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Traditional use of Betel Leaf (*Piper betel* L.) by the Residents of Purba Medinipur District of West Bengal: An Ethno-medical Study

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ABSTRACT: The betel leaf, sometimes referred to as "pan" in West Bengal, is a traditional medicinal plant that can be consumed as necessary. The green, young leaves of the betel vine are the edible or consumable component. The 'Neglected Green Gold of India' is another name for this plant. It has been discovered that the plant is a great source of vitamins, fiber, and minerals. Today's youth, however, are less fond of the pan than previous generations. Pan is gradually not so much consumed by the young villagers. The primary goal of the current study is to look into and gather data regarding the use of betel leaves by locals in West Bengal, India's Purba Medinipur District. From January 2023 to March 2023, the study was carried out in 8 villages in the Purba Medinipur District. The methods used to acquire data are in-person interviews and surveys using questionnaires. In addition to using it medicinally, it has been discovered that the locals use this plant extensively in many other aspects of their lives. Boils, cuts, minor to major wounds, gynecological difficulties, problems with the nerves, bowel movements, and respiratory distress are all treated with plant leaves. You could say that they live their daily lives around this plant. The people of West Bengal's Purba Medinipur District frequently use the pan as traditional medicine.

Keywords: Betel leaf, Traditional medicinal system, Purba Medinipur District.

INTRODUCTION

Ethnomedicine is a field of ethnobotany studies that reveals local knowledge of various ethnicities in maintaining the health of local people. This branch is often called folk medicine, or primitive medicine, however, the term ethnomedicine is considered more appropriate (Shashikumar, 2022). Exploration of local knowledge of ethnomedicine and community-based medical plants in India helps a lot to understand its importance in day-to-day life. According to World Health Organization, almost 80%of the world's population depends on herbal medicines for their primary health care needs. Treatment with medicinal plants is considered very safe as there are no or minimal side effects. The use of herbal treatments is independent of any age group and the sexes. These are the reasons why herbal treatment is growing in popularity across the globe. A major part of the developing countries still uses traditional folk medicines from various plant resources. Since 1999, World Health Organization has published three volumes of the WHO monographs on selected medicinal plants. Medicinal plants like Tulsi, Neem, Turmeric, and Ginger are found to cure various common physiological complications. These are considered plants for home remedies in many parts of India, both in rural and urban populations. Traditional medicines are in use for a long back for the treatment of complications like hypertension, dysentery, constipation, diarrhea, piles, fevers, disturbed menstrual cycle, etc. Herbs like black pepper and red clover are used to heal wounds and boils. Many medicinal plants are used as blood purifiers to alter or change a long-standing condition by eliminating metabolic toxins.

Betel leaf or pan is considered to be the most popular medicinal food plant which is traditionally used by the indigenous people of India. Regularly, almost 15-20 million people consume pan (Sengupta and Banik 2013). This leaf is very popular due to its sweet-scented fragrance. Pan has an impact on the social, cultural, mythological, religious as well as therapeutic aspects of the Indian people. There is customary to offer pan in and before any familial occasion. In a religious country like India pan is the most offered plant to the deity. In this way is it a part of the day-to-day life of Indian culture (Guha, 1997). The Piper betel is a perennial deciduous creeper with semi-woody stem. It is a species of flowering plant included in the pepper family Piparaceae. Leaves are 10-20cm. long, ovate in nature, often unequal at base. Branches are swollen at the nodes. The plant has alternate, heart-shaped, smooth, shining, long-stalked leaves with pointed apex. The plant has 5-7 ribs rising from the base.

Flavonoid chemicals, polyphenols, tannins, and essential oils found in betel leaf extract can kill pathogenic microorganisms. 15% and higher of the betel leaf extract's chemical content is equivalent to 70% ethanol in terms of its ability to kill germs and viruses (Syafitriani *et al.,* 2022). The results of a study imply that betel leaf-derived bioactive chemicals may be helpful in the management of COVID-19, particularly in the context of cytokine storms (Fatimawali *et al.,* 2022). At a minimum concentration of 0.19% (OD: 2.057), betel leaf extract has the

potential to be antibacterial, and at a minimum concentration of 0.39%, it can kill *V. harveyi* (Kurniasari *et al.,* 2021). An essential oil found in betel leaf (Piper betel) possesses exceptional antiseptic (fungicidal and bactericidal) properties. Tinea versicolor can be treated with betel leaf (*Piper betel*), also known as panu in the local dialect (Hadning *et al.,* 2020). The DPPH technique and microdilution, respectively, were used to assess the antioxidant and antifungal properties. The findings demonstrated that the highest yield and polyphenol content betel leaf extract was obtained by infusion with the sample-to-water ratio of 1:10, and this was positively correlated with antioxidant activity against DPPH (IC 50 = 17.4 ppm) and antifungal effect against Candida albicans (MIC= 0.5%) (Sartini *et al*., 2020).

In India, the plant is widely cultivated in West Bengal, Orissa, Tamil Nadu, Andhra Pradesh, Karnataka, Assam, Maharashtra, Madhya Pradesh, and Uttar Pradesh. West Bengal is one of the most important pan-growing states of India (Chandra and Sagar 2004). In West Bengalprime betel leaf farming districts include Purba Medinipur, Paschim Medinipur, South 24pgs, Nadia, Howrah, and North 24pgs (Sengupta and Chanrasia 2001). Purba Medinipur district produces the maximum betel leaf and claimed the first rank. In the Purba Medinipur district, two major betel leaf-producing blocks are Ramnagar-1 and Ramnagar-2 (Halder, 2015). The main source of irrigation in these 2 blocks is ponds, tanks, well, etc. in the cultivation field. Proper shade with perfect irrigation facility is the two prime demands for the successful cultivation of this crop. The maximum quantity of 'pan boroj' are found in these two blocks of Purba Medinipur district. Baroj or barouj is a fenced garden to grow betel crops. Mostly the fence is made using bamboo sticks and covered by coconut or palm leaves. The soil within the fence is plowed, and nurtured by manure, and oil cakes. The cutting is planted at the beginning of the monsoon season for proper growth and good-quality crop (Enayet and Karim 2012).

The present study aims to find out the use of betel crops by the residents of Purba Medinipur district as traditional medicine. The research also widened to gather knowledge regarding the diseases which are treated by using pan or betel leaf. Purba Medinipur is selected as the study area because the maximum amount of betel leaf is produced in this area. So, in this context, the study also aims to know the local folklore regarding the use of pan in this area.

Fig. 1. Betel leaves.

Fig. 2. Betel crop cultivation (inside view of boroj).

MATERIAL AND METHODS

Study area: A field survey was conducted from January 2023 to March 2023 in eight different villages of Purba Medinipur District of West Bengal. The selected villages come under the Ramnagar - 1 and Ramnagar - 2 blocks. Selected villages are written in Table 1.

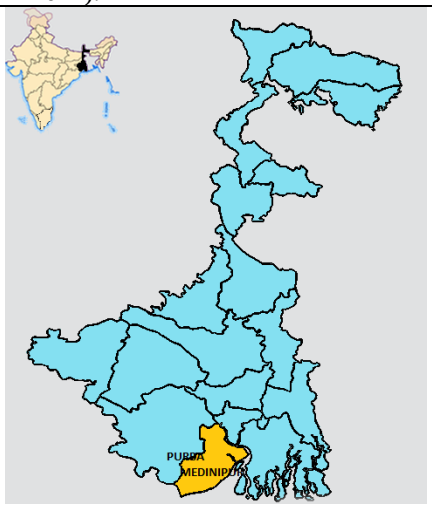

Fig. 3. Position of Purba Medinipur in West Bengal.

Fig. 4. Ramnagar-1 & Ramnagar-2 blocks in Purba Medinipur.

Table 1: Name of the villages under study situated in Ramnagar-1 and Ramnagar-2 Blocks.

	Ramnagar-1 Block	Ramnagar-2 Block
Villages	Kulbudhi	Satilapur
	Basantapur-1	Deuli
	Basantapur-2	Chahka
	Basantapur-3	Balishi

Method of data collection. The field survey method was applied through a questionnaire. A face-to-face interview was mostly taken.Questions included in the questionnaire includethe number of family members, occupation of the family members, awareness about a critical disease like cancer, different ways of using betel leaf in day-to-day life, ingredients used while consuming betel leaf, etc. The research worker tried to involve the maximum number of families in the survey. Voluntary participation was appreciated.

RESULT

The total number of family participated in the present study (block-wise) is given in Tables 2 and 3.

Table 2: Number of families participated from Ramnagar-1 Block.

Name of the village	No. of families
Kulbudhi	10
Basantapur-1	09
Basantapur-2	10
Basantapur-3	09

Table 3: Number of families participated from Ramnagar-2 Block.

Name of the village	No. of families
Satilapur	09
Deuli	10
Chahka	09
Balishi	09

A total of 38 families and 37 families participated in the present study from Ramnagar-1 and Ramnagar-2 Block respectively. A total of 75 families shared their views. The rest of the families were not interested in interaction. Most of the participating family members were workers of pan barouj regularly. It was observed during the survey that most of the members of a family are literate. The majority of the farmers studied up to high school standards. Both male and female members participate in the betel crop cultivation process. During the interaction, it was observed that they have a clear conception regarding their work. Children of each family were found to be studying in schools.

Regarding the therapeutic use of the betel leaf, it has been observed that residents use the crop for various therapeutic purposes. Out of 75 families, 70 families reported that they use betel leaf to *treat nausea*. Whenever they feel the sense of vomiting due to any cause, they put a betel leaf with areca nut in their mouth and start gentle chewing. The mixed saliva (betel quid) swallowed helps them to get relief. Sometimes these people use to add lime and tobacco with betel leaf and areca nut to increase the taste. Out of the total, 68 families were found to *treat sore throat* using betel leaf. Generally, they mix the paste of the pan with a bit of honey and consume it. Almost 67 families reported that pan is an excellent headache remover. The residents chew pans with areca nut and lime to *treat headaches* or apply the paste of betel leaf on their forehead. Fifty-two families reported consuming betel leaf to *treat constipation*. In the case of adults, they chew it with tobacco to initiate the motion. In children, the paste of betel leaf is mixed with castor oil or mustard oil and introduced inside the rectum. Betel leaf was also found to be used for the *treatment of nervousness*. Out of 75 families, 47 families reported this use. They use to make a juice of betel leaf, add honey to the juice, and consume twice/thrice a day to get rid of nervousness. It is also applied to children during school examinations. Sixty-five families reported that betel leaf is very effective to *heal wounds*. Betel leaf extract is applied on the wounds and cuts and covered with a bandage. The cut/wounds are reported to be recovered within 2-3 days. For the *treatment of boils* also betel leaf extract is used. Sixty-three families are reported to use betel leaf for boil treatment. For treatment, a betel leaf is taken, soaked in warm water to soften, dipped in castor oil, and applied on the inflated boil. This process is repeated every hour, replacing the old leaf. Gradually after 2-3 replacements, the purulent matter inside the boil comes out by rupturing the membrane. For the *treatment of muscle sprain or twitch in the muscle*, betel leaf is applied with lime and turmeric paste on the affected area, as reported by 57 families. The sprained area is washed properly, lime and turmeric paste mixed thoroughly, applied on the area, and covered with betel leaf. The total area is then covered with a bandage. This treatment is repeated for 2-3 days and gradually the pain is relieved. *Inflammations* are also reported to be treated with betel leaf. Betel leaf is reported to be beneficial for the inflammation of arthritis of knee joints. Older members of the families elaborated on the application process. Betel leaf paste, mixed with mustered oil or clove oil is applied on the knee joint several times a day with gentle rubbing. Gradually the inflammation subsides with pain. Twenty-five families have reported the use of betel leaf to ease the *urination process*. Betel leaf (1 or 2) extract mixed with warm milk is helpful for people suffering from obstructive urination. As reported, this treatment is continued for 3-4 days for better results. For the treatment of *cold and cough* also, betel leaf extract is used. Betel leaf extract is mixed with honey and consumed in the morning. Dried betel leaf is mixed with lukewarm water and either consumed or use for gurgling. To get relief from congestion in the chest betel leaf is soaked in lukewarm mustard oil and applied on the chest. Nine families reported that during lactation betel leaf is placed on the breast for *free flow of milk*.

Regarding the awareness of the local people about the adverse effect of betel leaf, most of the family knows the bad effect of chewing tobacco. Schoolchildren also supported the fact that chewing tobacco with lime, betel leaf, and areca nut may cause cancer in different parts of the body. But the elderly people made it their daily

habit and according to them, now it is hard to quit. To them, betel quid helps them to clear up their mind from physical and mental stress, gives them the energy to do more work, and chewing affects their mind to remove sleepiness after heavy meals during lunch. Betel quid provides them with a sense of satisfaction taking after each meal. Chewing betel leaf with lime, raw areca nut, and tobacco provides adults with a mood of relaxation. Chart 1 shows the therapeutic use rate of betel leaf by families under study.

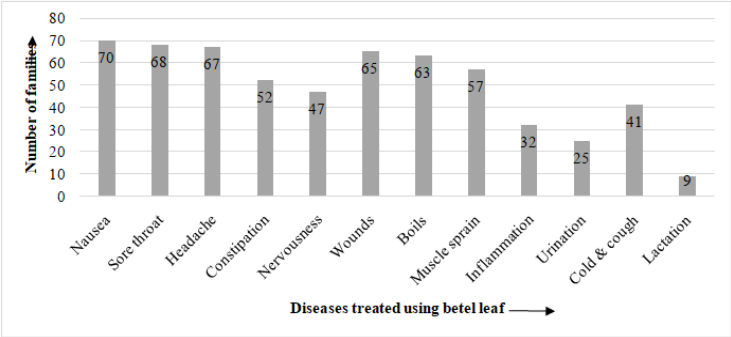

Chart 1: Theraputic use of betel leaf in various diseases.

DISCUSSION

From the present study, it is clear that residents of Ramnagar blocks of Purba Medinipur district of West Bengal are very much dependent therapeutically on a betel leaf. The betel crop contains certain chemical components which are responsible for therapeutic activity. Betel leaves contain a bulk number of vitamins (especially nicotinic acid, vitamin C, and carotin) which makes them highly nutritious (Ali *et al.,* 2010). It contains minerals like calcium and magnesium. Significant amounts of essential amino acids are also found in betel leaves like arginine, lysine, and histidine (Chakraborty *et al.,* 2011). Glycine and proline are also present in good quantity. The essential oil of betel leaf provides the flavor. Betel leaf contains chavicol (a phenol) which has antiseptic properties (Singh et al.2011). An analysis of a betel leaf found to consist of moisture 85.4%, minerals 2.2%, fiber 2.3%, fat 0.9%, carbohydrate 6.1%, and protein 3.1% per 100 grams (Chopra, 1982). Its calorific value is 44 (Singh *et al*., 2011). Various research works from different corners of the world confirm the anti-inflammatory, anti-microbial, anti-mutagenic, anti-histaminic, anti-diabetic, anti-ulcer, anti-bacterial, and anti-fungal activity of betel leaf.

Anti-fungal and anti-bacterial properties of betel leaf are well studied. At a minimum concentration of 0.19% (OD: 2.057), betel leaf extract has the potential to be antibacterial, and at a minimum concentration of 0.39%, it can kill *V. harveyi* (Kurniasari *et al.,* 2021). Four Piper betel varieties have been studied: Desi, Bangladesi, Jaleswar, and Desawari. Leaf extracts of these four varieties of betel leaf were tested against pathogenic microorganisms like *Escherichia coli, Staphylococcus aureus,* and *Pseudomonas aeruginosa.* In all the cases positive results have been found (Agarwal *et al.,* 2012). Hydroxychavicol extracted from the betel leaves was found to have anti-fungal properties (Ali *et al.,* 2010). This research works to support the use of betel leaf by the people of Purba Medinipur district for the treatment of cuts, wounds, boils, sore throat, and cold & cough.

Regarding the use of betel leaf as an anti-inflammatory substance, Dohi *et al.* (1989) put forward that, the ethanolic extract of pan possesses an anti-inflammatory effect. Other investigators (Manigauha *et al*., 2009) also researched out that, eugenol, present in betel leaf possesses an anti-inflammatory effect too. The above studies support the use of betel leaf as an anti-inflammatory agent by the people under survey.

Acne, or acne vulgaris as it is known medically, is one of the skin conditions that regularly grab the attention of teenagers and young adults. Repairing follicular irregularities, reducing sebum production, fewer Propionibacterium acnes colonies, and minimizing skin inflammation are all ways to cure acne. By using an antibiotic agent such as erythromycin, clindamycin, or benzoyl peroxide, the Propionibacterium acnes bacterial population can be decreased. We can use natural antibacterials to cure acne, one of which is produced during the secondary metabolism of plants. Betel leaf extracts and essential oils have antibacterial and antifungal properties (Meinisasti *et al.,* 2020).

One of the largest issues we currently face is diseases brought on by infections, of which Staphylococcus aureus is one of the main culprits. People prefer to treat themselves or utilize traditional herbs like betel leaf because treatment with penicillin antibiotics frequently results in resistance and negative effects. The average diameter of the inhibition zones at doses of 5%, 10%, 15%, and 20%, respectively, was 9.82 mm, 9.11 mm, 9.28 mm, and 9.01 mm. The antibacterial activity of betel leaf extract was 5% at 9.82 mm, which was also the concentration with the highest antibacterial activity (Aprilia *et al.,* 2022).

Betel leaf extract is also beneficial for the proper physiological activities of thyroid hormone, lipid peroxidation (LPO), and catalase (Panda & Kar 1998). The local anesthetic effect of plain betel leaf extract is also well documented (Krishnakumar *et al.,* 2001). The betel leaf extract, when applied to a motile normozoospermic semen sample, it was found that with the increasing concentration of the betel leaf extract, the mitochondrial activity of the sperm decreases. This research confirms the contraceptive effect of betel leaf

(Singh *et al*., 2011). The mitochondrial activity decreases significantly in 5 minutes to 25 minutes incubation period. No such uses of betel leaf were reported by the population surveyed in Purba Medinipur. This may be due to a lack of knowledge regarding these uses of pan. The use of betel leaf for the treatment of the ailments like nausea, headache, muscle sprain, obstructed urination, and increment of milk secretion from the breast during lactation is not evidenced in any literature. Further research work is necessary to find out the importance of betel leaf in these areas of ailments.

CONCLUSIONS

It is quite clear from the present study that, the local people of Ramnagar-1 and Ramnagar-2 Blocks of Purba Medinipur District of West Bengal are very well habituated in using betel leaf in traditional therapeutic ways. The betel leaf is used for therapeutic purposes either as a whole or its extract. Sometimes it is applied with constituents like honey, lime, turmeric, mustard oil, and cod liver oil. The main ailments that are treated by the application of betel leaf are nausea, constipation, cold cough, obstructive urination, headache, wounds, cuts, boils, etc. So, it is confirmed that betel leaf proved to be beneficial in different aspects and it becomes an integral part of the day-to-day life of the natives of Purba Medinipur district.

FUTURE SCOPE

The present research is central to some villages in the Purba Medinipur district. In the future study can also be extended to other villages. Paschim Medinipur district can also be further included in the future study.

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Conflict of Interest. None.

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