



## Review: Beneficial Effect Of Bark Extract Of *Terminalia Arjuna* On Human Heart

Anwasha Samanta<sup>1</sup>, Rabishankar Taladhi<sup>2</sup>, Papon Mondal, Sayed Golam Tanbir<sup>3</sup>, Mijanur Rahaman<sup>4</sup>, Saumadip Fadikar<sup>5</sup>, Manojit Bysack<sup>6\*</sup>

<sup>1,2,3,4,5</sup>Department of Medical Laboratory Technology, School of Allied Health Sciences, Swami Vivekananda University, Telinipara, Barasat-Barrackpore Rd, Bara Kanthalia, West Bengal - 700121, India.

<sup>6\*</sup>Department of Medical Laboratory Technology, School of Allied Health Sciences, Swami Vivekananda University, Telinipara, Barasat-Barrackpore Rd, Bara Kanthalia, West Bengal - 700121, India.

E-mail: [bysackmanojit@gmail.com](mailto:bysackmanojit@gmail.com)

**\*Corresponding author:** Manojit Bysack

<sup>\*</sup>Department of Medical Laboratory Technology, School of Allied Health Sciences, Swami Vivekananda University, Telinipara, Barasat-Barrackpore Rd, Bara Kanthalia, West Bengal - 700121, India.

E-mail: [bysackmanojit@gmail.com](mailto:bysackmanojit@gmail.com)

### Abstract

One of the greatest agents for cardioprotection is *Terminalia arjuna*. Arjuna has long been regarded as the go-to plant for treating a variety of heart-related issues. It works wonders for nourishing the heart and its muscles. It is highly beneficial for the cardiac muscles' normal contraction and relaxation. Maintaining a healthy heartbeat is another benefit. Additionally, it helps to increase blood density and is particularly effective in constricting blood capillaries, which is crucial for the heart's normal function. It is also useful for widening blood vessels, works wonders for clotting blood in the event of an injury, and is generally necessary to keep blood at the right thickness. This really aids in stimulating the heart to function at its peak efficiency. This coagulation property is achieved because it has an astringent taste, or kshaya rasa. According to a study, a 70% alcoholic extract of *Terminalia arjuna* caused peripheral hypotension, corroborating the plant's traditional use in traditional cardiovascular medicine. Adrenergic  $\beta$  2-receptor agonistic or direct action on the heart may be the cause of the observed effect. Comprehensive research on the active ingredients is required, as this could yield fresh perspectives on cardiovascular medications. According to a 1988 study in the Journal of Research in Education in Indian Medicine, arjuna possesses diuretic, cardio tonic, and antihypertensive qualities. The International Journal of Crude Drug Research has released information on the hypolipidaemic characteristic. It has been demonstrated to raise HDL levels. That's what the Indian Medical Gazette (1992) said. Patients with angina who take a 500 mg dose of Arjuna Bark extract along with other medications for three months report significant improvements in their treadmill test and exercise tolerance with no negative side effects. Arjuna has coenzyme Q10 as well. Patients with heart conditions are prescribed this Coenzyme Q10 in order to prevent heart attacks. Its combination effects—such as the hypolipidemic effect and dosage-dependent

<b>CC License</b> <b>CC-BY-NC-SA 4.0</b>	reductions in blood pressure and heart rate—were responsible for its beneficial cardiovascular effect.  <b>Keywords:</b> <i>Anti-atherogenic agent, Anti-oxidant, Cardioprotective, Contraction and Relaxation</i>
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## Introduction

One of the greatest agents for cardioprotection is *Terminalia arjuna*. Arjuna has long been regarded as the go-to plant for treating a variety of heart-related issues. It works wonders for nourishing the heart and its muscles. Regarding Ayurveda, nearly every illness can be cured by using one of the hundreds of herbs that Mother Nature has to offer. An ancient Ayurvedic herbal remedy known as arjunkichaal powder has been used for thousands of years to treat a wide range of illnesses at their source. It is constructed with the premium Arjun tree bark. The most common name for it is a heart tonic due to its cardio-protective qualities. Everyone is aware of the significance of exercise, a balanced diet, and good health. However, for lack of time or for other reasons, the majority of individuals don't incorporate yoga into their daily routine. The numerous health advantages of Arjun chaal powder make it a blessing for our bodies. It increases the body's metabolism and gives it all the vital nutrients it needs to perform at its best.

Kingdom Profile of Plants: Plante: Magnoliophyte Division

Magnoliopsida class

Family: Combretaceae Order: Myrtales

*Terminalia* is the Genus.

*T. arjuna* is the species.

Name in Zoology: *Terminalia arjuna*

## Review of Literature

1) Plant description: The huge deciduous tree is called Arjuna. The Arjuna tree can grow to a height of 100 feet. It's the evergreen tree with conical leaves and yellow blossoms. The bark has a smooth gray color. A fruit's length is 2.5–3.5 cm. Five hard wings, striate with five hard wings, and fibrous, woody, and glabrous. Its branches hang words from a broad, spreading crown that is supported by a buttressed trunk. Its leaves are light brown underneath and dull green above. Arjuna fruits are ripe from September to November, while flowers are visible from March to June [8].

2) Habitate: The Arjuna tree, which reaches a height of 60 to 80 feet, is found in the indo-sub-himalayan regions of Uttar Pradesh, Southern, Bihar, Chota Nagpur, Burma, Madhya Pradesh, Delhi, and the Deccan region. It is found alongside rivers, streams, and day water sources. It can also be found in the forests of Mauritius and Sri Lanka [1]. Although it grows practically anywhere, its preferred growing conditions are red laterltie soils and wet, fertile loams. It can withstand a few weeks of partial submersion. Arjuna is grown from seeds, which germinate 50–70 days after planting [2].

3) Bark of *Terminalia arjuna*: Microscopic analysis of the mature bark revealed that it is composed of 9–10 layers of 2–4 cell thick, tangentially elongated cells. There are phelloderm and pheellogen, which are made up of tangentially elongated cells. The ecratenchyma, phloem parenchyma, phloem bibbers, and crystal fibers containing rosettle crystals of calcium oxalate comprise the wide phloem. The old dark contains secondary phloem and periderm [3].

4) Benefit of bark of arjuna: Arjuna has been shown to help with angina, or chest pain. According to studies, arjuna bark significantly reduces chest discomfort by lowering cortisol levels, or the stress hormone. In patients with stable angina, arjuna also lowers blood pressure, raises exercise tolerance, and raises HDL levels [4] and [5].

5) Arjuna's Flowers: According to Indian mythology, Arjuna is a big, evergreen tree with drooping branches and a spreading crown. Reachs a maximum height of 25 meters, with smooth and gray bark. The leaves are oblong or elliptic oblong, sub-opposite, and measure 5–14×2–4–5 cm. Small white flowers grow in long, dangling racemes. Fruit contains five hard wings that are striped with many curved veins and measures 2.3–3.5 cm in length. It is fibrous, woody, and hairless. In India, the tree flowers between April and July.

## Phytochemical Analysis

The test sample's phytochemical analysis was performed using accepted techniques.

1) SALKOUSKU'S PHYTOSTEROL REACTION TEST: Add 1 ml of concentrated (Conc) chloroform extract to 0.5 ml of the extract in a test tube. H<sub>2</sub>SO<sub>4</sub> from the test tube locations. Physical manifestation of

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phytosterols.

2) **LIBERMANN BURCHARB'S TEST FOR TRITERPENOIDS:** A few drops of acetic anhydride were added to the extract, which was then boiled and cooled. After adding concentrated sulfuric acid from the test tube's sides, a brown ring appeared at the intersection of two layers, and the creation of a deep red color suggested the existence of triterpenoids.

3) **SAPONINE FOAM TEST:** A small amount of extract was added to a test tube along with a small amount of water, and the test tube was shaken vigorously. Foam appearance that lasted for ten minutes indicated the presence of saponins.

4) **LEGAL'S TEST FOR LACTONES:** Add sodium nitro prusside pyridine to the extract mixtures. After that, NaOH was used to treat the combination. The presence of lactones was suggested by the vivid red color. [6].

### **Probable Mode of Mechanism**

According to the study, an aqueous bark extract of *Terminalia arjuna* can significantly protect against adrenaline-induced oxidative stress-mediated cardiac injury in a mammalian model. In addition to the extract's own protective properties, antioxidant mechanisms appear to be responsible for this protection [9][10]. Bark extract's complex antioxidant components may play a role in its potential therapeutic value as a cardio-protective mechanism, which will undoubtedly impact both human and socioeconomic wellbeing [17][19].

Apart from that, the main advantage of *Terminalia* appears to be enhanced cardiac muscle function and consequently enhanced heart pumping activity. The inotropic action of *Terminalia* is assumed to be caused by the saponin glycosides, whereas the flavonoids and OPCs provide vascular strengthening and antioxidant activity against free radicals [15]. Dogs receiving intravenous *Terminalia* showed a dose-dependent drop in blood pressure and heart rate. Two novel cardenolide cardiac glycosides were recently extracted from *Terminalia*'s seed and root [11][12]. By raising intracellular calcium and sodium levels, these cardenolides primarily function to strengthen cardiac contraction force [13][14]. A wide range of pharmacological properties are exhibited by *T. arjuna*, such as anti-oxidant, anti-inflammatory, hepatoprotective, anti-carcinogenic, and anti-mutagenic properties [18][21][16][22]. It also acts as a urinary tract toner, reduces tension, and decreases blood pressure [23]. In Ayurvedic medicine, *T. arjuna* is also mentioned as a heart tonic [24][25][26].

### **Conclusion**

The ongoing fascination with medicinal plants has resulted in the identification of *Arjuna*'s novel chemical composition and pharmacological properties. Many experimental and clinical research have adequately established its efficacy as an anti-chemicagent, a strong antioxidant, and an anti-atherogenic agent. It is necessary to look into its precise function in primary or secondary coronary prevention. Furthermore, research is required to determine how *arjuna* affects CYP450 enzymes and how it interacts with other medications like as aspirin, statin, ACE inhibitors, and  $\beta$ -blockers. Raising knowledge about its medical application can help doctors better address the difficulties associated with treating cardiovascular illnesses. Additionally, it will be a breakthrough in the socioeconomic welfare of future generations as a manner of treatment for patients with CVS who do not currently have any intervention methods.

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### **Conflict of interest**

All authors declare that there are no conflicts of interest.

### **Data availability statement**

No data was used for the research described in the article.

**Author's contribution**

ManojitBysack (MB) participated in the conception of the study.SaumadipFadikar (SF), MijanurRahaman (MR), PaponMondal (PM) and SayedGolamTanbir (SGT)participated in literature searches and extraction.RabishankarTaladhi (RT)andAnweshSamanta (AS) wrote the manuscript for submission to this journal.

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