



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Review Article

An Overview on Betel Leaf

Aakanksha Gavade*, Simra Fakir, Sindhu Shedbale, Dr. D. R. Jadage

Womens College of Pharmacy, Pethvadgaon Kolhapur.

ARTICLE INFO

Published: 09 April. 2025

Keywords:

Betel Leaf, Piper betel, caryophyllene, allylpyrocatecholdiacetate, chavibetol, chavibetol acetate, antinociceptive, anticancer, immunomodulatory, antihalitosis, anti-diabetic, gastroprotective.

DOI:

10.5281/zenodo.15180925

ABSTRACT

Linn. Piper betel. An seasonal and permanent creeper with shiny, hearts-like leaves that contain superb storage of phenolic substances that have anti-inflammatory, anti-microbial, anti-proliferative, or anti-mutagenic qualities is a significant species of the Piperaceae family. According to botanical research, the amount of the many chemically active compounds found in piper betel varies depending on the type of leaf. Pinene, f-Pinene, u-Limonene, safrole, 1-8-cineol, camphene, chavibetol methyl ether, eugenol, caryophyllene, allylpyrocatecholdiacetate, chavibetol, chavibetol acetate, and allylpyrocatecholmonoacetate are among the significant components found in Piper betel, according to multiple research in the plant. These components have antifungal, antinociceptive, anticancer, immunomodulatory, antihalitosis, anti-diabetic, gastroprotective, anti-allergic, antifertility, anti-filarial, anti-larvicidal, wound-healing, and antidermatophytic properties that make them useful stimulants. The goal of this review is to emphasize the studies on drugs and other conventional uses of Piper betel L.

INTRODUCTION

The family Piperaceae comprises the evergreen betel plant (Piper betel L.), a perennial root climber that prefers shade and features white catkin along with shiny, heart-like leaflets. [1]. In most of Southern and South Asia, it is accessible. Apart from its significant nutritional or medicinal advantages, betel leaves, often known locally as paan, has considerable sociocultural applications [2]. About 60–70% of people in Bangladesh

typically eat betel leaf on a regular basis [3]. In Southeast Asian countries' traditional medical systems, it has been utilized as a significant medicinal herb. The components of the betel leaves include lime fluid, cannabis (Nicotiana tabacum L.), and areca nut (Areca catechu L.), is not complete without betel leaves [4]. Numerous ailments, including For many years, betel leaves has been used as a treatment for a number of ailments, including joint pain, injury, traumas, eye infection, bowel problems, migraines, irritation,

***Corresponding Author:** Aakanksha Gavade

Address: Womens College of Pharmacy, Pethvadgaon Kolhapur.

Email ✉: simrafakir840@gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



mastitis in mastoid it, leucorrhea, diarrhea, tongue edema, foul respiration, burns and infections, and arthritis. [5]. Growing betel leaves has a lot of promise because it is crucial to South Asians' economies and means of subsistence [6, 7]. This plant, which belongs to the Piperaceae family, enjoys sheds. Its leaves are 4-7 inches long and 2-4 inches large, and it has a perennial creeper. It produces both male and female blooms. Due to its Malaysian origins, it is now widely used throughout the Chinese southern and southwestern. usually Southeast Asian nations like India, Sri Lanka, Thailand, Malaysia, and Taiwan develop these crops. [8]. In India, the Piper betle (P. betle) has been known by a variety of names, including Pan in Hindi, Nanbal in Arabic, Malayalam's Vetulicolid, Tamil's Vetali, Telugu's Tamalapaku, and Persian's Burg-e-Tanbol Pan in Bangladeshi, Naggable in Gujrati, and Videch-pan in Marathi [9]. Every year, India harvests Located on 50,000 hectare of territory 15–20 millions betel leaf leaves (Piper betle) are valued about an overall of nine billion [10]. According to sources, betel leaves is widely grown in Tamil Nadu, Orissa, Madhya Pradesh, Uttar Pradesh, and Maharashtra. as well as in a number of other countries like Malaysia, Sri Lanka, the Philippine Islands Bangladesh, and Burma [11]. The majority of Asians employ betel leaf as a masticator due to its strong, spicy, and aromatic flavor. Flavonoids, terpenoids, tannins, alkaloids, saponins, and other antioxidants are abundant in betel leaves [12].

History:

Because it is both perennial and evergreen, The piper betel leaf is good because Lord created it and given it its form of a human their heart. In soul caves in Northwestern Thailand, archaeologists have discovered betel traces that go back to 5500–7000 BC, a considerable time earlier systematic and periodic cultivation was used. Similar findings

have been found in Timor, Indonesia, which is from 3000 BC, and in the darkened tooth of a 2600 year old human being discovered in Palawan, Philippines. It was mentioned in the Palli-written "Mahawamsa," which is the oldest historical account in Sri Lanka. Some long-time betel It has been discovered that chewers in the nations of Thailand, Myanmar, and Indonesians' teeth are brown because they chew for a long time. Archaeological evidence suggests that eating betel leaf or areca nuts together dates back to very ancient times, while it is unclear when these two different stimulant compounds were first mixed. As a result, it could be difficult to determine when that chewing paan tradition first started. [13]. Nonetheless, the practice's age is attested by the fact that it is described in both the Vatsyayana's Kamsutra and Raghuvamsa. The social position of pan has been clarified by the fact that in ancient India, it was an honor to receive paan bida, a pair of leaf packed with churna (lime), katha (catechu), and supari (areca nut), from kings and nobility. Tambuladayini, Tambuladhikara, Tambuladyaka, and Tambulika are some examples of titles. among others, appeared in a number of works around this time (about 600 AD). In Kadambari, standard uses are listed. One of the methods for obtaining siddhi is paan, according to the Sakta-tantra. Without chewing betel and giving the Guru pan, it was believed that no siddhi could occur [13].



Ayurvedic Significance:

Pipe betel, also called Saptasira in Vedic and Tambool, Nagvelleri, or Nagani in Sanskrit, was employed as a medicine for a variety of ailments. Vatsyayana's Kamasutra and Panchatantra and Kalhan's Rajatarngni, perhaps the best extant example of early Sanskrit literature, both make reference to Tambool. As a result, Tambool has alluded to a period of almost two thousand years. The properties of betel leaf in Ayurvedic medicine are described as follows;

Guna (Quality): Tikshan, Ruksha, and Laghu

Taste (Rasa): Tikta

Metabolic (Vipak): Katu

(Impact) Prabhav: Hridya

In Ayurveda, betel leaf extract is commonly used as an adjuvant or conjunction with medications. possibly for superior effects, in addition to being used as a medicinal on its own. The leafy parts of the tambool plant are described in the Sushruta Samhita as aromatic, pungent, sour, acrid, and beneficial as an appetizer, laxative, and voice aid. Additionally, they calm Vata and increase Pitta. [13].

Synonyms [14].

- Betel pepper.
- True pepper
- Pepper vine.
- Piper.

Morphology [15].

- Shape: Heart-shaped
- Length: 15-18cm
- Width : 10cm
- Colour : Deep Green
- Margin : The total margin
- Base : Symmetric Base

- Apex: Acute

Taxonomical Classification:

- Kingdom: Plantae
- Classification: Magnoliophyta
- Category: Magnolipsida
- Order: Piperales
- Family: Piperaceae
- Species: Piper
- Type: Betel

Vernacular Names:

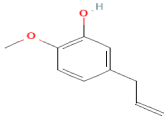
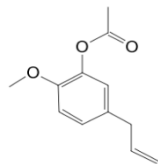
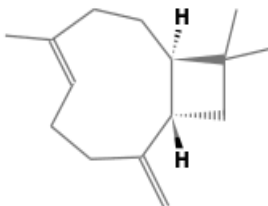
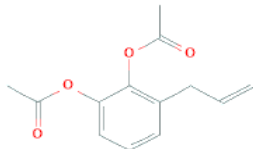
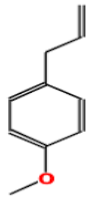
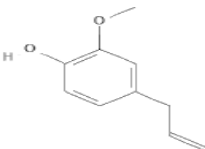
- Sanskrit: Varnalata, Mukhbhushan, and Tambool
- Hindi: Paan
- English : Betel, Betel pepper and Betel-vine
- Telugu : Nagballi and Tamalapaku
- Tamil : Vetrilai
- Gujarati : Nagarbael

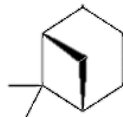
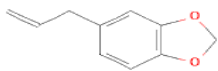
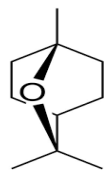
Chemical Constituents:

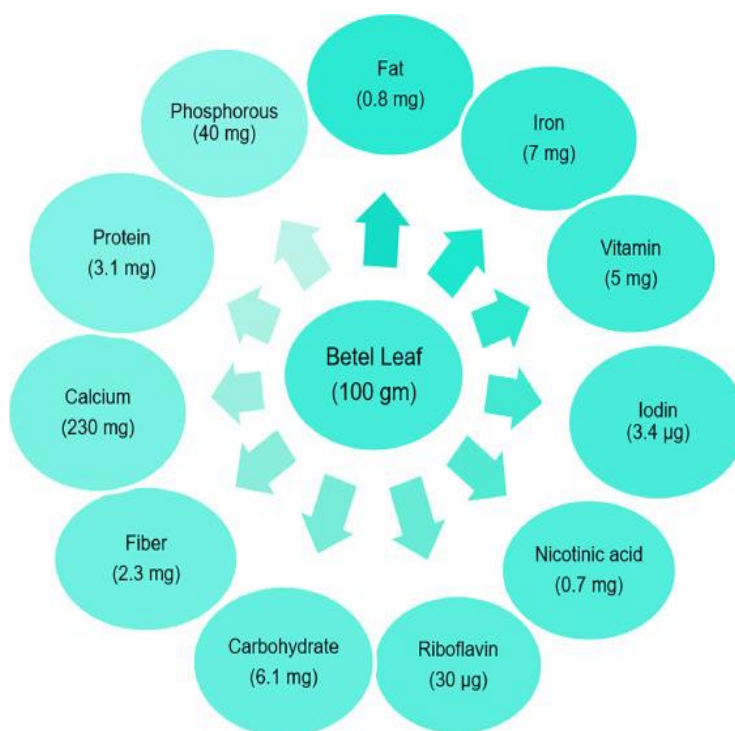
The alkaloids, carbohydrates, proteins, the tannins, and steroid constituents were discovered in the leaves following phytochemical examination [16]. Phenol is a compound that resembles terpene. give plants their distinct, intense, pungent, aromatic flavor [17]. Each leaf is composed of 85–90% water, 3–3.5% amino acids, 0.5–6.1% carbs, 2.3–3.3% elements, 0.4–1% fat, 2.3% fiber, 0.08–0.2% essential oil, 0.1–1.3% the tannin, and alkaloid (arakene). It also contains the following minerals: beta (10-70µg/100 gms), riboflavin (1.9-30µg/100 gms), an A vitamin (1.9-2.9 mg per 100 gms), nicotinic acid (0.63-0.89 mg per 100 gms), and vitamin C (0.005-0.01%). In addition to these, it has elements such sodium (1.1–4.6%), phosphorus (0.05–0.6%), iodine (3.4µg/100gms), calcium (0.2-0.5%), and iron (0.005-0.007) [18]. Compared to older leaves, the newer leaves have considerably higher levels of sugar and the



enzyme diastase. Betel tree leaf also include carbolic acid [19].It is a colourless liquidfound
 'Chavicol' which is four more powerful as jointly with terpenes in betel leaves oil.
 antibacterial ingredient as comparison to the

Sr. No	Chemical Constituents	%Of Chemical Constituents	Structure
1.	Chavibetol	53.1	
2.	Chavibetol acetate	15.5	
3.	Caryophyllene	3.71	
4.	Allylpyrocatechol diacetate	0.71	
5.	Chavibetol methyl ether	0.48	
6.	Eugene	0.32	

7.	a-Pinene	0.21	
8.	Safrole	48.7	
9.	1, 8-Cineole	0.04	



Cultivation and Collection:

Propagation: -

With the use of cuttings or root departments, propagation is simple. Betel needs semi-colored,

well-tired, fertile soil. Soils that are alkaline, saline, or wet are not suitable for growing it.

Cultivation: -

Initially, construct a barouj, or lawn, where betel is to be grown. Bamboo sticks and coconut leaves are used to fence the barouj. The dirt is plowed into

furrows that are 75 cm wide, 10 to 15 meters long, and 75 cm deep. Oil cakes are incredibly well mixed with the trench dirt and timber ash, manure, and leaves. At the start of the monsoon season, the cuttings are planted. For this crop to be successfully cultivated, proper coloring and irrigation are essential. Betel prefers soil that is consistently moist, but not excessively so. Mild status water must no longer be left for more than ½ of an hour, and irrigation is widespread.



Ethnobotanical Uses:

Leaf:

The leaf extract has antioxidant, antifungal, and antimalarial properties. Additionally, it is used to alleviate indigestion and coughing, particularly in youngsters. Additionally, it is cytotoxic, antimalarial, antibacterial, insecticidal, antidiabetic, and gastric protecting.

Stem:

It has demonstrated efficacy in treating bronchitis, asthma, indigestion, and cough.

Whole plant:

Both as a spice and as a meal, piper betel is utilized. Because of its strong flavor, it is also used

Collection: -

The vine will branch after reaching a height of 150 to 180 cm in three to six months. The farmer uses his right thumb to pluck the leaf and its petiole together as harvest gets underway. The harvest lasts anything from 15 days to a month or longer. [41].

in perfumes, oils, anti-infectives, and hallucinogens. Its use against worms has also been demonstrated by recent studies. Normalizing the digestive tract and preserving the digestive system are some other applications. Its light characteristics are the cause of this [42].

Uses of betel leaf:

- 1. Headache:** One well-known natural remedy for brain pain is betel leaf. The betel leaf possesses cooling and pain-relieving qualities. It is often used to relieve severe brain pain over the painful area with positive results.
- 2. Limited or blocked peeing:** Betel leaf juice is thought for its diuretic properties. The pulp facilitates peeing when combined with low milk and somewhat improved.

- 3. Nerve weakness:** Betel leaves are essential for treating debility, anxiety-inducing aches, and nervous fatigue. A single teaspoon of the juice of two betel leaves or buds can be taken twice a day, and it makes a delicious tonic when combined with a tablespoon of honey.
- 4. Sore throat:** A great natural treatment for hacking and throat pain is the betel leaves. The leaves have been used in the neighborhood to cure sore throats. To relieve a bothersome hack, mix the crushed organic product or fruit with nectar and consume it.
- 5. Respiratory Disorders:** Both young and old can benefit from betel leaves in terms of aspirational fondness. Coughing and insomnia may be relieved by applying the warmed leaves that absorbed mustard oil on the chest.
- 6. Constipation** A suppository made up of Castor oil-soaked betel leaf tails can be applicable to the rectum of youngsters who have blockage. This rapidly reduces obstruction.
- 7. Problem of breast milk secretion:** When applied to the bosoms during breastfeeding, Oil-smearred leaves are said to encourage the production of milk.
- 8. Inflammation:** Betel leaves, when applied topically, are beneficial in treating irritants, such as joint discomfort and orchitis, which is the enlargement of the testicles.
- 9. Wounds:** Betel leaves can help cure damaged tissue. After extracting the fresh juice from a few leaves, apply the juice to the wound, fold and bind a betel leaf, and the injury will heal in two full days with a single application.
- 10. Boils:** Additionally, betel leaf works well as a bubble remedy. A layer of castor oil is applied after a leaf has been gently warmed till it becomes pliable. The thrilling portion is covered with the oiled leaf. Like clockwork, this leaf needs to be replaced. The bubble will burst to remove all of the purulent problem after a few uses. You can finish

the application in the night and take it off in the morning.

Various proved activities of Piper betle:

■ Pharmacological Action:-

In many nations, traditional medicine uses a wide range of natural ingredients to treat a variety of illnesses. With more than 2000 species, The Piperaceae family includes piper betel. The plant is indigenous to India. The mechanisms underlying the effectiveness of piper betel leaves against a number of human diseases remain unclear. Since ancient times, piper betel extract have been used to cure a variety of illnesses due to their important qualities, that include anti-oxidant, anti-cancer & anti-allergic effects.

■ Antibacterial: -

The betel leaves (Piper betle) were first dried then powdered in a mixer, extracted with water, and finally heated to 90 degrees Celsius for 15 minutes in order to utilise the disc diffusion method to test the antibacterial properties. *S. epidermidis*, *S. aureus*, and *E. coli* were the bacteria that were employed, and ampicillin-sulbactam was used as a positive control. The results show that zone size against gram-positive (*S. aureus*, *S. coli*) and gram-negative (*E. coli*) bacteria is inhibited by betel leaves (Piper betle). *epidermidis*) bacteriaThe betel leaf contains terpenoids, alkaloids, phenols, flavonoids, tannins, glycosides, phenols, saponins, and essential oils. This essential oil contains 5- (2-propenyl)-1,3-benzodioxole (25.67%), 2-methoxy-4-(2-propenyl) acetatephenol (8.00%), and eugenol (18.27%). The antibacterial property in essential oils comes from oxygenated terpenoids, which include phenolic terpenes and alcohol; in contrast, some hydrocarbons



are typically inactive [20]. Other research findings have demonstrated that betel leaf (Piper betle) had antibacterial properties when examined in *Escherichia coli* & *Pseudomonas aeruginosa* are gram-negative bacteria, while *Staphylococcus aureus*, *Bacillus subtilis* & *Micrococcus luteus* are gram-positive bacteria. Both ethanol and water solvents shown antibacterial activity when Piper betle leaves were extracted. The presence of numerous strong chemicals, including glycosides, phenolic substances, tannins, and alkaloids, may be the cause of the notable antibacterial action [21].

▪ **Antimicrobial:-**

The disc diffusion method was employed in the betel leaf ethanol extract antibacterial activity test. When betel leaf powder (Piper betle) was subjected to phytochemical testing in the past, it was discovered to include proteins, carbohydrates, polyphenol compounds, flavonoids, alkaloids, and total antioxidants. Using the DPPH technique, the ethanol extract demonstrated antioxidant activity. It is clear that these extracts demonstrate strong antibiotic activity against all kinds of bacteria that were investigated, including *Proteus vulgaris*, *Klebsiella pneumonia*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa* [22]. Antibacterial properties can also be attributed to antioxidants present in medicinal plants. Four different extracts of Piper betle leaves (water, methanol, ethyl acetate, or petroleum ether) showed a unique zone of reduction against all four pathogenic bacteria: *Escherichia coli*, *Proteus vulgaris*, *Staphylococcus aureus*, and *Streptococcus pyogenes*, according to additional testing. This is because the betel extract contains significant amounts of sterol activity. Additionally, betel extract includes

fatty acids that exhibit strong antibacterial activity against a variety of pathogenic microorganisms, including hydroxy ester fatty acids, palmitic acid, and stearic acid [23].

▪ **Analgesic and Anti-Inflammatory: -**

The phytochemical study was performed after The Soxhlet apparatus was used to extract the hydroalcoholic solution (HEPBL) of betel leaves.. Experimental animals were Swiss albino mice of both sexes measuring 22–25 g and Wistar rats weighing 150–220 g (aged 8–12 weeks). The analgesic efficacy was investigated using tail-flick and acetic acid induction techniques, HoweverThe anti-inflammatory activity was investigated using models of cotton grain granuloma and carrageenan-induced paw oedema. HEPBL showed considerable analgesic efficacy at 100 mg/kg & 200 mg/kg, and it had major anti-inflammatory effects at 50, 100, and 200 mg/kg. Additionally, the subtherapeutic impact of the usual analgesic dose is strengthened by the subtherapeutic dose of HEPBL at 50 mg/kg. Flavonoids, tannins, phenols, and glycosides are among the phytochemical components that provide P. betle its analgesic and anti-inflammatory properties [24].

▪ **Antioxidants: -**

The DPPH ascorbic acid radical's mean IC₅₀ (µg/ml) was found to be 3.128, suggesting that Betel leaf ethanol extract has antioxidant properties. The mean IC₅₀ (µg/ml) of the ethanol extract was found to be 9,362. The DPPH radical was moderately affected by the leaf of Piper betle L. in an ethanolic extract [25]. Research employing rabbits as test subjects has shown that At multiple concentrations (5%, 10%, and 15%), ethanol



extract from betel leaves (*Piper betle*) has antioxidant qualities. After being shaved, rabbits were attached to their backs with heated metal until the dermis and the tissue beneath it were blistered. The treatment was administered once day for seven days, basting it evenly. Next, a microscope was used to view the rabbit's back process of wound healing. Bioplacenton served as the positive control.. Rabbits' back burns can be healed with 5%, 10%, and 15% betel leaf ethanol extract (*Oryctolagus cuniculus*). The recovery process is accelerated by the bioactive substances found in betel leaves, including flavonoids, phenols, essential oils, tannins, and saponins [26].

▪ **Antidiabetic: -**

The efficacy of crude betel leaves (*Piper betle*) flower extract in reducing glucose generation has been demonstrated by *ex vivo* studies. Known to possess strong antioxidant properties, the sample extract had a high DPPH radical scavenging activity of $92.0 \pm 0.68\%$ for the ethanol extract and a gallic acid equivalent of 0.39 ± 0.05 mg/ml for the methanol extract.. Antioxidants effectively lower the amount of glucose produced by chicken hepatocytes stimulated by cortisol. In contrast to the Over time, hepatocyte It was discovered that treatments using 15% methanol extract from fresh *Piper betle* flower & 5% ethanol extract of dried powdered betel leaves reduced gluconeogenesis. After being treated with a dry 5% ethanol extract of *Piper's betle* leaf powder, cortisol-induced chicken hepatocytes released more glucose during the first hour and thereafter less for a maximum of 60 minutes. The reduction in gluconeogenesis was more noticeable in the methanol extract than in the ethanol extract. The sample of extract was harmless at concentrations, according to the

MTT test. of 10, 20, 30, 40, and 50 μ l during a 24-hour incubation period for hepatocytes [27]

▪ **Anticancer Activity: -**

Breast cancer is a very prevalent disorder among women globally, annually, with 1.38 million the new cases recorded (Eccles et al, 2013). The disease's late prognosis, such as being discovered recently in the metastatic stage, is typically the reason for the high death rate. High matrix metalloproteinase (MMP) expression, cell migration, invasion, and other metastatic cascade-related phenomena are characteristics of this phase. Chemotherapeutic medications must be developed in order to treat these disorders, as radiation therapy and surgery alone are insufficient [28]. The cytotoxicity and anti-migration properties of the red betel leaf methanolic extract against spread breast cancer were evaluated by Zulharini M et al. (2018). Because red betel leaf (*Piper crocatum* Ruiz dan Pav) contain biphenolic chemicals such luteolin derivatives and apigenin that have cytotoxic effects on cancer cells, they are used as herbal medicine [29].

▪ **Anti-fungal Activity:-**

Hydroxychavicol, which was extracted from piper betel leaves, has antifungal properties *in vitro*. To find the minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC), the broth microdilution method was employed. Among fungal species of clinical importance, hydroxychavicol showed an inhibitory effect of MICs ranging between 15.62 – 500 μ g/ml for yeast, 125 – 500 μ g/ml for *Aspergillus* types, & 7.81 – 62.5 μ g/ml for dermatophytes. The antifungal activity of this chemical supports its utilization as an antifungal medication, particularly for

the treatment of cutaneous infections and the prevention of oral candida infection with gargle mouth wash [30].

▪ **Gastroprotective Activity: -**

The effectiveness of daily 150 mg/kg body weight P. betel ethanol extract administration for ten days in terms of healing following the formation of peptic ulcers in albino rats by NSAIDs. Mucus, total stomach tissue sulphahydryl group, and antioxidant factors such as superoxide dismutase and catalase activity increased during the healing process after receiving piper betel extract. Overall it can be inferred that the tree extract's therapeutic properties may stem from its capacity to gather free radicals or act as an antioxidant [31].

Anti-fertility Action

Piper betel Linn. (petiole)'s capacity to prevent female albino rats from becoming pregnant A 50% ethanolic extract of Piper betel (Petiole) was administered daily to 150–200 g normal cyclic female Wister strain Albino rats (*Rattus norvegicus*) for 30 days. When compared to control values, it was discovered that Piper betel medication resulted in a decrease in reproductive factors such as organ weights, circulating estrogen levels, fertility, litter size, blood glucose levels, acid phosphate enzyme activity, SGOT, and SGPT. Following Piper betel therapy, the concentrations of ascorbic acid and cholesterol rose, indicating that the body did not use cholesterol and that ascorbic acid was mobilized when using phyto-drugs to treat illnesses brought on by stress. The rats in the treated group had a lengthy and irregular oestrus cycle.. According to the research, the ethanolic extract of Piper betel had anti-estrogenic and anti-fertility effects on female rats. These effects were temporary and

non-toxic. In both male and female rats, the leaf-stalk's alcoholic extract significantly reduced fertility [32, 33].

▪ **Anti-malaria activity: -**

Citronella oil, a common mosquito repellent, was not as effective against *Anopheles stephensi* & *Culex fatigans* bites as essential oils of the Piper betle. Piper betle oil, when applied at a dosage of 20 µl/cm², offered safety from *Anopheles stephensi* & *Culex fatigans* for almost 4 hours, but citronella oil only offered protection for 2.2 and 2.6 hours, respectively. [34].

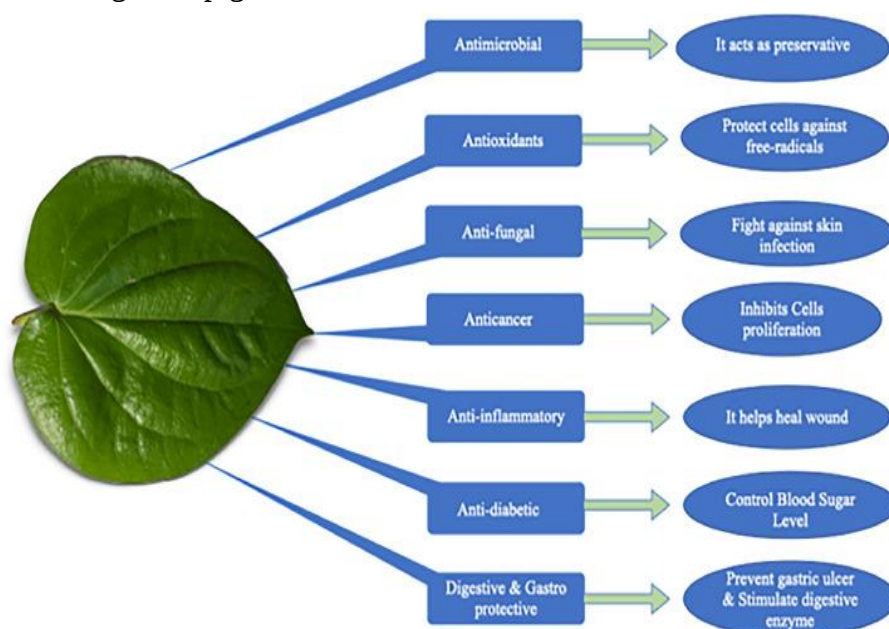
▪ **Anti-allergic activity: -**

Piper betle inhibits the synthesis of allergy mediators by lung epithelial cells and bone marrow-derived cells. According to the findings, Piper By inhibiting the production of allergic mediators, Betle might provide a novel method of treating allergy diseases. [35]. An antiseptic was used to either eliminate or drastically lower the amount of bacteria present in the surgical center while the procedure was being performed. A cataract patient was successfully treated with piper betle leaves before treatment [36]. employed guinea pigs to evaluate Piper leaf extract's antihistaminic qualities.[37].

▪ **Anti-asthmatic effect: -**

guinea pigs' ability to be protected against asthma by piper betles. The tracheobronchial smooth muscles was hyperresponsive to several stimuli, which resulted in asthma. Inflammation was a feature of bronchial asthma. One possible cause of respiratory asthma is superoxide and free radicals. It is possible for histamine to cause bronchoconstriction. Although its effectiveness was not as strong as that of di-

phenyl hydramine", The extract from piper betle can greatly lessen the effects of bronchial asthma. Leukotriene and different mediators are involved in human asthma, however. As a result, it was unknown how Piper betle L. affected human asthma. But that study demonstrated that Piper betle helped lessen pulmonary asthma in guinea pigs.[38,39,40].



Betel Leaf's Use and Various Medical Properties

Toxicity:

The short-term safety of oral betel nut is not well understood. However, high dosages or prolonged oral use of betel nut are not thought to be safe. There are certain compounds in betel nuts that have been connected to cancer. Certain substances are poisonous. Death can result from consuming 8 to 30 grams of betel nut. Redness of the mouth, lips, and feces might result from chewing betel nut. Caffeine and tobacco use are examples of its adverse consequences. Serious adverse effects can also include drooling, gum disease, vomiting, diarrhea, chest discomfort, low blood pressure, irregular heartbeat, breathing difficulties, heart attacks, dehydration, and death [43].

Chemical Tests of betel Leaf:

- 1. Alkaloids test:** A brownish precipitate showed that alkaloids were present when 2ml of extract and 2ml of Wagner's reagent were combined.
- 2. Cardiac glycoside test:** A layer was carefully created by adding strong sulfuric acid after 2 ml of extract had been dissolved in 2 ml of chloroform. At the interface of the steroid ring, a rich reddish brown color indicates a presence of cardiac glycosides.
- 3. Flavonoids test:** 2 ml of drug extract were mixed with 2 ml of 10% lead acetate. Their yellowish green color indicates the presence of flavonoids.
- 4. Saponins test:** Benedict's reagent was added to 2 ml of drug extract to dissolve it. The blue-black precipitate indicates that saponins are present..



5.Tannins test: We treated 2 ml of drug extract with 0.1% ferric chloride. When a tannin chemical entity is present, it appears brownish green.

6.Terpenoides test: (The Salkowski test 2ml of drug extract were measured, diluted in 2 ml of chloroform, and then carefully mixed with strong sulphuric acid to create a layer. Terpenoids are indicated by a reddish-brown .

7.Anthraquinones test: 1 ml of extract was heated in a water bath for a few minutes. after 10% HCL was added. Once filtered, it cooled. A little amount of 10% ammonia was added to the filtrate, followed by an equivalent volume of CHCl₃, and the combination was heated. The development of a rose pink hue indicates the presence of anthraquinones.

CONCLUSION:

Piper betel (betel leaf) has significant medicinal value, used traditionally in Ayurveda for its therapeutic properties such as aiding digestion, treating cough, and promoting overall health. Its bioactive compounds, including alkaloids and essential oils, provide antibacterial, anti-inflammatory, antioxidant, and anticancer effects. While it shows promise in treating various conditions, such as respiratory issues and wounds, caution is needed with long-term or excessive use due to potential health risks. Overall, betel leaf offers considerable medicinal benefits, however, more investigation is needed to properly evaluate its long-term impacts and safety.

REFERENCES

1. Chakraborty, D. 2011. Antimicrobial, anti-oxidative, anti-hemolytic activity of Piper betle leaf extracts. *International Journal of Pharmacy and Pharmaceutical Sciences*. 3: 975-1491.
2. <http://www.dawn.com/news/33381/betel-leaf-farming-in-coastal-area>.
3. Husna, A. A.; Islam, M. A.; Rahman, T. and Khatun, M. M. 2015. Efficacy of vinegar, sorbitol and sodium benzoate in mitigation of Salmonella contamination in betel leaf. *J. Adv. Vet. Anim. Res.* 2 (2): 190-194.
4. Rai, M. P.; Thilakchand, K. R.; Palatty, P. L.; Rao, P.; Rao, S.; Bhat, H. P., Baliga, M. S. 2011. Piper betle Linn (Betel Vine), the Malignant Southeast Asian Medicinal Plant Possesses Cancer Preventive Effects: Time to Reconsider the Wronged Opinion. *Asian Pacific Journal of Cancer Prevention*. 12: 2149-2156.
5. Agarwal, T.; Singh, R.; Shukla, A. D.; Waris, I. and Gujrati, A. 2012. Comparative analysis of antibacterial activity of four Piper betle varieties. *Advances in Applied Science Research*. 3 (2): 698-705.
6. Jeng, J. H.; Chen, S. Y.; Liar, C. H.; Tung, Y. Y.; Lin, B. R.; Hahn, L. J. and Chang, M. C. 2002. Modulation of platelet aggregation by areca nut and betel leaf ingredients: Roles of relative oxygen species and cyclooxygenase. *Free Radical Biology and Medicine*, 32 (9): 860-871.
7. Guha, P. 2006. Betel leaf: The neglected green gold of India. *J Hum Ecol.* 19, 87-93.
8. Kirtikar KR, Basu BD. *Indian medicinal plant* VOI' III, 2nd ed. *Latin Mohan BUSA prakashan*, Allahabad, 1993; 2131.
9. A.P. Patra, A.K. Mukherjee, L. Acharya Comparative study of RAPD and ISSR markers to assess the genetic diversity of betelvine (Piper betle L.) in Orissa *Am J Biochem Mol Biol*, 2011; 1(2): 200-211.
10. Mazumder, S., Roychowdhury, A., & Banerjee, S. (2016). An overview of betel leaf (Piper betle L.): A review. *Annals: Food Science and Technology*, 17(2), 367–376.
11. Madhumita, M., Guha, P., & Nag, A. (2020). Bio-actives of betel leaf (Piper betle L.): A comprehensive review on extraction, isolation,



- characterization, and biological activity. *Phytotherapy Research*, 34(10), 2609–2627. <https://doi.org/10.1002/ptr.6715>
12. Heliawati, L., Lestari, S., Hasanah, U., Ajiati, D., & Kurnia, D. (2022). Phytochemical profile of antibacterial agents from red betel leaf (piper scrotum Ruiz and Pav) against bacteria in dental caries. *Molecules*, 27(9), 2861. <https://doi.org/10.3390/molecules27092861> (Basel, Switzerland).
13. Bissa S, Songara D. and Bohra A: Traditions in oral hygiene: chewing of betel (Piper betle L.) leaves. *Current Science*, 2007; 92(1): 26-8.
14. Available from: <https://www.synonym.com/synonyms/betel>
15. Evans WC. Trease and evans pharmacognosy. 15th ed. Edinburgh London [NY]: Saunders Publication, 2002.
16. Sugumaran, M.; Poornima M.; Venkatraman S.; Lakshmi M.; Srinivasansethuvani. 2011. “Chemical composition and antimicrobial activity of sirugamani variety of Piper betle Linn Leaf oil”, *Journal of Pharmacy Research*. 4 (10): 3424-3426.
17. Bajpai, V.; Sharma, D.; Kumar, B.; Madhusudanan, K. P. 2010. “Profiling of Piper betle Linn. Cultivars by direct analysis in real time mass spectrometric technique”, *Biomedical Chromatography*. 24 (12): 1283-1286.
18. Guha, P. 2006. Betel leaf: The neglected green gold of India. *J Hum Ecol*. 19, 87-93.
19. Kumar, N.; Misra, P.; Dube, A. and others. 2010. Piper betle Linn. A maligned Pan-Asiatic plant with an array of pharmacological activities and prospects for drug discovery. *Curr Sci*. 99: 922-32.
20. Hartini, Y, S., Yohanes, M, S, D., Rekhel, N., and Elisa S. Antagonistic Antibacterial Effect of Betel and Red betel Combination against Grampositive and Gram-negative Bactria. *International Journal of Curren Microbiology and Applied Sciences*, 2018; 7(5):267-272.
21. Kaveti, B., Lisa, T., Tan, S, K., and Mirza, B. Antibacterial Activity of Piper Betel Leaves. *International Journal of Pharmacy Teaching & Practices*, 2011; 2(3): 129-132.
22. Datta, A., Shreya, G., and Mukesh S., Antimicrobial Property of Piper betel Leaf Against Clinical Isolates of Bacteria. *International Journal of Pharma Sciences and Research*, 2011; 2(3):104-109.
23. .Chakraborty, D., and Barkha, S. Antimicrobial, Anti-oxidativeand Anti-hemolytic of Piper betel Leaf Extracts. *International Journal of Pharmacy and Pharmaceutical Sciences*, 2011; 3(3):192- 199.
24. Reddy, P, S., Rajesh, K, G., and Srikanth, M, R. Analgesicand Anti-inflammatory activity of Hydroalcoholic Extract of Piper betle Leaves in Experimental animals. *International Journal of Basic & Clinical Pharmacology*, 2016; 5(3): 979- 985.
25. Perumal, P., Kavitha, S. Antidiabetic, and Antioxidant Activities of Ethanolic Extract of Piper betle L. Leaves In Catfish. *Asian Journal of Pharmaceutical and Clinical Research*, 2018; 11(3): 194-198.
26. Asri, M. Pengaruh Efek Ekstrak Etanol Daun Sirih (Piper betle Linn.) Sebagai Antioksidan Terhadap Luka Bakar Pada Kulit Punggung kelinci (*Oryctolagus cuniculus*). *Jurnal Farmasi As-Syifaa*, 2017 ; 9(2) : 182-187.
27. Kumar, S, S. ExVivo Studies On Gluconeogenes is Inhibitory Activity Of Piper betle Inflorescence. *International Journal of Engineering Applied Science and Technology*, 2020; 5(2): 264-268.
28. Mavaddat N, Peock S, Frost D, Ellis S, Platte R, Fineberg E, Evans DG, Izatt L, Eeles RA, Adlard J and Davidson R: Cancer risks for BRCA1 and BRCA2 mutation carriers: results from prospective analysis of EMBRACE.



- JNCI: J of the National Canc Inst 2013; 105(11): 812-22.
29. Zulharini M, Sutejo IR, Fadliyah H and Jenie RI: Methanolic extract of red betel leaves (*Piper crocatum* Ruiz & Pav) perform cytotoxic effect and anti-migration activity toward metastatic breast cancer. *Indonesian J of Cancer Chemoprevention* 2018; 8(3): 94-100.
30. Ali I, Khan FG, Suri KA, Gupta BD, Satti NK, Dutt P, Afrin F, Qazi GN and Khan IA: In-vitro anti-fungal activity of hydroxychavicol isolated from *Piper betle* L. *Annals of Clin Micro and Anti-Microbials* 2010; 9(1): 7.
31. Majumdar B, Chaudhuri SG, Ray A and Bandyopadhyay SK: Effect of ethanol extract of *Piper betle* Linn. leaf on healing of NSAID-induced experimental ulcer-A novel role of free radical scavenging action.
32. Sharma JD, Sharma L and Yadav P: Anti-fertility efficacy of *Piper betle* Linn. (Petiole) on female albino rats. *Asian J Exp Sci* 2007; 21(1): 145-50.
33. Priya G, Saravanan K and Renuka C: Medicinal plants with potential antifertility activity-A review of sixteen years of herbal medicine research (1994-2010). *Int Journal of Pharm Tech Research* 2012; 4(1): 481-94.
34. Pal M, Chandrashekar K. Mosquito repellent activity of *Piper betle* Linn. *International Journal of Pharmacy & Life Science*. 2010; 1(6):313-315.
35. Wirotasangthong M, Inagaki N, Tanaka H, Thanakijcharoenpatha W, Nagai H. Inhibitory effects of *Piper betle* on production of allergic mediators by bone marrow-derived mast cells and lung epithelial cells. *International Immunopharmacology*. 2008; 8(3):453-457.
36. Amalia H, Sitompul R, Hutauruk J, Andrianjah IAM. Effectiveness of *Piper betle* leaf infusion as a palpebral skin antiseptic. *Universa Medicina*. 2009; 28(2):83-91.
37. Hajare R, darvhekar VM, Shewale A, Patil V. Evaluation of antihistaminic activity of *Piper betle* leaf in guinea pig. *African Journal of Pharmacy and Pharmacology*. 2011; 5(2):113-117.
38. Darvhekar VM, Patil VR, Shevale A, Choudhari AB. Evaluation of antihistaminic activity of *Piper betle* leaf in Guinea Pig. *Journal of Pharmacy Research*. 2011; 4(3):899-901.
39. Rekha VPB, Kollipara M, Gupta BRSSS, Bharath Y, Pulicherla KK. A review on *Piper betle* L.: Nature's promising medicinal reservoir. *American Journal of Ethnomedicine*. 2014; 1(5):276-289.
40. Misra KH, Kodanda RB, Ranjita N, Bandyopadhyay M. Evaluation of anti-asthmatic effect of ethanol extract of *Piper betle* L. against histamine induced Bronchospasm in guinea pigs. *International Journal of Basic and applied chemical sciences*. 2014; 4(1):67-73.
41. Patel NM, Jain DD, Suryawanshi HP, Pawar SP. Phytopharmacological Study of *Piper betle* Leaf. *Saudi Journal of Medical and Pharmaceutical Sciences*. 2019; 5(11):964-971.
42. Pawar S, Bhane P, Jha U. Review on Betel Pepper Leaf for Anti-inflammatory Activity. *World Journal of Pharmaceutical Research*. 2022; 11(2), 1196-1208.
43. Pradhan D, Suri KA, Pradhan DK, Biswasroy P. Golden heart of the nature: *Piper betle* L. *Journal of Pharmacognosy and Phytochemistry*. 2013;1(6): 147-167.

HOW TO CITE: Aakanksha Gavade*, Simra Fakir, Sindhu Shedbale, Dr. D. R. Jadage, An Overview on Betel Leaf, *Int. J. of Pharm. Sci.*, 2025, Vol 3, Issue 4, 973-985 <https://doi.org/10.5281/zenodo.15180925>

