IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Compendious Review on Terminalia Arjuna

[1]Mayur R. Wagh, [2]Shweta G. Gunjal

[1]Research Scholar, [2]Research Scholar

[1]Department of Pharmacognosy,

[1]SMBT College of Pharmacy, Dhamangaon, Nashik, India

Abstract: Since the beginning of time, medicinal plants have been a major source of therapeutic compounds used to treat illnesses. One of the most popular and useful medicinal plants in indigenous systems of medicine for the treatment of several serious disorders is Terminalia arjuna. This thorough analysis covers a wide range of elements, including its phytochemistry, pharmacognostical, pharmacology, and clinical significance to numerous disorders, particularly cardiovascular problems. When used with other conventional medications, this plant has a favourable safety profile. In this review, the antibacterial, anti-atherogenic, anti-inflammatory, antiviral, and reproductive activities of T. arjuna are highlighted along with other therapeutic qualities.

Index Terms **- Medicinal plant, phytochemistry, pharmacology, Terminalia arjuna.**

INTRODUCTION

Since ancient times, it has been held that 80–85 percent of medicines used to treat hazardous diseases come from plants. Although the use of synthetic medicines is growing, they are expensive and have several adverse effects. As a result, people are interested in medicinal herbs[1]. *Arjuna, also known as Terminalia arjuna, Based on the observations of ancient physicians for ages, its bark decoction is used in the Indian subcontinent for anginal discomfort, hypertension, congestive heart failure, and dyslipidemia*[2].

One of these traditional medicines is *Terminalia arjuna* (TA), which is a member of the Combretaceae family. The Indian subcontinent is where the plant is primarily found. It is a deciduous and evergreen tree that grows up to 20–30 m above the ground and has about 24 species in India. It has been discovered that the various plant parts, including the fruit, bark, leaves, seeds, and roots, have various therapeutic effects[3].

It is a perennial tree that grows everywhere in Bangladesh and is between 60 and 80 feet tall. Its enormously potent ingredients include minerals, -sitosterol, glycosides, tannins, flavonoids, and triterpenoids[4]. It has a long history of usage in treating a variety of human illnesses and has significant therapeutic value. The bark extract of T. arjuna Roxb. can prevent myocardial changes brought on by chronic beta-adrenoceptor stimulation, as well as the isoprenaline-induced increase through oxidative stress, decrease in endogenous antioxidant level, and avoid fibrosis without increasing the heart weight to body weight ratio[5]. Researchers have discovered that the powdered bark possesses heart-protective qualities, anti-ischaemic, antioxidant activity, hypocholesterolaemic effect, fungicidal, antimicrobial, antibacterial, anti-fertility, treatment of ulcers, treatment of skin problems, and antidote to poisons. Additionally, it helps treat diabetes, hypertension, and obesity[4].

The purpose of this work was to provide important knowledge on the phytochemical and pharmacological properties of *T. arjuna Roxb.* The taxonomy and morphology of this plant are also covered in this compendium review.

TAXONOMY[6]

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

BOTANICAL SOURCE

Arjuna trees can be found in the Indo-Sub-Himalayan regions of Uttar Pradesh, southern Bihar, Chota Nagpur, Burma, Madhya Pradesh, Delhi, and the Deccan region. They are about 60-80 feet tall and grow beside rivers, streams, and dry water bodies. It thrives in nearly all types of soil, but likes red lateritic soils and moist, fertile loams. It can withstand partial submersion for a few weeks. Arjuna is reproduced through seeds, which require 50–70 days to germinate with a 50–60% germination rate[7].

VERNACULAR NAMES[8]

Sanskrit: Kakubha,
Assamese: Arjun
Bengali: Arjuna
English: Terminalia arjuna
Gujrati: Sadad, Arjuna, Sajada
Hindi: Arjuna
Kannada: Matti, Bilimatti, Neermatti, Mathichakke, Kudare Kivimase
Malayalam: Nirmasuthu, Vellamaruthi, Kellemasuthu, Mattimora, Torematti
Marathi: Arjuna, Sadada
Oriya: Arjuna
Punjabi: Arjon
Tamil: Marudam
Telugu: Maddi
Urdu: Arjun

PHYTOCHEMISTRY

Terpenoids

Arjunin, Arjunic acid, Arjungenin, Terminic acid, Terminoltin, Arjunolic acid, Arjunoside I-IV, Oleanolic acid, 2α,19α-Dihydroxy-3Oxo-Olean-12-En28-Olic acid 28-O-β-D-glucopyranoside[6], [9].

Ursane triterpenoids

3β-dihydroyurs-12,18-oic acid 28-O-β-D-glucopyranosyl ester, 2α,3β,23-trihydroxyurs-12,18-dien-28-oic acid 28-O-β-glucopyranosyl ester, Qudranoside VIII, Kajiichigoside F1, 2α,3β,23-trihydroxyurs-23-trihydroxyurs-12,19-dien-28-oic acid 28-O-β-D-glucopyranosyl ester[10].

Glycosides

Arjunetin, Arjunoside I, II, Arjunolone, Arjunolitin, Arjunaphthanoloside, Arjunglucoside IV and V, Arjunasides A-E, Olean-3β, 22β-diol-12-en-28 β-D-glucopyranosie-oic acid, Terminarjunoside I and II, Terminoside A, Termionic acid, Arjunetosie (3-O-β-D-glucopyranosyl-2α, 3β, 19α-trihydroxyolean-12-en-28-oic acid 28-O-β-D-glucopyranoside)[11].

Flavonoids and phenolics

Arjunone, Luteolin, Baicalein, Ethyl gallate, Gallic acid, Kempferol, Oligomeric proanthocyanidins, Pelargonidin, Quercetin, Gallic acid, ellagic acid and its derivatives such as 3-O-methyl-ellagic acid 4-O-β-D-xylopyranoside, 3-O-methyl ellagic acid 3-O-rhamnoside, 3-O-methyl ellagic acid 4′-O-α-L-rhamnophranoside[12].

Tannins

Pyrocatechols, Punicallin, Castalagin, Casuariin, Casuarinin, Punicalagin, Terchebulin, Terflavin C[13].

Minerals and trace elements

Calcium, magnesium, aluminum, zinc, copper, silica[14].

PHARMACOLOGICAL ACTIVITY

Antibacterial Activity

The Agar-well-diffusion method was used to test the antibacterial activity of five *Terminalia* species' leaf extracts against human pathogens such as E. coli, Pseudomonas aeruginosa, Bacillus subtilis, Staphylococcus aureus, and Staphylococcus epidermidis. The five species tested were *Terminalia alata Heyne ex Roth.*, *Terminalia arjuna* Roxb. Testing was done on the Rf values and relative activity of isolated substances. More antibacterial components were detected in hexane and dichloromethane extracts than in acetone extracts, demonstrating the non-polar nature of the antibacterial chemicals[15].

Antiatherosclerotic Activity

The impact of indigenous medications taken orally On experimental atherosclerosis, *Terminalia arjuna*, *Terminalia belerica*, and *Terminalia chebula* were studied. In order to promote atherosclerosis, rabbits were fed a diet high in cholesterol. Cholesterol was fed along with the three medications. The animals were killed at the conclusion of the experiment, and the lipid content of their plasma and tissue was determined. Aortic atherosclerotic lesions were histologically investigated. The most effective hypolipidemic drug, T. arjuna, was discovered to elicit partial suppression of rabbit atheroma[16].

Anti-inflammatory Activity

T. arjuna exhibits immunomodulatory effects, anti-inflammatory potential against some phlogistic compounds, and antinociceptive action that is likely mediated by opioid receptors. As a result, T. arjuna bark powder may show to be a significant homegrown medication for the treatment of atherosclerosis in the future[17].

Antiviral Activity

Using the Ames assay, the antimutagenic effects of a fraction derived from *Terminalia arjuna* were examined against 4-nitro-o-phenylenediamine (NPD) in TA98, sodium azide in TA100, and 2-aminouorene (2AF, S9-dependent), a promutagen, in both TA98 and TA 100 tester strains of Salmonella typhimurium. The fraction considerably reduced the mutagenicity of 2AF in both strains while just slightly affecting the revertant colonies produced by sodium azide and NPD[18].

Reproductive activity

A study was done to find out if arjunolic acid, a triterpenoid saponin derived from *Terminalia arjuna* bark, might protect mice's testicles from arsenic-caused injury. Arsenic was given orally for two days at a dose of 10 mg/kg body weight of sodium arsenite, or NaAsO(2), which significantly reduced intracellular antioxidant activity, antioxidant enzyme activities, and levels of cellular metabolites. Additionally, testicular arsenic concentration, lipid peroxidation, protein carbonylation, and glutathione disulfide levels were all increased by arsenic intoxication (GSSG). The seminiferous tubules experienced severe degeneration due to arsenic exposure, along with spermatocyte necrosis and defoliation. Arjunolic acid pretreatment at a level of 20 mg/kg body weight for four days could stop the damage to the testes' histological architecture and oxidative stress brought on by arsenic. In vivo antioxidant activity and free radical scavenging activity were both present in arjunolic acid[19].

FIGURES

Fig.1 Arjuna Tree

Fig. 2 Arjuna fruit

Fig. 3 Arjuna Bud

REFERENCES

[1] S. K. Sheetal Yadav, Sulochana Kaushik, Sunil Kumar Chhikara, Sandeep Singh, Jaya Parkash Yadav, "Terminalia arjuna (Arjun Tree): A Sacred plant with high Medicinal and Therapeutic Potential," *Res. J. Pharm. Technol.*, vol. 15, no. 12, pp. 5859–5867, 2022.

[2] S. Dwivedi and D. Chopra, "Revisiting Terminalia arjuna - An Ancient Cardiovascular Drug.," *J. Tradit. Complement. Med.*, vol. 4, no. 4, pp. 224–231, Oct. 2014, doi: 10.4103/2225-4110.139103.

[3] P. Ramesh and A. Palaniappan, "Terminalia arjuna, a Cardioprotective Herbal Medicine–Relevancy in the Modern Era of Pharmaceuticals and Green Nanomedicine—A Review," *Pharmaceuticals*, vol. 16, no. 1, 2023, doi: 10.3390/ph16010126.

[4] P. M. Paarakh, "Terminalia arjuna (Roxb.) wt. and am.: A review," *Int. J. Pharmacol.*, vol. 6, no. 5, pp. 515–534, 2010, doi: 10.3923/ijp.2010.515.534.

[5] S. Kumar, R. Enjamoori, A. Jaiswal, R. Ray, S. Seth, and S. K. Maulik, "Catecholamine-induced myocardial fibrosis and oxidative stress is attenuated by Terminalia arjuna (Roxb.).," *J. Pharm. Pharmacol.*, vol. 61, no. 11, pp. 1529–1536, Nov. 2009, doi: 10.1211/jpp/61.11.0013.

[6] C. S. P. . et al. Row, L.R.; Murty, P.S.; Rao, G.S.R.S.; Sastry, "Chemical examination of Terminalia species. XII. Isolation & structure determination of arjunic acid, a new trihydroxytriterpene carboxylic acid from Terminalia arjuna bark," *Indian J. Chem.*, pp. 216–221, 1970.

[7] K. L. Chopra RN, Chopra IC, Handa KL, "Terminalia arjuna W and A (Combretaceae)," in *Chopra's Indigenous Drugs of India*, 1st ed., Calcutta, India: UN Dhur and Sons, 1958, pp. 421–4.

[8] *The Ayurvedic Pharmacopoeia of India*, vol. IX, no. Pharmacopieas commission for Indian Medicine and Homeopathy,Ghaziabad. 2016.

[9] T. Honda, T. Murae, T. Tsuyuki, T. Takahashi, and M. Sawai, "Arjungenin, Arjunglucoside I, and Arjunglucoside II. A New Triterpene and New Triterpene Glucosides from Terminalia arjuna," *Bull. Chem. Soc. Jpn.*, vol. 49, no. 11, pp. 3213–3218, Nov. 1976, doi: 10.1246/bcsj.49.3213.

[10] W. Wang, Z. Ali, Y. Shen, X.-C. Li, and I. A. Khan, "Ursane triterpenoids from the bark of Terminalia arjuna," *Fitoterapia*, vol. 81, no. 6, pp. 480–484, 2010, doi: https://doi.org/10.1016/j.fitote.2010.01.006.

[11] M. S. Alam, G. Kaur, A. Ali, H. Hamid, M. Ali, and M. Athar, "Two new bioactive oleanane triterpene glycosides from Terminalia arjuana.," *Nat. Prod. Res.*, vol. 22, no. 14, pp. 1279–1288, 2008, doi: 10.1080/14786410701766380.

[12] G. R. Pettit *et al.*, "Antineoplastic agents 338. The cancer cell growth inhibitory. Constituents of Terminalia arjuna (Combretaceae)," *J. Ethnopharmacol.*, vol. 53, no. 2, pp. 57–63, 1996, doi: https://doi.org/10.1016/S0378-8741(96)01421-3.

[13] F.-L. H. Ta-Chen Lin, Shu-Chen Chien, Hsue-Fen Chen, "Tannins and Related Compounds from Combretaceae Plants," *Chinese Pharm. J.*, vol. 52, p. 26, 2000, doi: 10.7019/CPJ.200002.0001.

[14] S. Dwivedi and N. Udupa, "Terminalia arjuna: pharmacognosy, phytochemistry, pharmacology and clinical use. A review.," *Fitoterapia*, vol. 60, pp. 413–420, 1989.

[15] S. L. Shinde, S. B. Junne, S. S. Wadje, and M. M. V Baig, "The diversity of antibacterial compounds of Terminalia species (Combretaceae).," *Pakistan J. Biol. Sci. PJBS*, vol. 12, no. 22, pp. 1483–1486, Nov. 2009, doi: 10.3923/pjbs.2009.1483.1486.

[16] H. P. Shaila, S. L. Udupa, and A. L. Udupa, "Hypolipidemic activity of three indigenous drugs in experimentally induced atherosclerosis.," *Int. J. Cardiol.*, vol. 67, no. 2, pp. 119–124, Dec. 1998, doi: 10.1016/s0167-5273(98)00281-2.

[17] S. Halder, N. Bharal, P. K. Mediratta, I. Kaur, and K. K. Sharma, "Anti-inflammatory, immunomodulatory and antinociceptive activity of terminalia arjuna roxb bark powder in mice and rats," *Indian J. Exp. Biol.*, vol. 47, no. 7, pp. 577–583, 2009.

[18] S. J. Kaur, I. S. Grover, and S. Kumar, "Modulatory effects of a tannin fraction isolated from Terminalia arjuna on the genotoxicity of mutagens in Salmonella typhimurium," *Food Chem. Toxicol.*, vol. 38, no. 12, pp. 1113–1119, 2000, doi: 10.1016/S0278-6915(00)00104-6.

[19] P. Manna, M. Sinha, and P. C. Sil, "Protection of arsenic-induced testicular oxidative stress by arjunolic acid.," *Redox Rep.*, vol. 13, no. 2, pp. 67–77, 2008, doi: 10.1179/135100008X259169.