Formulation and evaluation of toothpaste from Neem

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Abstract: Since many centuries, Ayurveda regarded neem (Azadirachta indica Family: Meliaceae) as a cure for many ailments, predominantly due to its superb antimicrobial activity. It has been a practice since time immemorial to use tender twigs of neem as dentifrice. Looking as these facts the possibility of developing an authentic dentifrice from neem extract and formulations were formulated and evaluated for their antimicrobial activity and some formulations were found to have significant antimicrobial activity. For the present work the tender stems of neem were specifically chosen so that most specific results could be obtained especially when neem powder is selected for developing dentifrices. In addition to the antimicrobial activity it was thought that the small fibers in the powder may act as abrasive thereby potentiating the activity of the dentifrice. The scope of the present work is limited to testing the antibacterial activity of neem extract and neem leaves powder in a tooth paste form.

Keywords: Neem leaves, tender twigs of neem, Antimicrobial activity, Neem toothpaste, Azadirachta indica.

INTRODUCTION:

Your dental hygiene is one of the most important aspects of your health. Unfortunately, it’s all too easy to overlook the upkeep of your teeth when you have so many other health concerns to think about. One of the easiest ways to start improving your dental health is by switching to a more natural alternative that is still packed with helpful ingredients. Discover how neem toothpaste fits this category and can make a difference in your oral health.

What Is Neem?

A tropical plant native to Asia, neem has been a natural dental hygiene solution for centuries. In India and parts of Africa, people have historically used the twigs of a neem tree to brush their teeth. As a result, these people have been able to maintain excellent dental health. This holds true even in areas that don’t have what Westerners would view as modern dental care. Neem is effective for dental health because it has such great cleansing properties. These properties help keep impurities from sticking to your teeth. Nearly all parts of a neem tree have effective cleansing properties, including the seeds, twigs, and leaves. While more research needs to be conducted around neem to discover exactly how it works, several studies have shown that using neem toothpaste can significantly improve the cleanliness of your mouth.

What Are The Benefits Of Neem?

Because neem is such an important and famous cleaning plant, toothpaste containing neem is a great place to start. Food remnants on your teeth can eventually turn into plaque and then tartar. By using neem, you can keep your teeth cleaner and reduce the buildup of plaque. With all of this continuous cleansing and healthy protection, neem can work to enhance your sparkling smile and help you eliminate bad breath. If you’re ready for a clean smile and a more natural oral hygiene routine, give neem toothpaste a try. Check out Himalaya’s version today, as well as our range of herbal supplements that can help you lead a healthy life.

Botanical identification:

Azadirachta indica, commonly known as neem, nimtree or Indian lilac, is a tree in the mahogany family Meliaceae. It is one of two species in the genus Azadirachta, and is native to the Indian subcontinent and most of the countries in Africa. It is typically grown in tropical and semi-tropical regions. Neem trees also grow on islands in southern Iran. Its fruits and seeds are the source of neem oil.

Nomenclature:

Kingdom: plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Rutales
Suborder: Rutinae
Family: Meliaceae
Genes: Azadorachta
Species: A. Indica
Scientific name: Azadirecta Indica
Others name: nimba, Arista (sanskrit)

Binomial name:
Azadirachta indica

Synonyms:
Antelaea azadirachta (L.) Adelb, Antelaea canescens Cels ex Heynh, Antelaea javanica Gaertn, Azadirachta indica subsp. Vartkii Kothari, Londhe & N.P. Singh
Melia azadirachta L.

Macroscopy:

Leaves: They are alternate, extipulate, liflets 7-17, alternate or opposite, very shortly stalked, 1- cm long.

Colour: dark green

Odour: typical

Taste: bitter

Shape: lanceolate

Odour: Characteristics

Characteristics and morphology:

Fruit:
The fruit is a smooth (glabrous), olive-like drupe which varies in shape from elongate oval to nearly roundish, and when ripe is 14–28 mm (1/2–1+1/8 in) by 10–15 mm (3/8–5/8 in). The fruit skin (exocarp) is thin and the bitter-sweet pulp (mesocarp) is yellowish-white and very fibrous. The mesocarp is 3–5 mm (1/8–1/4 in) thick. The white, hard inner shell (endocarp) of the fruit encloses one, rarely two, or three, elongated seeds (kernels) having a brown seed coat.
Flowers:

White and fragrant flowers are arranged in more-or-less drooping axillary panicles which are up to 25 cm (10 in) long. The inflorescences, which branch up to the third degree, bear from 250 to 300 flowers. An individual flower is 5–6 mm (3/16–1/4 in) long and 8–11 mm (5/16–7/16 in) wide. Protandrous, bisexual flowers and male flowers exist on the same individual tree.

Leaves:
The opposite, pinnate leaves are 20–40 cm (8–16 in) long, with 20 to 30 medium to dark green leaflets about 3–8 cm (1+1/4–3+1/4 in) long. The terminal leaflet often is missing. The petioles are short.
Cultivation:
Neem can be grown in even in rocky soils where water availability is a major problem. Neem trees increase the soil fertility and helps in neutralising acidity in the soil.

Propagation in Neem Cultivation:
Propagation can be done be seeds. However, propagation with root cuttings is also possible.

Dental application of Neem:
• Antioxidant:
The process, through which free radicals are created, is a normal function of the body but the resulting molecules are unstable and can damage other cells. A series of disorders, including cardiovascular disease, eye health, cataracts and macular degeneration, age related neurodegeneration (decline of the brain cells and nervous system) and even cancer occurs due to high levels of free radicals. Azadirachtaindica protects against Chemically induced carcinogens and liver damage by boosting antioxidant levels. To control the harmful bacteria is one of the goals of successful acne treatment.

• Anti-inflammatory:
Neem is a strong antioxidant, neutralizing free radicals that may influence the development of some conditions. It is also a strong anti-inflammatory agent. Neem has antimicrobial effects and may be effective against several types of bacteria, viruses, and fungi.

• Anti-bacterial:
Its antibacterial properties due to the presence of nimbidin, Azadirachtin, and nimbinin help to remove many oral aerobic and anaerobic pathogens existing in the oral cavity. Neem bark and leaf extract is most effectively used in preventing cavities and gum disease.

• Tooth Decay:
Infections, tooth decay, bleeding and sore gums have all been treated successfully with daily use of neem mouth rinse or neem leaf extract added to the water. Some people have reported a total reversal of gum degeneration after using neem for only a few months.

Chemical constituents:
• Various parts of plant is used for various therapeutic and commercial purpose due to presence of different types of chemicals in different parts of this plants. Some of them being:

• leaves: quercetin, nimbosterol, nimbin.

• Flowers: nimbosterol, kaemperol, melicitrin.
Material:

1. Neem:
Neem in dental care industry. Neem bark and leaf extract is most effectively used in preventing cavities and gum disease. Mouthwash containing Neem is a remedy for tooth decay, oral infections, prevents bleeding and sore gums. Twigs of Neem tree are used as chewing sticks by people all over India. Rub the juice of a few neem leaves on your teeth and gums.

2. Amla:
You can eat one fresh amla every day or mix half a teaspoon of dried amla powder in half a cup of water daily. This herb has antibacterial properties that can destroy cavity-causing bacteria. Besides, it helps maintain strong and healthy teeth and gums.

3. Clove:
Clove is especially essential for oral health. Clinical research indicates that clove oil can relieve tooth pain and bad breath, as well as help reduce gum disease. Clove oil also has the natural ability to restrict the development of bacteria and can help fight mouth and throat infections.

4. Cinnamon:
Cinnamon oils, extracts, and their compounds may help prevent cavities, treat gum disease, and fight fungal and bacterial infections. Thus, hygiene products containing cinnamon may have some uses for oral health and pain relief.

5. Coconut oil:
Coconut oil has been used for centuries as an effective oral hygiene practice. Current research suggests oil pulling with coconut oil (swishing oil in your mouth for 10 to 20 minutes) may reduce bad bacteria in the mouth, prevent gingivitis and tooth decay, and get rid of bad breath.

6. Turmeric:
Turmeric has been shown to reduce the presence of bacteria that causes cavities. There is a technique of protectively sealing teeth against cavities called pit and fissure sealants. Using turmeric in combination with these pit and fissure sealants has been a very effective treatment for cavities.

7. Backing soda:
Baking soda does help to some extent in treating cavities in the primary stage. Baking soda is alkaline, and it will neutralize mouth acids, thereby preventing further erosion. Baking soda will also help to remineralize the enamel layer and close micro gaps.

8. **Sea salt:**

The research study showed that sea salt eradicated bacteria that causes periodontal gum disease. In my practice, I advise my patients to rinse with sea salt every time they experience acute flare-ups of gum disease, which show up as bleeding gums.

9. **Paper mint:**

Mint is generally known to improve oral hygiene and dental health. Usually, mint is linked with fresh breath, but it offers other benefits such as healthy gums and teeth. Also, mint contains anti-bacterial and anti-inflammatory properties that maintain oral hygiene.

10. **Honey:**

By fighting the bacteria, honey reduces the amount of acid your mouth produces. Without that acid, bacteria can no longer produce dextran, which is essentially the “glue” that helps bacteria attach to the tooth surface. Bacteria become plaque, which eventually can harden into what leads to gum disease and tooth decay.

**Formulation Table:**

<table>
<thead>
<tr>
<th>Sr.no.</th>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Neem powder</td>
<td>30gm</td>
</tr>
<tr>
<td>2.</td>
<td>Amla powder</td>
<td>10gm</td>
</tr>
<tr>
<td>3.</td>
<td>Clove powder</td>
<td>10gm</td>
</tr>
<tr>
<td>4.</td>
<td>Cinnamon powder</td>
<td>10gm</td>
</tr>
<tr>
<td>5.</td>
<td>Turmeric</td>
<td>1tbl spoon</td>
</tr>
<tr>
<td>6.</td>
<td>Baking soda</td>
<td>2gm</td>
</tr>
<tr>
<td>7.</td>
<td>Coconut oil</td>
<td>2ml</td>
</tr>
<tr>
<td>8.</td>
<td>Sea salt</td>
<td>Quantity sufficient</td>
</tr>
<tr>
<td>9.</td>
<td>Mint leaf powder</td>
<td>Quantity sufficient</td>
</tr>
<tr>
<td>10.</td>
<td>Honey</td>
<td>Quantity sufficient</td>
</tr>
</tbody>
</table>

Table no.01

**Procedure:**

**Preparation of Neem Toothpaste:**

• Take a fresh neem leaf and dry them at a room temperature.
• Then make a fine powder with the help of grinder.

• Take 30gm of neem powder & 10gm of amla powder.

• Then add 10gm of clove powder and 10gm of cinnamon powder & mix it well.

• Add 2ml of coconut oil and 1table spoon of turmeric powder. Mix it & make a paste.

• Then add 2gm of backing soda and add sea salt as per required amount.

• Mix well above mixture and add mint leaf powder as per flavour required.

• Then add honey in the mixture & mix it gently make a paste. Honey remove the bitter taste of neem powder.

• Therefore, toothpaste is prepared. Store in well closed container.

Evaluation of toothpaste formulation:

The pH was found to be neutral pH, thus the toothpaste formulations can be used without the risk of skin Irritancy. By this we can infer that the selected ingredients for toothpaste formulation did not alter the pH of the formulation. This assures that the formulation maintains a good. Toothpaste formulations were good in Appearance and homogeneity.

Spreadability:
One of the important criteria for a toothpaste formulation is that it should possess good spreadability. It is the term used to denote the extent of area to which formulation readily spreads when used. The therapeutic efficacy of a toothpaste formulation depends upon its spreading value.

**Homogeneity:**

The developed formulations were tested for homogeneity by visual inspection after the toothpaste formulation had been filled in the container. They were tested for the appearance of toothpaste and presence of any aggregates in toothpaste.

**Organoleptic evaluation:**

Toothpaste was evaluated for organoleptic parameter showed in table. The colour, odour, texture and smoothness.

<table>
<thead>
<tr>
<th>Sr.no</th>
<th>Parameter</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colour</td>
<td>Green</td>
</tr>
<tr>
<td>2</td>
<td>Odour</td>
<td>Pleasant</td>
</tr>
<tr>
<td>3</td>
<td>Texture</td>
<td>Fine</td>
</tr>
<tr>
<td>4</td>
<td>Smoothness</td>
<td>Smooth</td>
</tr>
</tbody>
</table>

**Irritancy test:** The formulation showed absence of irrigation, redness during irritancy test. This toothpaste safe to use on teeth.

<table>
<thead>
<tr>
<th>Sr.no</th>
<th>Parameter</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Irritation</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Redness</td>
<td>No</td>
</tr>
</tbody>
</table>

**Stability test:** The result of stability test was shown in following table. There is no change in colour, odour, texture and smoothness was observed at mentioned condition of stability.

<table>
<thead>
<tr>
<th>Sr.no</th>
<th>Parameter</th>
<th>Room temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colour</td>
<td>No change</td>
</tr>
<tr>
<td>2</td>
<td>Odour</td>
<td>No change</td>
</tr>
<tr>
<td>3</td>
<td>Texture</td>
<td>Fine</td>
</tr>
<tr>
<td>4</td>
<td>Smoothness</td>
<td>Smooth</td>
</tr>
</tbody>
</table>

**Conclusion:**

Regular use of neem containing toothpaste provided a significant reduction of dental plaque accumulation and improved the gingival health of the study participants.

**Result & Discussion:**

The most common dental diseases are preventable and one of the prime requisites for prevention is use of anti-plaque agent. Most of the commercially available oral care products contains chemicals and synthetics. Owing to doubts regarding the safety of these products, there is a change towards the use of naturally occurring herbal products. One such herb which has shown multiple benefits for health and used since time immemorial is Neem. Neem has been extensively used in all branches of healthcare and has become a cynosure of modern medicine. Because of its high medicinal properties it has been included in various formulations including toothpaste. This study was a sincere attempt to evaluate the effectiveness of neem containing toothpaste against plaque and gingivitis.

**References:**
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