

An Review: On Nutritive Activity and Ayurvedic Property of Piper Betel(Paan)

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Abstract:- Piper betel L. comes in family Piperaceae and called Paan leaves in India. Piper betel or Betel vine deep heart shaped. This betel leaf widely shown in Sri Lanka, India, Thailand, Taiwan and other Southeast Asian countries. The oil of paan may be used as an industrial raw material for manufacturing medicines, perfumes, mouth fresheners, tonics, food additives etc. The betel leaves are shows nutritive property as well as carcinogenic property which is very usefull for manufacturing of blood cancer drug which is greatest advantage of betel leaf. Their leaves have been used as a traditional medicine to treat various health conditions. This paan is highly abundant and inexpensive, therefore it promotes the further research and industrialization development, including in the food and pharmaceutical industries. P. betel leaves displayed high efficiency on Gram-negative bacteria such as Escherichia coli and Pseudomonas aeruginosa, Gram-positive bacteria such as Staphylococcus aureus, and Candida albicans. Piper betel is mostly use to chew with sliced areca nut, slaked lime, coriander, aniseed, clove, cardamom, sweetener, coconut scrapings etc, but less used remedy. This paan can cure many diseases and reduce the oral cancer which actually happens due to sliced areca nut, slaked lime not because of betel leaves. It contains high amount of nutrient like water, protein, energy, fats, fibres, calcium etc. It is cultivated in hotter and damper part in country following the traditional methods in India on about 55,000 hectare with an annual production worth about Rs 9000 million. It shows antimicrobial activity, antidiabetic, Gastroprotective, platelet inhibition activity, Antifertility like other onens properties, also they shows the antioxidant, antiallergic, anti coagulant, anti inflammatory, radioprotective, anticancer potential like activities.

Keywords:- Intro to Piper Betel, Chemical Constituents, there Effect on Indian System, Nutritive Value, Therapeutic Importance, Pharmacological Activity, Health Effect of Betel Leaves, Antimicrobial Activity, Antihistaminic Activity Etc.

I. INTRODUCTION

The piper betel is heart shaped deep green leaf as associated with piperaceae family with more than 2000 species. This leaves are glossy in nature along with catkin inflorescence. This substance this are used in the treatment has demonstrated efficacy in treatment of range of conditions such as halitosis, itches, constipation, headache,

boils, ringworm, gum swelling, injuries, cuts, rheumatism, abrasions, otorrhoea, mastoiditis, hysteria, mastitis, etc. This plant is attached with host tree or support by root and which arises from each node. In this both male and female plants are different so term is called as dioecious. The piper betel plant thrives in warm and humid conditions its leaves are characterized by simplicity, alteration, ovate shape with a heartshaped base, pointed tips, smooth edges, and vibrant green colour. In Indian culture piper betel known as betel leaf or a paan has been historically significant since around 400BC. The practice of chewing betel leaf (BL) after meals became prevalent between 75 AD and 300 AD, as documented ancient ayurvedic likes Charaka, Shushruta, Samhitas, and Kashyapa Bhojanakalpa. By the 13th century, European traveler Marco Polo noted that betel chewing was common among Indian kings and nobles. This leaves improves appetite, milk secretion, wound healing, treatment for lousey smell, stop bleeding.

Their extract plays a vital role in many aspects in pharmaceutical sciences. As a mixture containing betel leaf, areca nut, slaked lime and often tobacco, wrapped together and chewed. This combination releases various alkaloids and other compounds upon chewing, leading to psychoactive effects and potential health risks used as an excellent mouth freshener and mild vitalizer, routinely served on the social, cultural and religious occasions like marriage, religious, festivals, Sradha ceremony. Betel leaves are cultivated by various traditional methods like Boroj in India spans approximately 55,000 hectares, yielding an annual production valued at around Rs 9000 million on average, about 66% of this production is concentrated in West Bengal, where it is grown across approximately 20,000 hectares, involving approximately 4-5 lakh Boroj plants and employing a similar number of agricultural families.

This leaves rich in the moisture, protein, fats, minerals, vitamins. Additionally they contain phytochemical that convert into antioxidants, which are beneficial compounds that help fight oxidative stress in the body. This betel leaf exhibit monoecious reproductive structures, characterized by presence of both male and female spikes. This male spikes densely packed and cylindrical in shape whereas female spikes are pendulous. The betel plant roots sprout from every node, helping it cling to its host tree. The pepper betels colors range from yellowish green to dark green boasting a glossy upper surface and a pleasant distinctive odor. Betel leaves are aromatic with tastes, varying from sweet to pungent due to essential oils. Various

experiments using betel leaf extract suggest no harmful effects when consumed alone. Bhide et al. elucidated the impact of aqueous Betel leaf (BL) extract on carcinogenesis. Their study revealed that the administration of areca nut extract in Swiss and C17 mice led to development of various types of cancer, whereas both the control group that mice supplemented with aq BL extract exhibited no tumor formation. In this study Swiss mice were administered aqueous extracts of Betel Quid and its constituents via gavage. Mice receiving BL extracts alone exhibited tumor rates similar to control group. Subsequently, Syrian golden hamsters were topically treated with aq extracts of tobacco, areca nut or BL. and tumor development rate were compared.

Animals treated with tobacco and areca nut showed tumor development rates of 15 and 10%, respectively, while untreated animals, those treated with BL alone, and those treated with vehicle did not develop any tumors. Hence, these betel leaf extract gives a beneficial result to the carry experiments on animals. Hence, betel leaves give better activity against the tumor. Also betel leaf or piper betel introduced as per Ayurveda. So, these leaves are full of water content (moisture content) and in low calories. they're also low in fat and have moderate protein levels.

Plus, they are rich in iodine, potassium, vitamin A, vitamin B1, vitamin B2 and nicotinic acid. Ayurveda suggest they have medicinal properties too.

➤ *In Scientific Terms, Ayurvedic Properties can be Explained as Follows:*

- Rasa (taste)–bitter, pungent
- Vipaka (post digestive effect)–pungent
- Virya (potency)–hot
- Guna (qualities)–alkaline



Fig 1 (Betel leaves/plant)

➤ *Betel Leaves Purportedly Exhibit the Following Properties:*

- Anticarcinogenic potential .
- Antioxidant activity .
- Antifungal properties .
- Antiallergic effect .

- Wound healing properties .
- Potential for alleviating constipation.

➤ *Side Effects of Betel Leaf:*

The constipation of betel leaf in combination with tobacco, lime, areca nuts can lead to the following physiological effects.;

- The substance dependence potential.
- Induction of euphoria.
- Increased perspiration.
- Stimulation of salivation.

• *Taxonomical Classification:[1]*

- ✓ Kingdom : Plantae
- ✓ Division : Magnoliophyta
- ✓ Class : Magnoliopsida
- ✓ Order : Piperales
- ✓ Family : Piperaceae
- ✓ Genus : Piper
- ✓ Species : Betel

• *Vernacular names:[2]*

- ✓ Sanskrit : Tamboolavalli, tamboola, Tamboola vallika
- ✓ English : Betel leaf plant
- ✓ Hindi : Pan
- ✓ Malayalam : Vetta, vettila
- ✓ Bengali : Paan

➤ *Pharmacognostic Study of Piper Betel Reveals the Following Characteristics :*

• *The Morphology of Piper Betel has been Studied:*

- ✓ Colour: Deep green/yellowish green
- ✓ Shape: Heart shape/cordate
- ✓ Length: 15-18 cm long
- ✓ Size: length ranging from 15 to 18 cm, width approximately 10cm.
- ✓ Odour: Aromatic
- ✓ Margin: Entire
- ✓ Apex: Acute
- ✓ Base: Symmetric base

• *Varieties of Piper Betel Leaf :*

Some numerous species of betel leaves in India but the most popular species are as follows: The piper betel vine, a tropical perennial evergreen, thrives in shaded environments, it encompasses varieties such as magadhi, kauri, banarasi, calcutta, salem, ghanagete, mysore, venmony with different attributes denoted by numbers 11 to 13.



Fig 2 Banarasi Paan



Fig 5 Kumbakonam



Fig 3 Calcuta Paan



Fig 4 Kammar Paan

II. MICROSCOPICAL STUDY

The microscopic analysis entailed a through investigation of drug facilitating the discernment of organizational structure the study of piper betel leaf primarily concentrated on leaf constants or diagnostic leaf features. Hence , that study involves the

- Vein islet numbers= In a given area of 1 sq mm , there were 32 total veinlet counts observed.
- Vein termination = The vein termination observed within 1 sq mm amounted to 123.
- Stomatal numbers= there were 32 stomata in a 1 sq mm area of leaf.
- Stomatal index
- Stomata
- Trichomes
- Powder microscopy etc.

This test are used to evaluation of microscopical characteristics study of a betel leaf.

➤ *Chemical Constituents:*

The preliminary phytochemical analysis of aqueous and methanol extract of piper betel leaves reveals the presence of alkaloids, flavonoids, tannins, sterols, phenols , glycosides, saponins , terpenoids. In these main chemical constituents is caryophyllene, codinene, gamma lactone, allyl catechol , p -cymene amd eugenolmethyl ether . And it also examined anf found to contain phenols, flavonoids , glycosides, alkaloids, saponins , steroids , terpenoids . The scientist sre used techhniques like nuclear magnetic resonance (NMR)spectroscopy and Gas chromatography – mass spectrometry(GC-MS) to confirm and categorize these compounds into two main groups : monoterpine and sesquiterpenes , which are types of organic molecules found in plants.

➤ Structures :

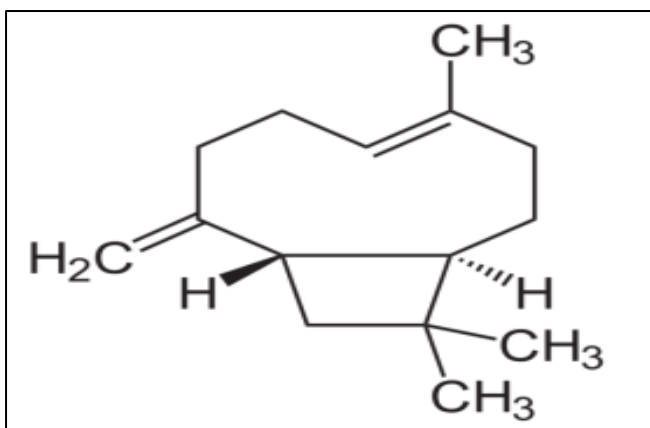


Fig 6 Caryophyllene

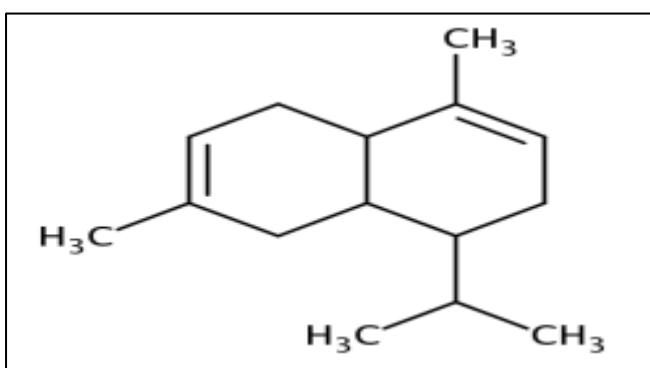


Fig 7 Cadinene

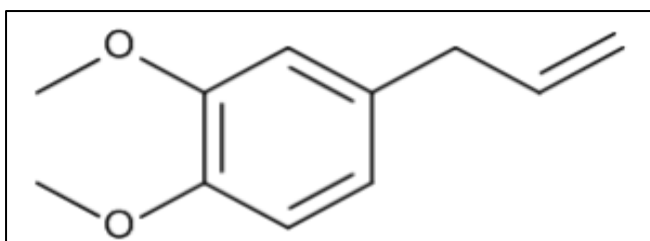


Fig 8 Eugenol Methyl Ether

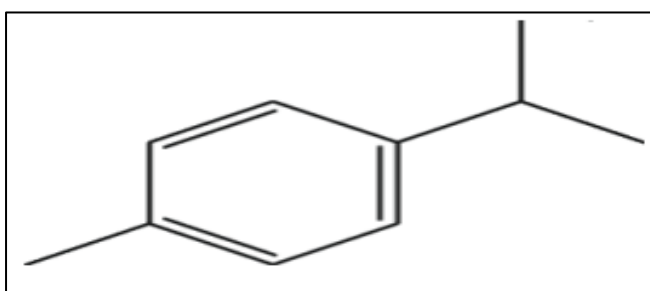


Fig 9 p-cymene

➤ Nutritive Composition of Betel Leaf:

Betel leaves exhibit significant nutritional value, containing abundant vitamins, minerals, essential amino acids like arginine, lysine and histidine, etc. enzymes like catalase. These are high number nutrition shows in the amino acids. These bioactive substances are used to treat the many disease like heart, liver, brain disease. These betel leaf major role play in the cancers.

➤ Fresh Betel Leaves are Found in Green Color which Includes:

Table 1 Fresh Betel Leaves are Found in Green Color

| Sr. no | Constituents | Percentage |
|--------|--------------|------------------|
| 1) | Chlorophyll | 0.01-0.25 % |
| 2) | Moisture | 85-90% |
| 3) | Carbohydrate | 0.5-10 % |
| 4) | Fiber | 2.3 % |
| 5) | Vitamin C | 0.005-0.01 % |
| 6) | Minerals | 2.3 -3.3% |
| 7) | Fat | 0.4-1.0 % |
| 8) | Protein | 3-3.5 % |
| 9) | Phosphorus | 0.05-0.6 % |
| 10) | Thiamine | 10-70 µg/100 g |
| 11) | Iodine | 100mg |
| 12) | Calcium | 0.2-0.5 % |
| 13) | Iron | 0.007 % |
| 14) | Riboflavin | 1.9-30 mg/100 g |
| 15) | Vitamin A | 1.9-2.9 µg/100 g |
| 16) | Potassium | 1.1-4.6 % |

➤ Therapeutic Importance or Applications of Betel Leaves:

Piper betel leaves are also used for medicinal purposes, including to treat gastrointestinal disorders, ease flatulence, and improve digestion. Betel leaf exhibits potential health benefits due to its antioxidant, anti-inflammatory and anti-microbial properties. It has been traditionally used to alleviate conditions such as gastrointestinal disorders, oral infections and respiratory issues.

➤ Uses of Piper Betel Leaf as an Ayurvedic Property:

• Oliguria or Urinary Retention:

The betel leaf is acknowledged for its diuretic properties due to its ability to facilitate the excretion of sodium and water from the body. When combined with diluted milk and slight sweetening, it aids in promoting urine flow.

• Neuropathy or Neurasthenia:

Piper betel leaves exhibit therapeutic potential in managing nervous disorders. A concoction comprising the juice of several betel leaves combined with a teaspoon of honey acts as an effective tonic. Consumption of this blend twice daily is recommended for its beneficial effects.

• Headaches/Cephalalgia:

This possesses analgesic and cooling properties beneficial for alleviating severe headaches. The topical application of betel leaf extract can provide relief from intense headaches.

• Respiratory Ailments:

Their leaves possess medicinal properties beneficial for treating pulmonary afflictions experienced during childhood and old age. When soaked in mustard oil and heated, they can be applied topically to the chest to alleviate coughing or respiratory difficulties.

- **Constipation:**

In the suppository composed of betel leaf stalk infused with castor oil can be inserted into rectum to promptly alleviate constipation in children.

- **Sore Throats:**

Using leaves for local applications is efficacious in treating pharyngitis. Mashing the fruit or berry and combining it with honey recommended for alleviating a dry cough.

- **Oral Health:**

These leaves contain many antimicrobial properties that provide relief from bad breath, yellowing of the teeth, plaque and tooth decay. Chewing a small amount of paste made from betel leaves after meals benefits oral health. It also provides relief from toothache, gum pain, swelling, and oral infection. Celebrity nutritionist Shweta Shah says that betel leaves have natural antiseptic properties that help prevent the growth of bacteria in the mouth and improve oral hygiene.

- **Optimum Health :**

By maintaining the optimum PH they give a good bowel movements every day. Extended mastication of food and consumption of nutrients meals during hunger periods promote gastrointestinal health. Additionally avoidance of dairy products, onions, garlic, meat, dried seafood can mitigate oral malodor. Ayurvedic principle state the consumption of hot or warm water it facilitate the digestion.

- **Wound Healing:**

Betel leaves possesses potential wound –healing properties, as indicated by studies on male albino rats which suggested that betel leaf extract could expedite wound healing and enhance the repair mechanism. Applications of betel leaves to wounds followed by bandaging a betel leaf it led to complete healing within two days in some cases. This effect is attributed to the promotion of epithelialization by betel leaves.

- **Saliva :**

Saliva plays a crucial role in maintaining adequate level of ascorbic acid in the human body. Ascorbic acid present in saliva, is believed to contribute to the carcinogenesis in oral activity. However, the worths nothing that the detrimental effects of chewing quid or tobacco may persist in other areas of body despite the presence of salivary ascorbic acid.

The Problem of Breast Milk Secretions : The application of oil-smears leaves is purported to stimulate lactation when applied to the breasts.

- **Pharmacological Activity:**

Natural products are extensively utilized a traditional medicine across multiple nations for treating various animals. This betel are comes to piperaceae family with over 2000 species. This plant is indigenous to India. Piper betel leaves are shown to be efficacy against numerous human pathogen oa bacterias. The extract derived from betel leaves have been employed for age in treating diverse conditions due to their essential properties such as antioxidant, anticancer, antiallergic, lactation promoting effects.

III. IMPORTANCE OF BETEL LEAF

- Consuming betel leaf regularly singnificance due to its rich content of phytochemicals which can booster immunity by inhibiying proliferation cancer call, mitigating DNA damage and preventing various diseases.
- Piper betel leaves are beneficial for alleviating nerve pains, relieving nerve exhaustion and combating debility.
- Tambula enhances physical aesthetics, prosperity, happiness and augments libido. Ethanolic extract from betel leaf exhibit potent antimicrobial efficacy against both gram-positive and gram-negative bacterias/pathogens.
- The anti-bacterial efficacy stems from its polyphenolic content, which disrupts the metabolic processes of spoilage causing microoraganism there by increasing shelf life of food.
- Hence, piper betel serves as rich reservoir of natural antioxidants, presenting promising prospects for integration into pharmaceutical formulations. these antioxidant exhibit potential activity in medicinal and food applications, augmenting the therapeutic efficacy of consumable products.
- Betel leaves possesses pharmacological properties that confer physiological benefits to the body, and they also recognized to modulate appetite regulation.
- It exert potential therapeutic effect on diabetes management due to their high antioxidant content, which attenuates oxidative stress in individuals with diabetes mellitus.
- The substance which decrease glycemia levels, thereby serving as an anti-diabetic agent
- Betel leaves enhance wound healing by augmenting protein content and accelerating wound contraction rate. They also mitigate oxidative stress, expediting the haling process of wounds, particularly burn the injuries.
- Eugenol found in betel leaves inhibits hepatic synthesis and intestinal absorption of cholesterol consequently reducing levels of low density lipoprotein (LDL) cholesterol through facilitation of its catabolic process.
- Therefore, betel leaves mitigate the risk of heart diseases and strokes as well as prevent asthma attacks through their anti-histamine and anti-inflammatory properties which facilitate unobstructed airflow in bronchitis, consequently reducing the asthma attacks.

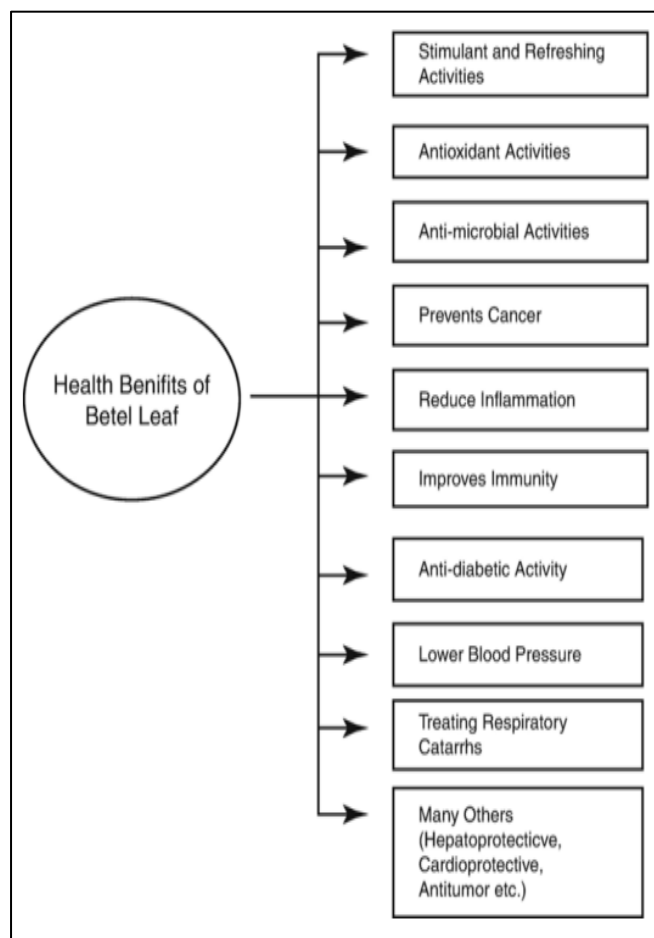


Fig 10 Importance of Betel Leaf

➤ *Some Therapeutic Properties of Piper Betel can be Expressed in Scientific Terms as Follows:*

• **Antimicrobial Activity:**

The aqueous and methanolic extract from piper betel leaves was observed against gram-positive and gram-negative bacterias. however the methanolic extract exhibited greater efficacy compared to the aqueous extract.

• **Antihistaminic Activity:**

The ethanolic extract and essential oil extract derived from piper betel demonstrate antihistaminic activity.

• **Anti Inflammatory Effect:**

The betel leaf was generally used to treat the inflammation in the oral cavity. It's ethanolic extract gives an anti-inflammatory activity.

• **Antiulcer Activity:**

Generally hydroalcoholic extract of Piper betel leaf gives antiulcer activity and in rats HCL ethanol.

• **Anidiabetic Activity :**

Antidiabetic activity of piper betel leaves was evaluated in both normoglycemic and streozotocin induced diabetic rats via oral administration of hot water extract and cold ethanolic extract.the cold ethanolic extract demonstrated a reduction in blood glucose level .

• **Anticarcinogenic Activity :**

Piper betel leaf extract act against prostate cancer , cervical cancer Leaf extract of this betel leaf plays vital role in thyroid function.

IV. CONCLUSION

According to their apearance it's nomenclature 'Green gold of India' . Piper betel is globally recognized and widely consumed as mouth freshner .it has a long history of traditional medicinal use dating back to ancient times.therefore , its continued utilization for therapeutic purpose like a anti- cancer, antidiabetic , antioxidant , antihistaminic , antibacterial , antiulcer etc.

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