

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, Bangladesh

²Department of Surgery, Ibn Sina Medical College and Hospital, Dhaka, Bangladesh

³Department of Community Medicine, Shahabuddin Medical College and Hospital, Dhaka, Bangladesh

⁴School of Science and Technology, Bangladesh Open University, Gazipur, Bangladesh

Email address:

faridhossain04@yahoo.com (Md. F. Hossain)

*Corresponding author

To cite this article:

Md. Farid Hossain, Mustafa Anwar, Shaheen Akhtar, Sharker Md. Numan. Uses Impact of Betel Leaf (*Piper betle* L.) on Public Health. *Science Journal of Public Health*. Vol. 5, No. 6, 2017, pp. 408-410. doi: 10.11648/j.sjph.20170506.11

Received: September 26, 2015; **Accepted:** October 11, 2015; **Published:** September 13, 2017

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 consummation 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.

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] 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.
- [9] 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.
- [10] 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.
- [11] Chaurasia, S.; Kulkurni, G. T.; and Setty, L. N. 2010. Phytochemical studies and invitro cytotoxicity screening of *Piper betle* leaf (PBL) extract, *International Research Journal of Pharmacy*, 1 (1): 384-391.
- [12] Ghosh, K. and Bhattacharya, T. K. 2005. Chemical Constituents of *Piper betel* Linn. (Piperaceae) roots. *Molecules*, 10: 798-802.
- [13] Fong, Y. S. 2009. Chemical constituents and biological activities of *Garcinia mangostana* and *Piper betle*. Master's thesis, University Putra Malaysia, pp. 22.
- [14] Chandra, V.; Tripathi, S.; Verma, N. K.; Singh, D. P.; Chaudhary, S. K. and Roshan, A. 2011. *Piper betle*: phytochemistry, traditional use & pharmacological activity-a review. *IJPRD*, 4 (4): 216-223.
- [15] Arambewela, L.; Kumaratunga, K. G. A. and Dias, K. 2005. Studies on *Piper betle* of Sri Lanka. *J. Natn. Sci. Foundation Sri Lanka*, 33 (2): 133-139.
- [16] Arambewela, L. S. R.; Arawwawala, L. D. A. M.; Kumaratunga K. G.; D. S., Ratnasooriya W. D.; Kumarasingha, S. P. 2011. Investigations on *Piper betel* grown in Sri Lanka", *Pharmacogn. Rev.* 5 (10): 159-163.
- [17] Dwivedi, B. K. and Mehta B. K. 2011. Chemical investigation of aliphatic compounds of *Piper betle* (leaf stalk). *J. Nat. Prod. Plant Resour.* 1 (2): 18-24.
- [18] Dwivedi, B. K.; Kumar, S.; Nayak, C. and Mehta B. K. 2010. Gas chromatography mass spectrometry (GCMS) analysis of the hexane and benzene extracts of the *Piper betle* (leaf stalk) (Family: Piperaceae) from India", *Journal of Medicinal Plants Research*, 4 (21): 2252-2255.
- [19] Bissa, S.; Songara, D. and Bohra, A. 2007. Traditions in oral hygiene: Chewing of betel (*Piper betle* L.) leaves. *Current Science*, 92 (1): 26-28.
- [20] Sarkar, M.; Gangopadhyay, P. and Basak, B. 2000. The reversible antifertility activity of *Piper betle* Linn. on Swiss albino male mice. *Contraception*, 62: 271-274.
- [21] Rahman, S. A. 2009. Anti-ulcer effects of *Piper betle*, *Solanum nigrum* and *Zingiber cassumunar* on ulceration induced by selected ulcerogens in rats, Master's thesis, University Putra Malaysia, pp. 4.
- [22] Pradhan, D.; Suri, K. A.; Pradhan, D. K. and Biswasroy, P. 2013. Golden Heart of the Nature: *Piper betle* L. *Journal of Pharmacognosy and Phytochemistry*, 1 (6): 147-167.
- [23] Jesonbabu, J. N. and Lakshmi, K. A. 2012. In vitro antimicrobial potentialities of chloroform extracts of Ethano-medicinal plant against clinically isolated human pathogens. *International Journal of Pharmacy and Pharmaceutical Sciences*, 4 (3): 624-626.
- [24] Chakraborty, D. and Shah, B. 2011. Antimicrobial, antioxidative and antihemolytic activity of *Piper betle* leaf extracts. *International Journal of Pharmaceutical Technology*, 3 (3): 192-199.
- [25] Agarwal, T. and Singh, R. 2012. Evaluation of Antimicrobial Activity of *Piper betel* cultivars, *International Journal of Pharmaceutical Technology*, 1 (1): 50-58.
- [26] Bangash, F. A.; Hashmi A. N.; Mahboob A.; Zahid, M.; Hamid B.; Muhammad, S. A.; Shah, Z. U. and Afzaal, H. 2012. In-vitro antibacterial activity of *piper betle* leaf extracts. *J App Pharm.* 3 (4): 639-646.
- [27] Chopra, R. N. and Chopra I. C. 1958. *Indigenous Drugs of India*. Pub- Academic Publishers 2nd Edition. pp. 372.
- [28] Fathilah, A. R.; Sujata, R.; Norhanom, A. W. and Adenan, M. I. 2010. Antiproliferative activity of aqueous extract of *Piper betel* L. and *Psidium guajava* L. on KB and HeLa cell lines. *Journal of Medicinal Plants Research*, 4 (11): 987-990.
- [29] Yang, Mei-Sang; Lee, Chien-Hung; Chang, Shun-Jen; Chung, Tieh-Chi; Tsai, Eing-Mei; Ko, Allen Min-Jen; Ko, Ying-Chin. 2008. "The effect of maternal betel quid exposure during pregnancy on adverse birth outcomes among aborigines in Taiwan". *Drug and Alcohol Dependence*, 95 (1-2): 134-9.
- [30] Senn, M.; Baiwog, F.; Winmai, J.; Mueller, I.; Rogerson, S.; Senn, N. 2009. "Betel nut chewing during pregnancy, Madang province, Papua New Guinea". *Drug and Alcohol Dependence* 105 (1-2): 126-31.
- [31] <http://www.thehealthsite.com/diseases-conditions/health-benefits-paan-betel-leaves-po0115/leaves>.
- [32] Toprani R. and Patel, D. 2013. Betel leaf: Revisiting the benefits of an ancient Indian herb. *South Asian Journal of Cancer*, 2 (3): 140-141.
- [33] Sekhar Namburi, U. R., Omprakash and Babu G. 2011. A review on management of warts in *Ayurveda*. *Ayu.* 32 (1): 100-102.
- [34] Arawwawala, L. D., Arambewela, L. S., Ratnasooriya, W. D. 2014. Gastro protective effect of *Piper betle* Linn. Leaves grown in Sri Lanka. *J Ayurveda Integr. Med.* 5 (1): 38-42.
- [35] Arambewela, L. S., Arawwawala, L. D., Ratnasooriya, W. D. 2005. Antidiabetic activities of aqueous and ethanolic extracts of *Piper betle* leave in rats. *J Ethnopharmacol.* 102 (2): 239-45.
- [36] <http://herbs.ygoy.com/health-benefits-of-betel-leaves/>.
- [37] <http://www.ayurvedictalk.com/betel-leaf-piper-betel-promotes-good-health/583/>.