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Review on Buchanania Lanzan Phytochemistry, Traditional Used and Pharmacological Potential

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ABSTRACT
The little deciduous tree Buchanania lanzan (family: Anacardiaceae), often called Charoli or Chironji, is indigenous to areas of Africa, Southeast Asia, and India. Indigenous medicine has long utilized the plant's seeds, fruits, leaves, and bark to cure a variety of disorders. Saponins, flavonoids, terpenoids, phenolic compounds, and essential fatty acids are among the plant's many phytochemical constituents, which are responsible for its well-known nutritional and medicinal qualities. Its potential pharmacological actions, including as antioxidant, anti-inflammatory, antibacterial, antidiabetichave been demonstrated by scientific research, which have verified many of these traditional applications.

KEYWORDS: Buchanania lanzan,Anacardiaceae, phytochemical constituents pharmacological actions, traditional applications

I. INTRODUCTION

India is the primary storehouse and home to a vast diversity of the world's aromatic and medicinal plants. In 15 different agroclimatic zones in India, there are over 8000 species of medicinal plants with varying biological environments.

India is known as the "Medical Garden" or "Botanical Garden" of the world, a testament to the abundance of medicinal plants that nature has bestowed upon the nation.[1] The history of traditional medicine in our nation is rich, and the development of the traditional Indian medical system was significantly influenced by medicinal plants. Since ancient times, medicinal plants have been utilized as a source of medicine in all societies. Many Indians rely on it for their livelihood in addition to being a significant source of raw materials for the pharmaceutical industry and traditional health practices (Unani, Ayurveda, Homeopathy, Siddha, Sowa-Rigpa, Naturopathy, and various area and community-specific folk medicine).[2] Plant-based indigenous and traditional medical systems have demonstrated promise (either directly or indirectly as immune-boosting agents) against a number of dreaded illnesses, such as the most recent worldwide COVID-19 pandemic. Medicinal plants now play a big role in international trade and foreign exchange earnings. 70% of India's forest product exports are non-timber forest products (NTFPs), and as a new trading frontier, the demand for phytochemicals is expected to rise in the future.[3]

Over 90% of medicinal plant species are currently in danger due to overexploitation, careless harvesting, or excessive and unsustainable collecting.[4] Buchanania lanzan, a member of the Anacardiaceae family and one of India's many medicinal plants, is in grave danger of going extinct.[5] The nation's indigenous peoples refer to this plant by a variety of colloquial names, including Char, Achar, Charoli, Chawar, and Priyal. This herb is incredibly beneficial and has many medical uses. Nutrients and phytochemicals of significant therapeutic significance are abundant in seeds, kernels, and leaves. It grows in forest circumstances and is a great fruit tree for agro-forestry and social forestry. It can tolerate adverse weather conditions.[6]

The very nutritious plant Buchanania lanzan is frequently consumed and sold by the tribes surrounding the Dnyanganga wild life sanctuary as a means of subsistence and income. Rich in lipid/fat (59.0%), protein (19.0-21.6%), starch/carbohydrate (12.1%), fibre (3.8%), minerals (calcium 279.0 mg), phosphorus (528.0 mg), iron (8.5 mg), and vitamins (thiamine (0.69 mg), ascorbic acid/vitamin C (5.0 mg), riboflavin (0.53 mg), and niacin (1.50 mg), they also contain 34-47% fatty oil. They have a moisture content of 3.0%. The seeds have tonic and expectorant properties.[7] The oil that is extracted from kernels is used to treat skin conditions and to clean the face of imperfections.[8] The leaves' juice has purgative, aphrodisiac, expectorant, and digestive properties.[9]

Southeast Asia and India are home to the medium-sized Buchanania lanzan tree, which is endemic to tropical and subtropical areas. For millennia, ancient medical systems including

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Ayurveda, Unani, and traditional Chinese medicine have utilized the plant. There have been reports that its seeds, fruits, leaves, and bark have medicinal properties, especially for conditions relating to the skin, digestive system, and inflammation. Though the plant has been used for a long time, there has been little scientific study of its pharmacological characteristics. However, there is growing interest in the plant's bioactive chemicals and possible medical uses. Buchanania lanzan's phytochemistry, traditional applications, and pharmacological characteristics are all covered in this review, which also offers insights into the plant's potential for the development of natural remedies.[10-12]

PLANT DESCRIPTION

The Buchanania Lanzan Belonging to the Anacardiaceae family, Spreng is a multipurpose tree species that originated in the Indian subcontinent. Native American traditional knowledge demonstrates the enormous medicinal benefit of practically every plant part, including the roots, leaves, fruits, seeds, and gum. Humans can eat the seeds produced by the deciduous tree Buchanania lanzan. They call it Charoli or Chironji. India is where these almond-flavored seeds are mostly utilized as a cooking ingredient.[13]

Scientific classification

Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliospida
Order	Spindales
Family	Anacardiaceae
Subfamily	Anacardioidae
Genus	Buchanania
Species	B.lanzan

Vernacular Names[14,15]

Arabic	Chirongi, habulsamnah
Bengali	Chironji
English	Almondette, Cheronjee, Cuddapah almond
Hindi	Achar, Baruda, Char, Chiraunji, Chironji, Kath bhilawa, Maira, Priyala
Gujrati	Charoli
Marathi	Char, Chareli, Charoli, Chiraoli, Chirauli, Pyalchar
Kannada	Charpoppu, Dhurkaalu, Erappu, Hulimaralu, Irrippa, Kolageru, Morale
Malyalam	Cheru, Kalamavu, Mungapper, Moongapezhu, Munnapelu, Nuruvi, Priyalam
Oriya	Charu

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Persian	Nakulekwajah
Sanskrit	Akhatta, Bahulavalkala, Char, Dhanu, Hasannaka, Lalana, Priyalam, Rajadana
Tamil	Ayattilitacempi, Caraipparuppu, Kaattumaa, Morala, Pulima, Sarai, Tanu
Telugu	Chari, Chaarumaamidi, Jaarumaamidi, jarumamidi, Saarachettu, Morichettu Tibetan: Pilaya
Urdu	Hironji, Maghz chiraunji

TRADITIONAL USES OF BUCHANANIA LANZAN[16-19]

In India and other Southeast Asian nations, Buchanania lanzan has long been a staple of traditional therapeutic methods. The plant's components are used for a variety of therapeutic purposes:

- **Seeds:** Buchanania lanzan seeds are high in oil and are frequently used to increase energy and endurance. Additionally, they are crushed into a paste and administered topically to wounds to aid in their recovery. In certain areas, the seeds are eaten to improve digestion and treat gastrointestinal issues.
- **Fruits:**The plant's fruits are regarded as a delicacy and are frequently eaten because of their high nutritional content. They are used to treat illnesses including indigestion, diarrhoea, and dysentery because they are thought to have anti-inflammatory and digestive qualities.
- **Leaves and Bark:** Poultices and decoctions made from Buchanania lanzan's leaves and bark are frequently utilised. These are administered topically to wounds, ulcers, and infections of the skin. They are also used to treat respiratory disorders and fevers in some traditional systems.
- **Roots:** In some areas, the tree's roots are used to ease stomach aches and speed up the healing of fractures.

PHYTOCHEMICAL COMPOSITION OF BUCHANANIA LANZAN[20-23]

Buchanania lanzan's extensive phytochemical profile is largely responsible for its medicinal qualities. Principal bioactive substances consist of:

- **Flavonoids:** Well-known for their antioxidant qualities, these substances aid in scavenging free radicals and lowering oxidative stress. The plant's anti-inflammatory and anticancer properties are attributed to flavonoids such as rutin, kaempferol, and quercetin.
- **Saponins:** Buchanania lanzan includes a variety of saponins that have anti-inflammatory, anti-cancer, and immune-boosting qualities. Additionally, saponins have been demonstrated to have hypoglycemic properties, which makes them helpful in the treatment of diabetes.
- **Terpenoids:** Triterpenoids, which have a variety of biological actions such as anti-inflammatory, hepatoprotective, and anticancer properties, are especially abundant in the plant's seeds. The ability of triterpenoids to control lipid metabolism and manage hyperlipidaemia makes them significant as well.
- **Phenolic Compounds:** The seeds and leaves of Buchanania lanzan contain phenolic acids, including gallic acid and tannins. These substances have antioxidant, antibacterial, and anti-inflammatory properties.
- **Essential Fatty Acids:** Fatty acids like oleic and linoleic acids, which are present in the oil that is derived from the seeds, help the plant support healthy skin and lessen inflammation.

PHARMACOLOGICAL PROPERTIES

Some of the main activities of Buchanania lanzan include:

- **Antioxidant Activity**: The antioxidant properties of Buchanania lanzan are among its most extensively researched pharmacological effects; the flavonoids and phenolic compounds in the plant exhibit strong free-radical scavenging activity, which helps prevent oxidative damage to cells and tissues. This antioxidant activity may be crucial in the plant's ability to safeguard against chronic diseases like cancer, neurodegeneration, and cardiovascular disease. Numerous studies have confirmed the traditional uses of Buchanania lanzan, demonstrating significant pharmacological effects that support its use in modern medicine.[24]
- **Anti-inflammatory Activity:**In both in vitro and in vivo studies, Buchanania lanzan has shown strong anti-inflammatory effects. The plant's triterpenoids, saponins, and flavonoids suppress inflammation-related pathways like NF-κB and inhibit the production of pro-inflammatory cytokines, making it a potential therapeutic agent for treating inflammatory

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conditions like arthritis, asthma, and inflammatory bowel disease.[25]

- **Antimicrobial Activity**: Buchanania lanzan has well-documented antimicrobial properties; extracts from the plant, especially from the seeds and leaves, have demonstrated activity against a wide range of pathogens, including viruses, fungi, and bacteria (both Gram-positive and Gram-negative). This antimicrobial effect is attributed to the presence of phenolic compounds, tannins, and flavonoids.[26]
- **Anti-Diabetic Activity**: Buchanania lanzan may have antidiabetic properties, according to several studies. By boosting insulin sensitivity and glucose metabolism, saponins and other bioactive substances found in the plant's seeds help control blood glucose levels. Buchanania lanzan may provide a natural way to manage type 2 diabetes, as evidenced by animal models that demonstrate the plant extracts' ability to reduce blood glucose levels.[27]
- **Anticancer Potential**:According to preliminary research, Buchanania lanzan may have anticancer properties. The plant's triterpenoids and flavonoids have been shown to induce apoptosis in cancer cells, inhibit cell proliferation, and stop the spread of tumours. These effects highlight the potential of Buchanania lanzan as an adjunct or complementary therapy for cancer treatment.[28]
- **Cardio Protective Activity :**Ethanolic extract of Buchanania lanzan Spreng. (EEBL) is studied for its cardioprotective properties against myocardial infarction caused by isoproterenolin rats by examining serum, electrocardiographic alterations, antioxidant defense mechanisms, and indicators of myocyte damage. Rats were given isoproterenol (200 mg/kg, s.c.) at 24-hour intervals on days 29 and 30 to cause myocardial infarction. Biochemical indicators were evaluated on the 30-day ECG. Administering isoproterenol caused alterations in the ECG pattern, such as an increase in the serum levels of cardiac injury markers (alanine transaminase, creatine kinase-MB, lactate dehydrogenase, and aspartate transaminase), a decrease in the heart's antioxidant defense system, and an ST-segment elevation (a sign of myocardial infarction). Rats who received EEBL pre-cotreatment avoided nearly every aspect of isoproterenol-induced myocardial infarction. The current study's findings imply that EEBL significantly protects the heart from isoproterenol-induced myocardial infarction by preserving endogenous antioxidant enzyme activity.[29]
- **DNA Protective Activity**:The majority of anti-cancer drugs are thought to work primarily by either directly interacting with DNA or by squelching free radicals. 32 The methanolic extract of B. lanzan is examined for potential DNA damage. Plasmid DNA (pBR322) was subjected to the Fenton reaction in this investigation for 30 minutes at 37 °C. Agarose gel electrophoresis indicated that the Fenton reaction resulted in a super shift, or change, from the native double-stranded DNA band (Form I) to single-stranded, nicked DNA (Form II). Contrarily, DNA pre-incubated with varying concentrations—10, 25, and 50 µg of the extract—prevented the scission whenexposed to Fenton reagent under the same circumstances as previously. The extract can squelch free radicals that damage DNA, according to the DNA nicking assay.[30]

TOXICITY AND SAFETY

Although Buchanania lanzan exhibits encouraging pharmacological effects, little is known about its safety profile; according to preliminary research, the plant is generally safe at moderate dosages, but there are few reports of long-term use or possible toxic effects. To ensure their safe application in humans, more research is required to determine the toxicity and safety of various plant extracts and dosages.

II. CONCLUSION AND FUTURE PERSPECTIVES

Rich in bioactive chemicals with a variety of pharmacological properties, Buchanania lanzan is a plant with considerable traditional value. It is a prospective candidate for drug research and therapeutic uses due to its anti-inflammatory, anti-cancer, hepatoprotective, antibacterial, antidiabetic, and antioxidant qualities. To prove its effectiveness and safety in people, more thorough clinical trials and safety investigations are still required, even if it has been used for a long time in traditional medicine. With the growing popularity of natural cures, Buchanania lanzan could be a major contributor to the creation of new plant-based treatments.

Conflict of Interest: No conflict of interest

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