

Tamarindus Indica L. A Plant with Multiple Medicinal Purposes.

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ABSTRACT:-

Tamarindus indica is a medicinal plant and medicinal plants are considered as the rear bone of traditional medicine.

Tamarindus indica is a member of family Leguminosae (Fabaceae). The common name of Tamarindus indica is tamarind tree.

Tamarindus indica is a medicinal plant that is used traditionally in various purposes such as wound healing, abdominal pain, diarrhea, cold, fever, inflammation. It is a great source of most of phytochemicals and essential amino acids and hence it is described to possess anti-diabetic, anti-microbial, anti-malarial, anti-oxidant, anti-asthmatic and anti-hyperlipidemic activity. Tamarindus indica contains various bioactive compounds in leaves, pulp, flowers, seeds and bark which are helpful to human health and probability of implementation in the different pharmaceutical industries.

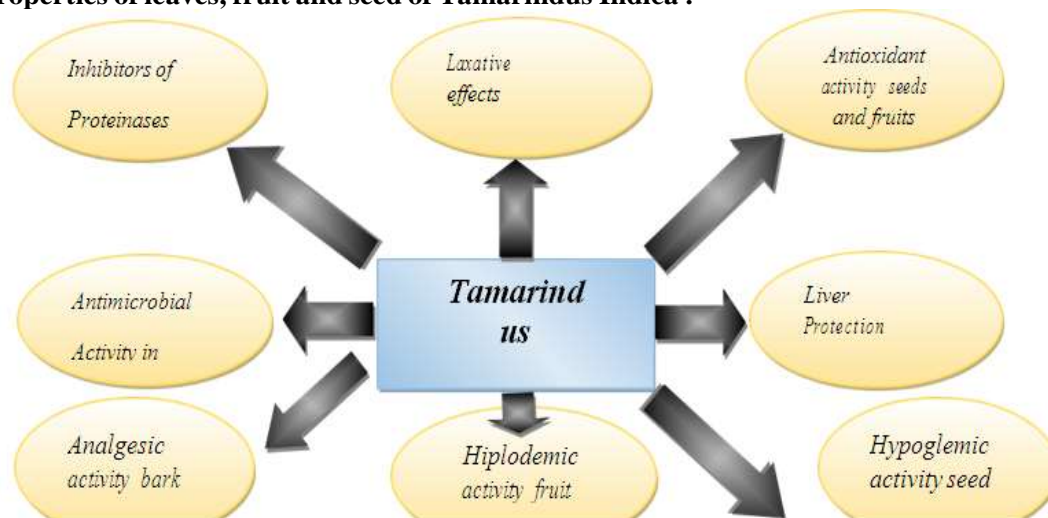
Keywords:- Tamarindus indica, Tamarind, anti-diabetic, anti-oxidant, anti-microbial, phytochemicals.

INTRODUCTION:-

Tamarindus indica L. commonly known as tamarind is a medium sized fruit-tree belonging to the family Leguminosae (Fabaceae). It is an evergreen tree that can reach a height of 24m and girth of 7m and they have pale yellow and pink flowers. It is endemic in the tropical Africa and it is largely cultivated in all tropical continents.

Due to low cost and lower frequency of side effects compared to the synthetic drug, there is a trend in researches about medicinal plants. The leaves of tamarind have a large ethnobotanical use in many areas such as Mexico, Puerto Rico, Tobago and Rico due to their antimicrobial, antifungal, and antiseptic effects.¹

□ Properties of leaves, fruit and seed of Tamarindus Indica :-



➤ **Methodology of the review:-**

- 1) **Evaluation of antimicrobial activity:-** Anti microbial activity can be stated as a collective terms for all active theory that retards the growth of bacteria and inhibit the formation of microbial colonies and may impair microorganisms. The plate diffusion method in sterile 20 ml petri dishes was used as an anti microbial test. Inoculated plates were nurtured at a temperature of 37°C for 2 days.²
- 2) **Preparation of plant extracts:-** Decoction was a conventional method determine to

prepare medicinal extracts. In this method both fresh and sun dried leaves. Fluid extracts were produce by the percolation method using ethanol 30 and 70%.Both the fluid extract were attained from 30 g of powdered sun dried leaves and were concentrated by low pressure with temperature less than 50°C for essential oil 200 g of fresh leaves was harvested and instantly hydrodistilled for 2 hours in a "Clevenger type apparatus". n-hexane was added to avoid losing the more polar essential oils into the water.³

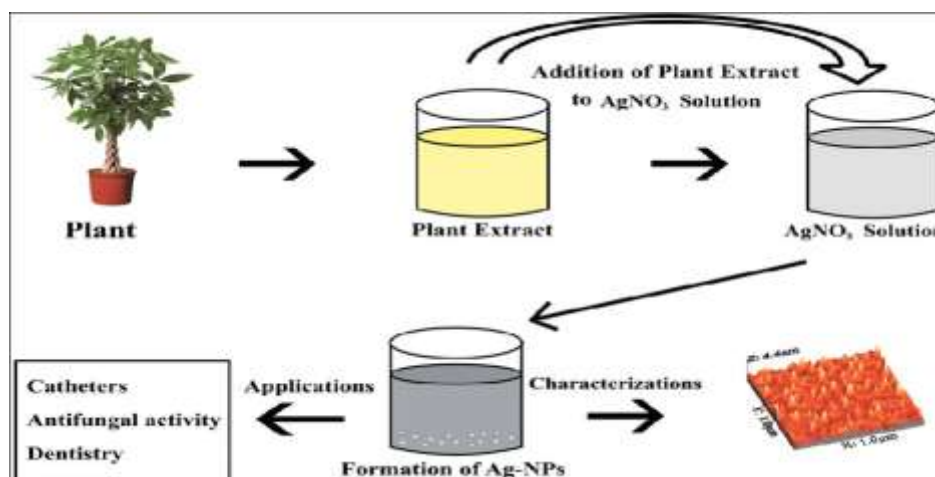


Fig 1 : Preparation of plant extract

➤ **Properties of Tamarindus Indica:-**

Some properties of this plant, the part that are used and the active components are as follows:-

A) Bark:- It has certain properties such as antioxidant, antibiotic, anti microbial, anti analgesic and spasmogenic activities.

The active components found are rich in tannins and polyphenols:-

b-sitosterol, 21 oxobeheic acid and (+)-pinitol and phenolic antioxidant of proanthocyanidins in several ways: procyanidin B2 , procyanidin trimer, procyanidin tetramer, procyanidin pentamer, procyanidin hexamer along the taxifolin, apigenin, eriodicytol, luteolin and naringenin.⁴

B) Leaves:- It has certain properties such as Antiemetic activity and Protection of liver

The active components found are source of proteins fiber , lipids and vitamins like riboflavin,

ascorbic acid and beta carotene composed by 13 essential oils in which limonene, benzoate and benzyl are the most important compounds followed by pentadecanol and hexadecanol.⁵

C) Stem bark:-The tea is used for sore throat. Spasmogenic, analgesic, antimicrobial and hypoglycemic activities The active components are saponin, flavonoids, cardiac glycosides, alkaloids and tannins⁶

D) Seeds:- Anti inflammatory activities effect on the control of satiety, having a potential for treatment or prevention of obesity

The active components are they are sources of protein and starch, sulphur amino acids and phenolic antioxidants are proanthocyanidins, epicatechin. Inhibitor of proteinases.⁷



➤ **Multiple medicinal purposes of tamarindus indica:**

□ **Most common uses of tamarindus indica in Africa :-**

Tamarindus Indica is most commonly used as a laxative and in curing the wounds and abdominal pains accompanied by diarrhoea, helminth infection, malaria, respiratory problem, fever, Dysentery, aphrodisiac, the chart given below only a first glimpse of medical uses of tamarind in Africa. Many other plants have similar virtues to that of tamarind based on the common phytochemical compounds like tannins that are similar or even greater than those of tamarinds. In the market of Dakar, most medicinal plants sold are used as a remedy for bowel problems and wounds showing that these conditions are often treated with traditional plant medicine.⁸

□ **Laxative:-**

Laxatives are a type of medicine that are used to cure diseases like constipation.

Nearly all laxative medicines are produced from the fruit or fruit pulp. The use of fruit as a laxative is due to the high amount of malic and tartaric acid and potassium acid tartrate is universally acknowledged and can even be initiated in the pharmacopoeias and industrialised countries like France, Britain and the United States.⁹

The laxative can be taken in the form of a sweetmeat called *Bengal* by the Wolof of Senegal, prepared from the unripe fruits and sometimes associated with lime juice or honey. Soaked fruits are also consumed in the rural Fulani in Nigeria, to ease constipation. Children in Madagascar are given entire tamarind fruits for breakfast to overcome constipation, but an anal wash based on tamarind may also be used.¹⁰

Tamarind is often cited in a literature concerning the treatment of cuts, wounds and abscesses. In Mali, over 80% of wounds are treated using traditional medicine compared to pharmaceuticals.

Wounds are first washed with a decoction of a plant followed by the application of a dried powder of the species. A decoction of the leaves may be used to wash wounds and ulcers, lesions or sores in the mouth. In a medicinal plant market in Dakar, Tamarind bark was mostly sold for wound healing purposes. Applying leaf powder to a wound is rather common and may be carried out to dry up open sores. Other tamarind plant parts are found in wound healing medicines like the fruits, the pod husks or the gum. The use of leaf decoction to wash a circumcision wound was found in nearby Benin. Fresh or boiled leaf pulp can be applied as a poultice.¹¹

□ **Abdominal pain :-**

Abdominal pain is not a specific disorder but a complaint indexed by Cook, which refers to a painful abdomen and which may have a wide variety of causes, including constipation or diarrhoea.

Knowing which plant parts of tamarind are used for which abdominal complaints without knowing their cause we could turn the argument around and start probing for the disorder that has caused abdominal pain based on the part of tamarind used in the treatment. Abdominal pain may be treated with the various parts of *Tamarindus indica*. When fruit is used constipation has been the cause, assuming the fruit is given as a laxative.¹² Bark treatment of abdominal pain in Nigeria could well be referred to diarrhoea. The leaves are used more difficult to assess what may have

cause the abdominal pain. Roots are repeatedly found in the treatment of stomach ache or painful abdomen, mainly in East Africa, prepared as an extract but also in Burkina Faso.¹³

□ **Diarrhoea and Dysentery:-**

Other important disorders treated by tamarind include diarrhoea or dysentery. In tropical countries diarrhoea is one of the major health problems and frequently occurs during rainy weathers. Dysentery is a kind of diarrhoea containing mucus or blood, usually caused by the infection of intestine. They appears to be a striking dissimilarity between West and East Africa in the treatment of diarrhoea.¹⁴

□ **Helminth Infections:-**

The bark is used in Dogon country and the office du Niger area, both in Mali, to treat schistosomiasis, the worm infection of the gut or urinary tract. The Guiziga and Moundang of Cameroun, crust and boiled seed of tamarind were mentioned most often for the treatment of ‘Red urine’ or urinary schistosomiasis. It is based on the doctrine of signatures, a link between the red colour of fabaceae extract and the main symptoms schistosomiasis: haematuria.

Keta and coppo described another way in which tamarind is used as a vermifuge, based on its laxative effect: Cette preparation peut provoquer diarrhee evacuation of eventuels vers par lesselle.¹⁸

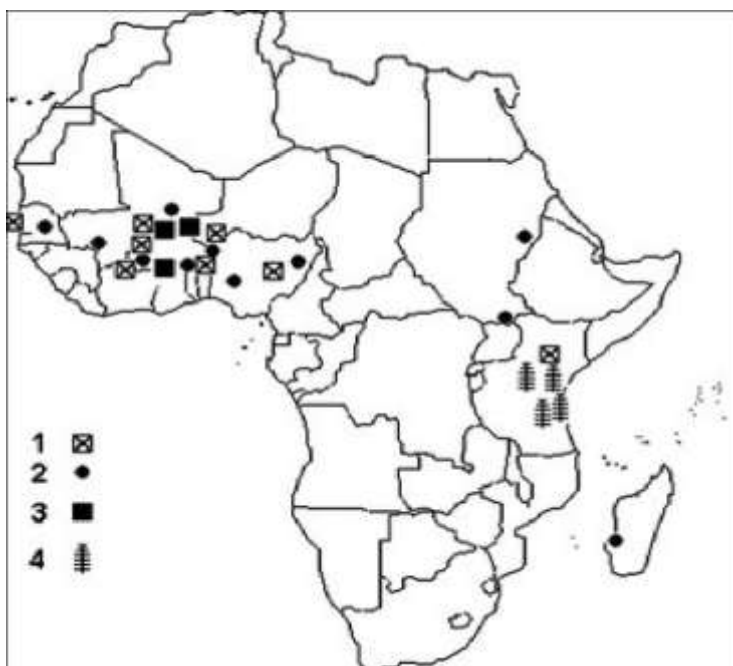


Fig 3 : Distribution of 4 common application of tamarind in African traditional medicine.

□ **Keys:-**

1. Leaves and bark used for wound healing
2. Fruit used as a laxative.
- 3 Bark used to treat diarrhoea.
4. Leaves used to treat diarrhoea.

□ **Fever and Malaria :-**

Fruits are known as febrifuge in Madagascar and throughout the Soudan. Malaria is treated with tamarind leaves in Ghana, Benin and Nigeria. In Benin and Sudan the fruits are used to treat malaria. The use of the fruit pulp as a febrifuge seems to be connected to its use as a

laxative in the Sahel and Soudan region. In Senegal, Benin and Sudan, where the recipe involves preparing solution of tamarind pulp and water sometimes involving a boiling steps. Sahel and Soudan regions problems are not only treated with the same ingredient all across the Savanna Belt from Senegal to Ethiopia, but also records of identical recipes based on tamarind fruits pulp exist for the treatment of malaria or fever and constipation.²⁰

□ **Cancer:-**

Ameliorative effect of tamarindus indica

seed extract has been shown in chemical induced acute nephrotoxicity and renal cell carcinoma. This effect can be explained by the antioxidant effect. Oxidation damage is strongly associated with cancer; polyphenol compound (2-hydroxy-dihydroxyacetophenone, methyl 3,4 dihydroxy benzoate, 3,4-dihydroxy phenylacetate, epicatechin, tannin anthocyanidine and oligomeric, proanthocyanidins) Tamarindus Indica seed extract has antioxidant enzyme, Induction properties and cancer related signals pathway blockage effects.¹⁹

➤ **Different medicinal purposes:-**

□ **Antioxidant activity:-**

The antioxidant activity is generally related to the presence of phenolic compounds that shows specific common structure that allow them to be reducing agent, hydrogen donors and singlet oxygen scavengers, among other reaction mechanism. Fruits, leaves and seeds are natural sources of antioxidants and several studies have bet on this alternative to replacing synthetic antioxidant.²⁰

□ **Antimicrobial activity:-**

Tamarindus indica has a broad spectrum of antibacterial activity. The methanolic extract of 14 species showed antibacterial activities during this preliminary screening. The activity was compared with standard antimicrobials Amikacin and Piperacillin. The result showed that the extract from tamarindus indica possesses strong in vitro antibacterial activity against the bacteria tested.

The methanolic leaf extract of Tamarindus indica was assessed for antibacterial activity against Burkholderia pseudomallei, and its name in vitro inhibitory potential suggests further animals studies to understand the role of Tamarindus indica in treating melioidosis.²¹

□ **Anti-inflammatory activities:-**

The processes of inflammation and body pain are interlinked and hence there are several drugs with both analgesic and anti-inflammatory activities. Petroleum ether stem bark extract at 50 mg/kg intraperitoneal injection was observed to show significant potent antinociceptive activity in animal model through the inhibition of the writhing response induced by acetic acid compare to the control group. T. indica is known to exert anti-inflammatory and analgesic effect probably by down regulating the nuclear factor kappa and the p³⁸ mitogen activated protein kinase pathway.²²

The presence of myriad of the principle bioactive compound in different parts of T. indica

including flavonoids, alkaloids, tannins, phenols, fatty acids, saponins and steroids. The oral administration of hydroethanolic extracts of T. indica leaves to Wister rats at doses of 500,750, and 1000 mg/kg body weight produced significant anti-inflammatory and anti-nociceptive action in a dose dependent manner.²³

➤ **Application of T. indica :-**

A. Fermentation medium:-

High protein content and carbohydrates content of TKP and its susceptibility to microbial attack suggested the possible utilization of this material in fermentation industries. Tannase production under solid state fermentation using Aspergillus niger species showed promising result with tamarind seed powder as media component. Penicillin and amylase production was observed to be less effective compared to cornsteep liquor.²⁴

B. Gelling agent:-

Gelling is a superior preservation technique for fruits. It has the ability to form gels in presence of sugar or alcohol over a wide pH, temperature range, and can be used to form pectin like gel in jams, jellies and other preservative. Tamarind seeds kernels contain 46-48% of a gel-forming substance. It can be obtained in abundance and it comparatively cheaper than other gelling agents. It is named as jellose.²⁵

C. Wound Dressing Material:-

TSP cross linked with epichlorohydrin was used for the formulation of novel wound dressing films, after loading with povidone iodine solution by soaking method. TSP films treated group showed faster epithelialisation and greater rates of wound contraction with significantly increased collagen content and tensile strength of the regenerated tissues. The in vivo efficiency of these dressing depends on antibacterial activity and wound healing activity. TSP showed ideal elasticity and tensile strength depending on the thickness and extent of cross linking.²⁶

D. Gluten intolerance:-

Gluten intolerance person cannot digest gluten for such people gluten free diet is advised. The tamarind gum is also rich in lycine, so lycine deficiency in such people can be overcome. It is mainly in wheat product gluten acts as dough binding agent and its removal affects the stickiness of dough in such cases, tamarind gum can be added to produce same effects.²⁷

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