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PHARMACOLOGICAL ACTIVITIES OF TERMINALIA ARJUNA: AN OVERVIEW

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ABSTRACT
Plants have utilized seeing as ancient times of heal and cure illness and to improve health and wellbeing. Ayurveda is one of the traditional medicinal System of Indian. Ayurveda involves the use of natural elements to eliminate the root cause of the disease by restoring balance at the same time create a long recorded history and they were used in ancient Chinese, Greek, Egyptian and Indian medicine for various therapies purposes. Terminalia arjuna belonging to family combretaceae is an important medicinal plant found as a weed through out India. Though almost all of its parts are used in traditional system of medicines. This review summarized the plant characteristics with their pharmacological activities.

KEYWORDS: Terminalia arjuna, pharmacognosy, hypolipidemic.

INTRODUCTION
In the traditional system of medicines, medicinal plants form the back-bone in India. The phytochemical ingredients from these medicinal plants serve as compounds in drug discovery and design. A single herb may even contain more than one of the aforementioned phytochemical constituents, which works synergistically with each other in producing pharmacological action. Drug formulation in Ayurveda is based on two principle use as a single drug and use of more than one drug, in which the latter is known as polyherbal formulation. Combining of several medicinal herbs to achieve extra therapeutic effectiveness is known as polypharmacy. [1] The ayurvedic literature “sarangdharsamhita” dated contries ago in 1300 A.D. has highlighted the concept of polyherbalism in this ancient medicinal system. In the traditional system of Indian medicine, plant formulations and combined extract of plants are chosen rather than individual ones. It is known as that ayurvedic herbals are prepared in a number of dosage forms, in which mostly all of them are polyherbal formulation[2]
PHARMACOGNOSY OF TERMINALIA ARJUNA:

Figure of Terminalia Arjuna bark

INTRODUCTION:

Biological source: *Terminalia Arjuna* (Roxb.)

Family: Combretaceae

Parts used: Bark

Scientific classification: [3]

Kingdom: Plantae
Division: Mangoliophyta
Class: Mangoliopsida
Order: Myrtales
Family: Combretaceae
Genus: *Terminalia*
Species: *Arjuna*

Synonyms [3]

English: *Terminalia Arjuna*, white Murda, Malabar almond

Bengali: Arjun, Arjhan

Hindi: Arjun, Arjuna, Koha

Tamil: Vellamatta

Sanskrit: arjun, NadiSarja,

Gujarati: Arjun, Sadado

Distribution of *Terminalia Arjuna* (roxb) [4]

*T.arjuna* Roxb is a deciduous tree found mainly in dry hill areas by the area of streams and rivers. It is wealth throughout Madhya Pradesh, Bangladesh, Indo-sub-Himalaya tracts of Uttar Pradesh, South Bihar Delhi. It is also found in forests of Srilanka, Burma and Mauritius.
Morphology of *T. arjuna* (Roxb)\[^5\]

- Tree is about 60-80 feet in high, large, branches and evergreen with a spreading crown.
- Leaves are simple, borne sub-opposite coriaceous, often crenulating, oblong or elliptic.
- Peptioles are 6-10 mm long with one or usually two prominent glands at the top, immediately below the leaf. This is a unique pharmacognostic feature of *T. arjuna* Roxb.
- Panicles are small, apical and when young, it is light green and when turns in to their color.
- Stems are buttressed and often fluted.
- Bark is thick, soft and smooth gray, red color from inside, irregular sheets, curved and rather flat pieces.
- Flowers are white or yellowish and found in groups.
- Calyx is glabrous.
- Fruits are a drupe, 2.5-5 cm long, ovoid or oblong, fibrous-woody, smooth-skinned with five hard angles or wings.
- Seeds are hard germination 50-76 days.
- Odour is characteristic
- Taste is bitter
- Root is superficial, shallow and spreads radially along stream banks.

**Chemical constituents:** \[^6\]


**Uses:** cardiotonic, congestive heart failure, cardiac arrhythmia, hypertension, tumor, demulcent, astringent, antidysentirc, urinary disorder strengthens the muscles of heart, ulcerhealing, scars, cirrhosis.\[^7\]

**Mechanism of action:** It is suggested that *T. Arjuna* inhibits lipid peroxidation of LDL moreover also suppressed the generation of free radicals these indicate its anti-oxidant action. In *vivo* arjunic acid and other its derivatives go through bio transformation cascade leads to formation of active metabolite which may be responsible for its hypolipidemic activity. \[^8\]

- **Pharmacological activities of Terminalia arjuna**
Lipid lowering effect:

V. shivakumar and S. Rajesh kumar (2014): investigated Ethanolic extract and aqueous extract at the dose of 250 mg/kg body weight for 32 days once daily by oral route. At fasting blood sample was collected to check lipids parameter like TC, TG, LDL, HDL using kits and histopathiological studies of heart was also performed by analysis it was found that there was markedly reduction in all parameters than ISO treated group while in histopathiological study there was less myotic necrosis.\[^9\]

SubhasiniUthrapathi (2011): Studied the three fraction diethyl ether, ethyl acetate and ethanol of \textit{T. arjuna}. It exerted hypolipidemic and antioxidative effects at two different doses levels of 175 and 350 mg/kg body weight in poloxamer (PX)-407 induced hyperlipidemic albino wistar rats. The hypolipidemic and antioxidant effects of \textit{T. Arjuna} fractions were noticed as EtOH> diethyl ether>ethyl acetate. The results suggest that ethanolic fraction of \textit{T. Arjuna} possesses the potent properties of being antioxidant and hypolipidemic than other fractions. In turn, it has therapeutic potential for the prevention of coronary artery arterial disease.\[^10\]

A.Phadke (2007): Studied the \textit{T. arjuna} bark powder capsule of 500mg/kg dose and vitamin E capsule 400 units/day and placebo was given to the three respected groups. After 30 days follow up, the level of lipid and lipid peroxidation levels as TBARS was estimated. Group treated with vit E and placebo not showed much better lipid lowering action.\[^11\]

Anti-diabetic effect:

Heather A J Thomson (2014): revealed that the \textit{Terminalia arjuna} extract stimulated insulin-release alone (p<0.001) in combination with known modulators but not without extracellular Ca\(^{2+}\). It increased intracellular calcium but had no effects on depolarized cells. Glucose-uptake was enhanced in the presence of \textit{T.arjuna} (p< 0.001). At higher concentration, the extract decreased starch digestion and inhibited protein glycation (p< 0.001>. \textit{Terminalia arjuna} extract possesses antidiabetic potential and may provide new opportunities for the treatment of diabetes.\[^12\]

Chandan Kumar \textit{et al.} (2013): Studied the hypoglycemic effects of \textit{Terminalia arjuna} bark extract were seen in high fructose (21%) followed by streptozotocin (40mg/kgBW) induced type-2 diabetic male albino rats. In vivo study showed protective effect of \textit{T. arjuna} bark acetone extract of towards blood glucose, serum urea, serum createnine.Feeding 500mg/kg BW \textit{arjuna} bark extract to rats showed better effect for blood and urine parameters as compared to rats fed with 250mg/kg BW \textit{arjuna} bark extract. The effect of feeding 500mg/kg BW \textit{arjuna} bark extract was found to be almost equal to that of with glimepride fed diabetic rats. The result indicated that
Terminalia arjuna bark acetone extract of have antidiabetogenic and possess hypoglycemic effect in type-2 diabetic rats.\textsuperscript{[13]}

Ragavan B.Krishnakumari S.(2006): examined the effect of ethanolic extract (250 and 500 mg/kg) body weight of Terminalia arjuna stem bark in alloxan-induced diabetic rats for 30 days, and its histopathological study was investigated in the liver, kidney and pancreatic tissues sections. Pathological lesions were evoked in cells of diabetic rats. The extracts improve the liver, kidney and pancreas function and reduce lesions associated with diabetic state in alloxan induced rats. The effect of oral administration of T.arjuna at a dose of 500mg/kg body weight was more efficacy than the 250mg/kg body weight. The extract exhibits the protective effect on tissues, and proves its potential as an antidiabetic agent.\textsuperscript{[14]}

- **Anti-oxidant effect:**
  Shahzad Ali ShahidChatha\textit{et al.} (2014): Investigated the anti-oxidant activity and free radical scavenging capacity of leaves and stem bark extract of Terminalia arjuna. Prepared in aqueous ethanol (water: ethanol 20:80/v/v) and aqueous methanol (water: methanol 20:80/v/v) solvents.\textit{Terminaliaarjuna} extract were good source of natural antioxidant.\textsuperscript{[15]}

- **Anti-anthelmintic activity:**
  Yadav D.Bodkeet\textit{al.} (2013): revealed the phytochemical analysis of the major bioactive components of the plants are terphenoids, polyphenols, saponins, tannins and glycosides. Live earthworm pheretimaposthuma were used for screening anthelmintic activity of bark extract.\textsuperscript{[16]}
  Dwivedi Abhishekh\textit{et al.} (2010): investigated the anthelmintic activity of equal size earth worm consisting of six earth worm in each group were used for the present study. Group was treated with one vehicle albendazol; alcoholic and aqueous extract 100mg/ml, 80mg/ml, 60mg/ml, 40mg/ml, and 20 mg/ml. concentration. Observation was made for the time taken to paralysis and death of individual worms. Paralysis was said to occur when the worms do not revive even in normal saline. Death was concluded when the worms lost their mortality followed with fading away of their body color. The aqueous and alcoholic extract of bark of \textit{Arjuna} showed significant anthelmintic activity.\textsuperscript{[17]}

- **Anti-bacterial and Anti-fungal activity**
  Sukalyani Debnath\textit{et al.} (2013): examined the antimicrobial activity of water, methanol and chloroform extract of \textit{T. Arjuna} bark by agar-well diffusion method, followed by determination of minimum inhibitory concentration. The water and methanolic extract of \textit{T.arjuna} bark produced significant zones of inhibition against twenty two tested bacteria including eight uro pathogens.\textit{MIC} values against the bacteria were found in the range of 0.16 to 2.56mg/ml. the
chloroform extract did not exhibit antibacterial activity. The polar extract of *T.arjuna* also showed strong anti-fungal effect.[18]

**Hepatoprotective effect**

P.Dooria and T.Ananthi (2012): Studied the aqueous extract of *Terminalia arjuna* bark for its hepatoprotective effect against isoniazid induced acute liver damage on albino rat. Isoniazid 100mg/kg significantly elevated the serum level of biochemical markers like SGPT, SGOT, ALP, ACP, bilirubin, protein and depleted antioxidant enzymes GSH and SOD upon administration of isoniazid 100mg/kg to albino rats. This indicate that there the aqueous extract of bark of *Terminalia arjuna* at 200mg/kg dose significantly reduced the elevated level of biochemical markers mentioned above .test extract treatment also increased the level of SOD and GSH. These results suggest that aqueous extract of *Terminalia arjuna* may have the potential therapeutic value in the treatment of isoniazid induced hepatic damage and some liver disease. Hepatoprotective activity of the study plant may be attributed to the anti-oxidant principles in it. [19]

**Analgesic and Anti-inflammatory:**

M.AlamMorshed et al. (2011): Showed *Terminalia arjuna* ethanol extract brine shrip cytotoxicity with lethal concentration 50 value of 50.11microgram/ml. Carrageenan-induced paw edema method was done to study the anti-inflammatory effect and it was found that *T.arjuna* can be effective in acute inflammatory disorders and in that that case it showed significant result (p<0.001) with both of the 250mg/kg and 500mg/kg dose level. The extract was also used to evaluate the centrally acting analgesic potential using formalin, hot plate and peripheral pharmacological actions using acetic acid induced writhing test in mice. The extract of the plant were found to be have significant (p<0.01; p<0.001) analgesic activity at the oral dose of 250&500mg/kg body weight, in the tested models. In hot plate test, atbothdose levels (250&500mg/kg) *T.arjuna* extract showed significant (p<0.001) increased latency period than the control group. *T.arjuna* also showed reduced number of writhes than the control group at two dose levels which are significant (p<0.05; p<0.001) compared to control. The results support the stem bark in painful conditions acting both centrally and peripherally. [20]

**CONCLUSION**

*Terminalia Arjuna* is very important medicinal plant traditionally. Many ayurvedic preparation containing *terminalia arjuna* like cardiotonic, hypertension, diuretics, ulcer healing, *terminalia arjuna* contains alkaloids, flavanoids, tannins, saponins, which have therapeutic value. It can be
concluded that *Terminalia Arjuna* seems to be promising plant in various activities. So this plant can be further explored pharmacologically on various isolated pure compound.

REFERENCES

3. Mr. E.EdwinJarald and Mrs E. ShreejaJarald, “Medicinal plants” for CBS Publishers& Distributors New Delhi. (India) page no.239.

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