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Review Article

An Review on Recent Advancements of *Terminalia Arjuna*

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ABSTRACT

Medicinal plants have historically served as a primary source of therapeutic compounds, providing natural solutions for disease management. *Terminalia arjuna* is a prominent example of a botanical species widely utilized in indigenous medicine, demonstrating significant potential in the treatment of various critical conditions. "*Terminalia arjuna*, commonly known as *Arjuna*, is a plant that belongs to the Combretaceae family." *Terminalia Arjuna* is a deciduous tree from the Combretaceae family, commonly found along rivers and streams in India's Indo-sub-Himalayan regions, including Delhi, Uttar Pradesh, Bihar, Madhya Pradesh, and the Deccan areas. This 60-80-foot-tall tree has been a foundation of traditional Indian medicine for centuries. Terminalia arjuna is a wide spread medicinal plant. Its bark, leaves, and fruits are used to treat various ailments. Arjuna is safe to consume, with minimal side effects, making it a popular natural remedy. *Arjuna* is a plant that helps heart health. It's used in traditional medicine to make heart problems better and also manages cardiovascular conditions and atherosclerosis including anginal pain, hypertension, congestive heart failure. It also including wound healing, antibacterial, anti-ischemic and antioxidant properties, anti-inflammatory, anti-asthmatic activity, anticarcinogenic activity, antimicrobial activity, anti-acne activity and also used in DNA protection. *Arjuna* plant contains a rich mix of phytochemicals, including, Triterpenoids, Glycosides, Flavonoids, Tannins, and essential minerals like calcium, magnesium and zinc.

INTRODUCTION

Terminalia Arjuna is commonly known as the Arjun tree. This versatile tree belongs to the combretaceae family and is part of the Terminalia genus. It goes by many names, including, Arjun, Koha, Kahua, Arjan, White Marudah, White Murdh, Arjuna Myrobalan, Orjun, Yerra maddi, Sadada, and Sadaru [1]. It is tall tree that grows up to 20-25 meters high. It has a strong trunk, a wide canopy, and drooping branches. Its leaves are shaped like ovals, green on top and brown on the

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bottom. The tree has smooth grey bark and produces pale yellow flowers from March to June. The fruit is woody, fibrous, and has five wings, growing up to 5 cm long. Arjuna trees are often found near rivers or dry riverbeds in West Bengal and central India [2]. It's a very useful plant with many medicinal benefits and has been used to treat various health issues. *Arjuna* is a highly respected plant in Ayurvedic medicine. It's been used for a long time to help keep hearts healthy and strong [3]. *Arjuna* has been widely used in conventional medicine for its numerous health benefits, including wound healing, antibacterial, anti-ischemic and antioxidant properties, and treating various health conditions such as obesity, hypertension, and heart disease. *Arjuna* plant contains a rich mix of phytochemicals, including, Triterpenoids, Glycosides, Flavonoids, Tannins, and essential minerals like calcium, magnesium and zinc [4].

Figure 1: *Terminalia arjuna* and *Arjuna* fruits

The flavonoids in *Terminalia Arjuna's* bark hold the key to its remarkable antioxidant and anti-inflammatory properties by consuming the bark, you can boost your body's defenses against free radicals, protect yourself from chronic diseases and reduce inflammation and oxidative stress [5]. *Terminalia Arjuna* is a versatile herbal remedy used to heart failure, ischemia, cardiomyopathy, atherosclerosis and myocardial necrosis. Address various diseases like blood disorders, anemia, venereal and viral infections. Support overall well-being and excellent health. Additionally, *Arjuna* is used to relief in fracture recovery heal ulcers, support liver health (hepatic issues). Its broad therapeutic applications make *Terminalia Arjuna* a valuable natural solution [6]. This reviews purpose to provide a comprehensive overview of *Terminalia Arjuna* incorporating the latest research findings from various fields including botany, phytochemistry, ethnopharmacology and clinical studies.

Table 1: Taxonomic Classification

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Myrtales
Family	Combretaceae
Genus	Terminalia
Species	Terminalia arjuna

SYNONYMS

- *Terminalia glabra.*
- *Terminalia arjuna Roxb.*
- *Terminalia cuneate.*
- *Pentaptera arjuna.*
- *Terminalia arguna.*
- *Terminalia arjuna Wight & Arn.*
- *Terminalia elliptica.*
- *Terminalia tiliaefolia.*
- *Terminalia nudiflora.*
- *Terminalia roxburghii.*

DESCRIPTION

The Arjuna tree is a large, deciduous-evergreen hybrid, reaching 60-85 feet tall. It features yellow flowers, conical leaves, and smooth gray bark. Its distinctive fruit is 2.5-3.5 cm long, with a fibrous-woody texture, glabrous surface, and five hard wings. The Arjuna tree has a strong base and a wide, spreading top. Its branches hang down, creating a beautiful shape. The leaves are green on top and light brown on the bottom. every year, the tree blooms with flowers from March to June, and produces fruit from september to November [7]. For 1,400+ years, Arjuna has been a key part of Ayurvedic traditional, the Arjuna plant plays a

significant role in Ayurvedic medicine. Its parts are used to create a milk-based solution, treating bleeding and cardiovascular ailments. This natural remedy has been trusted by practitioners for centuries.

Type of plant ⟶ Deciduous riparian tree
Native Country⟶ India Height ⟶ 20 to 27 meters
Habitat ⟶ *Arjuna* trees like humid areas with good soil but they can grow anywhere. They can even grow in the shade.
Leaves ⟶ Conical and oblong leaves.Leaves have a green color on the top and brown color below.
Bark ⟶ Grey and smooth bark
Flowers ⟶ Light yellow flowers
Fruit ⟶ It has fibrous woody fruits with five wings division having size around 2 to 5 cm (between September and November)
Blossom time ⟶ March and June [8].

Table 2: Chemical constituents [9]

Plant parts	Chemical constituents
Stem bark	**Glycosides:** arjunetin, arjunoside II, arjunoside I, arjunaphthanoloside, terminoside A Arjunasides A-E Arjunetoside, Ajunglycosides IV and V, Termiarjunoside I and II. **Triterpenoids:** arjunolic acid, arjunic acid, arjunin, arjugenin, Ursane triterpenoids. Arjunahomosesquiterpenol & Stigmasteryl digalactoside. **Flavonoids:** arjunone, bicalein, arjunolone, luteolin, ethyl gallate, gallic acid, kempferol, pelorgonidin, quercetin, oligomeric proanthocyanidins. **Tannins:** terflavin C, castalagin, punicallin, punicalagin, terchebulin, casuarinin, pyrocatechols, arjunin, gallic acid, ellagic acid. **Trace elements/Minerals:** zinc, copper calcium, aluminium, silica, magnesium
Roots	**Triterpenoids:** terminic acid, arjunic acid, oleanolic acid, arjunolic acid **Glycosides:** arjunoside I, arjunoside II, arjunoside III, arjunoside IV,2,19-dihydroxy-3-oxo-olean-12-en28-oic acid 28-O-d glucopyranoside
Leaves and fruits	**Flavonoids:** luteolin **Tannins:** Gallic acid, Corilagin, Chebulagic acid, etc.

Ethnopharmacology and Phytochemistry

Stem Bark: The *Terminalia Arjuna* tree has distinctive bark that is smooth to the touch**,** pinkish-gray on the outside**,** smooth and deep red on the inside. Its unique color and texture make it easily recognizable (figure 2, b) [10].

Major phytoconsituents in bark:

Terminalia Arjuna contains beneficial triterpenoids including Arjunin, Arjunic acid, Arjungenin, Arjunolic acid, Terminic acid.These natural compounds contribute to *Arjuna's* medicinal properties, supporting heart health and overall well-being [11]. *Terminalia Arjuna's* chemical composition includes, heart-healthy glycosides (arjunetin, arjunosides, arjunaphthanoloside, terminoside A), antioxidant flavonoids (arjunone, luteolin, quercetin, gallic acid), anti-inflammatory tannins (punicallin, punicalagin, terchebulin), plant sterol (sitosterol), essential minerals and trace elements (calcium, copper, magnesium, zinc, silica) [12].

Roots: The *Terminalia arjuna* tree features prominent buttress roots, ensuring stability in areas with rocky substrates and riparian environments [13].

***Terminalia Arjuna's* key chemical components include:** Glycosides (arjunoside I-IV)**,** triterpenoids (arjunic acid, arjunolic acid,

oleanolic acid, terminic acid), sitosterol (a plant sterol). These natural compounds contribute to *Arjuna's* medicinal properties, making it beneficial for various health conditions [14].

Leaves: Simple arrangement, opposite or slightly offset (figure 2, h).

- **Size:** 5-25 cm long, 4-9 cm wide.
- Smooth surface (glorious).
- **Shape:** oblong or elliptical.
- Hard texture.
- **Edges:** wavy (crenulated).
- **Tip:** rounded or slightly pointed.
- **Base:** rounded or heart-shaped.
- Short stem (petiole): 2-4 cm long, hairy (sericeous).

Two prominent glands at the leaf base, a unique identifying feature [15].

Fruits: Shaped like drupes (stone fruits) (figure 2, g).

- Oval and fibrous-woody.
- Smooth-skinned.
- Divided into five hard, curved wings.

Flowers: The Arjuna tree produces small clusters of white flowers, either on short branches or at the ends of stems. These flowers have both male and female parts and lack stalks (figure 2 e) [16].

(a)Arjuna-bark-and-dried-fruit

(b)Bark-of Arjuna-Tree

(c) Dried-Bark-of-Arjuna-Tree

(d) Arjuna-Tree-bark-powder

(e) Flower-of-Arjuna-Tree

(f) Dried-Seeds-of-Arjuna-Tree

(g) Green-Fruit-of-Arjun-Tree

(h) Leaves-of-Arjuna-Tree

(i) Trunk-of-Arjuna-Tree

(j) Whole-Arjuna-Tree

Figure 2: Various parts of arjuna tree

Table 3: Drug derived from plants [17]

Natural Plant Source	Name of the Drug
Willow Bark	Salicylates
Foxglove	Digitalis
Cinochona	Quinine
Contaminated Rye	Ergotamine

PHARMACOLOGICAL ACTIVITIES

1) Anti-diabetic effect:

The bark of the *Arjuna* tree contains natural compounds that help control blood sugar levels. these compounds, including tannins, saponins, and flavonoids, work together to, improve how the body uses glucose, reduce liver and kidney damage, limit the production of excess sugar. This process is similar to how insulin works, making the *Arjuna* bark extract a potential natural remedy for managing diabetes [18].

1) Anticancer activity:

Terminalia arjuna extracts have been found to exhibit anticancer effects against multiple cancer types (detailed in the table 4). Additionally, these herbal extracts have been shown to extend the lifespan of experimental animals [19].

Table 4: Different type of cancer reported to treat by *T.arjuna* extracts

Type of cancer	Used extract	Treated organism/cells
Mutagenic cancer	Dried bark	Salmonella typhimurium
Ehrlich ascites carcinoma (EAC)	Methanolic extract of leaves	Mice
Human breast, colon, intestine, Lung and leukemia	Leaf	Pestalotiopsis terminaliae
Human breast	Bark	Human breast adeno-carcinoma cells
BT- human breast	Ethanolic extract of leaves	BT-human breast carcinoma cells

Chronic myeloid leukemia	Methanolic extract of leaves	Human k562 leukemic cell line
Human hepatocellular carcinoma	Ethanolic extract of leaves	Human hepatoma cell line (HepG2)
Dalton's Lymphoma Ascites (DLA) tumour	Ethanolic extract of leaves	Mice
Hepatocellular carcinoma	Ethanolic extract of leaves	Liver of rat
Lungs, Breast and overian cancer	Leaves	A549>MCF7>PA respective cell line

2) Antimicrobial activity:

Terminalia arjuna extracts have demonstrated impressive antibacterial properties. Water and acetone-based extracts effectively combated S. aureus, while organic extracts targeted Gram-negative bacteria, with one exception. A study examined 34 plants from 18 families for their antibacterial effects on four Gram-negative bacteria. Nearly half (16 plants) demonstrated antibacterial properties [20].

3) Anti-inflammatory:

Terminalia arjuna leaves have been found to possess strong analgesic and anti-inflammatory properties. This natural remedy is relieving pain effectively, reduces inflammation, supports immune function, interacts with opioid receptors for pain relief. A study found that *Terminalia Arjuna* bark powder effectively reduces inflammation. A rat with swollen paws (due to carrageenan) were given the powder of arjuna resulting in that significantly decrease in inflammation reduced swelling relief from pain [21].

2) Cardio-protective activity:

Scientists studied the protective effects of *Terminalia arjuna* bark powder when taken for 12 weeks prior to a simulated heart attack or stroke. *Terminalia arjuna* bark supplements enhanced the heart's natural defenses and activated protective proteins in rabbits, safeguarding against heart damage from reduced blood flow.

3) Anti-asthmatic activity:

Terminalia Arjuna Fights asthma and allergic reactions. When mast cells are disrupted, they release histamine and acetylcholine leading to asthma and allergic reactions. Research shows that *Terminalia Arjuna* stabilizes mast cells preventing histamine release counters histamine and acetylcholine effects provides anti-asthmatic and anti-allergic protection [22]. The studies found that *Terminalia Arjuna* extract offered 28-40% protection against histamine-induced bronchoconstriction and also provided 25-35% protection against acetylcholine-induced bronchoconstriction. *Terminalia Arjuna's* natural compounds particularly arjunolic acid, demonstrate significant potential in managing asthma, allergic rhinitis and COPD (Chronic Obstructive Pulmonary Disease) respiratory infections [23].

4) Anticarcinogenic activity:

Terminalia arjuna's aqueous extract has been found to strengthen heart function by enhancing sarcoplasmic reticular performance. This leads to improved heart rhythm, reduced risk of arrhythmias (irregular heartbeats).

5) Antihyperlipidemic and antiatherogenic activity:

Terminalia Arjuna benefits heart health by reducing bad cholesterol, triglycerides and inflammation. It also increases good cholesterol and improves liver function. The studies shows that 15-16% drop in bad cholesterol, 11-15% drop

in total cholesterol and 11% drop in triglycerides. Its also increased good cholesterol *T. Arjuna* also help to manage coronary artery disease, high cholesterol, and diabetic heart conditions. It is effective when taken in doses of 500mg twice daily, together with standard care [24].

DNA protection:

Terminalia Arjuna's bark extract has been found to safeguard DNA against hydrogen peroxide-induced damage, highlighting its antioxidant properties. Terminalia Arjuna's compounds shield DNA from toxic damage. Studies show that pre-treating cells with Arjuna bark extract before exposure to the chemotherapy drug Adriamycin significantly reduces DNA damage, demonstrated by fewer micronuclei formations. This protective effect safeguards DNA integrity against harmful toxins [25].

6) Anti-acne activity:

A natural acne cream made with Terminalia arjuna extracts offers a non-toxic, safe and effective solution for acne-prone skin. This herbal cream encourages consistent use and patient compliance due to its gentle and reliable nature. By utilizing *Terminalia arjuna* extracts, this cream provides a highly acceptable alternative to harsh chemical-based treatments making it an attractive option for those seeking a natural and effective skincare solution [26].

7) Antiviral activity:

Terminalia Arjuna Fight against Herpes simplex virus. Researchers found that casuarinin, a compound extracted from *Terminalia Arjuna* bark, effectively fights Herpes simplex Type 2 virus in lab tests. It Prevents viral attachment and entry blocks infection at late stages demonstrates potent antiviral properties. This natural extract holds promise for developing new treatments against Herpes simplex virus [27].

8) Wound Healing activity:

The bark of *Terminalia Arjuna* has been revered for its healing properties. This are mention in ancient texts like Sushrutsamamhita. Research confirms its accelerated wound healing, enhanced tissue regeneration and effective bone and muscle repair. Studies demonstrate hydroalcoholic bark extract promotes complete epithelialization in rat dermal wounds and tannins outperform saponins in wound healing, triterpenoids aid bone and muscle tissue regeneration in frogs. Traditional healers in India's Orissa and Eastern Ghat regions have long used *Terminalia Arjuna* bark paste to treat fractured bones in humans and animals to promote faster recovery. *Terminalia Arjuna's* bark is a natural, effective remedy for various healing applications [28].

HEALTH BENEFITS OF ARJUNA TREE

In Ayurvedic medicine, *Arjuna* Bark is famous for its cardiovascular benefits, serving as a natural heart tonic and treatment for various heart conditions. However, its uses extend far beyond heart health. Recent research has explored *Arjuna's* potential in managing ulcers, diabetes and cancer. The bark of the *Arjuna* tree offers numerous health benefits including:

Atherosclerosis:

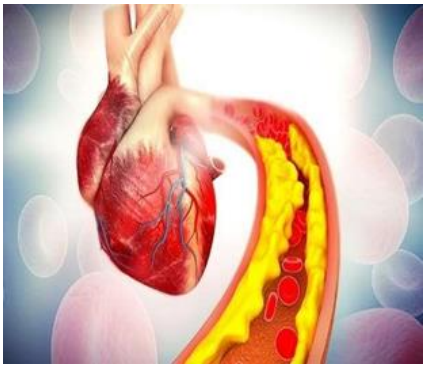


Figure 3: Atherosclerosis

Terminalia Arjuna has been found to have a significant impact on heart health. Its anti-inflammatory and antioxidant properties work to

reduce low-grade inflammation in blood vessels, while its anti-hyperlipidemic action lowers total cholesterol, LDL cholesterol, VLDL total cholesterol, and triglycerides. This results in a decreased atherogenic index, significantly reducing the risk of heart disease. Research on rabbits has shown that Arjuna bark can even reverse existing artery damage by reducing atherosclerotic lesions. With its natural ability to prevent artery hardening and stop disease progression. Arjuna bark is a valuable tool in the fight against heart disease [29].

1. **Heart failure:**

Figure 4: Heart failure

Terminalia Arjuna has been shown to mitigate symptoms of heart failure, significantly improving cardiac function and overall well-being. By enhancing left ventricular efficiency, boosting exercise performance and endurance and increasing cardiac output and contractility of *Arjuna* bark extract demonstrates its therapeutic potential. Research on rats revealed that this natural remedy prevents and reverses cardiac dysfunction, aids recovery from myocardial injury in congestive heart failure and exhibits potent antioxidant properties by inhibiting lipid peroxidation. Notably, *Arjuna* bark's efficacy was comparable to Fluvastatin, a conventional medication, underscoring its promise as a complementary treatment for heart health [30].

2. **Cardiovascular Health**

Figure 5: Cardiovascular Health

Terminalia Arjuna is a natural powerhouse for heart health, specifically enhancing left ventricular function and strengthening cardiac muscles. Its cardio-protective properties safeguard optimal heart function, accelerate recovery from cardiac damage, and prevent myocardial infarction (heart attack). *Arjuna's* anti-atherogenic properties reduce plaque buildup in coronary arteries, improving blood flow to the heart. In Ayurvedic medicine, Arjuna is recommended for preventing heart disease in individuals with diabetes and hypertension, offering a holistic approach to cardiovascular wellness [31].

3. **Advancement in Angina/ myocardial infaraction:**

Studies on *Arjuna* bark powder showed promising results in treating heart conditions of reduced angina frequency by 50% in stable angina patients and improved exercise tolerance and decreased need for nitrate medications, lowered blood pressure, cholesterol, and cortisol levels and also inhanced heart function (left ventricular ejection fraction) and good cholesterol (HDL). Comparative studies found *Arjuna* to be as effective as medication (isosorbide mononitrate) in reducing angina symptoms and better tolerated with fewer side effects. These findings suggest *Arjuna* is beneficial for patients with stable angina, but has limited impact on unstable angina [32-34].

4. **Bone Fracture:**

Figure 6: Bone Fracture

In Ayurvedic practice, *Arjuna* Bark is used to support bone fracture recovery. To promote healing a paste made from the bark and water is applied to the affected area after alignment twice daily. Additionally, take 3-4 grams of *Arjuna* bark powder mixed with 2 grams of cissus quadrangularis, Cow's Ghee and natural sugar (Desi Khand) twice a daily. This traditional remedy is believed to accelerate the body's natural healing process, enhancing fracture recovery.

5. Effect on Thrombosis:

A recent study examined *Arjuna*, a medicinal plant from bangladesh, for its potential to prevent blood clotting and damage. The results showed that *Arjuna* extracts had high thrombolytic activity (30.57%) and also reduced red blood cell damage and showed modest blood clot prevention further research is needed to understand the specific compounds responsible. Additionally, studies suggest *Arjuna* extracts may also affect liver enzymes, specifically suppressing CYP1A activity [35].

6. Effect on aortic prostaglandins:

A comprehensive 90-day investigation on rabbits demonstrated the remarkable efficacy of *Terminalia Arjuna* bark powder in promoting heart health. It has been significantly increasing prostaglandin E2 levels and also enhancing blood vessel relaxation and reducing inflammation, improved blood flow, boosting oxygenation and nutrient delivery to vital organs and enhanced heart functioning. This natural remedy demonstrates potential in supporting cardiovascular well-being [36].

7. Effect on Endothelin 1 level:

Research shows *Terminalia Arjuna* reverses diabetic heart damage. In a study, rats with diabetic heart disease received a daily oral dose of *Terminalia Arjuna* extract (500mg/kg) for 30 days. Results shows that it is improved vascular function, reduced blood levels of ET-1 (a harmful protein), decreased inflammation, increased heart protection. *Terminalia Arjuna* effectively counteracted diabetic heart damage, bringing key biomarkers closer to normal levels. This natural remedy holds promise for treating diabetic cardiomyopathy and promoting heart health [37].

MEDICINAL ETHANOBOTANY:

Terminalia Arjuna a time-tested ayurvedic remedy for over 1,000 years, *Terminalia Arjuna* has been a cornerstone of Indian Ayurvedic Medicine. Its bark is prized for its cardioprotective properties, treating angina, hypertension and artery blockages and wound- healing and anti-inflammatory effects relief from ulcers, diarrhea, cough, asthma and skin disorders. Its also useful for diabetes, anemia, and urinary issues. Traditionally, *Terminalia Arjuna* is prepared as a milk decoction (Kvatha) for heart health and alcoholic decoction with clarified butter and milk for chest pain. Ayurvedic texts like Charak Samhita. Astang Hridayam, Chakradutta and Bhava Mishra have documented its uses. Highlighting its sweet, acrid, cooling and heating properties like aphrodisiac, expectorant, tonic, styptic, antidysenteric, purgative and laxative effects. *Terminalia Arjuna's* bark powder is also used as an astringent and diuretic, demonstrating its versatility in promoting overall well-being [38-41].

OTHER MEDICINAL USES:

- As a powerful antioxidant *Terminalia Arjuna* slows down aging, keeping you looking and feeling younger.
- *Terminalia Arjuna* offers relief from TB-related coughs by reducing hemoptysis (coughing up blood) and promoting healing of lung blood vessels.
- Arjuna supports urinary health by maintaining normal urine flow and relieving painful urination.
- *Terminalia Arjuna's* bark powder exhibits diuretic activity providing relief from cirrhosis symptoms and supporting liver function.
- Arjuna bark powder provides natural relief from gonorrhea and spermatorrhea symptoms, arjuna's traditional use includes treating gonorrhea and spermatorrhea for improved reproductive health.
- *Terminalia Arjuna's* bark powder addresses asthma and acne naturally and breath easier with a warm infusion and achieve radiant skin with a soothing honey paste.
- *Arjuna* bark paste is traditionally applied to aid in bone healing for fractures. This natural remedy supports the recovery process by promoting bone regeneration, reducing inflammation and stabilizing the affected area.
- *Terminalia Arjuna* has natural properties reduce coughing up blood and promote lung health, easing symptoms of tuberculosis.
- *Arjuna* serves as a natural diuretic, helping eliminate small kidney stones and its bark can be boiled in water and consumed as a tea which has been breaks down kidney stones into smaller fragments and facilitates their expulsion from the body.
- *Terminalia Arjuna* reverses damage caused by chronic smoking and smoking leads to endothelial dysfunction an early sign of atherosclerosis primarily through oxidative stress. fortunately, two weeks of therapy with this medicinal herb repairs impaired endothelial function and reverses oxidative stress damage.
- The juice extracted from *Arjuna* leaves provides natural relief from earaches (otalgia) and this traditional remedy soothes ear discomfort and also reduces inflammation and alleviates pain.
- *Arjuna* leaves have been traditionally used to treat external ulcers and sores, promoting faster healing and infection prevention [42-44].

RELAVANT IMPACTS

1. **Pregnancy**: Pregnant women should avoid using *Terminalia Arjuna* as its safety during pregnancy is uncertain. To be cautious, it's also recommended to steer clear of other Terminalia species, as their effects on pregnancy are unknown.
2. **Bleeding problems:** If you have a bleeding disorder consuming *Terminalia Arjuna* may increase your risk of bruising and bleeding. This herb slows down blood clotting, making existing bleeding conditions worse.
3. **Breast-feeding**: Since there's limited research on using *Terminalia* while breastfeeding, it's recommended to choose safety on the side of caution and avoid consuming it. This ensures the safety and well-being of both mother and baby.
4. **Diabetes:** *Terminalia* is recognized for its ability to reduce blood sugar levels, making it a potential natural remedy for managing blood glucose.
5. **Surgery:** *Terminalia* use may increase surgical risks due to blood thinning and blood sugar fluctuations. Stop taking it two weeks before your operation. For safe surgery, avoid Terminalia for two weeks to prevent bleeding and blood sugar complications [45].

APPLICATIONS OF ARJUNA TERMINALIA

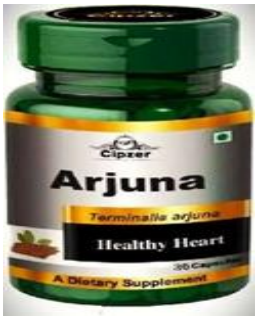
Arjuna Terminalis, commonly known as the *Arjuna* tree, is a valuable medicinal plant used extensively in Ayurvedic medicine. Its bark in particular is rich in bioactive compounds that offer various health benefits. Here are some of its primary applications.

Cardiovascular Health:

Heart Strengthening: *Arjuna* bark is believed to strengthen the heart muscle, improving its overall function.
Blood Pressure Regulation: It has been used to manage high blood pressure.
Cholesterol Reduction: Some studies suggest that *Arjuna* may help lower cholesterol levels.
Anti-Atherosclerotic Effects: It could potentially reduce the risk of atherosclerosis a condition where plaque builds up in the arteries.
Other Potential Applications
Anti-Inflammatory Properties: *Arjuna* has shown anti-inflammatory activity, which might be beneficial for conditions like arthritis.
Antioxidant Effects: It contains antioxidants that can help protect cells from damage.
Anti-Diabetic Properties: Some research suggests that *Arjuna* might have potential benefits for managing diabetes.
Skin Health: Topical applications of *Arjuna* extracts have been used for skin conditions like acne and inflammation. Source [46].

FORMULATIONS AVAILABLE IN THE MARKET:

Arjuna Heart Capsules

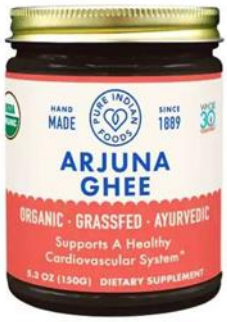


Himalaya Herbal Arjuna Tablet

Arjuna Powder

Planet Ayurveda Arjuna Tea

Terminalia Arjuna Liquid Dilution



Arjuna Ghee

CONCLUSION:

Arjuna, a natural health remedy, offers numerous benefits with virtually no side effects, making it safe for most people. The best part of research is that its potentially treating various common diseases. This natural wonder has been studied for its antioxidant properties, blood sugar control, cholesterol reduction, heart protection, bone fracture, immune system support, liver health, pain relief and Inflammation reduction. *Arjuna's* versatility and safety make it an attractive natural solution for overall well-being. The efficacy of Terminalia arjuna has been proved by its scientific evaluation of many bioactive ingredients like glycosides, flavonoids, tannins, and minerals and their cardioprotective, antioxidant, anti-inflammatory, antimicrobial, antitumor activity, antiasthmatic activity, antiacne activity.

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