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REVIEW ON: CARDIOPROTECTIVE PLANT: ARJUNA

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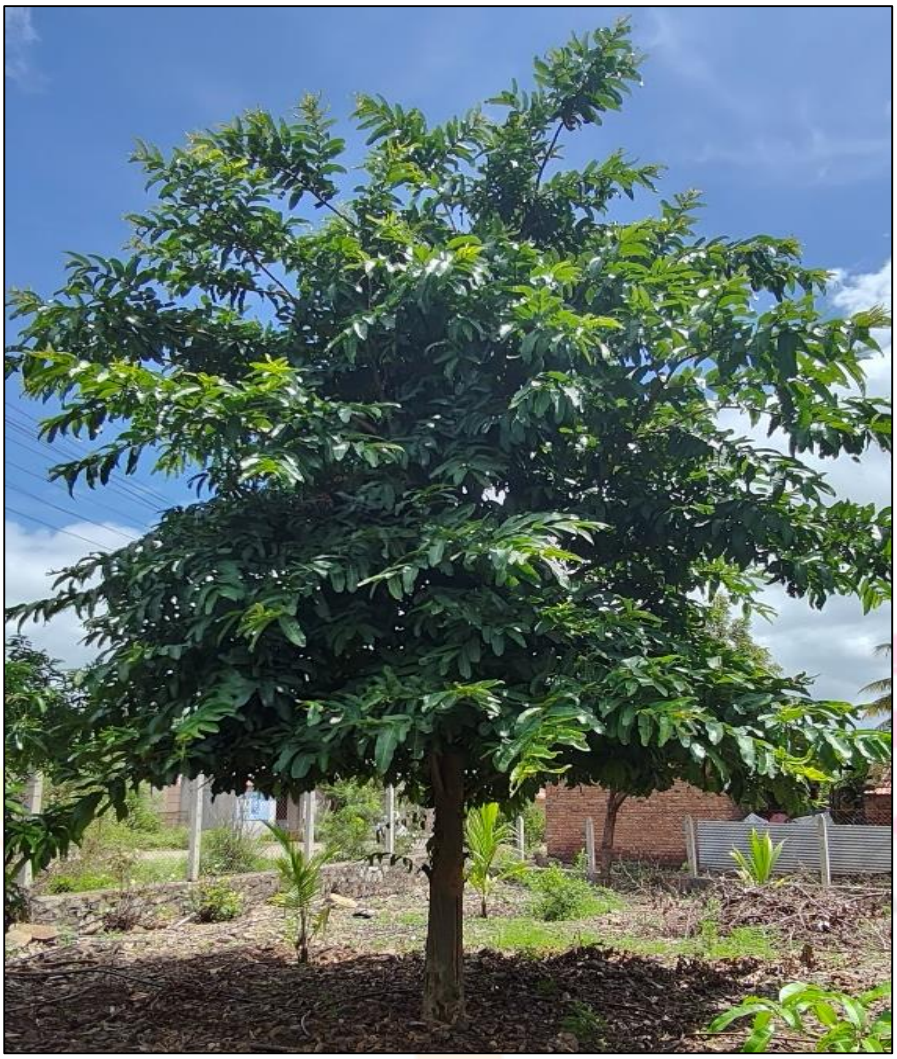
Abstract:
The medicinal plant Terminalia arjuna has been used since ancient times to treat various ailments and diseases. The main purpose of this review is to investigate the pharmacological properties of the indigenous plant Terminalia arjuna. Medicinal plants have be en considered as an important source of medicine for human diseases as they are healthier than synthetic products. Arjuna was intr oduced to Ayurveda by Vagbhata as a treatment for heart disease. It is always made in milk decoction. The plant has been known for thousands of years in the ancient Indian Vedas, and Vagbhata says that Arjuna could use it topically to heal wounds, bleeding, and ulcers. The plant is diverse and a rich source of bioactive compounds, many of which remain undiscovered. The bark is impor tant in Ayurveda and allopathic medicine for treating a variety of ailments. Arjuna has many benefits, and what makes this health food even better is that it has almost no side effects. It is safe for most people to consume, except for a few exceptions.

Keywords: Terminalia arjuna, pharmacological activity, health benefits

I. INTRODUCTION

In ancient India, herbs were used to prevent many serious diseases. The plant kingdom is the main source of herbs. In fact, in rece nt years, people have become more aware of the importance of herbs. In general, herbs are plants that are easily available, safe, ch eap, effective, and have few side effects. According to the World Health Organization, herbs will be the best way to get many med icines. Medicinal plants contain some organic compounds that have some effect on the human body. These chemicals include tann ins, alkaloids, carbohydrates, terpenes, steroids, flavonoids, and phenols. The Terminalia tree, commonly known as Arjuna, Koha, Kahua, Arjan, White Marudah, White Murdh, Arjuna Myrobalan, Orjun, Yerra madde, Sadada, and Sadaru, is a tree belonging to t he Terminalia genus of the Genelaceae family. It is a deciduous riparian tree native to India, but is also found in Pakistan, Sri Lan ka, Myanmar, and other Asian countries. The name Terminalia is derived from the Latin word "terminus" meaning "terminalis" or "end". In other words, it refers to the plant's habit of dropping its leaves at the ends of its branches.

The name "Arjuna" is also very well described in the ancient Indian texts called Rig Veda and Atharva Veda. Here it is called "wh ite" or "bright" or perhaps the brightness of his skin (Chaal). Terminalia has been used in the Ayurvedic traditional medicine syste m since the seventh century. All parts of the plant are usually used as a milk decoction. Ayurvedic doctors often use Terminalia to treat blood and cardiovascular problems. The leaves of this tree are fed by the Cecropia moth, which produces Tussah, a commerc ially important wild animal. The tree is also planted to provide shade, especially in coffee plantations. This plant is reported to con tain triterpenoids (adjunolic acid, ajunolic acid, adunin, terminator acid, etc.), glycosides, flavonoids (adjunone, ajunone, etc.), tan nins (Casuarin, gallic acid, pyrocatechol, etc.), βsitosterol, minerals (calcium, magnesium, zinc, copper, etc.). It has many medicin al properties such as antibiotics, antibiotics, antibiotics, antibiotics, antibiotics, antibiotics, antibiotics, insecticides, disinfectants, d isinfectants, disinfectants, etc.



II. DESCRIPTION

- 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).

III. PLANT PROFILE

- Kingdom: Plantae – Plants
- Subkingdom: Tracheobionta - Vascular plants
- Subkingdom: Spermatophyta- Seed plants
- Division: Magnoliophyta - Flowering plants
- Class: Magnoliopsida – Dicotyledons
- Subclass: Rosidae
- Order: Myrtale
- Family: Combretaceae
- Genus: Terminalia L.
- Species: Arjuna

Leaves

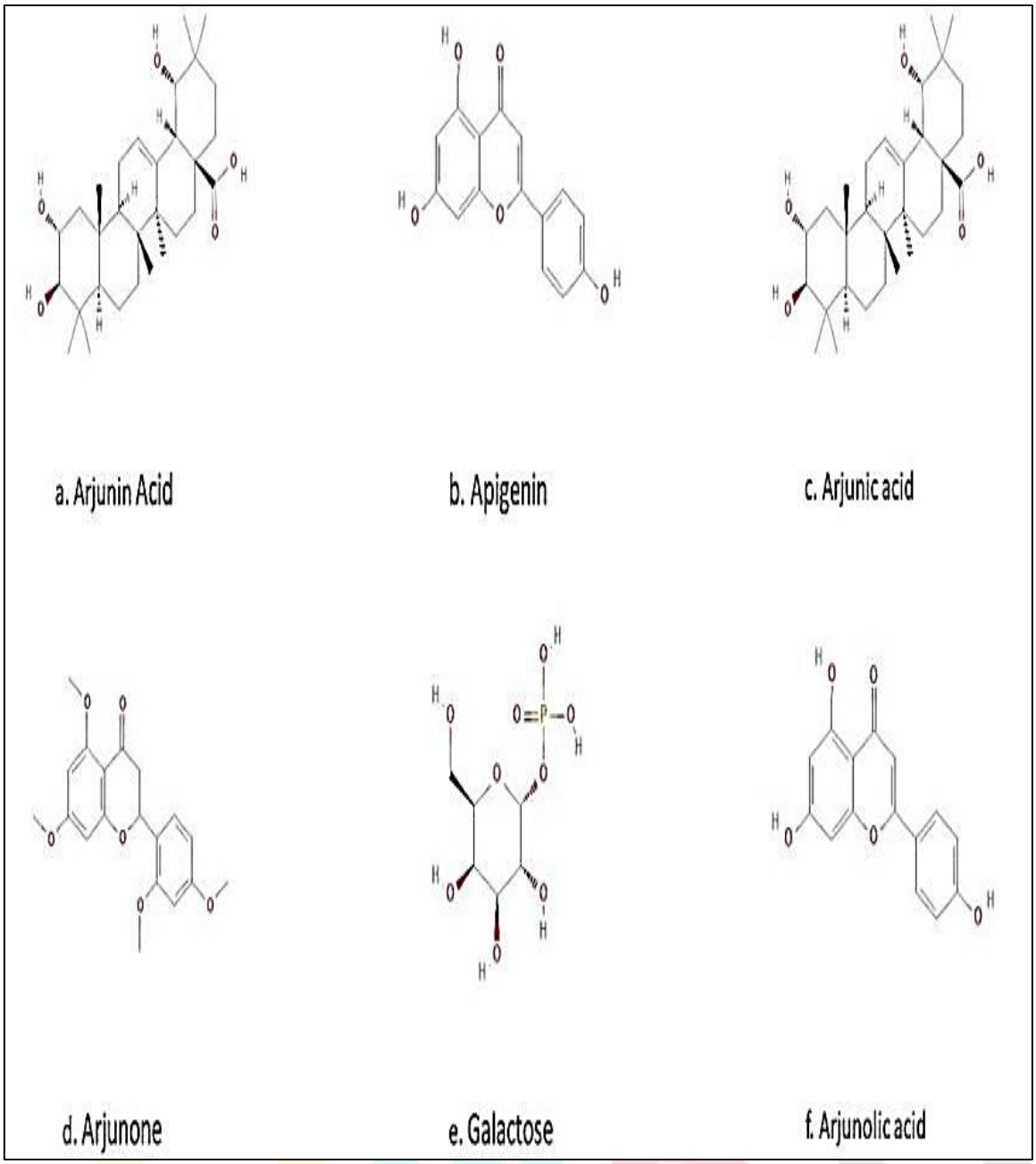
Trunk

Dried Bark

Dried Powder

IV. CHEMICAL CONSTITUENTS

PLANT PARTS	CHEMICAL CONSTITUENTS
Stem bark	• **Triterpenoids**: Arjunolic acid, Arjunic acid, Arjunin, Arjugenin, Ursane triterpenoids. • Arjunahomosesquiterpenol & Stigmasteryl digalactoside. oleaterminaloic acid A, B & C, Oleaterminolide and termiarjunoside I. • **Glycosides**: arjunetin, arjunoside II, arjunoside I, arjunaphthanoloside, terminoside A Arjunasides A-E Arjunetoside, Ajunglycosides IV and V, Termiarjunoside I and II. • β-Sitosterol. • **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**: Ellagic acid, Gallic acid, Corilagin, Chebulagic acid, etc. Chebuloside II and Bellericoside • Dietary minerals of Calcium, Magnesium, Zinc, and Copper



V. PHARMACOLOGICAL ACTIVITES

1. Antimicrobial activity:

- Disk diffusion method was used to evaluate the antibacterial activity of 34 plant species from 18 families against Escherichia coli, Klebsiella aerogenes, Proteus vulgaris and Pseudomonas aerogenes (Gramnegative bacteria). Am ong them, Terminalia arjuna showed significant antibacterial properties against the tested bacteria.

2. Cardioprotective activity:

- Arjunolic acid has been used for centuries as a cardiac tonic in Ayurvedic medicine and was first isolated from T. arjuna. Bark extracts have a major component of the triterpenoid saponin, arjunolic acid.
- Besides arjunolic acid, arjungenin was also found to be the most active as a direct free radical scavenger and inhibitor of perchloric acid formation followed by its glucoside, which was almost 50% active, resulting in a cardioprotective effect. The aqueous extract of the bark is isolated from rat atria that confirmed positive inotropic activity.
- Terminalia arjuna (aqueous extract) increased the force of cardiac muscle contraction in in situ frog heart, in situ hypodynamic frog heart and isolated perfused rabbit heart.

3. Antifungal activity:

- Organic extracts of five Terminalia species were tested against plant pathogenic fungi, ie A. flavus, A. alternata, A. niger, A. brassicicola and H. tetramera. Leaf extracts of all five plants were found to inhibit these plant pathogens.
- Polar extracts of T.arjuna have shown strong antifungal activity against eight species of Candida.
- Antifungal activities of Terminalia arjuna leaf extract (40, 60, 80, 100%) were tested against three strains of fungi. Aspergillus niger, Tricoderma viride and Fusarium oxysporum which showed significant inhibition of fungal growth.

4. Antioxidant activity:

- Terminalia arjuna extracts can be explored as a potential source of antioxidants for their use in food and pharmaceutical industries.
- Extracts from the bark of the investigated trees: A. indica, T. arjuna, A. nilotica and E. jambolana Lam. showed excellent antioxidant activity as measured by various antioxidant tests.56 Due to the antioxidant activity of Terminalia arjuna, it could very well be used as a hepatoprotectant.
- Terminalia arjuna exhibits potential antioxidant and free radical scavenging activity due to the presence of a greater amount of flavonoid and phenolic content.

5. Anti-inflammatory:

- The methanolic extract of Terminalia arjuna leaves has shown significant analgesic and acute anti-inflammatory effects on the tested models.
- T.arjuna has anti-inflammatory potential against some phlogistic substances, immunomodulatory effect and also has an antinociceptive effect probably mediated by opioid receptors.

6. Insecticidal property:

- Arjunolic acid isolated from the stem of T. arjuna shows significant inhibitory activity against the fourth instar larvae of Spilarctia obliqua

7. **Wound healing activity:**

- The use of a hydroalcoholic extract of the phytoconstituents of T. arjuna bark when applied topically has been reported to heal skin wounds in rats.
- T. arjuna has the ability to completely epithelize cuts and increased tensile strength of cuts.

8. **Against ear infection:**

- Plant extracts of T. arjuna have great potential to be developed as herbal ear drops for the control of bacterial ear infections.
- All organic extracts of T.arjuna (acetone, ethanol or methanol) showed good activity against both Gram-positive and Gram-negative ear pathogens, with inhibition being higher for Gram-positive than Gram-negative bacteria.

9. **Anti-acne activity:**

- Herbal acne cream is non-toxic, safe, effective and improves patient compliance. The use of herbal extracts of T. arjuna would be highly acceptable.

10. **Gastroprotective effect:**

- Hydroalcoholic extract of TA has been found to have antiulcerogenic as well as ulcer healing properties, which may be due to antisecretory activity. [69]
- T. arjuna acts as a gastroprotective agent probably due to its free radical scavenging activity and cytoprotective nature.

11. **Anti-asthmatic activity:**

- Arjunolic acid and the alcoholic extract of T. arjuna have a significant stabilizing activity of mast cells, and specifically, arjunolic acid shows comparatively better stabilizing activity than the alcoholic extract of TA. Antiasthmatic and antianaphylactic activity may be due to the potential to stabilize mast cells and inhibit antigen-induced release of histamine and acetylcholine.

CONCLUSION

- Arjuna has so many benefits and what makes this natural health food even more appealing is that it has virtually no side effects. It is safe for most people to consume, with a few exceptions.
- Current review shows that Terminalia arjuna is used to treat some common ailments. In this review, we have collected information related to botanical, phytochemical and pharmacological studies.
- The plant has been studied for its various pharmacological activities such as antioxidant, antihyperglycemic, antihyperlipidemic, cardioprotective, immunomodulating effects, hepatoprotective, in hyperthyroidism, hyperglycemia and lipid peroxidation, studies of analgesic and anti-inflammatory, anthelmintic and antinociceptive effects. .
- Therefore, it is necessary to utilize its maximum potential in the field of medical and pharmaceutical sciences for new and fruitful applications.

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