International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 4 July-Aug 2025, pp: 824-827 www.ijprajournal.com ISSN: 2456-4494

Pharmacological and Phytochemical review of Terminalia Bellerica

Ajay. P. Prajapati
Parul Institute Of Pharmacy, Parul University, Limda Vadodara, Gujrat

Date of Submission: 10-08-2025 Date of Acceptance: 20-08-2025

ABSTRACT-
World Health Organization (WHO) has promoted the study of the healing potential of plants for diseases where safe allopathic drugs are not available. Terminalia bellerica, also known as Beleric Myrobalan and part of the Combretaceae family, is a large deciduous tree. It has thick brownish-gray bark with shallow longitudinal cracks and can grow to a height of 20 to 30 meters. This tree is found growing wild across the Indian subcontinent, Sri Lanka, and Southeast Asia, up to 1,200 meters in elevation and in various ecological settings. The chemical compounds extracted from different parts of the plant include alkaloids, coumarin, flavones, steroids, tannins, glycosides, terpenoids, and saponins. Terminalia bellerica has demonstrated a wide range of medicinal properties, such as analgesic effects, antibiofilm activity, anticancer traits, antidepressant effects, antidiabetic properties, antidiarrheal effects, anti-ulcer properties, immunomodulatory effects, anti-spasmodic and bronchodilator effects, antifertility properties, antihypertensive effects, along with antifungal, antimicrobial, anti-inflammatory, and antioxidant activities.

Keywords- Terminalia bellerica, chemical constituents, pharmacological activity, medicinal properties

I. INTRODUCTION-

Traditionally, the use of plants to cure illnesses has deep roots in human history and is as old as civilization itself. In recent years, interest in using plants for therapy has grown due to their safety, affordability, and effectiveness. Terminalia bellerica, also known as Beleric Myrobalan and belonging to the Combretaceae family, is a large deciduous tree with thick brownish-gray bark that has shallow longitudinal fissures. It can reach heights of 20 to 30 meters. This tree grows wild throughout the Indian subcontinent, Sri Lanka, and Southeast Asia, up to an elevation of 1,200 meters, in various ecological settings. Terminalia bellerica is used in traditional medicine because of the wide range of pharmacological effects linked to the active chemicals in the plant. Various synonyms for Terminalia bellerica used in India and around the world are listed in this review article. The phytochemicals found in different parts of the plant include alkaloids, coumarins, flavonoids, steroids (β-Sitosterol), lignans (termilignan, thannilignan), tannins (gallic acid, ellagic acid), glycosides (fructose, sucrose, galactose), terpenoids (belleric acid and chebulagic acid), and saponins (bellericoside and bellericanin). Terminalia bellerica exhibits many medicinal properties, including analgesic, antibiofilm, anticancer, antidepressant, antidiabetic, antidiarrheal, antiulcer, immunomodulatory, antispasmodic, bronchodilator, antifertility, antihypertensive, antifungal, antimicrobial, anti-inflammatory, and antioxidant activities. This review summarizes the various phytochemicals present in Terminalia bellerica and lists its many biological activities.

Table:I Synonyms of Terminalia bellericain Indian Languages

S No	Name	Language	State / Region
1	Bauri	Assamese	Assam , North-East India
2	Baheda	Bengali	West Bengal
3	Baheda	Gujarati	Gujarat
4	Bahera	Manipuri	North-eastern India
5	Bahada	Oriya	Orissa

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 4 July-Aug 2025, pp: 824-827 www.ijprajournal.com ISSN: 2456-4494

Table II Phytochemicals Present in Terminalia bellerica

S No	**Phyto Chemicals**	**Plant Parts**
1	Alkaloids, Coumarin, Flavone**[3,4,5]**	Seeds,Leaves and Whole Plant
2	Steroids (β-Sitosterol) **[6,7,8]**	Leaves/ Areal Parts
3	Lignans (Termilignan, Thannilignan, hydroxy-3', 4' [methylenedioxy] flavan, and AnolignanB)**[8]**	Fruits
4	Tannins (Gallic acid, Ellagic acid, Methyl gallate, Ethyl gallate, Chebulagic acid, Chebulaginic acid, Hexahydroxydiphenic acid ester). **[9,10]**	Fruit
5	Glycosides (D-glucose, Fructose, Sucrose, Galactose and Mannose) **[6,7,8,11]**	Seeds,fruits

Table:III Medicinal Properties of Baheda

S.No	**Pharmacological Activity**	**Plant Parts**	**Extracts**
1	Analgesic Activity	Fruit	Aqueous-Methanolic
2	Antibiofilm Activity	Plant	Ethanolic
3	Anticancer Activity	Plant	Extracts
4	Antidepressant Activity	Fruit	Aquous / Alcoholic
5	Antidiabetic activity	Fruit	Methanolic

Analgesic Activity:

Sharma et al., in 2010 studied the analgesic activity of ethanolic and aqueous extracts of **Terminalia bellirica**fruits (200 mg/kg, p.o.) in acetic acid-induced writhing and Eddy's hot plate method. Both extracts showed a significant decrease in the number of the writhes in acetic acid-induced writhing and increase in paw licking time to heat stimuli in the hot plate method. [**12]**. The crude extract of Terminalia bellerica dose dependently (50 - 100 mg/kg) reduced the numbers of acetic acid-mediated writhes in mice.[**13]**

Antibiofilm Activity:

The ethanolic extract of a plant Terminalia bellerica(common name =Baheda) was tested for its antimicrobial activity against the oral plaque forming bacteriaStreptococcus mutans. It was found to significantly inhibit biofilm formation. It was found that the extract from Terminalia bellericashowed strong activity against Streptococcus mutans. The extract also prevents the formation of biofilm by the bacteria. The study suggests possible benefits of this herbal preparation which inhibit the biofilm formation by streptococci, a oral pathogens. [**14]**

Antidepressant Activity:

The effect of aqueous extract of Terminalia belericafruit (AETB) were compared with that of control. The AETB fruit showed significant reduction in immobility time of mice in both forced swim test and tail suspension test at doses of 9 mg/kg and 36 mg/kg and 9mg/kg, 18mg/kg respectively on acute administration and the study suggested the possible antidepressant like activity of AETB in mice on acute administration. [**16]**. Aqueous extract (50, 100 and 200 mg/kg) in a dose-dependent manner and ethanolic extract (100 mg/kg) significantly reduced the immobility time of mice in both forced swim test and tail suspension test**.** The efficacies of aqueous extract (200 mg/kg) and ethanolic extract (100 mg/kg) were found to be similar to that of imipramine (15 mg/kg, po) and fluoxetine (20 mg/kg, po) administered for 10 successive days without any significant effect on locomotor activity of mice. [**17]**

Antidiabetic Activity:

The antioxidant and hypoglycemic activity of methanolic extracts of the leaves of Terminalia arjuna, T. bellerica, and T. chebula. were evaluated for total phenolic, flavonoid, and tannin content, and in vitro antioxidant potential with DPPH, ORAC, and FRAP assays. The extracts' hypoglycemic activities were evaluated by hypoglycemic screening and an oral glucose tolerance test (OGTT) in normal rats. This correlates the potential of polyphenolic content enriched with antioxidant capabilities and substantiates the results of the hypoglycemic screening and OGTT, which determined that the T. chebulaextract had a better hypoglycemic effect in

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 4 July-Aug 2025, pp: 824-827 www.ijprajournal.com ISSN: 2456-4494

normal and glucose induced hyperglycemic rats (p <0.001) than that of T. bellericaand T. arjuna, respectively. [**18]**

II. CONCLUSION-

Plants have been used for the treatment of diseases throughout the world since the beginning of civilization. Terminalia belericais found growing wild troughout the Indian subcontinent, srilanka, and South East Asia, upto 1200 meters in elevation, in a wide variety of ecologies. The vast survey of literature showed that Terminalia belericahas a huge spectrum of pharmacological activities. It has an esteemed status in herbs with diverse biological potentials and has a great scope for further new area of investigations. Traditionally crude extracts of various parts of plants have been used for their analgesic activity, antibiofilm activity, anticancer activity, antidepressant activity, antidiabetic activity, antidiarrhoeal activity, anti-ulcer activity, immunomodulatory activity, Anti-spasmodic and bronchodialatory activity, antifertility activity, antihypertensive activity, antifungal, antimicrobial activity, anti-inflammatory activity, antioxidant activity. Future research on Terminalia belerica should be emphasized for control of various diseases especially it should be explore as a significant remedy regarding neuropsychological disorders for the welfare & service of mankind.

ACKNOWLEDGEMENT
I would like to thank all of my colleauges who helped me during this work

REFERENCES

[1]. Grabley S, Thiericke R. Drug Discovery from Nature. Springer, London, 1999; 5-7.
[2]. Saraswathi Motamarri N, Karthikeyan M, Kannan M and Rajasekar S. Terminalia belerica. Roxb-A Phytopharmacological Review. Int. J. Res. Pharma. Biomed. Sci. 2012;3(1):96-99.
[3]. Devi PN, Kaleeshwari S, Poonkothai M. Antimicrobial Activity and Phytochemical Analysis of fruit extract of Terminalia Belerica. Int J Pharm Pharm Sci. 6 (5) 639-642.
[4]. Meena AK, Yadav A, Singh U, Singh B, Sandeep, Kiran, Rao MM. Evaluation of physiochemical parameters on the fruit of Terminalia BelericaRoxb. Int. J. Pharm. and Pharma. Sci. 2010; 2(2).97-99.
[5]. Mallik J, Das P, Karon B, Das S. A review on phytochemistry and pharmacological activity of Terminalia bellerica. Int. J. of drug formulation and res. 2012; 3 (6):1-7.
[6]. Saroya AS. Herbalism phytochemistry and Ethanopharmacology, Science Publishers: 2011; 357-361.
[7]. Indian Herbal Pharmacopoeia. Revised New Edition., Published by Indian Drug Manufacturer's Association, Mumbai: 2002; 429-438.
[8]. Singh A. Medicinal Plants of the World, Published by Mohan Primlani for Oxford and IBH Co. Pvt, New Delhi:2006; 26.
[9]. Saxena V, Mishra G, Saxena A, Vishwakarma KK.A Comparative Study on Quantitative Estimation of Tannins in Terminalia Chebula, Terminalia Belerica, Terminalia Arjuna and Saraca indica using spectrophotometer. Asian J Pharm Clin Res, 2013; 6(3): 148-9.
[10]. Gangadhar M, Patil B, Yadav S, Sinde D. Isolation and characterization of gallic acid from Terminalia Belericaand its effect on carbohydrate regulatory system in vitro. Int. J. res. Ayur. and Pharm, 2011; 2(2): 559-62.
[11]. Sharma S. Chemical Investigations of Terminalia Belerica**.** Acta Chim. Pharm. Indica,2012; 2(3):132-133.
[12]. Sharma SU, Sharma US, Singh A, Sutar N and Singh PJ. Screening of Terminalia belliricaFruits Extracts for its Analgesic and Antipyretic Activities. Jordan J. of Bio. Sci., 2010; 3(3):121-4.
[13]. Khan AU, Gilani HA. Anti-Secretory & Analgesic Activities of Terminalia belerica. African J. of Biotech, 2010; 9(18):2717-19.
[14]. Yadav S, Singh S, Sharma P, Thapliyal A, Gupta V. Antibiofilm Formation Activity of Terminalia bellericaPlant Extract Against Clinical Isolates of Streptococcus mutans and Streptococcus sobrinus: Implication in Oral Hygiene. Int. J. of Pharmaceu. & Bio. Arch, 2012; 3(4):816-21.
[15]. 15.Pinmai K, Chunlaratthanabhorn S, Ngamkitidechakul C, Soonthornchareon N, and Hahnvajanawong C. Synergistic growth inhibitory effects of Phyllanthus emblicaand Terminalia bellericaextracts with conventional cytotoxic agents: Doxorubicin and cisplatin against human hepatocellular carcinoma and lung cancer cells.World J Gastroenterol, 2008; 14(10):1491-97.

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 4 July-Aug 2025, pp: 824-827 www.ijprajournal.com ISSN: 2456-4494

[16]. Manohar VR, Mohandas SR, Alva A, DSouza AR, Kateel R. Acute Antidepressant Activity of Aqueous Extract of Terminalia BelericaFruit in mice in Experimental paradigam. Int. J. of Res. Ayur. Pharm, 2014; 5(2):198-200.
[17]. Dhingra D, Valecha R. Evaluation of antidepressant-like activity of aqueous and ethanolic extracts of Terminalia belliricaRoxb. fruits in mice. Indian J Exp Biol, 2007; 45(7):610-6.
[18]. Arya A, Nyamathulla S, Noordin MI, Mohd MA. Antioxidant and Hypoglycemic Activities of Leaf Extracts of Three Popular Terminalia Species. E-J. of Chem, 2012; 9(2): 883-92.
[19]. Latha PCR, Daisy P. Influence of Terminalia belericaRoxb. Fruits Extract on Biochemical Parameters In Streptozotocin Diabetic Rats, Int. J. of Pharmacology, 2010; 06:89-96.
[20]. Kumar B, Divakar K, Tiwari P, Salhan M, Goli D. Evalution of Anti-Diarrhoeal Effect of Aqueous And Ethanolic Extracts of Fruits Pulp of Terminalia belericaIn Rats.Int. J. of Drug Develop. and Res, 2010; 2(4):769-79.
[21]. Venkatesh V, Sharma JD, Kamal R. A Comparative Study of Effect of Alcoholic Extracts of Sapindusemarginatus, Terminalia belerica, Cuminum cyminum and Allium cepa on Reproductive Organs of Male Albino Rats. Asian J. Exp. Sci, 2002; 16(1&2): 51- 63.
[22]. Patil JS, Satishagouda S, Vishwanatha T, Patil BS.Effect of Terminalia BelliricaBarks xtracts on Activities of Accessory Reproductive Duct in Male Rats. Int. J. of Pharmaceutical Sci. Rev. and Res, 2010; 1(2):75-78.
[23]. Valli S, Shankar GS. Terminalia bellerica-APromising Challenge to Cryptococcosis. Int. J. of Pharmaceutical Res. and Bio-Science, 2013; 2(5):154-69.
[24]. Kulkarni CG, Lohar BN, Jadhav ST, Salunkhe SS. Evaluation of AntihelminticAxtivity of Indian Herbs. Int. J. of Pharmacy, 2014; 4(1):357-62.
[25]. Kumar B, Kalyani D, Machawal L, Singh S. In-vitro Anthelmintic Activity of ethanolic and aqueous fruit Extract of Terminalia belerica. J.of Pharmacy Res, 2010; 3(5):1061-62.
[26]. Khan AU, Gilani AH. Pharmacodynamic Evaluation of Terminalia belericafor its Anti Hypertensive Effect. J.of Food and Drug Analysis, 2008; 16: 6-14.
[27]. Saraphanchotiwitthaya A, Sripalakit P, Ingkaninan K. Effects of Terminalia bellerica Roxb. Methanolic extract on mouse immune response in vitro**.** Maejo Int. J. of Sci. and Tech, 2008; 2(2):400-7.
[28]. Chanda S, Menpara D, Desai D, (2013). Antimicrobial Activity of Terminalia bellerica Leaf and Stem Collected from Two Different Sites. American J. of Phytomedicine and Clinical Therapeutics, 2013; 1(9): 721-33.
[29]. Kaur S, Arora S, Kaur S, Kumar S. Bioassay-guided isolation of anti mutagenic factors from fruits of Terminalia bellerica. J Environ PatholToxicol Oncol 2003; 22(1):69-76.
[30]. Arya A, Nyamathulla S, Noordin MI, Mohd MA. Antioxidant and Hypoglycemic Activities of Leaf Extracts of Three Popular Terminalia Species. E-J. of Chem, 2012; 9(2): 883 92.
[31]. Hazra B, Sarkar R, Biswas S, Mandal N. Comparative study of the antioxidant and reactive oxygen species scavenging properties in the extracts of the fruits of Terminalia chebula, Terminalia belericaand Emblica officinalis. BMC Complementary and Alternative Medicine. 2010**;**(20):1-15.
[32]. Madani A, Jain SK. Anti-Salmonella activity of Terminalia belerica: in vitro and in vivo studies. Indian J Exp Biol, 2008;46(12):817-21.
[33]. Gilani HA, Khana A, Tuba Ali T, Ajmal S. Mechanisms underlying the antispasmodic and bronchodilatory properties of Terminalia bellericafruit J. of Ethnopharmacology, 2008; 116:528–538.
[34]. Ansari AV, Siddiqui HH, Singh PS. Antithrombotic and Thrombolytic activity of Terminalia belericafruit extracts. Res. J. of Pharmaceutical, Biological and Chemical Sci, 2012; 3(2):471-78.
[35]. Choudhary GP. Anti-ulcer activity of the ethanolic extract of Terminalia belericaRoxb. Int. J. of Pharmaceutical and Chemical Sci, 2012; 1(4):1293-97.
[36]. Shaikh S, Lochan R, Kaul P, Tandon GD. Beta lactamase Inhibitors from Indigenous Herbs and Spices. Res. J. of Pharmaceutical, Biological and Chemical Sci, 2014; 5(2):275-85.