CRITICAL REVIEW ON POTENTIALS OF ETHNOPHARMACOLOGICAL, ETHNOMEDICINAL AND TRADITIONAL PRACTICES OF MADHUCA LONGIFOLIA (J. KOENIG EX L.) J. F. MACBR. (FAMILY: SAPOTACEAE)

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ABSTRACT

The importance of medicinal plants in traditional medicinal practices and their contribution to biodiversity preservation is now widely acknowledged. It is well recognized that the traditional application of medicinal plants in medicinal operations offers guidance for brand-new study areas. Ethnopharmacological studies are very helpful in the creation of herbal medications. One of the primary goals of these studies, which provide scientific documentation for medicinal plants used for specific therapeutic purposes, is the development of superior preparations for use by peoples. It is now commonly recognized how crucial the traditional medicinal uses of plants are for opening up new research areas. It is essential to preserve the traditional knowledge of ethnomedicine. Economic factors are significant, but traditional techniques also have appeal for social, cultural, and medicinal reasons. Madhuca longifolia has pharmaceutical, ethnomedicinal and ethnopharmacological values. The parts used include flowers, fruits, seeds, leaves, barks etc. This medicinal plant is effective against various diseases, e.g. cancer, ulcers, as well as snakebite. So, the aim and rationale of the study were to explore the ethnopharmacological, ethnomedicinal and traditional practices of Madhuca longifolia (J. Koenig Ex L.) J. F. Macbr. (Family: Sapotaceae).

KEYWORDS: Ethnopharmacology, Ethnomedicine, Practice, Traditional, Madhuca longifolia.

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1. Introduction

Researchers from a variety of fields, primarily pharmacology, chemistry, and botany, collaborate to conduct ethnopharmacological investigations [1]. The literature on ethnobotany and ethnomedicine is the source of primary data for a variety of investigations [2]. Ethnomedicine deals with the study of ancient claims. Different in vitro or in vivo models may be used to research biological processes [3]. Both strategies have a number of benefits and drawbacks. After weighing a variety of parameters, the choice of an in vivo or in vitro assay is determined [4]. For instance, an in vivo test may be preferred if there are no ethical concerns at stake and a large sample size and financial resources are available [5]. These tests will provide a clearer understanding of the plant's therapeutic potential [6]. An in vitro assay might be a superior option, though, if there are time constraints, insufficient resources, or a small sample size [7]. The medicinal plant enters the drug development process once several different assays have been successfully completed and evidence of significant biological activity has been revealed [8]. Tribes own intellectual property in the field of ethnomedicine [9-11]. Their ethnomedicinal practices have been significantly impacted by the relocation of tribal communities to different locations and the extinction of medicinal plant and animal species [12-14]. Every tribe has a distinctive understanding of ethnomedicinal techniques that sets them apart from other tribes [15]. Ethnomedicine is a form of research of old methods of treatment; alternative medicine is a type of treatment which is not in line with the evidence based medicine [16-17] and in this respect we decided doing review about Madhuca longifolia.

Madhuca longifolia is a medium to big deciduous tree with a short bole, spreading branches, and a wide spherical crown that grows up to 18 meters tall. The bark is grey to black in colour, with vertical fractures and thin scales that exfoliate. Leaves are elliptic or elliptic-oblong, 7.5-23 cm x 3.8-11.5 cm, coriaceous, hairy when young, virtually glabrous when mature and clustered near the ends of branches. Flowers occur in thick fascicles towards branch ends, many and small; calyx is coriaceous; corolla is tubular, fleshy, cream-coloured, 1.5 cm long, perfumed, caduceus. The species can be found in northern, central, and southern peninsular India, as well as Sri Lanka and Burma. Var. longifolia is found in Sri Lanka and southern India, expanding northwards to Maharashtra and Gujarat; var. latifolia is found in central and northern India, as well as Burma. Dry mixed deciduous forests, dry forests and dry teak forests are all
places where it can be find. The tree may grow in a range of conditions, but it prefers sandy soil. It thrives in shallow, clayey and calcareous soils as well. It can be found up to 1200 m altitude, with mean annual maximum temperatures of 28°C-50°C, minimum temperatures of 2°C-12°C, and annual rainfall of 550-1500 mm. Madhuca longifolia can be found in the plains and woods of Central and North India, as well as in some portions of Eastern India, including West Bengal, Odisha, Bihar, and Jharkhand.

2. Ethnopharmacology, Ethnomedicine and Traditional Practice with its Significance

Ethnopharmacology has made a comeback as an important strategy for drug discovery. Botanicals are the focus of the majority of ethnopharmacology studies because they provide a natural library of various chemical scaffolds and structures [18]. Each plant is made up of many molecules and bioactive substances. Each bioactive substance may be able to affect one or more targets [19]. Each target has the potential to impact one or more genes and metabolic pathways, what can contribute to healing one or more diseases [20].

When traditional knowledge is lacking, random screening and a phytochemical approach have been found to be quite helpful in finding new leads [21]. These prevent several plants from being disregarded because of a lack of supporting evidence [22]. However, because a significant number of resources are lost during the trial-and-error process, the two approaches prove to be more expensive than the ethnopharmacological strategy [23].

More ethnic and less scientific is ethnomedicinal practice [24]. It is a study of personal experiences with disease and illness as well as cultural healing techniques [25]. Ethnomedicine permits the use of medicinal plants and animal products to treat illness [26]. Ethnopharmacology is the modern medicinal system that uses bio-products to cure serious chronic disorders as well as generalized fevers, colds, and coughs. [27] Ethnomedicine cannot treat life-threatening conditions including cancer, diabetes, or high blood pressure. It may be used for general colds and coughs, issues with the stomach or liver, joint pain, etc. [28]. Since the beginning of human culture on earth, people have developed a man-made environment to meet their numerous fundamental, derived and integrative bio-psychic wants, including those for food, water, shelter, sex, love, care, and affection, as well as political, social, and economic requirements [29]. This has led to the development of medicinal knowledge for health care and physical fitness [30].

The earliest known medicinal system is Ayurveda, which was created between 1000 and 800 BCE in the Vedic period, roughly between 4500 and 500 BCE. Numerous therapeutic herbs [31], God’s function as both a healer and restorer of health, and devils who cause disease are all mentioned in Ayurveda [32]. According to some researchers, it predates the development of the Mesopotamian medicinal system. In India, herbal medicine is used to treat more than 70% of the population and herbal doctors have employed more than 6,000 of the 15,000 species of natural plants as herbal treatments or medicines [33-34]. People from tribal groups typically reside in forested settings, where they get to know species range of animals and plants which are used for medicine and foods [35]. Their culture and economics are greatly impacted by deforestation and migration, and their ethnomedicinal practises are greatly impacted by the extinction of medicinal plant and animal species, such as those used in the treatment of general illnesses, fever, gynecological issues, etc. [36]. More than 50,000 plant species are known to have medicinal benefits worldwide, according to a study. Much of the population living in lightly urbanized areas still relies solely on traditional health care remedies, despite globalization and modernization [37]. Due to their cultural viability, affordability, and the fact that current modern health care services are expensive in comparison to traditional medicine, the dependence on traditional medicinal herbs and their function in the health care system will only grow in the future [38]. Before modern medicine came along, the only way to take care of health and prevent, diagnose, and treat mental, physical and social illness had been through traditional medicine.

Oral tradition among the general population still perpetuates the use of plants in the conventional treatment of illnesses. Our understanding of the transmission of traditional knowledge and cultural heritage, which are in danger due to the global development of popular culture and the emphasis on science, is aided by ethnobotanical studies [39]. The use of traditional knowledge holders as study participants aids in the creation of innovative natural resource conservation initiatives [40]. Plants have been used to discover numerous bioactive principles and useful medicinal compounds. Plant-based alternative therapies have been recognized as a significant option and are being investigated more and more. This strategy is based on ethnobotanical knowledge and ethnoveterinary practises, and it may provide details on plant species of interest for more research to recommend sustainable therapy based on local uses and resource availability [41]. Despite the impressive growth of research in ethnobiology and ethnopharmacology over the past few decades, folklore healthcare practises using locally available resources have been passed down orally across a generation of folklore healthcare practitioners in order to treat a number of human disorders that are closely tied to the spiritual ideas and practises of the native population [42]. Indigenous and local ethnic groups have absorbed traditional knowledge into their cultures and medicinal practises since the dawn of humanity. It was also seen as a crucial element of sustainable resource management [43].

3. Evidence Based Systematic Literature

Jodh et al. [45], investigating the therapeutic potential of Madhuca longifolia, showed that the plant has therapeutic effects that include antibacterial,
anxiolytic, anticancer, hepatoprotective, anti-ulcer, antihyperglycemic and pain-relieving activities. Skin infections, stiffness, migraines, chronic congestion and piles and hemorrhoids, bone fractures and burns are also treated with the help of this plant. The leaves act as an expectorant and are used to treat persistent bronchitis, Cushing's disease and diabetes, while the flowers are used as a tonic, analgesic and diuretic. Dalvi et al. [46] found that *Madhuca longifolia* compounds have several activities, such as antibacterial, antipyretic, antioxidant, anticonvulsant, analgesic, and antitumor effects, and Keri [47] further demonstrated that the bark and leaves of this plant exhibit antidepressant, sedative, aphrodisiac, astringent, anti-inflammatory, antiproliferative, antibacterial, antidiabetic and antiulcer activities, as well as can be used as a therapeutic approach to treat Alzheimer's disease.

Khutade et al. [48] stated that traditionally the plant flowers are collected by tribal groups and used for making liquor. It is practiced in many states in India, in different regions of Andhra Pradesh, Maharashtra, Chhattisgarh, where some tribal communities cultivate and harvest mahua flowers for alcoholic beverages.

Naveena et al. [49] reported that *Madhuca longifolia* seed has potential anti-oxidant and anticancer activities in methanolic extract of 18.9 % yield. Sawant et al. [50] noticed that pharmacological studies proved that *M. longifolia* flowers act as antiulcer, anti-inflammatory, antioxidant, anti-diabetic and also have non-toxic effect even after consumption of larger doses. They prepared Mahua candies which are the cough drops/hard candies that can be consumed by any age group. Saif et al. [51] explored the ethnopharmacological usage of *Madhuca longifolia*. This plant has antimicrobial, antioxidant, antipyretic, anti-inflammatory, antiulcer, cardioprotective, anti-carcinogenic, immunomodulant, antihaemorrhagic, oxytocic, anti-estrogenic, uterotonic, anti-inflammatory, demulcent, and many other pharmacological actions and traditional uses such as anti-inflammatory, antipyretic, antihyperglycemic, antifertility and antiulcer properties and *Madhuca longifolia* seeds are a rich source of edible fats, making it economically valuable. Manikandan et al. [52] evaluated how to make *Madhuca longifolia* seed extracts to be rich in compounds that have anti-foot ulcers properties as well as have pharmacological actions and potential therapeutic activities.

Mishra and Usha [53] explored that *Madhuca longifolia* has pharmacological properties for the treatment of numerous liver ailments. The ethanolic extract showed hepatoprotective action against paracetamol-induced hepatotoxicity in albino rats via inducing hepatocyte repair and regeneration. Mishra and Poonia [54] determined that Mahua flowers used by tribal groups for the production of liquor and medicine have been used to treat raktapitta (bleeding disorders), diarrhoea, and skin problems for centuries, as well as have been used as an aphrodisiac, galactagogue, carminative, anthelmintic, antibacterial, and antioxidant agent. Chavan et al. [55] employed ethanolic extract of *Madhuca longifolia* flowers as a test drug at doses of 100, 200, and 400 mg/kg on mice weighing 20-25 g for CNS depressant action on the Actophotometer. The locomotor activity was reduced in the presence of all extracts, which could be owed to the drug's CNS depressive properties. Chinnadhurstai et al. [56] evaluated the pre-treatment with *Madhuca longifolia* leaves on 7,12-Dimethylbenz(a)anthracene (DMBA)-induced mammary carcinoma in Sprague Dawley rat. The leaves of *Madhuca longifolia* may be used in the treatment of mammary carcinoma. Bisht et al. [57] further demonstrated that Mahua is a type of tree that is involved in tribal people's day-to-day activities. In tribal and rural communities, the mahua flower is used as a food as well as an exchanger. This plant has antibacterial, anticancer, hepatoprotective, antiulcer, antihyperglycemic, and analgesic properties that can be used externally to treat skin diseases, rheumatism, headaches, chronic constipation, piles, and haemorrhoids, as well as ethnomedical properties like antibacterial, anticancer, hepatoprotective, antiulcer, antihyperglycemic. The mahua tree and mahua drink are considered part of the tribes' traditional legacy. As a result, raising public awareness about the need of forest conservation is critical.

An ulcer is a frequent, chronic condition that can be caused by a variety of reasons such as stress, diet, bacteria, and the use of medicines that irritate the gastrointestinal tract. The findings of the investigation of Sangeetha et al. [58] revealed that a hydroalcoholic extract of *M. longifolia* leaves may have promising gastro-protective and treating ulcers activity.

The antioxidant and cytotoxic activities of ethanol bark extract was investigated by Godfrey et al. [59]. To summarise, the ethanol bark extract of *Madhuca longifolia* imparts target specific cytotoxicity in MCF-7 cell lines, and there is a significant link between the presence of antioxidant chemicals and cancer cell cytotoxicity.

According to Jha and Mazumder [60], *Madhuca longifolia* is widely utilised in traditional and folklore medicine with its many pharmacological qualities, such as in snake bites and diabetes. Pharmacological research has shown that it has a wide range of biological actions, including antiulcer, anti-inflammatory, antioxidant, and anti-diabetic properties. The study of Subanithi and Swarnalatha [61] was designed to evaluate antibacterial activity of species that originated in India. *Madhuca longifolia* showed antibacterial activity, pharmacological and therapeutic activity. Jaydeep et al. [62] stated that the plant has been traditionally used as a medication for a variety of ailments, including headache, diarrhoea, skin, and eye disorders, due to its various phytochemical properties. Their review investigates the composition of dry and fresh flowers & its uses, therapeutic and nutritive value which can enhance the livelihood of tribal people by increasing work opportunities. Khare et al. [63] showed that *Madhuca longifolia* has therapeutic effects in treating conditions such as eczema, rheumatism, burns and can serve as an emollient. The flowers are used as a tonic, analgesic, and diuretic, while the bark is used to treat rheumatism, chronic bronchitis, and diabetes mellitus, and the leaves are used as an expectorant and to treat chronic bronchitis and Cushing's disease. Khare et al. [64] stated that the plant has anthelmintic, antiulcer, anticancer, antibacterial, antidiabetic, anti-inflammatory, antioestrogenic, and hepatoprotective activity. Sarkar et al. [65] explored that to overcome the problem of breast cancer, silver nanoparticles (AgNPs) synthesized using Indian medicinal plant *Madhuca longifolia* can be used as an alternative anticancer
medicine. According to Arun et al. [66], Madhuca longifolia is a traditional medicinal plant used in the treatment of a variety of diseases, including cancer, and also used in herbal formulations. The plant has antioxidant properties. Sinha et al. [67] demonstrated that this plant has been used as an herbal medicine to treat a variety of ailments. They summarised previous research on mahua flower, fruit, and seed, with a focus on the application of mahua flower in value addition. Mahua has undergone extensive therapeutic investigation, demonstrating antibiotic, anticancer, hepatoprotective, anti-ulcer, anti-hyperglycemic, and analgesic characteristics, among others. Furthermore, Devi and Sangeetha [68] stated that the plant has potent herbal medicine and has traditionally been used to treat infections, wounds, rheumatism, heart disease, diabetes, and a variety of other conditions. The findings of these investigations have highlighted current pharmacological profile and offered compelling evidence for its future clinical usage in modern medicine. Kamal [69] concluded that Madhuca longifolia is one of the most widely used medicinal plants and also have traditional therapeutic use, but to investigate their possible therapeutic properties, more biological research is required. In vitro anticancer investigations were conducted by Bhamik et al. [70] against the human cancer cell line (HeLa), and the MTT assay was utilised to assess cell growth suppression. The findings revealed that several extracts of Madhuca longifolia fruit-seeds exhibit very good to moderate anticancer efficacy. Akshatha et al. [71] focused on the Madhuca longifolia which is used in tribal people's day-to-day activities. Ethnomedicinal uses included antipyretic, hepatoprotective, anti-inflammatory, analgesic, antitumor, antiprostational, antiinflammatory, and wound healing properties. M. longifolia bark has traditionally been used to treat rheumatism, ulcers, bleeding, and tonsilitis. Mishra and Pradhan [72] explored that in tribal and rural communities, the mahua flower is used as a food. Madhuca longifolia is occasionally used as an emetic. Yadav et al. [73] stated that Madhuca longifolia has spasmodic, oxytocic, uterotonic, antibacterial, anti-implantation, anti-tumor, anti-progestational, antiinflammatory, anti-cancer activity.

Chakma and Patel [74] tested the antimicrobial activity of M. longifolia acetone and aqueous extracts against a variety of pathogenic microorganisms. The acetone extract was shown to have strong antibacterial action. The research backs up its use in traditional medicine. Gaikwad et al. [75] investigated the anti-inflammatory activity of the ethanolic extract and seed saponin mixture of Madhuca longifolia L. (Sapotaceae) in rats with acute carrageenan-induced inflammation.

4. Conclusion

The practising of conventional system of medicine is one of the oldest professions. This system was postulated and then created by humans through empirical observation and trial-and-error experimentation, particularly the use of conventional medicinal plants. Even in the current era of computational pharmacology techniques, traditional medicinal plants still serve a vital role in the treatment of many ailments in developing countries. Chloroquine and artemisinin, two of the most effective antimalarials currently on the market, are gifts from our treasured traditional knowledge and practise of using conventional medicinal plants. The recent success of developing medications from medicinal plants has encouraged and inspired many researchers to investigate and validate the use of traditional medicinal plants [76]. There are many challenging issues and formidable barriers that must be swiftly and efficiently overcome in order to promote traditional medicinal herbs. Combining the efforts of ethnomontanists, anthropologists, pharmacists, and medicinal experts may be a useful strategy for evaluating and confirming traditional medicinal plant use practices using up-to-date scientific techniques and cutting-edge methodologies. So, from the above review it has been established that Madhuca longifolia (J. Koenig Ex L.) J. F. Macbr. (Family: Sapotaceae) have high ethnopharmacological, ethnomedicinal and traditional value.

Authors contribution

DS: Conception and design, acquisition of data, analysis of data, revising critically.

SKS: Conception and design, input important intellectual content.

Conflict of interest

The authors(s) declare no conflict of interest.

References


Prospects in Pharmaceutical Sciences, 21(2), 30-36. https://doi.org/10.56782/pps.130

10.1016/j.bjp.2014.11.006


47. Keri, R.S. Madhuca longifolia - bark and leaves, An outlook for natural therapeutic approach for Alzheimer’s disease. Research Square. 2022, 1, Art. No. PPRSA06829. https://doi.org/10.21203/rs.3.rs.1524591/v1


62. Jaydeep, P. D.; Kumar, V.; Kumar, A; Gat, Y; Suri, S;


