-Lrhamnopyranoside) and a cardioid (uzarigenin-3-O-βDxylopyranosyl (1-2)-α-L rhamnopyranoside) were identified from the seed extract. Cellulose, albuminoid. amyloids, phytohemagglutinins, chitinase.
Stem bark	Tannins, saponins, glycosides, peroxidase and lipids.
Root bark	The n-hexacosane, eicosanoic acid, β-sinosterol, (+)-pinitol, octacosanyl ferulate, 21-oxobehenic acid.



Formulation Methods

Tamarind seed powder preparation

Manually broken tamarind fruit pods were used to remove the fibers and pulp that contained the seeds from each pod.

To facilitate the removal of the pulp and fiber strands, tamarind seeds with fibers were soaked overnight in fresh portable water (1: 3 w/v). After that, pure distilled water was used to wash the seeds. Using a Wonder mill, the cleaned seeds were ground into fine flour after being sun dried for 14 days in the shade.

Before further usage, the flour was sieved through a 300 mm screen and placed in an airtight container to be frozen at 18 °C. For additional nutritional examination, the tamarind kernel flour was then sealed in airtight plastic containers after being passed using a 60 mesh screen. The conventional method was used in the laboratory to examine the nutritional properties of tamarind kernel flour.

Extracting gum from modified tamarind seeds

Tamarind seeds that have been modified are used to make gum. Tamarind seed was extracted by crushing it in a mortar and pestle. After that, the crushed material was transferred to the 1000-ml beaker and cooked for 5-6 hours in 500 ml of distilled water. Use a muslin cloth to filter the raw material after it has fully boiled.

By boiling for two to three hours over a water bath, the filtered material was concentrated. After cooling, alcohol was gradually added to the concentrate, causing precipitates to form. With the aid of vacuum filtration equipment, the precipitates were separated. Under the sun, the precipitates dried. Follow these steps to make carboxymethylated modified tamarind seed gum (CMTG). Tamarind seed gum was used to carboxymethylate tamarind gum.

After stirring for 30 minutes, tamarind seed gum (1.25%, W/V) was dissolved in ice-cold sodium hydroxide (45%, W/W) to create an aqueous dispersion. With continual stirring, 25 ml of a 45% (w/v) monochloroacetic acid aqueous solution were added to this. The reaction mixture was then heated to 700 °C while being constantly stirred for 30 minutes, cooled and suspended in 80% (vol/vol) methanol. Precipitates of CMTG were then formed and they were filtered, neutralized with glacial acetic acid, washed with portions of 80% (vol/vol) methanol, filtered and dried in an oven at 40 °C.

The carboxymethylated tamarind seed gum (CMTG) is complexed with calcium

Calcium cross-linked gum derivatives are created by reactinga particular derivative that contains calcium chloride. To create thick, homogenous, and gelatinous precipitates, 2.5 g of carboxymethyled gum was dissolved in 50 ml of water, followed by the addition of a drop at a time of a calcium chloride (5%, W/V) solution in 50 ml of water. To get rid of unreacted calcium and gum, these precipitates were repeatedly rinsed with distilled water. When the filtrate failed to produce red colour from blue colour after being added to a normal magnesium-EDTA complex solution containing Erichrome black T indicator solution, the washing was stopped.

These cleaned precipitates underwent freeze drying before being put through a #80 filter [17].

Fig 3: Extracted pure Tamarind seed gum

Fig 4: Carboxymethyled Tamarind seed gum

Fig 5: Calcium complexed Tamarind seed

Table 2: Medicinal uses

Disorder category	Medicinal uses	Plant part	Preparation
Unspecified	Fortifiant	Bark and leaf	Decoction of fresh plant parts with potash used as blood tonic
	Jaundice	Bark and leaf	Decoction of fresh plant parts with potash
Circulatory	Heart disease	Fruite (unripe)	Chew with onion and swallow to treat palpitations
	Hypotension	Leaf	Infusion taken 3 times a day
Digestive System	Abdominal Pain	Bark	Well the fresh bark of young twigs in water for 24 h and drink as purgative and to treat abdominal pain
	Dairrhoea	Bark	Decoction, used as astringent
	Dysentery	Seed	Powdered seeds administered Orally
	Laxative	Bark	The fresh bark of young twigs is soaked in water for 24 h and drunk as purgative and to treat abdominal pain
	Vomiting	Fruit	In leprosy treatment to enhance the emetico-cathartic properties of Trichilia America; A mixture of Cantharides-powder and tamarind pulp is taken by the patient before the syphilis treatment starts
Endocrine System	Dibetis	Leaf	Not Specified
Genitourinary System	Aphrodisiac	Bark	Mash and add to porridge to treat impotence
	Contraceptive	Not Specified	Large quantity of 'tamarind' infusion drunk by the woman before sexual intercourse; Mixture of 'tamarind' with pepper and honey in water, called Konkori Badji
	Diuretic	Unspecified Bark	In the treatment of gonorrhea: food prepared of millet with tamarind and ground seeds of Jatropha curcas or with Trichilia emetic, Medicine prepared bark of tamarind and that of Prosopis africana (Toucouleur)
	Infertility	All aerial parts	Crush all parts and soak in water; give orally to the cattle
Infections	Cold	Fruit pulp	Mix with water and add sugar for taste, then drink
	Fever	Fruit	Fruit pulp used in the treatment of fever for refreshment followed by rubbing
	Malaria	Bark	Decoction with Mangifera indica (part used of the latter species unclear)
	Helminth infections	Bark	Macerate used in the treatment of vesical schistosomiasis
	Hepatitis A	Leaf	Not specified
	Leprosy	Bark/Root	Drink root and bark extract together with root and bark extract of Stereospermum kunthianum
	Measles	Pods/Leaves	Burnt to symbolize the disease egress through the skin
	Microbial infection	Fruit	Soaked fruit, oral administration to treat infectious diseases including STD's
Inflamation	Broncjhitis	Leaf	Leaf juice with ginger in the treatment of bronchitis
Injuries	Wounds	Bark	Not specified
Mental	sleep	Fruit pulp	Mix with water and add pepper, then drink
	Sorcery	Leaf/Bark	Mix with water and add pepper, then drink
Nervous System	Epilepsy	Root	One cup of root decoction taken twice a day
Nutritional	Appetide	Leaf	Cooled down decoction, to drink for appetite
Pain	Scurvy	Fruit pulp	Not specified
	Dysuria	Bark	Add to the soup a tablespoon of a sugared decoction of ground tamarind stem bark and Capsicum frutescens fruit pericarps
	Pain	Bark&Leaf	Decoction of fresh plant parts with potash used to treat body pains
Poisoning	Antidote	Leaf	Decoction of the leaves is used as wash on snake and insect bites
Pregnancy, Birth, puerperium	Birth	Leaf	Cooled down decoction is given to drink to sheep and goats to treat complications with delivery
	Lactation	Fruit	To increase lactation, eat Kunu (a kind of porridge) prepared with fruit of tamarind and Ximenia americana or drink a macerate of tamarind fruits in water
	Pregnancy	Fruit	Drink macerate of fruits in water to relieve pain upon labor
Respiratory System	Repertory	Bark	Macerate of the bark taken for coughs
Sensory Systesm	Earache	Leaf	Pounded, applied to ear
	Eye	Leaf Bud	Decoction used as wash
	Vertigo	Fruit pulp	Mix with water and add sugar for taste, then drink
Skin	Skin	Bark & Leaf	Decoction of fresh plant parts with potash used as skin cleanser

As a food and beverage tamarind pulp uses

The pulp is widely utilised for residential and industrial purposes because of its delicious acidic flavour and rich scent. The pulp is employed as a spice, to flavour desserts, curries, and sauces, as well as to prepare some beverages in place of chemical acidulants. There are many items that may be made from tamarind pulp, including tamarind juice, concentrate, powder, pickles and paste [5, 7]. Tamarind pulp also asserts some medicinal benefits and is recognised as a blood tonic, expectorant, digestive, carminative, and laxative. It has been discovered that the pulp contains hypolipidemic action. Tamarind consumption increases the excretion of fluorine through the urine, which slows the progression of flourisis in humans. The pulp is used as a topical treatment for inflammations and as a gargle for sore throats. In situations of paralysis, the pulp is claimed to help with the restoration of sensation [15].

Health benefits of tamarind seed

1. Arthritis

Its anti-inflammatory property eases out joint pain, consumption of ½ a teaspoon of roasted tamarind seed

powder twice a day with water boost joint lubrication which soothes pain.

Tamarind seed advantages for arthritis
Consuming a half-teaspoon of roasted tamarind seed powder twice daily with water increases joint lubrication, which reduces discomfort due to its anti-inflammatory properties.

2. High blood pressure and heart disease
In addition to avoiding cardiovascular ailments like coronary heart disease and atherosclerosis, dietary fat rich in linoleic acid is also linked to lowering blood pressure.

Heart disease and blood pressure
Dietary fat rich in linoleic acid is, apart from preventing cardiovascular disorders such as coronary heart diseases and atherosclerosis, also associated with preventing high blood pressure.

3. Teeth
Tamarind seeds can cure all teeth related problems and clean nicotine stuck to teeth. Seed powder can be used to clean the teeth.

4. Indigestion
Increase bile production and treat indigestion with tamarind seed juice. Its abundant dietary fibre helps to reduce cholesterol. This is a fantastic natural appetiser and aids in digestion. Additionally helpful for treating stomatitis and easing constipation

5. Diarrhea
Diarrhea and dysentery are well treated by the tamarind seed's crimson outer shell. Xyloglucan works well as a fruit pectin alternative and can therefore be used as a treatment for colitis, diarrhoea and dysentery.

6. Cancer
Colon cancer can be prevented and treated using sticky tamarind seed juice. Tamarind seeds' antitumor and immune-modulating properties stop the body from developing cancer. Renal cell carcinoma's progression is slowed or stopped by seed extract, which of reduces oxidative stress producers.

7. Enhancer immunity
Tamarind seeds have immunity-boosting qualities that can guard against a wide range of illnesses and ailments. TSP improved haemoglobin (Hb), red blood cells (RBCs), white blood cells (WBCs), and platelets on a preventative basis. Following TSP therapy, the enhanced expression of CD4+ and CD8+ cells indicated a high predominance of TH1 cytokine-producing T cells [16].

Conclusion
The phytochemistry and pharmacognosy of Tamarind seed has been well documented in this brief review. In view of its multiple uses, more activity screening and structural relationship studies are yet to explore further. Tamarind seeds are used for both residential and commercial purposes. Enhancing research efforts is necessary to process tamarind seeds. For the best possible use of tamarind products, additional research might be needed. The informations presented in this review would be helpful in promoting research aiming at the search and development of new agents for medical application and agro industries based on natural products derived from plants.

Acknowledgment
We are thankful to the principle and all Management RSM'S NN Sattha College of Pharmacy Ahmednagar for assistance and Valuable Guidance.

References
1. De Caluwé E, Halamová K, Van Damme P. Tamarind (*Tamarindus indica* L.): a review of traditional uses, phytochemistry and pharmacology.
2. Ebifa-Othieno E, Mugisha A, Nyeko P, Kabasa JD. Knowledge, attitudes and practices in tamarind (*Tamarindus indica* L.) use and conservation in Eastern Uganda. Journal of ethnobiology and ethnomedicine. 2017 Dec;13(1):1-3.
3. Shah NC. *Tamarindus indica*-Introduction in India and Culinary, Medicinal, and Industrial Uses. Asian Agrihist. 2014 Oct;18(4):343-55.
4. Gitanjali VS, Shashi J. Nutritional properties of tamarind (*Tamarindus indica*) kernel flour. Int. J Curr. Microbiol. Appl. Sci. 2020;9(05):1359-64.
5. Arudra AK. Tamarind seed processing and by-products. Agricultural Engineering International: CIGR Journal, 2015 Jun, 17(2).
6. Yahia EM. editor. Postharvest biology and technology of tropical and subtropical fruits: Mangosteen to white sapote. Elsevier; c2011 Jun.
7. Idris MM, Karamba H, Ayoubi R. *Tamarindus indica*.-A Review Paper on Efficacy of Tamarind plant in Water Treatment and Purification.
8. Toungos MD. Tamarind (*Tamarindus indicus* L) Fruit of Potential Value but Underutilized in Nigeria. International Kournal of Innovative Food, Nutrition and Sustainable Agriculture. 2019;7(1):1-0.
9. Muzaffar K, Kumar P. Tamarind-a mini review. MOJ Food Processing & Technology. 2017;5(3):296-7.
10. Chimsah FA, Nyarko G, Abubakari AH. A review of explored uses and study of nutritional potential of tamarind (*Tamarindus indica* L.) in Northern Ghana.
11. Rao AS, Kumar AA, Ramana MV. Tamarind seed processing and by-products. Agric. Eng. Int.: CIGR J. 2015 Jun;17:200-4.
12. Fischer G, Balaguera-López HE, Magnitskiy S. Review on the eco-physiology of important Andean fruits: Solanaceae. Revista UDCA Actualidad & Divulgación Científica, 2021 Jun, 24(1).
13. Zohrameena S, Mujahid M, Bagga P, Khalid M, Noorul H, Nesar A, *et al*. Medicinal uses & pharmacological activity of *Tamarindus indica*. World Journal of Pharmaceutical Sciences; c2017 Jan. p. 121-33.
14. Morton JF. The Tamarind (*Tamarindus indica* L.); Its Food, Medicinal and Industrial Uses. In Proceedings of the Florida state horticultural society. 1958;71:288-293.
15. Mishra A, Malhotra AV. *Tamarind xyloglucan*: a polysaccharide with versatile application potential. Journal of Materials Chemistry. 2009;19(45):8528-36.