



## The Cardiotoxic Effect of Arjunolic Acid from *Terminalia Arjuna*

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### ABSTRACT –

The bark of *Terminalia arjuna* is used in treatment of various heart diseases. It acts as a cardiotoxic. Cardiotoxic are the drug that provide a strength and energy to the heart. The cardiotoxic increase the contraction of cardiac muscle and stimulate the overall activity of heart. *Terminalia arjuna* is evergreen plant which is used in cardiovascular disorders. The arjunolic acid exhibits a cardiotoxic effect. The various phytoconstituents like triterpenoids, glycosides, tannins, flavonoids extracted from bark of *Terminalia arjuna*. This phytoconstituents treat heart disease. The therapeutic properties related to heart is due to a triterpenoids present in *arjuna* plant. *Terminalia arjuna* belongs to family Combretaceae. This review provides a pharmacological profile, uses, mechanism of arjunolic acid. Arjunolic acid is used as antioxidant, antimicrobial, antibacterial, antifungal wound healing activity. TLC densitometric method for quantification of triterpenoids acid in *Terminalia arjuna* bark is arjunolic acid using HPTLC. It is used to strengthen heart muscles and cardiac ailments. It is used to decrease blood pressure.

**Key words** – *Terminalia arjuna*, Arjunolic acid, cardiotoxic effect, cardioprotective effect Triterpenoids

### 1. Introduction –

*Terminalia arjuna* is an important medicinal plant that has been used in Indian System of medicines in cardiac ailments [1]. *Terminalia arjuna* is one of the herbal products that has been used as traditional remedy for the treatment of cardiovascular disease [2]. *Terminalia arjuna* belongs to family Combretaceae [3]. The major phytoconstituents of *Terminalia arjuna* are Arjunic acid, Arjunolic acid, arjunone, arjungenin, arjunolone, gallic acid, ellagic acid, luteolin [3]. The oleanane triterpenoids i.e. arjunic acid, arjunolic acid, arjunone etc. are present in *Terminalia arjuna* plant are responsible for cardioprotective effect [4]. *Terminalia arjuna* are useful in obesity, hyperglycemia, hypertension [5]. It possesses antilipidemic, anti-inflammatory, antinociceptive and immunomodulatory, antioxidant activity [6].

### Arjunolic acid –

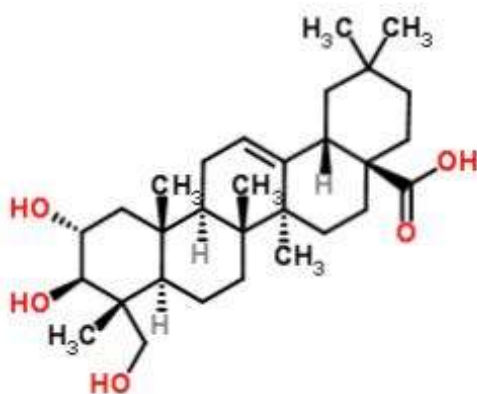


Fig1- structure of arjunolic acid

Arjunolic acid is a chiral pentacyclic triterpenoid saponin which is isolated from *Terminalia arjuna* [7]. Arjunolic acid is a major extracted bioactive compound present in the wood and bark [8]. Arjunolic acid protects cells from metal-induced toxicity and possesses anti-inflammatory, antidiabetic,

antimicrobial, antitumor activity [6]. Arjunolic acid is used as cardiac tonic in Ayurvedic medicines for centuries and it is a first isolated from *Terminalia arjuna* plant [6].

### 1.1) Taxonomical classification of *Terminalia arjuna*

Kingdom – Plantae

Division – Magnoliophyta

Class- Magnoliopsida

Order- Myrtales

Family – Combretaceae

Genus – Terminalia

Species – Terminalia arjuna

Common name – Arjuna



Fig 2 – Arjuna tree

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## 2. Material and method –

### 2.1) Collection of bark sample –

The bark of *Terminalia arjuna* was collected locally. A bark patch 10 cm × 10 cm was sustainably removed from tree terminalia arjuna . The bark was washed with distilled water. The bark patches was cut into a small pieces and dried in a shade [8]. The plant material was free from adulterated material and debris and grinded to coarse powder with help of grinder [9].



## 2.2 Method of Extraction –

The extraction of arjunolic acid, 1g of stem bark powder was extracted with 20mL water under reflux for 2hr , cooled. The mixture was taken in a separating funnel and extracted with 75ml of mixture of chloroform (1) : diethyl ether (2) . The fraction was collected and dried over sodium sulphate. The aqueous layer was extracted with a mixture of chloroform (1) : diethyl ether (2) and process repeated 2 times.

The combined mixture was evaporated and residue was dissolved in methanol and make up the volume up to 25ml in a volumetric flask [10].

## 3. Formulation of emulsion –

### 3.1) Emulsion –

Emulsion is a biphasic liquid preparation of two immiscible liquids in which one is dispersed as a minute globule into another. Two immiscible liquids cannot dispersed for long time, so emulsifying agent is added.

Emulsion provide a protection against drug which are prone to oxidation [11].

#### Ingredient are used in preparation of emulsion –

Type of oil	Ratio	Ratio of quantity
1.	Oil : Water : Gum	4 : 2 : 1
2.	Oil : Water : Gum	60 : 30 : 10

Table 1 – Ingredient with quantity

### 3.2) Preparation of Emulsion –

The small scale emulsion was prepared by *Dry Gum method* .

1. Measure a required quantity of oil in a dry measur and transfer it into a mortal and paste [11].
2. Add calculated quantity of gum acasia into mortal and triturate rapidly to from a uniform mixture [11].
3. Add some quantity of water and triturate till clicking sound is produced, product become white due to reflection of light. The emulsion produced, called as a *primary emulsion* [11].
4. Add some water for required volume [11].

## 4. Mechanism of action -

Terminalia arjuna improve the cardiac function and pumping activity of heart [12]. The arjuna possesses the coenzyme Q which are useful in cardiac patients for prevention of heart attack [13]. Arjuna is act as best coagulant [12]. In myocardial infarction that induced by isoprenaline, Terminalia arjuna produced vasodilation and hypotension like PGE2 [14]. The cardioprotective effect of arjunolic acid is attributes the protective effect against damage causes by myocardial necrosis [[6]. Experiment on animals showed an increase in coronary blood flow that increased the force of contraction that results in decreasing in blood pressure with bradycardia with accordance with dose taken [14].

## 5. Uses –

1. It is used as a cardiogenic [15].
2. Terminalia arjuna is helpful in nourishing a heart muscles that maintenance of proper heartbeat contraction and relaxation of heart muscle [12].
3. Terminalia arjuna helpful in dilation of blood vessels and coagulation of blood in case of injury and maintaining of proper thickness of blood [13].
4. Arjuna useful in removing a blockage in arteries [15].

## 6. Discussion –

In above article the cardiogenic effect from Terminalia Arjuna is discussed. The uses of Terminalia Arjuna are discussed above. The method of extraction of Arjuna is been studied. The arjunolic acid was extracted from bark of arjuna and it shows cardiogenic effect is discussed. The formulation of emulsion from extracted essential oil is been studied. The ingredients used are fixed oil ie. Methanolic extract of bark powder, water and emulsifying agent.

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## 7. Conclusion –

The cardiotoxic effect of Terminalia Arjuna was investigated in this work. The uses of Terminalia Arjuna are discussed and the formulation of emulsion is done. The mechanism of action and effect of Arjuna is discussed. The extraction of essential oils is done and thus the formulation of emulsion is done. The various activities shown by terminalia Arjuna are been discussed. The formula and structure of Arjunolic acid is studied.

## Author Contribution -

Both the author involved equally in collecting the information, ddesigning the manuscript.

## Conflict of Interest –

The author declare no conflict of interest.

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