

Review Article**Uses Impact of Betel Leaf (*Piper betle* L.) on Public Health****Md. Farid Hossain^{1,*}, Mustafa Anwar², Shaheen Akhtar³, Sharker Md. Numan⁴**¹School of Agriculture and Rural Development, Bangladesh Open University, Gazipur, Bangladesh²Department of Surgery, Ibn Sina Medical College and Hospital, Dhaka, Bangladesh³Department of Community Medicine, Shahabuddin Medical College and Hospital, Dhaka, Bangladesh⁴School of Science and Technology, Bangladesh Open University, Gazipur, Bangladesh**Email address:**

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Abstract: This review paper focus on the uses and health impact of betel leaf (*Piper betle* L.). The betel plant belongs to the family Piperaceae. Traditionally betel leaf is chewing after taking meal having significant medicinal properties and nutritional values. It contains some vitamins, minerals and produce enzyme that helps in digestion and work as mouth freshener. Literature shows that the leaf has a significant antimicrobial activity against broad spectrum of microorganisms. The betel leaf is predominantly consumed as betel quid, which is a mixture of substances areca nut, tobacco and lime. Some reports may suggest that betel quid has adverse health effects but most of the findings show that the betel leaf has many medicinal benefits and it has no adverse effects.

Keywords: Betel Leaf, Betel Quid, Medicinal Value, Health Hazard, Importance

1. Introduction

The betel plant (*Piper betle* L.) is an evergreen; shade loving perennial root climber belongs to the family Piperaceae with glossy heart shaped leaves and white catkin [1]. It is available in most of South and Southeast Asia. Betel leaf is locally known as *paan*, which has an important socio-cultural uses, besides having significant medicinal properties and nutritional values [2]. In Bangladesh, about 60-70% of people usually consume betel leaf frequently [3]. It has been used as an important medicinal plant in the traditional treatment systems of Southeast Asian countries. Betel leaves are an integral component of the betel quid that consists of areca nut (*Areca catechu* L.), tobacco (*Nicotiana tabacum* L) and slaked lime [4]. Betel leaf is traditionally known to be useful for the treatment of various diseases like bad breath, boils and abscesses, conjunctivitis, constipation, headache, itches, mastitis, mastoiditis, leucorrhoea, otorrhoea, swelling of gum, rheumatism, cuts and injuries [5]. Betel leaf cultivation has vast potential as it plays an important role in economics and livelihood of people in South Asia [6, 7].

2. Chemical Constituents

Phytochemical investigation on leaves revealed the presence of alkaloids, carbohydrate, amino acids, tannins and steroidal components [8]. The specific strong pungent aromatic flavour in leaves is due to phenol and terpene like bodies [9]. The leaf contains water (85-90%), proteins (3-3.5%), carbohydrates (0.5-6.1%), minerals (2.3-3.3%), fat (0.4-1%), fibre (2.3%), essential oil (0.08-0.2%), tannin (0.1-1.3%) and alkaloid (arakene). It also contains different vitamins like vitamin-C (0.005-0.01%), nicotinic acid (0.63-0.89mg/100gms), vitamin-A (1.9-2.9mg/100gms), thiamine (10-70µg/100gms), riboflavin (1.9-30µg/100gms). Beside these it contains minerals such as calcium (0.2-0.5%), iron (0.005-0.007), iodine (3.4µg/100gms), phosphorus (0.05-0.6%), potassium (1.1- 4.6%) [7]. The fresh new leaves contain much more amount of essential oil diastase enzyme and sugar as compare to old leaves. Betel leaf also contain 'Chavicol' that is four times potent as antiseptic agent as compare to carbolic acid [10, 11-18]. It is a colorless liquid

found together with terpenes in betel oil.

3. Medicinal Values

The leaves are the most valued part of plant that is used as a chewing agent to prevent halitosis. The leaves are also supposed to harden the gum, conserve the teeth and to prevent indigestion, bronchitis, constipation, congestion, cough and asthma [4]. Betel leaf is a second most popular daily consumption item in Asia, which contribute the best oral hygiene to oral cavity [19]. The fresh betel leaves possess antimicrobial, act against ringworm, antifungal, so it act as antiseptic and antihelminthic effects [20]. The leaves have wound healing property [21]. Betel leaves extract increases the salivation which increases the amount of peroxidase, lysozyme and antibodies to combat against bacterial growth in the oral cavity. Chewing of betel leaf not only accelerating the salivation but also enhances the gastric juice, pancreatic lipase secretion which aids in digestion process. To getting these opportunity people usually consume and chewed *paan* after meal. The leaf has the great potency to act as natural anti-oxidant. The anti-oxidant property is correlated with different biological activities like hepatoprotective, antidiabetic, antiarthritis, anti-stroke and anticancer properties, since free radicals are involved in all these diseases [22].

The leaf has a significant antimicrobial activity against broad spectrum micro-organisms [23] including *Streptococcus pyrogen*, *Staphylococcus aureus*, *Proteus vulgaris*, *Escherichia coli*, *Pseudomonas aeruginosa* etc. Beside this the leaf extract also possess the bactericidal activity against the urinary tract pathogenic bacteria such as *Enterococcus faecalis*, *Citrobacter koseri*, *Citrobacter freundii*, *Klebsiella pneumoniae* etc. [24, 25, 26]. The leaf possess the broad spectrum antimicrobial activity against various bacterial strains including *Bacillus cereus*, *Enterococcus faecalis*, *Listeria monocytogenes*, *Micrococcus luteus*, *Aeromonas hydrophila*, *Salmonella Enteritidis*, *Streptococcus mutans*, *Streptococcus pyogenes*, *Enterococcus faecium*, *Actinomyces viscosus*, *Streptococcus sanguis*, *Fusobacterium nucleatum*, *Prevotella intermedia* etc. Moreover, the leaves also poses the antimicrobial, antifungal and antiprotozoal activity against pathogen, which causing typhoid, cholera, tuberculosis, etc. The leaf extract shows the gastro protective activity by enhancing the secretion of mucus rather than decrease the acid production [22]. Betel leaf is beneficial to the throat and removes viscosity in human beings. As well as it helps in digestion and removes the bad smell of mouth. It is also good for respiratory system and used in treatments of various diseases such as bronchitis, cough and common cold [27]. However, it has also been reported for the cure of stomach problems, worms and as a general tonic. It is often chewed in combination with the betel nut (*Areca catechu*), as a stimulatory. Some evidence suggests that betel leaves have immune boosting properties as well as anti-cancer properties [28]. It is to reveals the potential effect of this plant in the development of therapeutically active herbal drugs against different microbial infections [22]. With a lot of beneficiary effect on health some studies have reported that expectant mothers, who chew betel quid, during pregnancy, significantly increase adverse outcomes for the baby

in Taiwan, Malaysia and Papua New Guinea [29, 30]. The effects of betel quid and areca nut were similar to those reported for mothers who consume alcohol or tobacco during pregnancy. Lower birth weights, reduced birth length and early delivery of baby were found to be significantly higher [29, 30].

Betel leaf extract stimulates the release of saliva which is the first step of digestion, as various enzymes in it break down food, making it easy to digest [31]. Chewing betel leaves has also shown to prevent oral cancer by maintaining the level of ascorbic acid in the saliva [32]. Ascorbic acid is an excellent antioxidant, which helps reduce the free radicals in the body, thus preventing cancer. Extracts of betel leaves are known to have gastro protective activity and help in preventing gastric ulcers [33]. Moreover, extracts of betel leaves are known to control blood sugar levels and have an effective anti-diabetic property [34]. Betel leaves are a major component in various Ayurvedic (herbal) medicines used in treating warts [35]. So it has been concluded that betel leaves contain many health benefits, curative and healing properties [36]. Chewing the leaves of the herb while increasing the flow of saliva, also, protects against intestinal parasites. Moreover, betel leaf is a good source of calcium, carotene and iron; and also helps in digestion without any adverse effects [37].

4. Conclusion

Literatures revealed that betel leaf contain several vitamins like, vitamin-C, vitamin-A, nicotinic acid, thiamine and riboflavin. The leaf acts as natural antioxidant that is related with different biological activities. The leaf produce enzyme that helps in digestion and has a significant antimicrobial activity against broad spectrum microorganisms. However, extensively used betel leaf by itself has many medicinal benefits without side effects except carrying mother.

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