A REVIEW ON MEDICINAL VALUE OF BETEL (*Piper betle* L.)

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By

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1. Introduction

- Family: Piperaceae
- Origin: Malaysia
- Distribution: Bangladesh, Burma, India, Nepal and Sri Lanka
- Production in commercial scale in Sri Lanka: Kurunegala, Gampaha, Kegalle, Kalutara and Colombo districts
2. Requirements for the growth of betel

- Rainfall: 2250 mm - 4750 mm
- RH: 40% - 80%
- Temperature: 15°C – 40°C
- Appropriate shade level and irrigation
- Special care for its cultivation (sterilization of soil)
- Well-drained and fertile soil
3. Composition of betel leaves

Composition
(for 100g of betel leaves)

- Moisture: 85.4g
- Proteins: 3.1g
- Fats: 0.8g
- Minerals: 2.3g
- Fiber: 2.3g
- Carbohydrates: 6.1g

Special compounds present

- Minerals
- Vitamins (calcium, carotene, thiamine, riboflavin, niacin and vitamin C)
- Tannins
- Sugar
- Diastases
- Essential oil
- Phenol (chavicol): antiseptic properties
- Alkaloid
3. Composition of betel leaves (Continued)

- Phytochemicals
4. Properties of betel leaves

- Healing power and curative properties

<table>
<thead>
<tr>
<th>Ailment</th>
<th>Remedy</th>
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<tbody>
<tr>
<td>1. Scanty or Obstructed Urination</td>
<td>Juice, mixed with dilute milk and sweetened slightly</td>
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<td>2. Weakness of Nerves</td>
<td>The juice of a few betel leaves, with a teaspoon of honey can be taken twice a day</td>
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<td>3. Headaches</td>
<td>Juice can be applied over the painful area</td>
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<td>4. Respiratory Disorders</td>
<td>The leaves, soaked in mustard oil are warmed and apply on the chest</td>
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<td>5. Constipation</td>
<td>stalk of betel leaf dipped in castor oil can be introduced in the rectum</td>
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<td>6. Inflammation and Wound</td>
<td>Betel leaves can be applied locally</td>
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<td>7. Lumbago</td>
<td>Juice mixed with some bland oil such as refined coconut oil can be applied to the loins</td>
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5. Betel quid and cancers

- Regular consumption is believed to cause cancer of the oral cavity.
- Tobacco and arecanut are both carcinogenic and slaked lime is promoted carcinogenesis.

- **Scientific studies reveal that betel leaf is devoid of mutagenic and carcinogenic effects.**
- **Phytochemicals prevent the actions inducing cancers in experimental animals.**
6. Prevention of carcinogenesis

1. Prevention of oral carcinogenesis:
   - One of the tenth most common cancer
   - 90% from South East Asian countries
   - Betel leaf extract inhibit benzo-a-pyrene induced oral tumorigenesis (β-carotene and α-tocopherol)

2. Prevention of fore stomach carcinogenesis:
   - Fourth most common cancer
   - The second most lethal cancer
   - Betel quid and Helicobacter pylory
• Leaf extract in drinking water significantly reduced the benzo[a]pyrene-induced fore stomach neoplasia

• Eugenol possess antimicrobial effects on thirty strains of Helicobacter pylori

3. prevention of skin carcinogenesis:

• Topical application of betel leaf extract, β-carotene and α-tocopherol was effective reducing the tumor formation
4. Chemoprevention of mammary carcinogenesis:

- The Second most common cancer type

- Betel leaf extract through drinking water decreased tumor burden and tumor incidence, and delayed the onset of mammary tumors in the DMBA model of rat mammary tumor genesis
7. Mechanisms responsible for cancer preventive effects in betel

1. Free radical scavenging effects
   * Free radicals are constantly produced in normal cellular metabolism
     
     Ex 1. Reactive nitrogen species
     2. Reactive oxygen species
     * Excessive amount causes
       - Cytotoxicity
       - Mutagenesis
       - Inflammation
     * Extract of inflorescence
   * Hydroalcoholic extract of betel leaves
7. Mechanisms responsible for cancer preventive effects in betel - Conti...

2. Increase in antioxidant effects
   * Eukaryotic cells normally process antioxidant molecules
   * Ex: Vitamin E, A & C
   * Protect against free radical induced damage
   * Mutagenesis
   * Carcinogenesis
   * Betel leaf extract increase the level of antioxidant and mediate the chemo preventive effects
7. Mechanisms responsible for cancer preventive effects in betel - Conti...

3. Induction of detoxification enzymes

* β carotene, α tocopherol, hudroxychavicol significantly increase the GST level

(GST- Glutathione S- Transferase)

**GST** – Critical roll in cellular protection against oxidative stress and toxic foreign chemicals
4. Inhibition of lipid peroxidation

Polyunsaturated fatty acids in cell membrane highly affected by free radicals

- Loss of cell membrane function
- Product of peroxidation (malondialdehyde)
  - Mutagenic
  - Carcinogenesis
7. Mechanisms responsible for cancer preventive effects in betel - Conti...

5. Anti-inflammatory effects
6. Antimutagenic effects
7. Antitumor-promoting activities
8. Conclusion

These studies clearly suggest that, betel leaf could develop as a potential chemo preventive agent for preventing cancers of different histological origins.
Thank you