



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals

ISSN 2349-7203



A MINI-REVIEW ON PLANTS PHYTOFRAGMENT HAVING ANTI-TUBERCULAR PROPERTIES

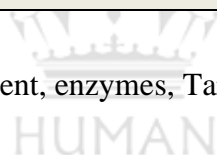
Pooja Dalavi , Rushikesh Patil, Swapnil Khot

Anandi Pharmacy College, Kalambe Tarf Kale Tal- Karveer, Dist- Kolhapur, Maharashtra, India.

ABSTRACT

Mycobacterium tuberculosis causes tuberculosis, which is an infectious disease. After HIV, tuberculosis is the second biggest cause of death among infectious diseases. Numerous anti-TB synthetic medicines have been created over time, but the majority of resistance has been seen in these drugs. As a result, using plant Phytofragment to cure the ailment is beneficial. Furthermore, these medications have less negative effects. As a result, finding more effective and less toxic drugs to battle fatal tuberculosis is critical.

Keywords: Tuberculosis, Phytofragment, enzymes, Target



INTRODUCTION

Tuberculosis is a contagious disease caused by the bacillus mycobacterium tuberculosis, slow-growing, acid-fast bacteria (*M. tuberculosis*). The only vaccine against pulmonary tuberculosis is BCG (*Bacillus Calmette-Guerin*). Despite years of immunization and antibiotic therapy, M. Tuberculosis is inhaled in the form of minute aerosol droplets carrying the bacilli and is spread to healthy people via inhalation into the lungs from an infected individual. The germs make their way through the lungs and settle in the alveoli. The infection does not lead to active disease in 90% of infected people, and is referred to as a latent infection, in which bacteria can persist in a non-replicating form for many years. The disease affects the remaining 10% of people who have an impaired immune system. . [1]

PHYTOCHEMICALS USED IN TUBERCULOSIS THERAPY

Garlic (*Allium sativum*) is a common dietary item that has long been praised for its beneficial effects on human health. Garlic is used to treat and prevent a wide range of infectious and non-infectious disorders. 30–32 Garlic is a powerful antibacterial agent that can stop both Gram-positive and Gram-negative bacteria from growing. Allicin/garlic extract kills Mycobacteria directly and induces pro-inflammatory cytokines in macrophages, as well as restricting M. tuberculosis infection inside the cells by interacting with the cell surface receptors that allow M. tuberculosis to enter the cells. [3-6]

Bergenin

Bergenin is a natural secondary metabolite that can be found in various areas of plants.43 Cuscutin is a trihydroxybenzoic acid glycoside that is also known as cuscutin .One of the active phytochemicals in herbal and ayurvedic preparations is FATIMA et al. 499. Bergenin has antibacterial, antiviral, antifungal, antitussive, anti-inflammatory, anticancer, antidiabetic, and wound-healing effects, among other things. Bergenin therapy activated the MAP kinase and ERK pathways in infected macrophages, resulting in the generation of TNF-, nitric oxide (NO), and interleukin-12 (IL-12). Bergenin also stimulates the production of Th1 and Th17 immune responses and limits the bacteria's multiplication in a mouse model. 47

Curcumin

Curcumin, popularly known as "Indian Yellow Gold," is a polyphenol called diferuloylmethane that gives the Indian spice turmeric (*Curcuma longa*) its vibrant yellow-orange hue. In India, turmeric is the most widely used spice. It has been utilized in traditional remedies and as an antibiotic in India and China since time immemorial. Curcumin contains anti-inflammatory and antioxidative properties, and it inhibits numerous key

bacterial survival processes. Curcumin suppresses the transcription factor NF-B, which reduces the expression and activity of the cyclooxygenase (COX-2) gene, as well as the activity of inducible nitric oxide synthase (iNOS). This, in turn, plays a function in the prevention of tumour progression. It efficiently eradicates *M. tuberculosis* in tuberculosis patients. As a result, it would be fascinating to go deeper into the subject.

Piperine

The presence of different phytoconstituents in black pepper (also known as the king of spices) confers antipathogenic qualities to it, resulting in its pharmacological activities. Piperine is the most significant alkaloid among all the phytoconstituents. Piperine is an anti-inflammatory, antibacterial, antifungal, antioxidant, and anticarcinogenic natural chemical found in the *Piper nigrum* and *Piper longum* plants. The piperine dimer chabamide is extracted from the stems of *P. chaba*. This dimer has antituberculosis properties against *Mycobacterium tuberculosis*.

Ginger

Ginger is a common plant that grows throughout Asia and Africa, but is especially prolific in China and India. It has long been used to treat headaches, colds, coughs, flu, asthma, arthritis, muscular aches and pains, and any type of inflammation. A random trial of pulmonary tuberculosis patients found that combining ginger with DOTS therapy produced considerably positive results.

Cardamom

Cardamom includes phytochemicals (4-terpineol, acetic acid, cinnamaldehyde, eucalyptol, 3,7-dimethyl, Santolina alcohol) that can interact with the microbe's important enzyme [histidinol dehydrogenase (H37Rv)]. [18]

Saponin

The RNA polymerase of *E. coli* and *M. tuberculosis* was inhibited by saponin-polybromophenol, but not the DNA polymerase,[19]

Vasica adhatoda

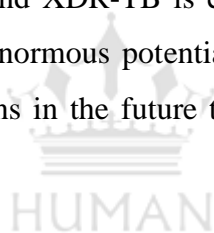
Adhatoda vasica is a tiny, evergreen shrub of the Acanthaceae family that can be found in many parts of India and around the world. It is generally known as 'Adosa,' and its leaves are the most essential portion because of their antispasmodic and expectorant properties. The anti-tuberculosis medication and the ethanolic extract of *A. vasica* [20].

Allium cepa

Allium cepa is a type of onion. Onion, or *Allium cepa*, is a herbaceous biennial plant cultivated for its delicious bulb. The Liliaceae family includes this plant. On extraction, *A. cepa* contains several sulfur-containing compounds in the form of cysteine derivatives such as S-alkyl cysteine sulfoxides, which breakdown into a range of thiosulfinates and polysulfides thanks to the action of an enzyme called allinase. Water extract of *A. cepa* showed anti-tubercular efficacy against two MDR strains of *M. tuberculosis*. These MDR strains were resistant to first- and second-line TB medicines such as rifampin and isoniazid. However, this plant extract can stop *M. tuberculosis* from growing. [21]

CONCLUSION

Phytochemicals generated from plant extracts are effective not only for killing bacteria, but they may also serve as potential adjunct agents to assist reduce the side effects of traditional antimycobacterial medications, as detailed in the review. Furthermore, studies on compounds with anti-MDR-TB and anti-XDR-TB activity may have a substantial impact on TB care, as medication development for MDR- and XDR-TB is critical due to its high prevalence and challenging management. Given its enormous potential, this therapy may be recommended for inclusion in anti-TB drug regimens in the future to increase the efficacy of current TB treatment techniques.



REFERENCES

1. FATIMA et al. Advances in adjunct therapy against tuberculosis: Deciphering the emerging role of phytochemicals, *Med Comm.* 2021;2:494–513.
2. Thomson M, Ali M. Garlic (*Allium sativum*): a review of its potential use as an anti-cancer agent. *Curr cancer drug targets.* 2003; 3(1):67-81.
3. Rivlin R S. Historical perspective on the use of garlic. *J Nutr.* 2001; 131 (3s): 951S-954S.
4. Ross ZM, O’Gara AE, Hill DJ, et al. Antimicrobial properties of garlic oil against human enteric bacteria: evaluation of methodologies and comparisons with garlic oil sulfides and garlic powder. *Appl Environ Microbiol.* 2001; 67:475-480.
5. Bakri IM, Douglas CW. Inhibitory effect of garlic extract on oral bacteria. *Arch Oral Biol.* 2005; 50(7): 645-651.
6. Dwivedi VP, Bhattacharya D, Singh M, et al. Allicin enhances antimicrobial activity of macrophages during *Mycobacterium tuberculosis* infection. *J Ethnopharmacol.* 2019; 243: 111634.
7. Yan DB, Zhang DP, Li M, et al. Synthesis and cytotoxic activity of 3, 4, 11-trihydroxyl modified derivatives of bergenin. *Chin J Nat Med.* 2014; 12:929-936.
8. Dwivedi VP, Bhattacharya D, Yadav V, et al. The phytochemical bergenin enhances t helper 1 responses and antimycobacterial immunity by activating the map kinase pathway in macrophages. *Front Cell Infect Microbiol.* 2017; 7:149.
9. Boyanapalli SS, Kong AT. Curcumin, the king of spices, epigenetic regulatory mechanisms in the prevention of cancer, neurological, and inflammatory diseases. *Curr Pharmacol Rep.* 2015;1(2):129-139
10. Hatcher H, Planalp R, Cho J, Torti FM, Torti SV. Curcumin: from ancient medicine to current clinical trials. *Cell Mol Life Sci.* 2008;65(11):1631-1652.
11. Surh YJ, Chun KS, Cha HH. Molecular mechanisms underlying chemopreventive activities of anti-inflammatory phytochemicals: down-regulation of COX-2 and iNOS through suppression of NF-kappa B activation. *Mutat Res.* 2001; 480-481:243-268.

12. Jobin C, Bradham CA, Russo MP. Curcumin blocks cytokinemediated NF-kappa B activation and proinflammatory gene expression by inhibiting inhibitory factor I-kappa B kinase activity. *J Immunol.* 1999; 163(6):3474-3483.
13. Hegeto LA, Caleffi-Ferracioli KR, Perez de Souza J. Promising antituberculosis activity of piperine combined with antimicrobials: a systematic review. *Microb Drug Resist.* 2019;25: 120-126.
14. Sharma S, Kalia NP, Suden P, et al. Protective efficacy of piperine against *Mycobacterium tuberculosis*. *Tuberculosis.* 2014; 94(4):389-396.
15. Nair KP. Pharmacology and nutraceutical uses of ginger. Turmeric (*Curcuma longa* L.) and Ginger (*Zingiber officinale* Rosc.)—world's invaluable medicinal spices. Cham: Springer Nature; 2019:519-539.
16. Shahrajabian MH, Sun W, Cheng Q. Pharmacological uses and health benefits of ginger (*Zingiber officinale*) in traditional Asian and ancient Chinese medicine, and modern practice. *Not Sci Biol.* 2019;11:309-319
17. Pan MH, Hsieh MC, Kuo JM, et al. 6-Shogaol induces apoptosis in human colorectal carcinoma cells via ROS production, caspase activation, and GADD 153 expression. *Mol Nutr Food Res.* 2008;52:527-537
18. Patra et al.; Cardamom Derived Phytochemicals against *Mycobacterium tuberculosis* Causing Tuberculosis, *JPRI*, 32(6): 132-135, 2020; Article no.JPRI.56451
19. Asit Kumar Chakraborty, et al, An Abundant New Saponin-Polybromophenol Antibiotic (CU1) from *Cassia fistula* Bark Against Multi-Drug Resistant Bacteria Targeting RNA Polymerase (2020)
20. Atul Kumar Gangwar and Ashoke K. Ghosh , Medicinal uses and Pharmacological activity of *Adhatoda vasica*, *International Journal of Herbal Medicine* 2014; 2 (1): 88-91 <https://www.florajournal.com/vol2issue1/april2014/23.1.pdf>
21. Agarwal KC (1996). Therapeutic actions of garlic constituents. *MedRes Revi.* 16(1):111-124.

