Review on Medicinal Plant: *Terminalia arjuna*(Roxb.)

Abstract

Terminalia arjuna also known as arjun or arjuna, is a member of Combretaceae family. Medicinal plant plays an important role in treatment of various diseases and arjuna is one such medicinal plant. This review helps in studying various aspects like phytochemical, phytological and clinical significance. Alkaloids, flavonoids, triterpenoids, glycosides and mineral ions present in different parts of the plant are discussed. *Terminalia arjuna* is used mainly in cardiovascular treatment, shows antibacterial, antimicrobial and antifungal properties.

Keywords: Antimicrobial; antifungal; alkaloids; cardiovascular; medicinal plant.

1. Introduction

Healing herbs of compatible worth can be found on mother earth. The solution to healwounds holds in hands of nature.Healing plants play an important part in healthcare sector and are significant for both conventional and traditional medicinal. Traditional medicinal practice has expanded around the world. Itis generally created on the skills, knowledge, suppositions and practices of folks. Major texts like Charaka Samhita consist of studies on traditional medicinal plants(1)In the past years, there has been around 2.5% to 12% increase in usage of therapeutic medicine(2). *Terminalia arjuna* has major contribution in research areas like medication, energy and material due to which there is surge in demands of nanoparticles (3)**.**

During ancient times many traditional plants were used as curativetoavoid different fatal disease in different medicinal systems like Ayurveda, Unanani and Siddha etc. In the current scenario, awareness about the use of traditional medicine has spread tremendously. Herbal medicines are inexpensive, efficacious, approachable and have very less side effects. Medicinal plants have certain organic compounds which perform physiological functions in human body. The compounds include carbohydrates, tannins, resins, terpenoids, flavonoids, alkaloids and phenols.There are numerous plants described in

Indian customary healing system for different treatments of different diseases. One such therapeutic tree is *Terminalia arjuna (Roxb.)*(2).

Terminalia arjuna also known as "arjuna". It is distributed in major parts of Sri Lanka, Burma and India like Himachal Pradesh, Madhya Pradesh, Sub-Himalayan regions of Uttar Pradesh and Delhi etc(4). The plant belongs to family Combretaceae. It is a huge tree with buttressed trunk and smooth grey bark. The tree generally attains a height of 20-25 m with sub opposite pale dark green leaves and yellowish white flowers. The fruits are ovaloid (2.5 -5.0 m) fibrous woody and smooth that is without hairs. The tree is found on the banks of rivers and streams. Various heart diseases like, heart failure, myocardium necrosis, coronary artery disease atherosclerosis and cardiomyopathy can be cured with the help of *Terminalia arjuna*(1,5). This can also be used in other problems like blood pressure, anaemia, viral infections, ulcers and hepatic diseases. The first person to support the use of bark powder of stem of arjuna in heart diseases was Vagabhatta. The tree has antimicrobial, antioxidant, antiallergic, antibacterial, antitumoral, antifeedant and antimicrobial properties. The aim of this review to summarise the medicinal properties and it phytoconstituents from the research data available(6,7).

Table 1: Classification of *Terminalia arjuna*

Kingdom	Plantae
Phylum	Angiosperms
Class	Dicotyledonae
Order	Myrtales
Family	Combretaceae
Genus	*Terminalia*
Species	*arjuna*

2. Habit and Habitat

The tree of arjuna is around 60-80 ft in tall, generally found near the rivers and aroundwatercoursesin the Himalayan regions of India. It can be grown in all types of soil, but majorly grows in humid, fertile and loamy soil(4,8,9).This tree can also be propagated by seeds, germinates in 60-70 days with approx. 50-70 % of total germination. Leaves of the *Terminalia arjuna* aresimple, mostly crenulations and borne sub oppositely. Drupe fruit

is found, fruits are oval in shape with fibrous and woody nature. The bark of the stem is smooth and simple with pinkish grey colour(4).

3. Phytoconstituents

The bark of the tree, fruit, leaves and seeds have major phytoconstituents.The constituents were extracted and studied by different workers under chemical procedures like chromatography and spectrochemical analysis. The table given below shows the list of phytoconstituents found indifferent parts of *Terminalia arjuna*.

Table.2: Phytoconstituents Present in *Terminalia arjuna.*

Plant part	Phytoconstituent	Compounds found
Bark (stem)	Triterpenoids	Arjunolic acid (10,11) Terminic acid,(12) Arjunin, arjunic acid,(13) Terminoltin,(14)
Bark	Triterpenoids (Ursane)	2a,3b,23-trihydroxyurs-23-trihydroxyurs-12,19-dien-28-oic acid 28-O-b-D-glucopyranosyl ester.(15) 2a,3b-dihydroyurs-12,18-oic acid-28-O-b-D-glucopyranosyl ester,(15)
Bark	Minerals, elements	Zinc (4,9) Magnesium (9) Copper (4,9,16) Silica (9,16) Aluminium (9,16)

		Calcium (4,9,16)
Bark	Phenolic compounds and flavonoids	Arjunolone(6,17,18) Luteolin(19) Gallic acid
Bark	Tannins	Pyrocatechols(20,21) Terflavin C Castalaigen(22) Casuarinin(22)
Bark	Glycosides	Arjunolone,(1,4,8) Arjunoltin, Arjunaphthanoloside Arjunetin,(8,9,23–25) Terminarjunoside I and II (26) Terminoside A (1,16,27,28)
Roots	Triterpenoids	Arjunolic acid(8,12,25) Arjunic acid Oleanolic acid Terminic acid(9,12,29)
Roots	Glycosides	Arjunetosie (3-O-b-D-glucopyranosyl-2a, 3b, 19a-trihydroxyolean-12-en-28-oic acid(14,15,26,29) 28-O-b-D-glucopyranoside
Seeds, leaves	Flavonoids, glycosides	14,16-dianhydrogitoxigenin 3-b-D-xylopyranosyl-(1 > 2)-O-b-D-galactopyranoside (30) Luteolin (19)
Fruits	Flavonoids, triterpenoids	Arjunone, (1,4,6,7) Arachidic stearate, (7) Gallic acid(7) Hentriacontane(7)

Arjunic acid, (7)

Methyl oleaolate,(7)

Cerasidin, (7)

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4. Medicinal Importance

Bark of *Terminalia arjuna* is also known as “ancient cardiovascular drug” because of its medicinal properties. Various experimental and clinical studies show the evidences that proves that bark of *Terminalia arjuna* possess anti-oxidant, antiviral, antibacterial and anticancer properties.(1,4,6,8,18,31)

4.1 Cardiovascular Importance

The bark of arjun has anti-ischemic effect which was trailed on many patients, as a result of which it was learnt that it is good for heart(2,4,8,28,32). Phytoconstituents like terpenoids and flavonoids are known to show this effect. It is used in treating cardiomyopathy, hypolipidemic condition, rhematic heart disease, myocardial infraction, and many other heart conditions. It is generally advised to heart patients to consume bark powder of arjun to have speedy recovery.

4.2 Analgesic Properties of Leaf

Leaf of arjuna also has pain relieving and antioxidant properties. Studies show that leaves exhibit analgesic i.e., pain reliving, antioxidant and anti-inflammatory properties(1,8,33)

4.3 Antibacterial Effect

Bark extract of Terminalia arjuna is known to exhibit anti-bacterial activity against ay bacteria like *Plasmodium aerogenes, Plasmodium, vulgaris* and*Escherichia coli*. (5)

4.4 Platelet Aggregation

Theextract from bark of stem also helps in decreasing platelets activation and possesses antithrombotic properties. Arjunolic acid is a phytoconstituent, which provides cardiovascular protection and is present in the bark of arjuna. (1,5,6,8)

4.5 Anticancerous Properties

Anticancerous properties are shown by many species of *Terminalia arjuna.*Traditionally it is used for treating cancer from a very early period. Terpenoids and flavonoids phytoconstituents present in bark show anti-cancerous properties. (1,4,6,8).

5. Harmful Aspect

In many people some of the sign and symptoms of different health issues were reported by after consuming this plant, such as headache, body ache, constipation, gastritis and insomnia. Blood issues, metabolic activity and renal issues has not been testified even after 24 months of its intake and observations. In contrast to this,recently outcomes from some latest studies of oral toxicologic labs show that the use of ethanolic extract of 2000mg/kg did not produce any kind ofside effects in gutof animals(1,20,21).

6. Conclusion

On basis of studies available, we can conclude that *Terminalia arjuna* is a very important medicinal plant which is majorly used in treatment of cardiovascular diseases like cardiomyopathy, heart attack, high blood pressure and chest pain etc(1,4,6,8). It is an antioxidant, antibacterial, anti-fungal andanti-ischemic in nature. However, continuous researches on *Terminalia arjuna* can also help in discovering its many other properties. This plant extracts can be majorly used in drug administration, drug interactions and toxicological studies(1,4–8,18). Still, author advices not to neglect the side effects of this plant. More clinical trials are suggested to overcome this problem.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement

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NOTE:

The study highlights the efficacy of " ayurveda " which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

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