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# Formulation and Evaluation of Azadirachtaindica Mouth Paint

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***Abstract:*** *The potential of a natural mouth paint for oral health. This innovative formulation centers on Azadirachta indica, more commonly known as neem, a medicinal plant with established antimicrobial properties. The study aims to develop and evaluate a mouth paint that combines neem extract with clove oil and peppermint oil. A crucial aspect of this research involves identifying the optimal concentration of neem extract. Clove oil, known for its analgesic effects, is being incorporated to potentially alleviate mouth discomfort. Peppermint oil brings a refreshing taste to the mix and may also contribute additional antimicrobial activity. To assess the effectiveness of this novel mouth paint, researchers will conduct a rigorous evaluation process. This includes examining the paint's physical characteristics – appearance, pH balance, density, and ease of spreading. More importantly, the paint will be tested in a controlled laboratory setting (in vitro) to determine its efficacy against harmful oral bacteria. If successful, this unique combination of natural ingredients has the potential to be a safe and effective alternative for maintaining good oral health. This mouth paint could offer a natural approach to oral care, potentially reducing reliance on conventional products that might contain harsher chemicals.*

***Key Words:*** *Azadirachta indica leaves extract, Clove oil, Spread ability, Anti-bacterial Activity.*

## 1. INTRODUCTION:

The oral depression is a unique ecological niche for microbial colonization. It's an entry gate for the mortal body through which air, solids, and liquids pass. It provides a variety of shells for colonization ranging from the hard non-shedding shells of teeth to desquamating keratinized and non-keratinized epithelia. Some individualities have dental appliances which introduce acrylic, polyurethane, ceramic and essence amalgamation shells that are also settled. The surfaces in the mouth are kept warm and moist by the constant flow of saliva across them. It is not surprising, therefore, that the human oral cavity supports a complex and dynamic micro-biota [1, 2].

Dental caries consider one of the frequent occurring health problems in the world. For years, many antimicrobial agents had been used in an attempt to control growth of bacteria with the increasing in utilization and misuse of antimicrobial agents, many bacteria had produce strains that resist antimicrobial agent, leading to difficulties in controlling them. Natural products including plants had been used as source for many antimicrobial components [3].

Periodontal illness is perceived as a significant general medical condition all through the world and happens in all congregations, individualities, lines, relations, and fiscal situations. It's painted by vexation and debilitation of the epoxies, supporting bone, periodontal tendon, and instigation, and convocation of bacterial microorganisms, for the utmost portion inside the periodontal pockets. The periodontal infection typically alludes to instigative ails that are shrine fermented that's goo complaint and periodontitis [4, 5]. Goo complaint is the moderate Stage of infection brought around-around by an amassing of supra-gingival shrine and painted by enlarging, light draining, and greenish-ness of the inconsiderable gingival. Goo complaint is related to an adaptation of the micro foliage, moving from a gram- positive anaerobic Flora to a further gram- inhospitable bone.

Periodontitis, a more serious phase of periodontal illness, brings about the resumption of the alveolar bone and separation of the periodontal tendon supporting tooth. Periodontitis is an inflammatory response to the overmuch of anaerobic abiding commodities, for illustration, Pro-hormone's gingivitis, Prevotella inter-media, Fuso-bacterium nucleatum, Campylobacter rectus, Prevotella Melaninogenica, and Actinobacillus actinomycetes Contains [6, 7]. The traditional program for treatment the Periodontal infection like vocal, face, and foundational dimension structures have

significant downsides like super infection, low or contrariness, low gingival reticular liquid stages of anti-infection instrumentalities, abecedarian incidental goods, pithy extent, and high relative expenditure. Periodontal treatment intends to fix gutted towel, drop the number of pathogenic microbes and dispose of the unhealthy pockets. Ongoing advances in the field of dentistry have advanced the application of home-grown and regular productions for the treatment of no identical vocal ails. There have been colorful crashes of the application of herbal shops and regular particulars for the treatment of vocal affections [8].

Azadirachta indica (Neem) has been used in India and throughout southern Asia for many years as a preferred tool for keeping teeth and gums healthy. Neem oil derived from leaves consistently showed moderate to potent antibacterial activity against a wide range of gram-positive and gram-negative microorganisms [9]. The antibacterial activity of neem has been evaluated and published [10, 11] including its therapeutic use in periodontal disorders [12]. Many studies have shown that dental plaque plays a major role in the etiology of periodontal diseases [13] that there is a direct relationship between the presence of dental plaque and the development of gingivitis [14].

Clove (Syzygium aromaticum), a ubiquitous fragrance with a distinct aroma and air, has a long- nonmoving character in traditional drug for its analgesic and antiseptic parcels. Eugenol, the primary bioactive emulsion in clove oil painting, is responsible for its potent antimicrobial exertion. Research has established the forcefulness of eugenol against colorful vocal pathogens, involving bacteria responsible for shrine conformation and bad breather [15].

Still, clove oil painting's strong air and eventuality for vexation necessitate careful reflection when incorporating it into a mouth makeup expression. Peppermint oil painting (Mentha piperita), another extensively honored natural remedy, offers a stimulating and am ping sensitive experience. Beyond its affable taste, peppermint oil painting boasts fresh advantages for vocal health. Inquiries have demonstrated its efficacity against bacteria associated with shrine conformation and bad breather, contributing to a cleaner and fresher vocal terrain [16].

## 2. MATERIALS:

This section outlines the methodology and materials involved in the formulation and evaluation of a novel mouth paint containing Azadirachtaindica, clove oil, and peppermint oil.

**Chemical** - Carbapol-940, Sodium CMC, Sodium benzoate, PEG-400, Sod. Saccharin, all these chemicals were taken from our college laboratory.

### Collection & Extraction

Neem leaves were randomly collected from nature plants. Azadirachtaindica leaves (10g) was placed in the thimble of Clevenger apparatus.100 ml of ethanol was used as a solvent. The extract was concentrated using Rota vapor. Then the extract was dried in a digital water bath till a dark green residue was obtained.

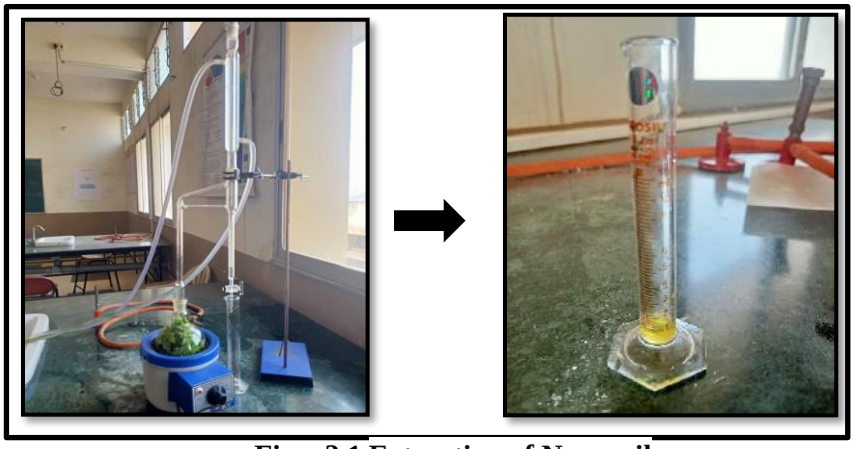

**Fig – 2.1 Extraction of Neem oil**

## 3. METHOD:

Carbopol- 940 and Sodium CMC were dispersed in 40 ml of distilled water with nonstop agitation. In another teacup, sodium benzoate was dissolved in 10 ml of water and heat it to dissolve duly. After cooling of result polyethylene glycol 400 was added and mixed with the first result. After this needed volume of Neem oil and clove oil painting was mixed and the remaining chemicals were also mixed in the below result duly with nonstop shifting and tri-ethanolamine was added drop wise to the expression to gain gel in needed thickness and for pH adaptation and obtain gel.

**Fig – 2.2 Prepared Azadirachtaindica Mouth Paint**

**Table – 2.1 Formulation table**

| S.N. | Ingredients | Quantity taken | | |
|---|---|---|---|---|
| | | F1 | F2 | F3 |
| 1. | Clove oil | 2 ml | 1 ml | 1.5 ml |
| 2. | Neem oil | 1ml | 2 ml | 1.5 ml |
| 3. | Peppermint oil | 0.3 ml | 0.3 ml | 0.3 ml |
| 4. | Honey | 0.6 ml | 0.6 ml | 0.6 ml |
| 5. | Carbapol-940 | 3.5 g | 3.5 g | 3.5 g |
| 6. | Sodium CMC | 1.5 g | 1.5 g | 1.5 g |
| 7. | Sodium saccharin | 0.7 g | 0.7 g | 0.7 g |
| 8. | Sodium benzoate | 0.5 g | 0.5 g | 0.5 g |
| 9. | PEG-400 | 2 g | 2 g | 2 g |
| 10. | Tri-ethanolamine | qs. | qs. | qs. |
| 11. | Distilled water | qs. | qs. | qs. |

## 4. DISCUSSION:

The potential of Azadirachta indica, commonly known as neem, as a mouth paint deserves further exploration. Initial studies have shown promising antimicrobial properties, but larger scale trials are needed to confirm its efficacy and safety for oral health. Additionally, the palatability of neem solution needs to be addressed, as it has a characteristic bitter taste. If these challenges can be overcome, neem mouth paint could offer a natural and potentially more affordable alternative to conventional oral hygiene products.

## 5. EVALUATION ANALYSIS:

1. **Physical Appearance-**

- **Color**- A white background was used to assess the color of the expression.
- **Thickness**- The thickness of the product was tested by putting it to the skin.
- **Greasiness**- The operation of the greasiness to the skin backed the greasiness.
- **Odour**- The odour of the gels was determined by dissolving the gel in water and smelling.

2. **Transparency** - In a 10 ml test tube, 5 ml of set gel was placed and its translucency was tested visually.
3. **Smoothness**- By rubbing the gel expression between the fritters, the smoothness of the expression was determined, and it was determined whether the gel was smooth, floundered, homogeneous, or rough.
4. **Relative density**- Weight in gram taken in 10 ml expression and 10 ml distilled water using Relative Density bottle was used to determine the relative viscosity of the expression.
5. **Determination of pH**- A pH cadence was used to determine the pH of the set gel. 1 g gel was dispersed in 100 mL filtered water in this way. Before use, the electrode was gutted with double distilled water, dried with towel

paper, and calibrated using a standard buffer result at7.0 and 0.7, The pH readings were taken three times and the average results were determined.


**Fig -3.1 pH testing**

6. **Determination of Spreadability-** A modified rustic block and glass slide outfit were used to test spreadability. A rustic block with a fixed glass slide and a pulley made up the outfit. A thread was used to connect a visage to another glass slide (movable). For the spreadability test, a measured quantum of gel was placed in the fixed glass slide, and the portable glass slide with a visage attached was placed on top of the fixed glass slide for 5 twinkles, stuffing the gel between the two slides. The visage was now filled with around 30 grams of weight. The length of time it took for the slides to separate was recorded. The spreadability was calculated using the formula below.

**Fig – 3.2 Spreadability testing**

7. **Determination of Homogeneity:-**After the gels had been set in the vessel, all of the produced gels were visually audited for unity. They were examined for the appearance of summations and the presence of any.
8. **Stability Study**- The stability test was carried out by ICH recommendations. The formulated gel was filled in collapsible tubes and stored at different temperature and moisture conditions, 25ºC ± 2ºC/ ± 5 RH, 30º C ± 2ºC/ 65 ± 5 RH, 40ºC ± 2ºC/ 75 ± 5 RH for three months and studied for appearance, pH and spreadability.
9. **Determination of Antimicrobial exertion-** The antibacterial exertion of a combination of clove oil painting and flaxseeds was tested using the agar mug plate system. All clove oil painting and flaxseeds phrasings of

around 1 were deposited aseptically in mugs of agar plate that had been preliminarily invested with culture. Before incubation at 37 °C for 24 hours, the plates were left at room temperature for 30 twinkles. Azithromycin (Macrolides), a broad range antibiotic, was employed as a positive control to achieve similar data. After 24- 48 hours of incubation, plates were examined for the presence of the zone of inhibition. The periphery of microbial growth inhibition zones (millimetres) was used to assess antimicrobial exertion.

## 6. RESULT:

**Table – 4.1 Physical characteristics**

| S.N. | Parameter | | F1 | F2 | F3 |
|---|---|---|---|---|---|
| 1. | Physical Appearance | Color | Yellow cream | Yellow cream | Yellow cream |
| | | Thickness | Thicker | Thicker | Thicker |
| | | Greasiness | Less greasy | More greasy | Less greasy |
| | | Odour | Minty | Minty | Minty |
| 2. | Transparency | | translucent | Semi- translucent | translucent |
| 3. | Smoothness | | Smooth | Silky Smooth | Very Smooth |
| 4. | Relative density | | 9.6 | 9.8 | 9.7 |

**Table – 4.2 Determination of pH**

| S. N. | Formulation | pH |
|---|---|---|
| 1 | F1 | 6.87 |
| 2 | F2 | 7.0 |
| 3 | F3 | 7.33 |

**Table – 4.3 Determination of Spreadability:-**

| S.N. | Formulation | Spreadability (g cm/sec) |
|---|---|---|
| 1 | F1 | 18.55 |
| 2 | F2 | 15.69 |
| 3 | F3 | 16.08 |

**Table – 4.4 Determination of homogeneity:-**

| S.N. | Formulation | Homogeneity |
|---|---|---|
| 1 | F1 | Very good |
| 2 | F2 | Good |
| 3 | F3 | Very good |

**Table – 4.5 Stability Study:-**

| At , 25ºC± 2ºC / 60% ± 5% RH, | | | |
|---|---|---|---|
| Color | Appearance | Spreadability | pH |
| Light yellow | homogeneous | 18.50 | 7.5 |
| At 30º C ± 2ºC / 65% ± 5% RH, | | | |
| Light yellow | homogeneous | 17.69 | 7.0 |
| At 40ºC ± 2ºC / 75% ±5% RH | | | |
| Light yellow | homogeneous | 16.62 | 6.7 |

**Table – 4.6 Anti-microbial activity:-**

| S. N. | Formulation | Microorganism | Zone of inhibition | Azithromycin |
|---|---|---|---|---|
| 1 | F1 | Staphylococcus aureus | 20.44mm | 25.55mm |
| 2 | F2 | Staphylococcus aureus | 18.56mm | 24.60mm |
| 3 | F3 | Staphylococcus aureus | 17.90mm | 22.46mm |

Research into Azadirachtaindica mouth paints is exploring natural alternatives for oral care. Studies have investigated formulations using ingredients like Neem oil for wound healing and clove oil for its antibacterial properties. These

Azadirachtaindica mouth paints are evaluated for factors like drug content, viscosity, and spreadability. Similar to commercially available medicated mouth paints, herbal versions aim to deliver a topical solution to address concerns like mouth ulcers or bad breath. Further research is needed to validate the efficacy of these herbal formulations compared to traditional methods.

**7. CONCLUSION:**

As a result, the excrescency of microorganisms inside the mouth depression is averted. The combination of clove oil painting and neem oil painting in a tooth gel showed off that there's a lot of eventuality for dental exploration in natural curatives in the future. The antibacterial exertion of a clove oil painting and neem oil painting combination expression against staphylococcus aureus was set up eventuality of a new mouth makeup expression combining Azadirachta indica( neem) excerpt with clove and peppermint canvases . By arbitrating the optimal neem excerpt attention and incorporating the analgesic parcels of clove oil painting and the implicit antimicrobial exertion of peppermint oil painting, this exploration leveled to develop a safe and operative volition for vocal health conservation. Assessing the mouth makeup's physical characteristics, taste, and most importantly, it in vitro efficacity against vocal pathogens will be pivotal in laying its implicit application. However, this natural mouth makeup could extend an encouraging volition to usual productions, promoting good vocal hygiene with a potentially balmy and more natural path, if prosperous.

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