A REVIEW ON TRADITIONAL USES OF BETEL LEAVES (PAN) AND ITS THERAPEUTIC ACTIVITIES

Bhalerao Kanchan[1], Jadhav Divyashwari [2], Ms. Kamble Rachana[3]

Department of Pharmacy, Samarth Institute of Pharmacy, Pune, Maharashtra, India

Department of Pharmacy, Samarth Institute of Pharmacy, Pune, Maharashtra, India

Faculty of Pharmacy, Samarth Institute of Pharmacy, Pune, Maharashtra, India

ABSTRACT

The World Health Organization adopted a major policy change in accepting that most developing nations would have to make use of more traditional medical practices for primary health care. Piper betel L. belongs to family Piperaceae commonly known as Pan. It is extensively grown in Sri Lanka, India, Thailand, Taiwan and other Southeast Asian countries. This oil may be used as an industrial raw material for manufacturing medicines, perfumes, mouth fresheners, tonics, food additives etc. The leaves are nutritive and contain anti carcinogens showing promise for manufacturing of a blood cancer drug. The present review aims to compile medicinal values of Piper betel generated through the research activity using modern scientific approaches and innovative scientific tools.

Keywords *: Piper betel, Pan, Phytopharmacology, Traditional system of medicine.*

1. INTRODUCTION

The scientific name of betel vine is *Piper betel L*. belongs to the family *Piperaceae*, i.e. the Black Pepper family. In spite of its alienness, the plant is much more popular in India than in any other country of the world since the antiquity. This would be evident from the numerous citations laid down in the ancient literature, particularly the Indian scriptures. In these citations, significance of the leaves has been explained in relation to every sphere of human life including social, cultural, religious and even day-to-day life, which is very much relevant even these days.

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 [1] . The Essential oil isolated from the leaves is supposed to be useful in treating respiratory catarrhs and as an anti-septic [2] . Piper betel is claimed to be useful to improve learning and memory, in Indian traditional system of medicine yet not documented scientifically in this regard 3 .

1.1 Vernacular Names:

Sanskrit: Tamboolavalli, Tamboola, Tamboola vallika

English: Betel leaf plant.

Marathi : Pan

Fig 01: Betel Leaves

1.2 Plant description:

A perennial dioecious creeper. Stems semi woody, climbing by means of short adventitious roots. Leaves 10-20 cm long, broadly ovate, slightly cordate and often unequal at the base, shortly acuminate, glaucous on both sides, bright green or yellowish, petiole stout 2.0-2.5 cm long. Male spikes cylindrical dense. Female spikes 2.5-5.0cm long, pendulous. Fruits rarely produced, often sunk in the fleshy spike, forming nodule-like structures [4] . Betel leaf is the most valuable home remedy for common illness. The Betel (Piper betel) is a spice whose leaves have medicinal properties. The branches of the plant are swollen at the nodes. The plant has alternate, heart-shaped, smooth, shining and long stalked leaves, with pointed apex. It has five to seven ribs arising from the base; minute flowers. Betel is a native of central and eastern Malaysia. It spread at a very early date throughout tropical Asia and later to Madagascar and East Africa. In India, it is widely cultivated in Tamil Nadu, Madhya Pradesh, West Bengal, Orissa, Maharashtra and Uttar Pradesh. Offering betel morsel (pan-supari) to guests in Indian subcontinent is a common courtesy.

1.3 Chemical Constituents:

Plant contains a terpinine, P-cymene, carvacrol, chavicol and its derivatives, allyl catechol, eugenol, estragol, oxalic acid, malic acid and amino acids. Leaves contain good amounts of vitamins particularly nicotinic acid, ascorbic acid and carotin. They also contain significant amounts of all essential amino acids except lycine, histidine and arginine. Large concentrations of asparagines are present while glycine and proline occur in good amount. Essential oil of leaf gives it the aromatic flavour. B sitosterol is present in the root [5] .

1.4 Contents of Betel leaves:

Betel leaves contain tannins, sugar and diastases and an essential oil. The essential oil is a light yellow liquid of aromatic odour and sharp burning in taste. It contains a phenol called chavicol which has powerful antiseptic properties. The alkaloid alkene in it has properties resembling cocaine in some respects .An analysis of the betel leaf shows it to consist of moisture 85.4 per cent, protein 3.1 per cent, fat 0.8 per cent, minerals 2.3 per cent, fiber 2.3 per cent and carbohydrates 6.1 per cent per 100 grams. Its minerals and vitamin contents are calcium, carotene, thiamine, riboflavin, niacin and vitamin C. Its calorific value is 44 [6] .

2. TRADITIONAL USES OF BETEL LEAVES :

The use of betel leaf can be traced as far back as two thousand years. Betel leaves help to heal the following illnesses.

2.1 Headache:

Betel leaf is a popular home remedy for headache. The betel leaf has analgesic and cooling properties. It can be applied with beneficial results over the painful area to relieve intense headache.

2.2 Sore Throat:

Betel leaf is an excellent household remedy in the treatment of cough and sore throat. 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 irritating cough.

2.3 Respiratory Disorders:

Betel leaves are useful in pulmonary affection in childhood and old age. The leaves, soaked in mustard oil and warmed, may be applied to the chest to relieve cough and difficulty in breathing.

2.4 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.

2.5 Problem of Breast milk secretion:

The application of leaves smeared with oil is said to promote secretion of milk when applied on the breasts during lactation [7] .

2.6 Inflammation: Applied locally, betel leaves are beneficial in the treatment of inflammation such as arthritis and orchitis that is inflammation of the testes.

2.7 Wounds:

Betel leaves can be used to heal wounds. The juice of a few leaves should be extracted and applied on the wound. Then a betel leaf should be wrapped over and bandaged. The wound will heal up with a single application within 2 days.

2.8 Boils:

Betel leaf is also an effective remedy for boils. A leaf is gently warmed till it gets softened, and is 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 all the purulent matter. The application can be made at night and removed in the morning [8] .

3. THERAPEUTIC ACTIVITIES :

3.1 Antimicrobial Activity:

Nair and Chanda (2008), were studied the Aqueous and methanol extract of the leaves of Terminalia catappa L., Manilkara zapota L. and Piper betel L., for antibacterial activity against 10 Gram positive, 12 Gram negative bacteria and one fungal strain, Candida tropicalis. Piperacillin and gentamicin were used as standards for antibacterial assay, while fluconazole was used as standard for antifungal assay. The three plants showed different degree of activity against the microorganisms investigated. The methanolic extract was considerably more effective than aqueous extract in inhibiting the investigated microbial strains. The most active antimicrobial plant was Piper betel [9] .

3.2 Anti-inflammatory effects:

The betel leaf is used as a common household remedy for inflammation in the oral cavity [11]. Dohi et al., (1989), has shown that the ethanolic extract of betel leaf has been reported to possess anti-inflammatory activities at non-toxic concentrations in the complete Freund's adjuvant-induced model of arthritis in rats. Eugenol, one of the principal constituent of betel leaf has also been shown to possess anti-inflammatory effects in various animal models of studies with various inflamogens [12] .

3.3 Antiulcer Activity:

Vyawahare et al., (2010), evaluated the antiulcer activity of hydroalcoholic extract of Piper betel (HEPB) leaves, in rats employing the HCl-ethanol, acute stress and pylorus ligation models to induce the experimental gastric ulcers. Pre-treatment with Piper betel extract provided significant ulcer protective effect in all the experimental models along with significant increase in gastric pH and decrease in gastric fluid volume. The hydroalcoholic extract of Piper betel leaves possesses antiulcer activity which can be attributed to its putative mechanism of action 24

3.4 Anti-diabetic activities:

Arambewela et al., (2005) investigated the antidiabetic activity of Piper betel leaves, tested in normoglycaemic and strepozotocin (STZ)-induced diabetic rats using oral administration of hot water extract (HWE) and cold ethanolic extract (CEE). In normoglycaemic rats, both HWE and CEE significantly lowered the blood glucose level in a dose-dependent manner. In glucose tolerance test, both extracts markedly reduced the external glucose

load. The antidiabetic activity of HWE is comparable to that of CEE. Both extracts were found to be non-toxic and well tolerated after following chronic oral administration (no overt signs of toxicity, hepatotoxicity or renotoxicity). However, the weight of the spleen had increased in treated groups possibly indicating lympho proliferative activity [27] .

3. 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.

4. REFERENCE :

[1]. Guha, P. "Paan Theke Kutir Silpa Sambhabana" (In Bengali). "Exploring Betel Leaves for Cottage Industry", In: Krishi, Khadya-O- Gramin Bikash Mela –A Booklet published by the Agricultural and Food Engineering Department, IIT, Kharagpur, India 1997; 15-19.

[2]. Satyavati GV, Raina MK, Sharma M. Medicinal Plants of India. New Delhi: Indian Council of Medical Research, New Delhi, India. Vol 1, 1987.

[3]. Kirtikar KR, Basu BD. Indian medicinal plants Vol' III, 2nd ed. Lalit Mohan Basu Prakashan, Allahabad. 1993: 2131.

[4]. The treatise on Indian medicinal plants. Editors; Prof. (Mrs) Asima Chatterjee, Dr. Satyesh Chandra Pakrashi, Vol -1, National institute of Science communication (CSIR), Dr K.S Krishnan Marg, New Delhi 110 012, India, 26.

[5]. Medicinal plants by Shankar Gopal Joshi, Oxford $ IBH publishing Co. Pvt. Ltd. New Delhi, 307.

[6]. Chopra RN, Chopra IC, Handa KL, Kapur LD. Chopra's Indigenous Drugs of India; 2nd ed. AP: New Delhi, Calcutta, 1982.

[7]. Chopra, R.N., Nayar, S.L. and Chopra, I.C.: Glossary of Indian Medicinal Plants. CSIR, New Delhi 1956: 194.

[8]. p-cognosy.blogspot.com/2008/08/piper-betel.html

[9]. R. Nair and Sumitra Chanda. Antimicrobial Activity of Terminalia catappa, Manilkara zapota and Piper betel Leaf Extract, Indian J Pharm Sci. 2008; 70(3): 390–393.

[10]. Rahul Hajare, V. M. Darvhekar, Ashish Shewale and Vijay Patil, Evaluation of antihistaminic activity of Piper betel leaf in guinea pig, African Journal of Pharmacy and Pharmacology. 2011; 5(2) .113-117. 11. Satyavati GV, Raina MK, Sharma M. Medicinal Plants of India. New Delhi: Indian Council of Medical Research, New Delhi, India. Vol 1, 1987.

[11]. Dohi T, Terada H, Anamura S, Okamoto H, Tsujimoto A. The anti-inflammatory effects of phenolic dental medicaments as determined by mouse ear edema assay. Jap J Pharmacol, 1989; 49: 535-9.

[12]. Azuine MA, Amonkar AJ, Bhide S. Chemopreventive efficacy of betel leaf their effect on drug detoxification system in mouse skin. Indian J Exp Biol.1981; 29:346-51.

[13]. Bhide SV, Zariwala MB, Amonkar AJ, Azuine MA. Chemopreventive efficacy of a betel leaf extract against benzo[a]pyrene-induced forestomach tumors in mice. J Ethnopharmacol. 1991; 34: 207-13.

[14]. Lei D, Chan CP, Wang YJ, et al. Antioxidative and antiplatelet effects of aqueous inflorescence Piper betel extract. J Agric Food Chem.2003; 26, 51:2083-8.

[15]. Manigauha A, Ali H, Maheshwari MU. Antioxidant activity of ethanolic extract of Piper betel leaves. J Pharm Res. 2009; 2: 491-4.

[16]. Jagetia GC, Baliga MS. The evaluation of nitric oxide scavenging activity of certain Indian medicinal plants in vitro: a preliminary study. J Med Food.2004; 7: 343 – 48.

[17]. Umezawa K, Fujie S, Sawamura M, et al. Morphological transformation, sister chromatid exchange and mutagenesis assay of betel constituents. Toxicol Lett.1981; 8:17-22.

[18]. Shirname LP, Menon MM, Nair J, Bhide SV. Correlation of mutagenicity and tumorigenicity of betel quid and its ingredients. Nutrition and Cancer1983; 5: 87-91.

[19]. Bhattacharya S, Subramanian M, Roychowdhury S, et al. Radioprotective property of the ethanolic extract of Piper betel Leaf. J Radiat Res.2005; 46:165-71

[20]. Devjani chakraborty, barkha shah, antimicrobial, antioxidative and antihemolytic activity of piper betel leaf extracts. International Journal of Pharmacy and Pharmaceutical Sciences 2011; 3(3). 22. Rahimtula AD, Bereziat JC, Bussacchini-Griot V, Bartsch H. Lipid peroxidations as a possible cause of ochratoxin A toxicity, Biochemistry and Pharmacology. 1988; 37: 4469-4477.

[21]. Niki E. Antioxidants in relation to lipid peroxidation. Chemical Physical Lipids 1982; 44: 227-253. 24. Neeraj S. Vyawahare, Virendra G. Kagathara, R.G. Katedeshmukh, Pushpendra K. Sharma and Smeeta

M. Mohod, Evaluation of Antiulcer Activity of Piper betel Leaves Extract in Rats, Research J. Pharmacology and Pharmacodynamics 2010; 2(4): 278- 282.

[22]. Tarun Agarwal, Rachana Singh, Amar Deep Shukla, Imran Waris and Ankita Gujrati. Comparative analysis of antibacterial activity of four Piper betel varieties, Pelagia Research Library, Advances in Applied Science Research 2012; 3 (2):698-705.

[23]. Ali et al. In vitro antifungal activity of hydroxychavicol isolated from Piper betle L, Annals of Clinical Microbiology and Antimicrobials 2010; 9:7.

[24]. L.S.R Arambewela, L.D.A.M Arawwawala, W,D Ratnasooriya, Antidiabetic activities of aqueous and ethanolic extracts of Piper betle leaves in rats. Journal of Ethnopharmacology. 2005; 102(2) : 239–245. Husnun Amalia, Ratna Sitompul, Johan Hutauruk, Andrianjah and Abdul Mun'im,, Effectiveness of Piper betel leaf infusion asa palpebral skin antiseptic, UNIVERSA MEDICINA. 2009; 28:2.

[25]. S. Krishnakumar, V. S. Geetha, A. Kuruvilla, Determination of local anesthetic action of Betel leaf extract alone and with Betel nut using infiltration and surface anesthesia, Journal of Natural Remedies. 2001; 1(1): 28 -32.

[26]. Sunanda Panda and Anand kar, Dual role of betel leaf extract on thyroid function in male mice, Pharmacological Research. 1998; 38(6): 493–496.

[27]. L.S.R. Arambewela, L.D.A.M. Arawwawala, and W.D. Ratnasooriya, Antinociceptive Activities of Aqueous and Ethanol Extracts of Piper betel Leaves in Rats Pharmaceutical Biology 2005; 43 (9- 5) : 766-772 .

[28]. Arvind Singh, Sushila Kala, Deepak N. Kapoor, Richa Gupta, Antar Virk, Samarjeet Singh and Jyoti Chaudhary, Effect on human sperm mitochondrial activity by Piper betle and Calendula officinalis, Scholars Research Library Annals of Biological Research 2011; 2 (5):622-627.