



A COMPREHENSIVE REVIEW OF PIPER BETEL LEAF (PAAN): A REVIEW

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Abstract: Piper betel Linn. an important species of the Piperaceae family is an evergreen and perennial creeper, with glossy heart-shaped leaves that are magnificent reservoirs of phenolic compounds with anti-proliferative, anti-mutagenic, antibacterial and antioxidant properties. Betel is recognized as health promoting food due to presence of essential components such as minerals and vitamin usually calcium, carotene, thiamine, riboflavin, niacin, and vitamin C. Apart from it contain many essential amino acids as well as flavonoids and polyphenolic content. Due to its potential health benefits it is so far part of many food products such as noodle, dairy beverages and many food products. Betel leaves and their constituent parts have been utilised for centuries for their medicinal benefits in treating wounds, indigestion, bad breath, inflammations, and inflammatory disorders.

Keywords: Piper Betel Leaf, medicinal uses, essential oil, antioxidant

I. INTRODUCTION

Betel leaves are the leaves of a betel plant that is both evergreen and perennial creeper. The fresh leaves of betel vine are popularly known as Paan in India. It belongs to the family Piperaceae. There are about 100 varieties of betel plant currently available in the world, of which about 40 had originated in India and 30 in West Bengal. It's plant are being grown in India, Bangladesh, Sri Lanka, Malaysia, Thailand, Taiwan and other nations of South East Asia. The leaves of betel have long been use in the Indian local system due to its medicinal properties. In ancient India, betel leaves are found auspicious and are still applied as part of our religious functions. It helps in curing various diseases like hypertension, diabetes, brain toxin, boils and abscesses, headache, leucorrhoea, cuts and injuries, ringworm infestation, swelling of gum, voice problems, rheumatism, wound healing, obesity, conjunctivitis, constipation, abrasion etc.

There are chewing habit practices of betel leaves in many countries which are believed beneficial for avoiding bad breath, strengthening the gum, preserving the teeth, and stimulating the digestive system. In traditional medicine practices, betel leaves are used for vaginal douching in Indonesia, as a gargle mouthwash in India and Thailand, and as a treatment for dental problems, headaches, arthritis, and joint pain in Malaysia. In Srilanka, the betel leaf juice is used to treat skin ailments. Additionally, its boiled leaves could be used as cough medicine, tonic, or astringent. Traditional applications of betel leaves are related to their antibacterial and antifungal properties. Piper betel leaves (*Piper betel* Linn.), also referred to as 'green gold', is widely consumed as a condiment in Africa and Asia (especially India and Taiwan). The plant is also very useful for several other motives belonging to the genus Piper like perfumes, insecticides, oils, spices, bait, hallucinogens, foods, etc. Minerals and vitamins are present in betel leaf, and simultaneously it is too nutritive.

Indian folk medicine uses betel leaf widely as an antibiotic and topically on lesions and wounds to promote healing. This unique characteristic opened the way for more experimental research that proved pan extract possesses antimicrobial and antioxidant effects. The presence of saponins and tannins changes tissue regeneration during wound healing due to their antioxidant and antibacterial properties, which influence how wounds join and speed up epithelialization.

The essential components of *P. betel* have developed into a reliable source of income and a means of obtaining foreign cash for the nation. The primary criterion used by betel manufacturers to classify their products in the marketplace is the size and color of the betel leaf. Five significant families of betel vine landraces, including Bangla, Kapoori, Meetha, Sanchii, and Desawari, have been identified based on the chemical components of the leaf essential oils. The leaves are combined with the areca nut (which is incorrectly referred to as the "betel nut" by association) and mineral slaked lime (calcium hydroxide) and chewed as a wrapped bundle. Other flavourings and spices maybe used along with catechu, known as kattha in Hindi. The lime maintains the active component in its freebase. Due to its light qualities, it aids in restoring the digestive tracts natural function and is hence particularly useful in maintaining the digestive system. Additionally, it aids in clearing the mucus from the infusion made from the leaves and stems, which is also said to be effective in treating asthma, bronchitis, constipation, coughs, and indigestion. Children with dyspepsia and cough are treated systematically with leaf juice. There is a lot of potential information about *Piper betel* and its activities, such as its anti-malarial, anti-bacterial, anti-fungal, insecticidal, antioxidant, anti-diabetic, gastro protective, anti nociceptive, cytotoxic, anti-platelet, etc., that has been revealed by numerous research investigations to date.

The betel leaves are primarily employed as a mouthwash, but they are also well known for managing a wide range of infectious and non-contagious conditions, which includes viruses, coughs, bronchial asthma, rheumatism, pain in the stomach, and other conditions like bad breath, boils and abscesses, conjunctivitis, constipation, gum swelling, cuts, and injuries. The most important and effective asexually propagated cash crop, with an extensive range of cultivars, is betel vine. It is a plant that likes sheds and is an element of the Piperaceae family. It has a perennial creeper and has 2-4 inch large, 4-7-inch-long leaves. It has flowers that are both male and female. It is also used as a special item offered to the guests in order to show respect and for such traditional use of betel leaf in the Indian society, the leaf really stands alone without any parallel even today.



II. HISTORY

The piper betel plant, which God created and gave the shape of his own heart to, is blessed because it is both perennial and evergreen. Even before regular and organized agriculture began to be practiced, anthropologists have discovered betel traces in the spirit caves of Northwest Thailand dating as far back as 5500– 7000 BC. It had been included in the oldest historical work on Sri Lanka, the Palli-written "Mahawamsa." In Thailand, Myanmar, and Indonesia, some seasoned betel chewers have been discovered with blackened teeth as a result of many years of chewing. It is unknown when these two various stimulant ingredients were initially combined, however there is archeological evidence that betel leaves and areca nuts have been chewed together since very ancient times. It may therefore be challenging to pinpoint the exact time when the custom of chewing paan first began.

Similar discoveries dating back to 3000 BC have been made in Timor, Indonesia, and in the blackened teeth of a human skeleton discovered in Palawan, the Philippines, back to 2600 BC. However, the fact that it is mentioned in both the Raghuvamsa and the Kamsutra of the Vatsyayana attests to the practice's age.

The social standing of pan can also be understood by the fact that in ancient India, receiving paan bida, which is a pair of leaves stuffed with churna (lime), kattha (catechu), and supari (areca nut), from kings and nobility, was seen as a great honor. Words like Tambuladhikara, Tambuladyaka, Tambuladayini, and Tambulika, etc. were employed at this time (about 600AD) in various works. Kadambari mentions a few of the typical applications.

III. AYURVEDIC SIGNIFICANCE

Piper betel is a Vedic plant in the Vedic name Saptasira and the Sanskrit labels Tambool, Nagvelleri, and Nagani. It was used as therapy for a number of ailments. From Vatsyayana's Kamasutra and Panchatantra all the way to Kalhan's Rajatarngni (perhaps the last documented old Sanskrit writing of historical relevance), mentions to Tambool can be discovered. Tambool has thus roughly referred across a period of about 2000 years. In Ayurveda medicine system, the properties of betel leaf described as given below:

Guna (Quality): Laghu, Ruksha, and Tikshan

Rasa (Taste): Tikt

Vipak (Metabolism): Katu

Virya (Potency): Ushan

Prabhav (Impact): Hridy

Additionally, to its solitary usage as medicine, betel leaf extract is widely employed in Ayurveda as an adjuvant and blended with pharmaceuticals, possibly for better benefits. Tambola leaves have been defined in the Sushruta Samhita as aromatic, sharp, hot, acrid, great for the voice, a laxative, and an appetizer, in addition to the fact that they comfort Vata and promote pitta.

In Ayurveda, betel leaf extract is frequently used as an adjuvant & mixed with different medicines possibly for better effects besides its independent use as medicine. In Sushruta Samhita tambool leaves have been described as aromatic, sharp, hot, acrid and beneficial for voice, laxative, appetizer, besides this they pacify Vata and aggravate pitta.

IV.PLANT PROFILE



➤ Taxonomical Classification:

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnolipsida
Order: Piperales
Family: Piperaceae
Genus: Piper
Species: Betel

➤ Vernacular Names:

Sanskrit: Tambool, Mukhbhushan, Varnalata
Hindi: Paan
English : Betel, Betel pepper, Betel-vine
Telugu: Nagballi, Tamalapaku
Tamil: Vetrilai
Gujarati: Nagarbael

V. Varieties of betel leaf

Based on the morphological characters and essential oil content, betel vine varieties are divided into five main groups viz, Bangla, Desawari, Kapoori, Sanchi, and Meetha.



Kapoori



Sanchi



Bangla



Desawari

- Sanchi consists of a cordate leaf base with more elliptical lamina and long tapering apex. Normally seven nerves are seen in Sanchi.
- Desawari is large thin leaves and cordate lamina with seven to nine nerves. Leaf of Desawari is pinkish, and leaf apex is short, acuminate, and curved.
- Kapoori leaves are more elliptical, and lamina is thin with undulated margin. Leaf apex of Kapoori is acuminate, and petiolar sinus is inconspicuous.
- Bangla is large thin leaves with nine main nerves and ovate lamina with cordate base. Leaf apex is pointed and short, not curved.

VI. BIOLOGICAL USES

Antidiabetic activity: Betel leaves possessing nutraceuticals for preventing diabetes mellitus in patients. Bhattacharya demonstrated the possibility of betel extracted by hot water extract for treatment for type 2 diabetes patients. It is well known that betel leaf extract has potent anti-diabetic properties and can regulate blood glucose levels. The aqueous extract of betel leaves significantly reduced blood sugar levels in rats with low blood sugar after being tested on an overnight schedule. In a glucose tolerance test, the extract showed antihyperglycemic activity in the external glucose level.

Antioxidant activity: Betel leaf extract containing polyphenols compounds like catechol, allylpyrocatechol responsible for antioxidant activity. Manigauha observed that the methanolic extracts of the betel leaves possess reducing power, DPPH radical and superoxide anion scavenging and deoxyribose degradation activities. Lei have reported scavenging H₂O₂, superoxide radical and hydroxyl radical by aqueous extract of betel leaves.

Anti cancer activity: The betel leaves have also been reported to own anti carcinogenic properties and it destroys tobacco carcinogens due to existence of the bioactive components as hydroxychavicol and chlorogenic bioactives.

Antimicrobial activity: The antimicrobial activity of betel leaves have been illustrated against *Streptococcus pyogenes*, *Staphylococcus aureus*, *E.coli*, *Pseudomonas aeruginosa* etc. Apart from this the bactericidal activity of leaf extract have also signified against pathogenic bacteria such as *Enterococcus faecalis*, *Citrobacter koseri*, *Citrobacter freundii*, *Klebsiella pneumoniae* etc. present in the urinary tract. The bioactive molecule sterol is responsible for anti-bacterial activity.

Cardiovascular and platelet inhibition activity: Betel Chewing induces secretion from catecholamine from the adrenal cortex that may have affect on the stamina, blood glucose, heart rate, and neural activity in our body. The bioactive isolated from betel leave i.e. piper betol, ethylpiperbetol; piperol may inhibit the platelet aggregation.

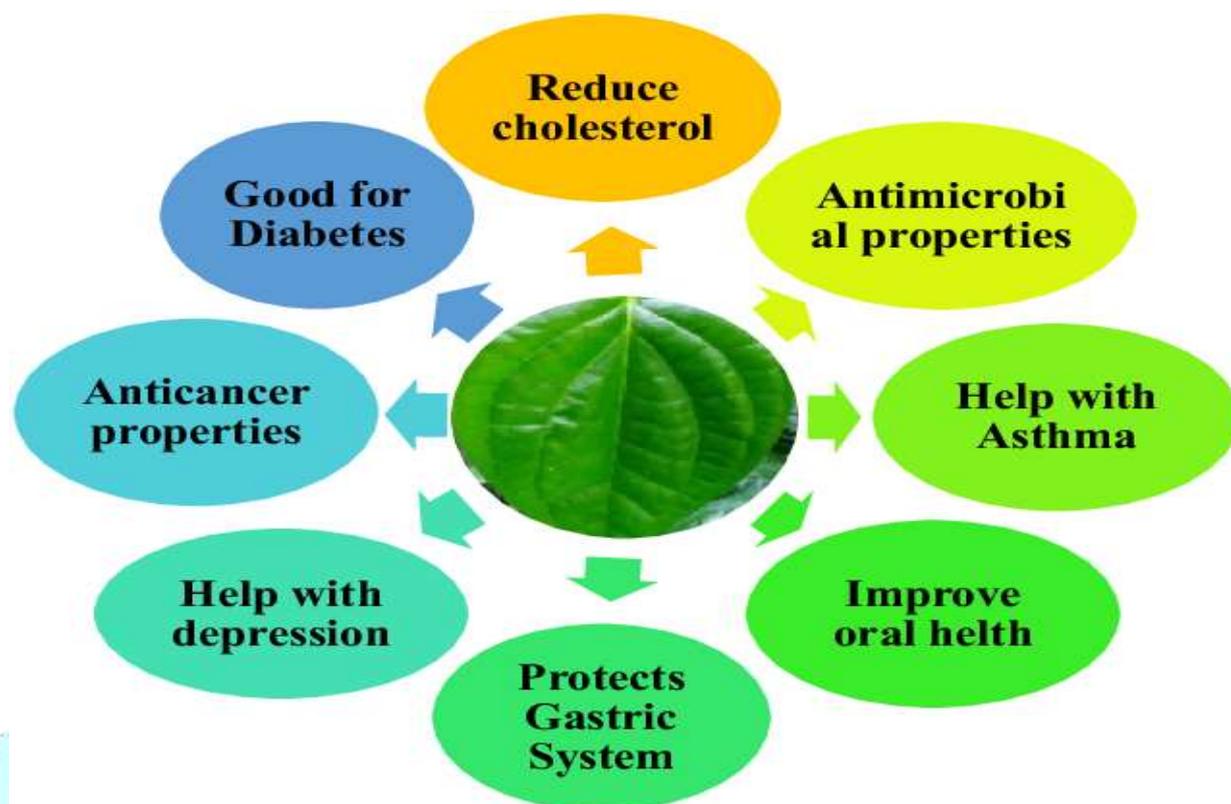
Anti-fungal activity:

The bioactive chemical hydroxychavicol (polyphenol) found in betel leaves, which can suppress the growth of fungi, may be utilized to treat fungal infections. Betel leaves are used as a topical antifungal or as a mouthwash to treat oral fungal infections.¹ However, additional research on the antifungal action of betel leaves in people is necessary. In case of a possible fungus infection

VII. AYURVEDIC USES

- **Scanty or Obstructed Urination:** Betel leaf juice is credited with diuretic properties. Its juice, mixed with dilute milk and sweetened slightly, helps in easing the passage of urine.
- **Weakness of Nerves:** Betel leaves are beneficial in the treatment of nervous disorders. The juice of a few betel leaves, with a teaspoon of honey, serves as a good tonic. A teaspoon of this mixture can be taken twice a day.
- **Headaches:** The betel leaf has analgesic and cooling properties. It can be applied to relieve intense headaches.
- **Respiratory Disorders:** Betel leaves are useful in pulmonary afflictions suffered in childhood and old age. The leaves, soaked in mustard oil and warmed, may be applied to the chest to relieve a cough or difficulty in breathing.
- **Constipation:** In the case of constipation in children, a suppository made of the stalk of betel leaf dipped in castor oil can be introduced in the rectum. This instantly relieves constipation.
- **Sore Throats:** Local application of the leaves is effective in treating sore throat. The crushed fruit or berry should be mixed with honey and taken to relieve an irritating cough
- **Wounds:** Betel leaves can be used to heal wounds. The juice of a few leaves should be extracted and applied to the wound. Then a betel leaf should be wrapped over it and bandaged. The wound will heal with just a single application within two days.
- **Boils:** The herb is also an effective remedy for boils. A leaf is gently warmed till it gets softened and then coated with a layer of castor oil. The oiled leaf is spread over the inflamed part. This leaf has to be replaced, every few hours. After a few applications, the boil will rupture draining out all the purulent matter. The application can be made at night and removed in the morning.
- **The Problem of Breast Milk Secretions:** The application of leaves smeared with oil is said to promote the secretion of milk when applied on the breasts during lactation.

HEALTH BENEFITS OF BETEL LEAF



VIII. MARKETED PRODUCTS

1) Betel leaf powder



Betel leaves powders are a powerhouse of antioxidants that clear radicals from the body. It restores normal PH levels in the body and helps an upset stomach. Ayurveda widely recommends eating betel leaves powder for relief from constipation. Crush betel leaves and put them in the water overnight. Drink the water in the morning on an empty stomach to ease bowel movements.

2) Betel leaf toothpaste



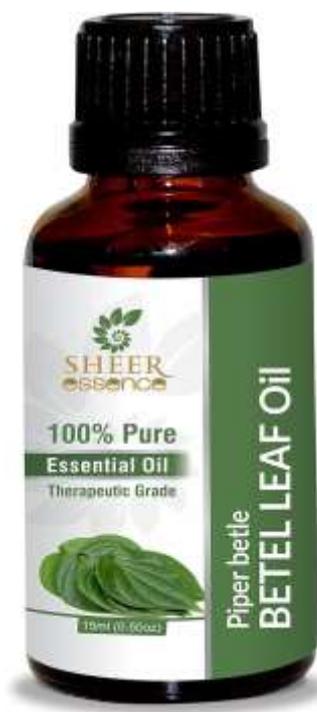
Betel Leaf Organic toothpaste gently cleans bacteria from your teeth without doing any harm to your teeth enamel. The results revealed that betel leaf herbal toothpaste significantly decreased plaque index.

3) Betel leaf hand wash



Betel leaf hand wash prevent disease and infection spreading to others. The aroma of herbal hand washing keeps the skin clean and fresh. It also helps to effectively remove skin dirt and oil. It prevents people from contracting diseases such as diarrhea and influenza.

4) Betel leaf oil



Betel leaf oil contains various health benefits, curative and healing properties. It is rich in calcium, vitamin C, thiamine, carotene, riboflavin, and niacin. Topical application of the oil provides relief from inflammations such as arthritis and orchitis. The essential oil of betel leaf relieves earaches, sore throats, and boils.

5) Betel leaf syrup



Betel leaf syrup lowers the cholesterol and protects heart. Betel leaf has strong anti-cancer and anti-mutagenic compounds in it and can lower the risk of developing cancer. It has anti-microbial properties that can protect you from minor bacterial and fungal infections.

IX.CONCLUSION

It is quite evident from this review that betel leaf contains a number of phytoconstituents which reveals its uses for various therapeutic purposes. The Plant or its individual parts can be used for the treatment of various disorders in human being such as, diabetes, fungal infection, microbial infection, inflammation, antihistaminic, antiulcer, local anaesthetic etc.

The betel leaves really as a cheap, natural and easily available appetizer, digestive, mild stimulant, aphrodisiac and refreshing mastication .Still, so much work is required with the betel leaf to investigate the mechanism of actions with other therapeutic activities. This adequately justifies its nomenclature as the “Green Gold of India”.

Removing the betel quid, areca nut, tobacco and other ingredients from the ‘Paan’ and having the leave with cardamom we can increase its beneficial part and reduce the side effects of it. Paper focuses on the beneficiary part of *Piper betel* plants. It is a traditionally used plant since antiquities as medicinally useful plant. So, we have to keep it using for curing diseases. This review highlights the great potential of medicinal and nutritional value occupied by betel leaves. The antioxidant, antimicrobial and anticancer components present in it, proves that it is more valuable. Due to these health benefits betel leaves have been utilized in various dairy products which are chemically stable and sensory acceptable. However, such applications are limited and there is potential to enlarge its uses. Also, there are numerous technological challenges that have to be carried out to develop value added dairy products enriched with betel leaves. Moreover, more research is needed to improve the existing method and to develop the procedures for new novel dairy products.

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