

Musa Balbisiana: Unravelling Its Pharmacological Properties and Health Benefits

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ABSTRACT

Musa balbisiana, a wild banana species native to Asia, is a member of the Musaceae family. Despite its numerous medicinal properties, including the use of its seeds, pulp, inflorescence, and stem, the banana peel is often overlooked for medicinal purposes. Standing over 6 meters tall with a 30 cm diameter base, Musa balbisiana displays distinctive features such as large leaves and solid stems, making it an interesting plant for botanical studies. This study explores the therapeutic capabilities of the banana peel, revealing its potential pharmacological benefits. Chemical analysis of the Musa balbisiana plant revealed a wide variety of active compounds, highlighting its potential for medicinal use. Lab studies showed that the plant has significant anti-inflammatory properties, reducing inflammation-causing chemicals. The flowers have reddish to brownish hues. Many parts of the plant contain high levels of specific compounds, including terpenoids, alkaloids, saponins, flavonoids, and tannins. These compounds contribute to the plant's anti-inflammatory, antibacterial, cholesterol-lowering, and antifungal properties. Dried fruits contain a potent blend of vitamins, minerals, and elements that support tissue growth and provide energy. They are particularly rich in calcium, chloride, carbonate, and potassium. Research indicates that dried fruit supplements may protect against heart disease by reducing inflammation and oxidative stress. Traditionally, extracts from M. balbisiana have been used as contraceptives. Additionally, the fruit's peel exhibits hepatoprotective properties, while its root has shown anti-diabetic activity. Geographically, this plant is found in Southeast Asian countries such as India, Sri Lanka, Malaysia, China, Myanmar, Thailand, Nepal and Indonesia.

Key words- Musa balbisiana, pharmacological activity, Antibacterial, Flavonoids, Musaceae.

I. INTRODUCTION

The wild banana, or Musa balbisiana, is highly valued for its many nutritional benefits and culinary applications. Recent research, however,

has started to reveal its pharmacological potential and offers a number of encouraging medical uses. Given its phytochemical makeup and range of bioactivities, Musa balbisiana is an intriguing candidate for more pharmacological research.[1] The natural product is crucial to the creation of medications and the management of illness. Since ancient times, traditional medicine has made use of plants, which are recognized for their abundant therapeutic qualities. Herbal medicines are still widely used in healthcare in many parts of the world, including Asia, Africa and parts of the United States [2].

Plantains are rich in essential nutrients that support health and well-being, including vitamins (C and B6), minerals (potassium and magnesium), and dietary fiber [3]. Foods high in potassium, such as Musa balbisiana, may support healthy muscle function and electrolyte balance, This may help to lower the blood pressure, reduce the chances of stroke and improve cardiac health [4]. Antioxidants found in Musa balbisiana include flavonoids and phenolic substances, which lessen oxidative stress, neutralize dangerous free radicals, and shield cells from harm[5]. The dietary fiber in Musa balbisiana helps maintain digestive health by encouraging regular bowel movements, avoiding constipation, and improving gut health, all of which facilitate the absorption of nutrients[6].

II. MATERIALS AND METHODS

A comprehensive search was conducted for information on Musa Balbisiana using various sources, including books on ethno botany, academic articles from reputable journals, local publications, and data repositories like Scopus, Science Direct, Pub Med, Google Scholar and Web of Science.



FIGURE 1. PLANT OF MUSA BALBISIANA

VARIOUS NAMES OF MUSA BALBISIANA IN OTHER LANGUAGE

HINDI	Kela
KANNADA	Bale
SANSKRIT	Kadali
MALAYALAM	Vazha
GUJRATI	Kelphool

Scientific Classification of Musa balbisiana:

KINGDOM	Plantae
CLASS	Scitaminae
DIVISION	Angiospermae
ORDER	Zingiberales
GENUS	Musa
SPECIES	M. Balbisianacolla 3
FAMILY	Musaceae



FIGURE 2. FRUIT OF MUSA BALBISIANA

PHARMACOLOGICAL ACTIVITIES OF MUSA BALBISIANA

Antioxidant Activity

Free radicals are harmful molecules that contribute to various health problems. Phenols, which are rich in antioxidants, can potentially combat these health issues. Bananas contain various phenolics, including anthocyanin, gallic acid, epicatechin, and catechin. In Southern India, banana rhizomes, which are high in phenolic compounds, are traditionally consumed for their medicinal properties [8]. Musa balbisiana, a tropical fruit, contains abundant flavonoids, phenolics, and other antioxidants. These compounds contribute to its antioxidant properties. By neutralizing harmful free radicals, they reduce oxidative stress and the risk of various diseases. Studies have demonstrated that extracts from Musa balbisiana fruits and flowers possess strong antioxidant activity. These findings suggest its potential use in improving health and preventing disorders associated with oxidative damage. This article reviews research exploring the antioxidant capabilities of Musa balbisiana extracts. [8,9].

Anti-inflammatory and Analgesic Activity

Research has demonstrated that extracts from the Musa balbisiana plant have anti-inflammatory properties. This is because the extracts can prevent enzymes and cytokines that cause inflammation. As a result, Musa balbisiana extracts may be beneficial for treating conditions characterized by inflammation [10]. Research suggests that extracts from Musa balbisiana, a plant species, may possess pain-relieving properties. It is believed that these effects occur by either blocking the production of pain-inducing chemicals or altering the ways in which pain signals are transmitted in the body [10,11]. Pseudo-stem extract from the Musa balbisiana plant possesses anti-inflammatory and pain-relieving properties.

Studies indicate that it effectively reduces pain, potentially by interrupting the transmission of inflammation- and pain-related signals in the body [12].

Antimicrobial Activity

Extracts derived from *Musa balbisiana* plants have showing great potential in fighting off various types of microbes, these compounds exhibit both antifungal and antibacterial properties, hinting at their use in treating microbial infections [13]. Recent research has revealed that the leaves of the *Musa balbisiana* plant contain powerful antibacterial qualities against common disease-causing bacteria like *Escherichia coli* and *Staphylococcus aureus*. This suggests that *Musa balbisiana* could be a valuable natural source for developing new antimicrobial drugs to fight infectious diseases [14,15,16].

Hepatoprotective Activity

An extract from the *Musa balbisiana* plant has demonstrated protective effects against liver damage induced by carbon tetrachloride in rats. The extract is able to protect by neutralizing free radicals and reducing inflammation, which has antioxidant effects. By counteracting oxidative stress and mitigating inflammatory responses, the extract effectively prevented and minimized liver injury [17]. Researchers tested a compound from *Musa balbisiana* banana peels in mice with liver damage caused by drugs. The compound guarded the liver by increasing antioxidants and reducing inflammation. This suggests that *Musa balbisiana* could potentially offer a natural approach to shielding the liver [18].

Researchers investigated whether an extract from *Musa balbisiana* could protect the liver from damage caused by paracetamol in rats. The results showed that the extract lowered levels of enzymes like transaminases and alkaline phosphatase, which indicate liver damage. It also acted to neutralize harmful molecules called free radicals. When observed under a microscope, the liver tissue treated with the extract appeared healthier, which suggests that the extract has liver-protecting properties [19].

Antidiabetic Activity

Extract from *Musa balbisiana* plant demonstrates antidiabetic properties in rats with diabetes. Administration of the extract resulted in substantial decreases in blood sugar levels and enhancements in the body's ability to effectively

utilize insulin [20]. Investigating the effectiveness of the extract from *Musa balbisiana* peel in reducing elevated blood sugar levels and mitigating oxidative stress in rats with diabetes [21]. *Musa balbisiana* extract has been shown to effectively reduce blood sugar levels, enhance the body's ability to absorb and use glucose, and increase insulin sensitivity in rats with diabetes induced by streptozotocin. This suggests that the extract has the potential to be a beneficial natural treatment for diabetes [22]. These enzymes are vital in regulating blood sugar levels following meals, suggesting that the extract could be a valuable natural option in controlling diabetes by managing post-meal glucose levels [23]. The extract demonstrated antioxidant activity and protected pancreatic β -cells, suggesting its potential therapeutic role in managing diabetes mellitus [24].

Anticancer Activity

Researchers conducted a study to explore how extracts from *Musa balbisiana* impact various types of human cancer cells. Results revealed that these extracts possess potent cytotoxic effects on cancer cells including those affecting the liver, colon and breast [25]. This study investigated the effect extract on human colon cancer cells (HT-29) and breast cancer cells (MCF-7). The findings showed a reduction in the growth of cancer cells as the concentration of the extract increased, indicating that banana peel extract is promising as a cancer treatment [26].

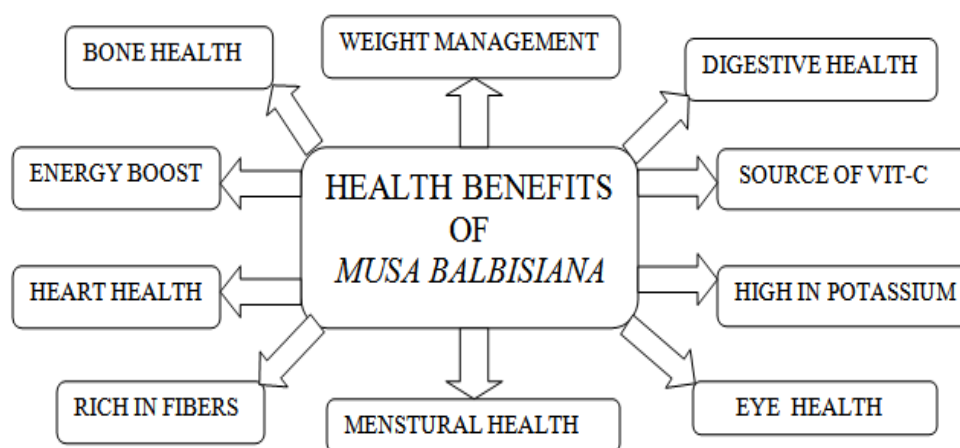
Cardioprotective Activity

Musa balbisiana are a great source of potassium, a crucial mineral for regulating blood pressure. Potassium assists in counteracting the negative impacts of sodium, which is vital for maintaining healthy blood vessels [27]. Consuming foods high in potassium can reduce the chances of developing hypertension and heart-related issues [28]. The study showed that the plant extract effectively protected the heart by decreasing indicators of cellular damage caused by oxidation and enhancing the heart's overall performance [29]. In rats with heart damage caused by a chemical called isoproterenol, *Musa balbisiana* fruit extract helped protect their hearts. It lowered indicators of damage, boosted antioxidant enzymes that defend against harm, and decreased harmful changes to fats. This suggests that *Musa balbisiana* fruit may have the power to shield the heart [30].

Wound Healing Activity

According to a research study, extracts from the stem of *Musa balbisiana* have been shown to promote wound healing in rats. The extract stimulates collagen production, boosts antioxidant enzymes, and decreases inflammation at the wound site, facilitating wound healing. [31]. Additional

research reveals that the extract has remarkable wound-healing properties. It noticeably speeds up wound closure, promotes the formation of collagen, and stimulates the growth of new blood vessels, making it a promising potential treatment for wound healing [32].



III. DISCUSSION

The potential of *Musa balbisiana* as a valuable source of medicinal compounds is highlighted by its pharmacological activities, which include anti-inflammatory, antibacterial, hepatoprotective, antidiabetic, anticancer, cardioprotective, and wound healing characteristics.

Because *Musa balbisiana* contains a high concentration of phenolic compounds, it has antioxidant action that protects against disorders linked to oxidative stress. Furthermore, its anti-inflammatory qualities might aid in the relief of illnesses linked to inflammation. Additionally, *Musa balbisiana* shows antibacterial activity, indicating that it may be useful in the fight against microbial diseases.

Additionally, research suggests that *Musa balbisiana* has hepatoprotective properties against liver damage brought on by a variety of substances. Its ability to reduce blood sugar and improve insulin sensitivity indicates that it has antidiabetic qualities, which offer promise for the treatment of diabetes mellitus.

Another noteworthy discovery is *Musa balbisiana*'s potential as an anticancer agent; it has been shown to have cytotoxic effects on a variety of cancer cell lines. Furthermore, its potassium concentration and antioxidant qualities, which are linked to its cardioprotective activity, show that it

has heart-healthy benefits. Last but not least, *Musa balbisiana* exhibits encouraging qualities for wound healing, including quickening wound closure, boosting collagen synthesis, and encouraging tissue regeneration.

IV. CONCLUSION

Musa balbisiana exhibits a diverse array of pharmacological activities, making it a promising candidate for further exploration in drug discovery and development. The properties of *Musa balbisiana*, such as its antimicrobial, hepatoprotective, antioxidant, anticancer, antidiabetic cardioprotective, anti-inflammatory and wound healing abilities, provide numerous potential therapeutic benefits. Further research is required to fully comprehend its mechanisms of action, conduct clinical trials, and explore potential synergies with existing treatments. *Musa balbisiana* shows great promise as a source of innovative pharmaceutical compounds for treating a range of health issues and promoting general well-being.

V. FUTURE ASPECTS

Biomedical Research: Ongoing research in the medical field aims to uncover the specific active ingredients in *Musa balbisiana* and how they impact our bodies. This involves finding new compounds that may have healing properties and learning how they interact with different parts of

our biology.

Clinical Trail: Future studies can test the effectiveness and safety of extracts or chemicals from *Musa balbisiana* in treating specific health problems. These studies could focus on conditions such as heart health, diabetes management, wound healing, and immune function.

Nutritional Studies: More research on the nutritional value of *Musa balbisiana* is needed to understand its effects on human health. Studies could investigate its impact on heart disease risks, blood sugar control, and the makeup of gut bacteria. This information will help us better appreciate the potential of *Musa balbisiana* in supporting overall health.

Functional Foods and Nutraceuticals: *Musa balbisiana*, a specific type of banana, has potential as an ingredient in functional foods or nutraceuticals. By exploring its properties, it can be used to create innovative food products or supplements aimed at addressing specific health issues. To enhance its benefits, researchers can refine formulations to optimize the absorption and effectiveness of *Musa balbisiana* in the body.

Personalized Nutrition: Personalized nutrition strategies can explore how variations in individuals' genes, metabolism, and gut bacteria affect their responses to consuming *Musa balbisiana*. This understanding can lead to personalized diet plans that meet the specific health needs of different individuals.

Public Health Initiatives: Promoting healthy diets and preventing chronic diseases should include the health benefits of *Musa balbisiana*. Public health campaigns can educate people about its nutritional benefits and how eating it can improve their overall health.

Global Health Solutions: Harnessing the health benefits of the *Musa balbisiana* banana can help tackle health issues worldwide, especially in areas where healthcare and nutritious foods are scarce. Encouraging the farming and consumption of *Musa balbisiana* can provide a cost-effective and accessible solution, delivering essential nutrients and beneficial compounds that can improve overall health.

Environmental Sustainability: To protect the

environment and biodiversity, we can use sustainable farming methods for the *Musa balbisiana* plant. Agroecological techniques like organic farming and agroforestry help improve soil quality, save water, and cut back on the use of artificial pesticides and fertilizers.

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