



TERMINALIA ARJUNA: A REVIEW

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Abstract: Terminalia Arjuna commonly known as Arjun tree, Arjuna, Koha, Kahua, Arjan, White Marudah, White Murdh, Arjuna Myrobalan, Orjun, Yerra maddi, Sadada and Sadaru is a tree of Combretaceae family and genus Terminalia. Medicinal plants have been a major source of therapeutic agents to cure human diseases, since ancient time. In Ayurveda, Arjuna Bark is mainly used for heart diseases and as a heart tonic. In addition, it is also shown in other diseases as listed above. Now, Arjuna is also researched for an ulcer, diabetes, and cancer treatments. Terminalia arjuna is a wide spread medicinal plant. The different parts of Terminalia arjuna like bark, leaves and fruits etc., have different medicinal values and are used to cure various diseases. The bark is the main part used in Ayurveda as well as in Allopathy for curing various diseases. There are so many benefits of arjuna, and what makes this natural health food even more appealing is that it has virtually no side effects. It's safe for most people to consume, with a few exceptions.

Keywords : Terminalia Arjuna, Pharmacological activity, health benefits.

INTRODUCTION

Terminalia Arjuna commonly known as Arjun tree, Arjuna, Koha, Kahua, Arjan, White Marudah, White Murdh, Arjuna Myrobalan, Orjun, Yerra maddi, Sadada and Sadaru is a tree of Combretaceae family and genus Terminalia. It is a deciduous riparian tree native to India but also found in Pakistan, Sri Lanka, Myanmar and some other Asian Countries. The name Terminalia is derived from a Latin word 'terminalis' or 'terminus' which means "ending". In other words it is refer to the habit this plants leaves that are being crowded at the tips of the shoots. The name 'Arjuna' is also well described in the ancient Indian script known as Rig-Veda and Atharvaveda. In this it is term as a "white" or "bright" or probably the shining quality of its (Chaal) bark. Terminalis has been used in the Ayurveda system of traditional medicine since the 7th century. All parts of the plant are used, usually as a milk decoction. Practitioners of Ayurveda typically use Terminalis for bleeding and cardiovascular ailments. The leaves of this tree are fed on by the Antheraea paphia moth which produces the tassar silk (Tussah), a form of wild silk of commercial importance. The tree is also planted to provide shade, especially in coffee plantations. [1]



Medicinal plants have been a major source of therapeutic agents to cure human diseases, since ancient time. Terminalia arjuna is one kind of widely used medicinal plant used in various indigenous system of medicine like Ayurveda, Siddha and Unani. This review has been conducted to pile up phytochemical as well as pharmacological information that is available in different scientific literatures. This plant has been reported to contain phytochemical constituents like Triterpenoids (arjunolic acid, arjunic acid, arjunin, terminic acid, etc.), Glycosides (arjunetin, arjunosides, arjunglycosides etc.), Flavonoids (Arjunone, arjunolone etc.), Tannins (casuarinin, gallic acid, pyrocatechols etc.), β -Sitosterol, Minerals (calcium, magnesium, zinc, copper etc.). Which exhibit various pharmacological activities like Antimicrobial, Anti-cancer, Cardioprotective, Anti-fungal, Anti diabetic, Antioxidant, Anti-inflammatory, Hypolipidemic, Anthelmintic, Insecticidal, Wound healing, Anti acne, Gastroprotective etc. [2]

DESCRIPTION

- Arjuna is the large size deciduous tree. The height of the Arjuna tree reaches up to 60 -85 feet. It is the evergreen tree with the yellow flowers and conical leaves.
- It has a smooth gray bark. Fruit is 2.5 -3.5 cm long, fibrous woody, glabrous with 5 hard wings, striated with numerous curved veins.
- It has a buttressed trunk and a vast spreading crown from which the branches drop downwards.
- Its leaves are dull green above and pale brown beneath. Arjuna flowers between March to June and fruits between September to November. [3]

Arjun tree



- Type of Plant -----Deciduous riparian tree
- Native Range-----India
- Height -----20 to 27 meters
- Habitat-----It prefers humid, fertile and red lateritic soils, but it can grow in any type of soils. It can also grow in shade.
- Leaves -----Conical and oblong leaves. Leaves have a green color on the top and brown color below.
- Bark-----Grey and smooth bark
- Flowers-----Pale yellow flowers
- Bloom Time-----March and June
- Fruit ----- It has fibrous woody fruits with five wings division having size around 2 to 5 cm (between September and November)
- Fruition Time -----Between September to November

Terminalis has been used in the Ayurveda system of traditional medicine since the 7th century.

All parts of the plant are used, usually as a milk decoction. Practitioners of Ayurveda typically use Terminalis for bleeding and cardiovascular ailments. The leaves of this tree are fed on by the Antheraea paphia moth which produces the tassar silk (Tussah), a form of wild silk of commercial importance. The tree is also planted to provide shade, especially in coffee plantations. [1]

CULTIVATION AND COLLECTION [5]

Climate and soil

The plant naturally occurs in sub-tropical and tropical moist regions of the country. The tree prefers alluvial loamy or black cotton soils, which are loose, moist, fertile, and have good drainage and water holding capacity. River bank soils, streams, and ravines are its natural habitat. The plant also survives in open sunny and low rainfall areas.[4]

The maximum temperature, which is required for the plants should range 38 degree Celsius to 48 degree Celsius and the minimum temperature should be zero degree to 15 degree Celsius. [5]

Land preparation and planting for Arjuna herb:

All the unwanted weeds, pebbles, stones and also the unwanted materials of the previous should be removed. Then the land should be ploughed for 2-3 times as it will attain the fine tilth and smooth texture following by the ploughing, the harrowing and levelling should be done. For the land we should use 5kg each pit should be fitted with a mixture of soil and also manure. The pits of 60 cm*60 cm* 60 cm* should be dug. The spacing on either side should be 6m*6m.



Nursery preparation for growing Arjuna:

The beds should be sown with seeds in a row of 1 foot each from and 2 inches of spaces between the seeds. The best time for sowing is in the month of February – march. After sowing the seeds, regular irrigation of bed and also the poly bag should be done. The germination might be done for 7 days and also they continue to germinate up to 60 days.

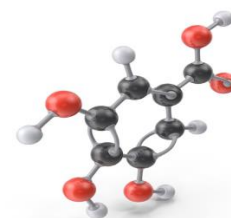
Yield of terminalia Arjuna:

The yield of the Arjuna herb is 45 kg per hectare of the land in 3 years.

PHYTOCHEMICAL PROFILE [6]

Plant Profile

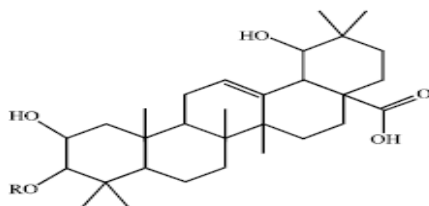
- Botanical Name: Terminalia arjuna (belongs to Combretaceae family)
- Common Name: Arjuna, Dhavala, Kakubha, Nadisarja, Veeravriksha, Partha, Indradru.
- Parts Used: Bark, Roots, Leaves and Fruits
- Taxonomical/ Scientific classifications:
 - Kingdom: Plantae – Plants
 - Subkingdom: Tracheobionta - Vascular plants
 - Subkingdom: Spermatophyta- Seed plants
 - Division: Magnoliophyta - Flowering plants
 - Class: Magnoliopsida – Dicotyledons
 - Subclass: Rosidae
 - Order: Myrtales



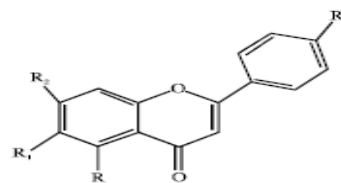
- Family: Combretaceae- Indian Almond family. fig. gallic acid
- Genus: Terminalia L.
- Species: arjuna.

Table : Chemical Constituents

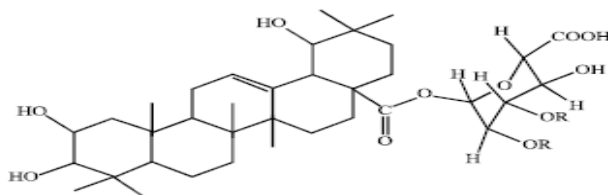
Plant parts	Chemical constituents
Stem bark	<p>Triterpenoids: arjunolic acid, arjunic acid, arjunin, arjugenin, Ursane triterpenoids. Arjunahomosesquiterpenol & Stigmasteryl digalactoside. oleaterminaloic acid A, B & C, oleaterminolide and termiarjunoside I.</p> <p>Glycosides: arjunetin, arjunoside II, arjunoside I, arjunaphthanolosite, terminoside A Arjunosides A-E Arjunetoside, Ajunglycosides IV and V, Termiarjunoside I and II. β-Sitosterol.</p> <p>Flavonoids: arjunone, bicalein, arjunolone, luteolin, ethyl gallate, gallic acid, kempferol, pelargonidin, quercetin, oligomeric proanthocyanidins.</p> <p>Tannins: terflavin C, castalagin, punicallin, punicalagin, terchebulin, casuarinin, pyrocatechols, arjunin, gallic acid, ellagic acid.</p> <p>Trace elements/Minerals: zinc, copper calcium, aluminium, silica, magnesium</p>
Roots	<p>β-Sitosterol</p> <p>Triterpenoids: terminic acid, arjunic acid, oleanolic acid, arjunolic acid</p> <p>Glycosides: arjunoside I, arjunoside II, arjunoside III, arjunoside IV, 2,19-dihydroxy-3-oxo-olean-12-en-28-oic acid 28-O-d glucopyranoside</p>
Leaves and fruits	<p>Glycosides</p> <p>Flavonoids: luteolin</p> <p>Tannins: Ellagic acid, Gallic acid, Corilagin, Chebulagic acid, etc. Chebuloside II and Bellericoside</p> <p>Dietary minerals of Calcium, Magnesium, Zinc, and Copper</p>



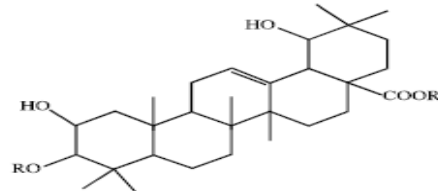
- 1: R = H, Arjunic acid
- 2: R = beta-D-(+)-galactose, Arjunoside I
- 3: R = beta-D-(+)-ghicosyl-L-2-deoxyrhamnamnose, Arjunoside II
- 4: R = Alpha-L-rhamnopyranose, Arjunoside IV



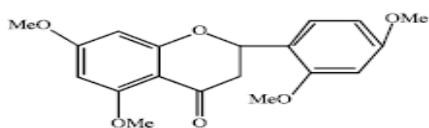
- R = H; R1 = R3 = OH; R = OMe; Arjunolone
- R = R1 R2 = OH; R3 = H; Baicalein



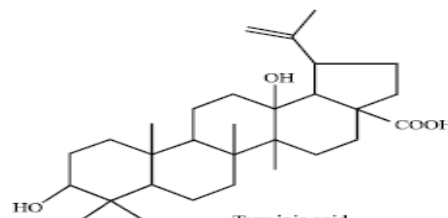
Arjunoside III



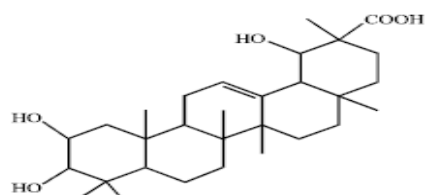
- R = Gal, R1 = H; Arjunoside I
- R = Gbi-2-Deoxyrha, R1 = H; Arjunoside II
- R = H, R1 = Gluc. acid; Arjunoside III
- R = Rha, R1 = H; Arjunoside IV



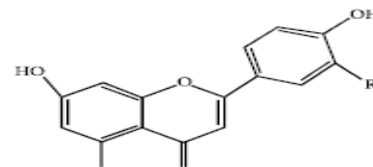
Arjunore



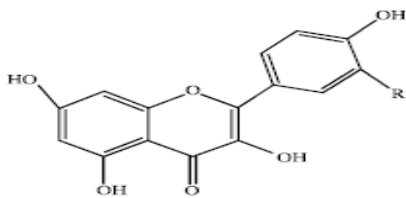
Terminic acid



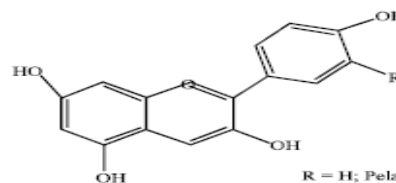
Terminic acid



- R = H; Apigenin
- R = OH; Luteolin



- R = H; Kaempferol
- R = OH; Quercetin



- R = H; Pelargonidin
- R = OH; Cyanidin

The structures of compounds isolated from Terminalia arjuna :[7]



Arjuna-bark-and-Dried-fruits



Arjun-Tree-bark-powder



Bark-of Arjun-Tree



Dried-Bark-of-Arjun-Tree



Dried-Seeds-of-Arjun-Tree



Flowers-of-Arjun-Tree



Green-Fruit-of-Arjun-Tree



Leaves-of-Arjun-Tree



Trunk-of-Arjun-Tree



Whole-Arjun-Tree

PHARMACOLOGICAL ACTIVITIES [5]

1. Antimicrobial activity:

- When total 34 plant species belonging to 18 different families were assayed for antibacterial activity against *Escherichia coli*, *Klebsiella aerogenes*, *Proteus vulgaris*, and *Pseudomonas aerogenes* (gram- negative bacteria) by the disc diffusion method, about 16 plants showed activity. Among them *Terminalia arjuna* showed significant antibacterial activity against the tested bacteria

2. Anticancer activity:

Different types of cancer reported to treat by *T. arjuna* extracts are compiled in a Table. Herbal extracts of *T. arjuna* reported to enhance increased percentage of life span of experimental animals.

Table: Different types of cancer reported to treat by *T. arjuna* extracts

Types of cancer	Used extract	Treated organism/cells
Mutagenic cancer	Dried bark	<i>Salmonella typhimurium</i>
Human breast, colon, intestine, lung and leukemia	Leaf	<i>Pestalotiopsis terminaliae</i>
Ehrlich ascites carcinoma (EAC)	Methanolic extract of leaves	Mice
Human breast	Bark	Human breast adeno- carcinoma MCF-7 cell
BT- human breast	Ethanolic extract of leaves	BT-human breast carcinoma cells
Chronic myeloid leukemia	Methanolic	Human K562 leukemic cell line

	extract of leaves	
Human hepatocellular carcinoma	Ethanol extract of leaves	Human hepatoma cell line (HepG2)
Dalton's Lymphoma Ascites (DLA) tumour	Ethanol extract of leaves	Mice
Hepatocellular carcinoma	Ethanol extract of leaves	Liver of rat
Lung, Breast and ovarian cancer	Leaves	A549>MCF7>PA respective cell line

3. Cardioprotective activity:

There are different types of therapeutic use of *T. arjuna* for cardiac disease that based on empirical explanation recorded in various treatment of ancient medicine.

(a) Cardiotonic activities:

- Arjunolic acid is used as a cardiac tonic in ayurvedic medicine for centuries and it has been first isolated from *T. arjuna*. The bark extracts have major component triterpenoid saponin is an arjunolic acid.
- Besides Arjunolic acid, Arjungenin was also found to be most active as direct free radical scavenger and inhibitor for the hypochlorous acid production followed by its glucoside that was almost 50% active resulting in cardioprotective action.
- The aqueous extract of the bark is isolated from rat atria that confirmed positive inotropic activity.
- Terminalia arjuna (Aqueous Extract) increased the force of contraction of cardiac muscle in frog's heart in situ, hypodynamic frog's heart in situ and isolated perfused rabbit heart.

(b) Anti-anginal effects & Myocardial infarction:

- Treatment with *T. arjuna* is fairly effective in patients with symptoms of stable angina pectoris. However, it has a limited role in unstable angina.
- Terminalia arjuna ethanol extract (TAEE) and Terminalia arjuna aqueous extract (TAAE) both produced significant cardio protection in isoproterenol induced myocardial infarction in animals.

(c) Coronary flow:

- Terminalia arjuna (Aqueous Extract) increased the coronary flow at a 400 µg dose in isolated perfused rabbit heart along with dose dependent bradycardia. However the doses required were high as compared to digoxin so the agent proved to be less potent as compared to digoxin.
- The coronary flow was significantly enhanced with 1024 µg/ml dose of TA extract on the isolated perfused rabbit heart.

(d) Hypotensive effects:

- Intravenous injection of alcoholic and aqueous extract of bark causes dose- dependent persistent bradycardia and hypotension.
- 70% alcoholic extract of Terminalia arjuna produced hypotension of peripheral origin which may be due to adrenergic β₂-receptor agonistic and/or direct action on the heart.

4. Antifungal activity:

- The organic extracts of five Terminalia species were tested with plant pathogenic fungi i.e. *A. flavus*, *A. alternata*, *A. niger*, *A. brassicicola*, and *H. tetramera*. The leaves extracts of all five plants found to inhibit these plant pathogens.
- The polar extracts of *T. arjuna* demonstrated strong anti-fungal activity against eight species of *Candida*.
- The antifungal activities of Terminalia arjuna leaves extract (40, 60, 80, 100 %) were tested against three fungal strains. *Aspergillus niger*, *Trichoderma viride* and *Fusarium oxysporum* which showed remarkable inhibition of fungi growth.
- The bark extracts were more effective than fungicide (control) used in this antifungal test. Moderate antifungal activity against *C. albicans*, *C. krusei* and *C. parapsilosis* was exhibited by a mixture of arjunolic acid with minimum inhibitory concentration (MIC) values in the range of 50-200 µg/ml.

5. Antidiabetic activity:

- The *T. arjuna* extracts have potential effects on diabetes. *T. arjuna* bark extracts cause a significant reduction in liver and kidney markers such as alkaline phosphatase (ALP), acid phosphatase (ACP), alanine amino transferase (ALT), aspartate amino transferase (AST) and lactate dehydrogenase (LDH) as well as significant decrease in the activities of glucose- 6-phosphatase, fructose-1,6-disphosphatase, aldolase and an increase in the activity of phosphoglucosomerase and hexokinase in tissues and also cause a significant ($P < 0.05$) increase in superoxide dismutase, catalase, glutathione peroxidase, glutathione-s-transferase glutathione reductase and glucose-6-phosphate

dehydrogenase, reduced glutathione, vitamin A, vitamin C, vitamin E, total sulfhydryl groups (TSH) and non-protein sulfhydryl groups (NPSH) in liver and kidney of alloxan induced diabetic rats, which clearly shows, the anti-diabetic and antioxidant property of *T. arjuna* bark.

- Aqueous Bark Extracts of *Terminalia Arjuna* Stimulates Insulin Release, Enhances Insulin Action and Inhibits Starch Digestion and Protein Glycation in Vitro
- The organic extracts (Ethanol, methanol and acetone) of *T. arjuna* leaves and bark possess significant hypoglycemic and anti-diabetic activity due to the presence of the phytochemicals (flavonoids, tannins, glycosides, alkaloids, terpenoids) in it which are strong antioxidants.

6. **Antioxidant activity:**

- The extracts of *Terminalia arjuna* may be explored as a potential source of antioxidants for their use in food and pharmaceutical industries.
- The extracts from barks of investigated trees: *A. indica*, *T. arjuna*, *A. nilotica*, and *E. jambolana* Lam., exhibited outstanding antioxidant activity as measured by various antioxidant assays.⁵⁶ Because of antioxidant activity of *Terminalia arjuna*, it could be very well used as hepatoprotectant.
- *Terminalia arjuna* shows potential antioxidant and free radical scavenging activity due to presence of more amount of flavonoid and phenolic content.

7. **Anti-inflammatory:**

- The methanol extract of the leaves of *Terminalia arjuna* demonstrated significant analgesic and acute anti-inflammatory activities in the tested models.
- *T. arjuna* has anti-inflammatory potential against some phlogistic agents, immunomodulatory effect and also has anti-nociceptive action probably mediated via opioid receptors.

8. **Lipid lowering activity:**

- The rats receiving *Terminalia arjuna* had a marked reduction in total cholesterol, triglycerides, LDL cholesterol, and VLDL cholesterol as well as an increased HDL cholesterol when compared to the induced animals. Thus, *Terminalia arjuna* was observed to be the most potent hypolipidemic & hyperglycemic agent.
- *T. arjuna* significantly decreases Total Cholesterol, LDL and Triglyceride levels and increases HDL and lessens atherosclerotic lesion in aorta. Hence *T. arjuna* extract can effectively prevent the progress of atherosclerosis. This is likely due to the effect of *T. arjuna* on serum lipoproteins and its antioxidant and anti-inflammatory properties.
- *Arjuna* bark acts as a hypolipidemic, hypocholesterolemia and oxidative stress lowering agent induced by high fat high cholesterol diet in rats.

9. **Anthelmintic activity:**

- Crude methanolic extracts of *T. arjuna* bark exhibited anthelmintic activity both in vitro and in vivo studies which may be mainly attributed to its tannin content.
- All extracts showed effective anthelmintic activity at 20 mg ml⁻¹ concentration.

10. **Insecticidal property:**

- Arjunolic acid isolated from the stem of *T. arjuna* exhibits significant inhibitory activity towards fourth instar larvae of *Spilarctia obliqua*.

11. **Wound healing activity:**

- The hydroalcoholic extract of *T. arjuna* bark phytoconstituents was reported to be used in topical application on healing rat dermal wounds.
- *T. arjuna* has capability to complete epithelization of excision wounds and increased tensile strength of incision wounds.

12. Against ear infection:

- T. arjuna plants extracts having a great potential to be developed as herbal ear drop to control the bacterial ear infections.
- All the organic T.arjuna extracts (acetone, ethanol or methanol) have shown good activity against both the Gram positive and Gram-negative ear pathogens, the inhibition being higher in Gram positive bacteria than the Gram-negative bacteria.

13. Anti-acne activity:

- Herbal anti-acne cream is non-toxic, safe, effective and improves patient compliance by the utilization of herbal extracts from T. arjuna would be highly acceptable.

14. Gastroprotective effect:

- Hydro alcoholic extract of TA was found to possess anti-ulcerogenic as well as ulcer healing properties, which might be due to anti-secretory activity. [69]
- T. arjuna acts as a gastroprotective agent probably due to its free radical scavenging activity and cytoprotective nature.

15. Anti-asthmatic activity:

- Arjunolic acid and alcoholic extract of T. arjuna have significant mast cell stabilization activity and specifically, arjunolic acid exhibits comparatively better stabilization activity than alcoholic extract of TA.
- The antiasthma tic and antianaphylaxis activity may be due to the mast cell stabilizing potential and inhibition of antigen induced histamine and acetylcholine release.

16. Decrease arsenic-induced toxicity:

- Arsenic, one of the environmental pollutants, causes tissue damage. Its exposure occurs from inhalation, absorption through the skin and by ingestion of contaminated food and drinking water.
- An impaired antioxidant defense mechanism followed by oxidative stress is the major cause of arsenic induced toxicity. Arjunolic acid has been shown to protect against arsenic induced cytotoxicity probably due to its free radical scavenging as well as metal chelating properties.

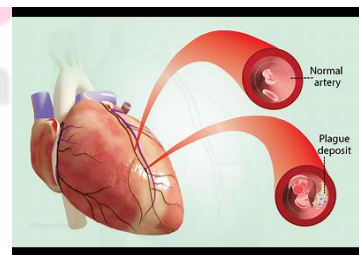
HEALTH BENEFITS OF ARJUN TREE [1]

In Ayurveda, Arjuna Bark is mainly used for heart diseases and as a heart tonic. In addition, it is also shown in other diseases as listed above. Now, Arjuna is also researched for an ulcer, diabetes, and cancer treatments.

Listed below are some of the popular health benefits of using Arjun tree bark:

1. Atherosclerosis

Terminalia Arjuna has anti-atherogenic and hypo-lipidemic properties. It reduces inflammation of the blood vessels and anti-hyperlipidaemic action lowers concentration of total cholesterol, LDL cholesterol, VLDL total triglycerides. It also reduces atherogenic index. Research on rabbit



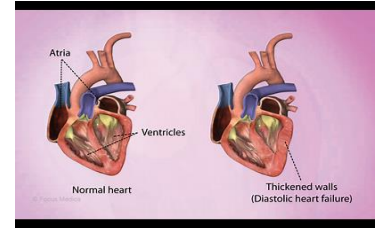
reduces low-grade serum cholesterol, and suggested a likely to be due to

its antihyperlipidemic, anti-inflammatory and antioxidant characteristics. Thus, Arjuna bark can be used for its anti-atherogenic action, reducing atherosclerotic lesion and stopping the progress of atherosclerosis.

2. Heart Failure

Terminalia Arjuna reduces manifestations of heart failure. It increases left ventricular stroke volume index and left ventricular ejection fractions. Research suggested it helps to improve exercise performance and effort tolerance. Terminalia Arjuna bark extract improves cardiac output and cardiac contractility index.

It prevents and reduces cardiac dysfunction and helps to recover from myocardial injury in congestive heart failure, a rat study suggested. Additionally, the study recommended Arjuna bark inhibits lipid peroxidation and acts as an antioxidant. Its action was comparable to FLUVASTATIN, a standard modern drug.

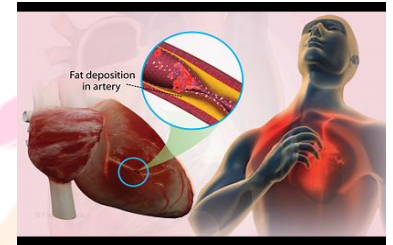


3. Coronary Artery Disease

Coronary Artery Disease is a common cause of heart failure in addition to uncontrolled hypertension. Terminalia Arjuna helps to stop its progress and further plaque deposition by reducing low-grade inflammation in the blood vessels and coronary arteries.

In addition, it also checks cholesterol deposits and plaque formation. It considerably reduces serum cholesterol, triglycerides, low-density lipoprotein and atherogenic index.

However, it may not help alone to treat the coronary artery disease, but along with following herbs, it works efficiently to clear the blockage caused by Cholesterol-containing deposits.



4. DNA protection

Arjuna consists of compounds that help to protect against DNA damage from toxins. Research has found that pre-treatment of lymphocytes with bark extract of Terminalia Arjuna before administration of Adriamycin results in significant decrease in formation of micronuclei. So, it protects DNA against Adriamycin-induced damage.

5. Cardiovascular Health

Terminalia Arjuna is quite beneficial to improve the functions of left ventricle of the heart. It provides strength to the heart muscles and improves the heart's capacity to pump the blood. It has cardio-protective actions, which helps to preserve the optimum functions of the heart and speeds up the recovery process for cardiac injury.

It is most commonly used for prevention from Myocardial Infarction (Heart attack) because it has anti-atherogenic property, which helps to decrease plaque build-up in the coronary arteries and improves the blood flow to the heart tissue.

In Ayurveda, Arjuna is commonly suggested for heart disease's prevention in people suffering from diabetes mellitus and hypertension.

6. Improves High Blood Pressure

Arjuna herb is one of the best home remedies for hypertension or high blood. High blood pressure is a hugely serious medical condition that can cause a heart failure, stroke, coronary heart disease (CHD), heart attack, kidney failure and other serious health problems.



7. Haemorrhages & Bleeding Disorders

Astringent's substances in Arjuna Bark have anti-haemorrhagic property, which may be because it may cause vasoconstriction that helps to reduce bleeding and treat haemorrhages. It is commonly used in Ayurveda for bleeding disorders along with other herbs.

8. Chronic Low-Grade Fever

Arjuna Bark Ksheera Pak is useful for the treatment of chronic low-grade fever associated with extreme fatigue and physical weakness. However, it is not the perfect medicine for lowering fever, but it assists other medicines to fight off infections and fever. Additionally, it reduces fatigue and weakness and restores body strength.

9. Dysentery

Terminalia Arjuna is used as Arjuna Ksheera Pak along with Indrayava (Holarrhena Antidysenterica seeds) for the treatment of dysentery. This combination helps to reduce bleeding in stools, frequency of defecation, and eradicates the infection.



10. Bone Fractures

In Ayurveda, a paste of Arjuna Bark is prepared with water and applied on the part of bone fracture after alignment. The application of bark powder is repeated twice a day until recovery. Additionally 3 to 4 grams Arjuna Bark Powder along with 2 grams of Cissus Quadrangularis is recommended to take twice daily with Cow's Ghee and Desi Khand (naturally prepared sugar). It is believed this helps to speed up the proliferative physiological process, which enhances the fracture healing.



MEDICINAL USES [8]

- Terminalia arjuna is a wide spread medicinal plant. The different parts of Terminalia arjuna like bark, leaves and fruits etc., have different medicinal values and are used to cure various diseases.
- The bark is the main part used in Ayurveda as well as in Allopathy for curing various diseases.
- The bark of arjuna tree contains calcium salts, magnesium salts and glucosides have been used in traditional ayurvedic herbalism .
- According to vagbhata, Terminalia bark is cooling, kapha, pitta pacifying, cardiac restorative and help in healing wounds, tuberculosis and poisoning. Chakradatta advised to take it by processing in milk for cardiac disorders alone or with panchamula.

Other medicinal uses

- It works as a wonderful anti-oxidant so it helps in stopping early aging and help in maintaining youth.
- Arjuna is very effective in tuberculosis cough by stopping blood in cough and heal the ruptured arteries in lungs.
- Arjuna maintains normal urine flow and help in suppressing painful micturition
- Bark powder of arjuna has diuretic properties that cure cirrhosis
- Bark powder is also used in the treatment of gonorrhoea, and spermatorrhoea.

- Hot in fusion of powder of bark is used to treat Asthma and also works well in Acne when applied as a paste mixed with honey.
- Bark paste is applied for bone bandage in fractures.
- Arjuna is effective in tubercular cough by stopping blood in cough and healing the ruptured arteries in lungs.
- Arjuna is diuretic taken to flush out the small stones formed in the kidneys. If bark is boiled in water and taken as a drink it is known to break the kidney stones into smaller pieces and expel out of the body.
- Terminalia arjuna reversing the damage by chronic smoking. Smoking causes do the dysfunction an early event of Atherosclerosis. It is mediated through mainly oxidative stress process.

FORMULATIONS AVAILABLE IN THE MARKET: [9]



Arjuna heart capsules



Himalaya herbal Arjuna tablet



Arjuna powder



Planet Ayurveda Arjuna tea



Arjunarsihta syrup



Terminalia arjuna liquid dilution

Arjunachhal ghanvati



Arjuna ghee

PRECAUTIONS [10]

- **Pregnancy:** There is some evidence that Terminalia arjuna is POSSIBLY UNSAFE during pregnancy. There isn't enough reliable information to know if the other two species are safe to use when pregnant. Stay on the safe side and avoid using any Terminalia species.
- **Breast-feeding:** There isn't enough reliable information to know if Terminalia is safe to use when breast-feeding. Stay on the safe side and avoid use.
- **Bleeding disorders:** Terminalia might slow blood clotting. This might increase the risk of bruising and bleeding in people with bleeding disorders.
- **Diabetes:** Terminalia might lower blood sugar levels. Your diabetes medications might need to be adjusted by your healthcare provider.
- **Surgery:** Terminalia might interfere with blood sugar control and increase the risk of bleeding during surgery. Stop taking Terminalia at least 2 weeks before a scheduled surgery.
- It may cause slight constipation and flatulence.
- High doses may cause harm to the liver.
- Excessive use may reduce the functioning of the Thyroid gland

CONCLUSION

- There are so many benefits of arjuna, and what makes this natural health food even more appealing is that it has virtually no side effects. It's safe for most people to consume, with a few exceptions.
- The present review reveals that Terminalia arjuna is utilized for the treatment of some common disease. In the present review we have congregated information pertaining to botanical, phytochemical, pharmacological studies.
- The plant has been studied for their various pharmacological activities like antioxidant, antihyperglycemic, antihyperlipidemic, cardio protective, immunomodulatory effects, hepato protective, in hyperthyroidism, hyperglycemia and lipid peroxidation, analgesic and anti-Inflammatory, anthelmintics , antinociceptive activity studies have also been studied.
- Therefore it is necessary to exploit its maximum potential in the field of medicinal and pharmaceutical sciences for novel and fruitful application.

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