An Overview on Pharmacological Activity of Bambusa Vulgaris

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Abstract— The common bamboo, Bambusa vulgaris, has long been a staple in Asian culture, from architecture to food. The bioactive compounds with promising therapeutic potential have been unearthed by recent research. . This review investigates the phytochemical composition of bamboo, its various therapeutic properties, and future research directions. It also addresses sustainability issues and suggests ethical growth practices. Finally, bamboo is not only a versatile material; it has the potential to revolutionize medicine. [1][2]

Keywords: Bambusa vulgaris, bamboo, phytochemicals, alkaloids, flavonoids, saponins, anti-inflammatory, anti-microbial, anti-diabetic, anti-pyretic, anti-ulcer, natural medicine.

I. INTRODUCTION

Bambusa vulgaris, commonly known as bamboo, has been a mainstay of Asian culture for thousands of years and has been used in architecture, food production, and traditional medicine. However, recent scientific advancements have identified a variety of bioactive compounds from the humble stem, advancing it into the realm of modern medicine. This review investigates the phytochemical diversity of Bambusa vulgaris by analyzing alkaloids, flavonoids, saponins, and phenolic acids. We carefully review the preclinical and clinical data supporting its enormous therapeutic potential, including its anti-inflammatory, antibacterial, antidiabetic, and even anticancer properties. We critically evaluate the efficacy and safety of different Bambusa vulgaris extracts and formulations, highlighting promising directions for future research and development. Finally, we address sustainability issues associated with large-scale bamboo harvesting and propose strategies for ethical and responsible cultivation. This comprehensive review paints a fascinating picture of Bambusa vulgaris, not only as a versatile material but also as a powerful player in the pharmaceutical field, poised to revolutionize healthcare with its natural abilities. [2]

II. BOTANICAL DESCRIPTION

Bambusa vulgaris is a thorny plant with numerous stems, a tufted rootstock, and a height of approximately 30 meters. Its culms are 15–18 cm across and have prominent nodes with internodes up to 45 cm long. Shoots are naked and armed with 2-4 stout, recurved spines. Leaves are linear-lanceolate, with stiff tips and glabrous or puberulous beneath. Panicles are inflorescences that often occupy the entire stem. Caryopsis is 5-8 mm long, oval shaped and are grooved on one side. [3]

Fig. Bambusa vulgaris

Scientific Classification: [4][5]

Kingdom: Plantae

Branch: Tracheophytes

Branch: Angiosperms

Branch: Monocots

Branch: Commelinids

Order: Poales

Family: Poaceae

Genus: Bambusa

Species: B. vulgaris

Binomial name: Bambusa vulgaris.

Synonyms: Bambusa auriculata, Gigantochloa auriculata, B. striata

III. PHYTOCHEMICAL COMPOSITION [6][7]

The phytochemical content of Bambusa vulgaris has been investigated, revealing the presence of several beneficial chemicals. Phytochemical analysis of Bambusa vulgaris extracts revealed the presence of phenolic compounds, flavonoids, terpenoids, alkaloids, tannins, and saponins. Furthermore, the study found no steroids or saponins in the crude extract of Bambusa vulgaris. Moreover, tannins, steroids, phenols, glycosides, flavonoids, carbohydrates, and proteins are found in fermented Bambusa balcoa shoots. These findings highlight the diverse phytochemical makeup of Bambusa vulgaris, indicating its potential for various medicinal uses.

IV. PHARMACOLOGICAL ACTIVITY

IV.I. ANALGESIC ACTIVITY AND ANTIDIABETIC ACTIVITY

The methanol extract of the aerial parts of Bambusa vulgaris had significant analgesic activity in Swiss albino rats. The dose of the extract is administered at dose twice as higher than the previous dose and it ranges from 50 mg/kg to 400 mg/kg which diminished acetic acid-induced torment in rats by 25.9%, 29.6%, 37.0%, and 44.4%, respectively. With conventional analgesia with 200 and 400 mg/kg aspirin, reductions of 40.7% and 51.9% were achieved. This suggests that the extract has a dose-dependent analgesic effect. The extract may have the ability to relieve pain because it contains alkaloids and saponins. Methanol extract also exhibited antidiabetic activity, significantly reducing blood glucose by 32.8%, 45.8%, and 55.3% in mice was observed at the dose from 100mg/kg to 400mg/kg in which the dose of the extract is administered at dose twice as higher than the previous dose, respectively, compared to control mice. These results are comparable to the conventional antidiabetic drug glibenclamide [9], which reduced blood glucose by 50.8%. Finally, the aerial parts of Bambusa vulgaris have adequate analgesic and antidiabetic potential. [8][10]

IV.II. ANTI-ULCER ACTIVITY

The anti-ulcer activity of this plant is commonly used in Indian folk medicine. Researchers conducted experiments in animal models using a methanol extract of the leaves and in combination with a non-steroidal anti-inflammatory drug (NSAID). They found that the methanol extract exhibited significant anti-inflammatory activity and anti-ulcer properties. The most effective and least harmful anti-inflammatory action was demonstrated by the methanol extract and NSAID combination. Studies have shown that combining herbal extracts with modern medicine can lead to the development of effective and safe anti-inflammatory medicine for the long-term treatment of chronic inflammatory conditions. Overall, this study supports the traditional use of bamboo to treat inflammatory conditions. [11][12]

IV.III. ANTI-INFLAMMATORY ACTIVITY

A methanolic extract of Bambusa vulgaris leaves was used in the study, and several animal models of inflammation were used in the experiments. The extract demonstrated a significant and dose-dependent inhibition of inflammation in all experimental models. This indicates that the extract has a strong anti-inflammatory effect. There were flavonoids, carbohydrates, glycosides, proteins, and alkaloids found in the extract according to preliminary phytochemical screening. The anti-inflammatory properties of the extract might be facilitated by these compounds. Even at high dosages, no mortality was noted in the study, further demonstrating the extract's safety. According to these results, Bambusa vulgaris can be applied to relieve inflammatory and painful ailments. Studies imply that Bambusa vulgaris possesses the ability to act as an anti-inflammatory and could help create new, more potent therapeutics. Finally, the research offers proof from science supporting Bambusa vulgaris methanolic leaf extract's anti-inflammatory properties. Vulgaris. The extract showed promise as a natural anti-inflammatory agent by significantly reducing inflammation in a range of animal models. [13][14]

IV.IV. ANTIMICROBIAL ACTIVITY

Extracts of Bambusa vulgaris in methanol, ethyl acetate, and n-hexane. Bambusa vulgaris has the ability to inhibit bacteria and fungi that are both Gram-positive and Gram-negative. Bambusa antimicrobial activity of these extracts was demonstrated against Staphylococcus epidermidis, Staphylococcus aureus, Aspergillus niger, and Escherichia coli.[15] In vitro tests were conducted to evaluate the antimicrobial activity of vulgaris methanol extract against gram-positive, gram-negative, and fungal microorganisms. The greatest activity is shown by gram-positive bacteria against B. subtilis. Conversely, among gram-negative bacteria, E.Coli showed the highest activity. Inhibition zones were reported to measure 25 to 35 mm, specifically in cases of kanamycin resistance.[16] This study shows the efficacy of Bambusa vulgaris methanol extracts by showing that the inhibition region of methanolic extract was closer to the standard kanamycin. Striata against E. coli and S. aureus. Coli. Has the average value of 13.75 mm and 12.54 mm against S. aureus and E, it displays the largest zone of inhibition. Coli at 12- and 24-hour incubation, Has the average value of 8.64 mm and 8.86 12.54 mm. Different phytochemicals were present in all the B. vulgaris . The antibacterial properties of extracts can be attributed to them. [17]

IV.V. ANTIOXIDANT ACTIVITY

Satya et al. recently reported that antioxidants can protect organisms from oxidative stress caused by free radicals and looked into the possibility that young shoots of Bambusa vulgaris When tested for their capacity to scavenge free radicals using the DPPH method, Bambusa vulgaris showed a 28 point 21% antioxidant activity. The DPPH test was used to assess the radical scavenging activity of the Bambusa vulgaris chloroform, acetone, and methanol extracts. The corresponding IC50 values were 389.23 µg/ml, 300.55 µg/ml, and 262.90 µg/ml. [18][19]

IV.VI. ANTIPYRETIC ACTIVITY

The methanol extract of Bambusa vulgaris was tested for its antipyretic qualities. Rats' rectal temperatures significantly increased 18 hours after the infusion of brewer's yeast. The Bambusa vulgaris methanol extract exhibited variable levels of antipyretic activity in this investigation. A dosage of 1000 mg/kg of Bambusa vulgaris has antipyretic effects. The Bambusa vulgaris test produced a drop in temperature after two hours for both doses. The fifth hour saw the temperatures in both groups return to normal. [9]

V. CONCLUSION

Bamboo plants have been used for treating various human ailments due to their rich phytochemistry, including carbohydrates, saponins, glycosides, alkaloids, phenolics, tannins, flavonoids, phytosterols, oils, triterpenoids, and fats. They have analgesic, antidiabetic, antipyretic, anti-inflammatory, hepatoprotective, antibacterial, antifertility, antioxidant, and anti-ulcer properties. The reference that will be conducted in the near future will explore the potential of Bambusa vulgaris.

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