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# A Research Paper On Formulation And Evaluation Of Herbal Effervescent Tablets For Cleaning Denture Base

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**Abstract**

Dental caries occurs as a result of the localised disintegration of the hard tissues of teeth, which is predominantly brought on by acids, due to the presence of bacteria in the biofilm (dental plaque) on the surface of teeth. Dental caries is the term for these "cavities". The disadvantages of commercially available liquid mouthwashes containing artificial active ingredients include tooth discolouration, a greater alcohol content, odd tastes, xerostomia, and stability issues. creating the oral hygiene solid preparation (US6428770B1) in the form of herbal effervescent mouthwash tablets (CN106619318A, US8728446B2) using Azadirachta indica and Curcumin, which have antimicrobial, antibacterial, antiplaque, and anti-inflammatory activities. To conduct the optimisation research for effervescent granules, a 33 factorial design was employed. A total of 27 early experimental batches with various ratios of citric acid, tartaric acid, and sodium bicarbonate were produced using the fusion procedure. Scanning electron microscopy was used to further examine the combination made up of curcumin and hydroxypropyl cyclodextrin. The manufactured tablets' pre- and post-compression characteristics were evaluated. An in vitro antibacterial study employing the Agar well diffusion technique was conducted on S. mutans. Each experimental batch of effervescent granules had its pH, effervescent duration, and CO2 content measured. The final tablet formulation was created using six more batches. The considerable pre-compression parameter findings showed excellent flow characteristics and post-compression parameters.

**Keywords:** Dental caries, oral hygiene, effervescent mouthwash tablet, antimicrobial study, Curcumin, Azadirachta indica.

## Introduction:

You can maintain proper oral hygiene and stop illnesses, bad breath, and other problems from forming in your mouth by brushing your teeth on a regular basis. WHO claims that dental caries affects every person on earth. Campaigns to raise awareness of oral health have been launched in response to population risk identification. By eliminating dental plaque from teeth and avoiding periodontal disease, gingivitis, and cavities (dental caries), teeth are cleansed in the oral cavity. Dental biofilm, or dental plaque, is the term for the sticky, yellow film of bacteria that forms on the surface of teeth. At the gum line, it is visible. Dentures and other dental equipment must all be kept clean. Dentures should be removed at night before going to bed. When wearing a denture while sleeping, saliva's moderate cleaning and antibacterial powers against candida albicans, bacteria, and dentures stomatitis are diminished. Due to discomfort and infection in the oral mucosa

that lies beneath the denture, older persons who wear dentures while sleeping have a higher chance of developing pneumonia. To lessen bacterial bulk and pathogenicity, it is advisable to soak the denture in an alkaline-peroxide denture cleaning tablet for one day, at least once a week.


**Types of bacteria:**

Staphylococcus aureus is the main bacterial pathogen identified in the oral area. spherical Staphylococcus aureus bacteria that are gram-positive. In the oral cavity, Staphylococcus aureus may survive in a variety of ways, such as via forming biofilms and extracellular enzyme extravasation. In the mouth cavity, bacteria may persist and colonise. This virus has the capacity to produce bio films, which are multicellular groupings that develop spontaneously inside of solid teeth.

The majority of microorganisms reside in "bio films," which are communities made up of extracellular matrix-based cells that serve as homes for the organisms and facilitate their growth on harmed tissues.

Only allopathic drugs are effective in treating biofilm and plaque infections on dentures, and the pharmaceutical industry does not offer a herbal formulation for dentures. Nevertheless, many scientists are still working to discover a treatment for these illnesses. However, research suggests that some therapeutic herbs have stronger antibacterial properties.

Effervescent tablets are solid oral dosage forms that eliminate oral bacteria and stop biofilm and plaque from forming on dentures, helping to maintain good dental hygiene.

The material that makes up dental enamel is necessary for the growth of plaque bacteria and includes fermentable carbohydrates after food has been consumed. the inorganic substance frequently ingested with saliva when food is close. Diets high in carbohydrates lower the pH of dental plaque, which results in the loss of inactive minerals in the oral cavity. Acidic organisms include Lactobacillus, Staphylococcus aureus, and Streptococcus mutans. In instance, S mutans eats polysaccharides and keeps producing acid for a very long time after the meal.

The majority of microorganisms reside in "bio films," which are communities made up of extracellular matrix-based cells that serve as homes for the organisms and facilitate their growth on harmed tissues.

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**Symptoms:**

Symptoms of bacterial illness brought on by poor dental hygiene include:

- Under a denture, there may be slight oral mucous membrane inflammation and redness.
- On the roof of the mouth, there are little red pimples.
- Infection with swelling that may be painful.
- Gums that bleed or hurt due to plaque.

**Pathophysiology:**

The material that makes up dental enamel is necessary for the growth of plaque bacteria and includes fermentable carbohydrates after food has been consumed. the inorganic substance frequently ingested with saliva when food is close. Diets high in carbohydrates lower the pH of dental plaque, which results in the loss of inactive minerals in the oral cavity. Acidic organisms include Lactobacillus, Staphylococcus aureus, and Streptococcus mutans. In instance, S mutans eats polysaccharides and keeps producing acid for a very long time after the meal.

**Oral dosage form:**

Effervescent tablets are solid oral dosage forms that eliminate oral bacteria and stop biofilm and plaque from forming on dentures, helping to maintain good dental hygiene.

**It has advantage:**

- Simple to use
- appropriate for patients of any age
- uphold proper hygiene and oral health.
- Using mouthwash can help you avoid pregnancy complications.

Pills in the effervescent form are the preferred dosage type. Due to its many advantages, such as being more economical than other dosage forms, convenient administration, exact dosing, patient compliance, and self-medication, solid dosage forms are the most popular [1].Tablets and capsules are the most often used solid dosage forms. Effervescent tablets are a revolutionary oral medication delivery dosage form created by pharmaceutical professionals that dissolve swiftly in water in a couple of seconds. In comparison to standard dosage forms, this early tablet disintegration starts the drug's solubility and absorption, which considerably improves the bioavailability and start of pharmacological activity. Effervescent tablets, which are uncoated tablets that swiftly disperse in water after being immersed for 59 seconds, are defined by the European Pharmacopoeia.

**Optimal properties of effervescent tablets:**

- Tablets must dissolve easily and fast in water in order to be effective.
- It would be ideal if it worked well with the other excipients; tablets should have a significant amount of medicine loading.
- No residue should remain in the water after delivery, and it should be very resistant to environmental variables like humidity and temperature.

**Advantages of effervescent tablets:**

- Simpler patient administration.
- Patients' compliance may be improved.
- Effervescent pills make it easier to take medications.
- When preparing solid doses, it offers benefits over liquid medications.
- Following rapid absorption, pharmacological action on dentures starts to take effect right away.

**Limitations of effervescent tablets:**

- Effervescent tablets must be maintained in a dry atmosphere due to their hygroscopic nature, and occasionally incorrectly made pills may have an unpleasant aftertaste.
- It might be difficult to obtain dosage homogeneity for effervescent tablets, which need special packaging to keep them stable.

**Various methods for preparation of effervescent tablets:**

Effervescent tablets can be produced in a variety of methods, but the final products vary in terms of mechanical strength, bioavailability, water solubility, stability, and, to some extent, taste.

**1. Molding method:**

The quick rate at which these pills break down and disintegrate is indicative of their very porous construction. Most of the excipients in moulded tablets are water soluble compounds. This method involves wetting a powder mixture with a solvent (often ethanol or water) before compressing the wet mixture into tablets at lower pressures than those used for conventional tablet compression. The powder combination can be sieved before to moulding, which will enhance the dissolving. Tablets that have been formed have very little mechanical strength.

**2. Compaction Method:**

Conventional tablet preparation methods including dry granulation, wet granulation, and direct compression can also be used to create effervescent tablets. A few super disintegrants are present in effervescent pills.

**3. Spray-drying method:**

Spray drying is a method for producing very fine, porous powders. Using sodium bicarbonate or citric acid as an alkali metal and hydrolyzed or unhydrolyzed gelatine as a supporting component for the matrix, effervescent tablets are produced using this method. The use of mannitol results in increased bulk. Eventually, sodium bicarbonate and citric acid are used to help in dissolving and disintegration. The resultant mixture is spray-dried using the binding agent PVP-K-30 as the last step. For tablets created using this method, the disintegration time is under 59 seconds.

**4. Sublimation:**

In this process, a subliming chemical called "Camphor" is used. Following the creation of the tablets, the sublimation is carried out in a vacuum for 30 minutes at an 80°C temperature. The tablets made with this method disintegrate typically within 10 to 20 seconds due to their porous nature.

**5. Effervescent method:**

By mixing sodium bicarbonate, tartaric acid, and super disintegrants such pregelatinized starch, sodium starch glycolate, mannitol, etc., this approach produces an effervescent tablet. Tartaric acid and sodium bicarbonate were first properly mixed and heated to 80°c. To complete, the mixture is crushed into tablets.

**Challenges in the formulations of effervescent tablets:**

- Mechanical resistance and time to disintegration
- Drug solubility in water
- dose of the medication
- Hygroscopicity
- Good packaging design for the mouth

**Mechanism of tablet disintegration:**

The following are the main techniques used in tablet disintegration:

- Swelling.
- Porosity and capillary action.
- Deformation.
- forces that repel particles.

**Evaluation of effervescent tablets:**

- **Content uniformity**

The consistency of the substance test depends on testing each prescription drug separately in various individual dose units to ascertain if a substance is within the breaking threshold. The consistency test for the content is required for tablets whose dosage is less than 25 mg or 25% of one tablet. The content of dynamic fixing is determined in each of the 10 measurement units that were chosen at random using the technique demonstrated in the test. The test is allowed by the planning if a single substance is between 85 and 115% of a normal material.

- **Hardness**

The strength used over the tablet's width in an effort to break it is how a tablet's hardness is determined. The way the tablet is handled both before usage and during capacity adjustment will determine how resistant it is to chipping, scraping, or breaking. The hardness of each definition's tablet was assessed using the Monsanto Hardness Analyzer. The hardness of effervescent tablets is frequently kept lower than that of regular tablets because greater hardness slows the tablet's disintegration. A hardness of between 3 and 5 kg/cm2 is regarded as suitable for uncoated tablets. Estimated in kilogrammes is the power.

- **Uniformity of weight**

The 20 tablets are individually weighed for the weight variation test, the average tablet weight is calculated, and the findings are contrasted with the average weight.

**Table No. 1.1. Weight variation table**

| Monograph | Average weight | Deviation [%] |
|---|---|---|
| **IP/BP** | <80 mg | 10 |
| | Between 80 and 250 mg | 7.5 |
| | >250 mg | 5 |
| **USP** | <130 mg | 10 |
| | Between 130 and 325 mg | 7.5 |
| | >325 mg | 5 |

- **Friability test**

Friability is the weight loss of a tablet in its holder as a result of microscopic particles being ejected from its surface. A friability test is done to see if the tablet can withstand having its surface scraped while being packed, handled, and transported. The Roche friabilator is used to assess the tablets' friability. The friabilator has a plastic chamber that rotates at a speed of 25 revolutions per minute while decreasing the tablets by 6 creeps after each upset. The friabilator was filled with a sample of pre-measured tablets and spun 100 times. Then, after being de-tidied with a fine muslin towel, the pills were reweighed. The pill's weight loss, which is conveyed at a pace as it follows, serves as a gauge of friability.

$$\%Friability = \frac{Lossinweight}{Initialweight} \times 100$$

- **Thickness**

The diameter and thickness of the tablets were determined using a Micrometre screw gauze. Average features were determined using five tablets from each kind of detailing. Millimetres are used to measure it. WHO claims that dental caries affects every person on earth. Campaigns to raise awareness of oral health have been launched in response to population risk identification. By eliminating dental plaque from teeth and avoiding periodontal disease, gingivitis, and cavities (dental caries), teeth are cleansed in the oral cavity.

- **Water absorption ratio**

A piece of tissue paper was taken and folded twice. Then, it was placed in a small Petri dish that contained 6 ml of water. The time taken to thoroughly wet a pre-weighed tablet was measured after it was placed on the paper. After being wet, the pill was weighed once again. The water absorption ratio [R] was calculated using the equation below.

$$R=10\times W_a W_b$$

Where Wb is the tablet's weight before water absorption and Wa is the tablet's weight following water absorption.

## Materials & Methods:

### List of Chemicals

| S.No. | Name of Chemical | Grade and Batch | Source |
|---|---|---|---|
| 1 | Neem Extract | unknown | Extracted |
| 2 | Citric acid | Pharmaceutical grade | Central Drug House Pvt. Ltd. (New Delhi) |
| 3 | Sodium bicarbonate | Pharmaceuticals grade | Central Drug House Pvt. Ltd. (New Delhi) |
| 4 | Mannitol | Pharmaceutical grade | Central Drug House Pvt. Ltd. (New Delhi) |
| 5 | PVP | Pharmaceutical grade | Central Drug House Pvt. Ltd. (New Delhi) |

**List of Equipments**

| S.No. | Name | Company |
|---|---|---|
| **1** | Tablet Punching Machine | Rinek |
| **2** | Dissolution Apparatus | Electrolab |
| **3** | Melting Point Apparatus | The National Scientific Instrument |
| **4** | U.V Spectroscopy | Perkin Elmer |
| **5** | Monsanto Hardness Tester | The National Scientific Instrument |
| **6** | Tablet Disintegration Test Machine | The National Scientific Instrument |
| **7** | Magnetic Stirrer | The National Scientific Instrument |
| **8** | Bulk Density Apparatus | The National Scientific Instrument |
| **9** | Digital Weighing Balance | Shimadzu, Japan |
| **10** | Micropipettes | Erba Biohit |
| **11** | Glass Wares (test tubes, beakers, pipette, flask, glass rod etc.) | Borosil |
| **12** | Friability test Apparatus | The National Scientific Instrument |

## Methodology:

**Preparation Neem Extract:**

Neem leaves weighing 50 g were finely chopped.

↓

For 10 minutes, leaves were cooked in 100 cc of water.

↓

Next, the extract was filtered.

↓

Extract from liquid was lyophilized

↓

Powder was gathered

↓

Following extraction, neem extract's spectral absorbance was measured in UV light at 400 nm.

**MINIMUM INHIBITORY CONCENTRATION (MIC)**

They took a little test tube.

↓

Test tube should be cotton plugged and filled with water.

↓

Water from the autoclave was dumped.

↓

Combine the inoculum and neem extract in the test tube.

↓

Every two hours, the absorbance at 600 nm was measured.

**Anti-bacterial Study**

Bacterial suspension was placed inside a tooth after it had been removed.

↓

It was incubated for 90 minutes at 37 degrees.

↓

It was cleaned with saline (0.9% NaCl).

↓

It was dipped in water (control water) as a control group and in 10 ml (Neem extract) for 15, 30, and 60 minutes.

↓

It was covered with formaldehyde.

↓

The number of microorganisms counted under a microscope

**Cell surface Hydrophobicity(CSH) assay**

In 96 wells, bacteria (all cell types) were cultivated.

Neem extract (1/2,1/4,1/8,1/16 100 microliters) with medium plus 0.5% glucose
↓24 hrs

Sodium chloride (0.9% NaCl) rinsed
↓

(10 minutes) Methanol was added.
↓

Methanol was taken out
↓

For five minutes, 100 microliters of crystal violet (0.1%) were added.
↓

Crystal Violet dye was eliminated.
↓

It was twice washed with distilled water.
↓

Dry kept for air
↓

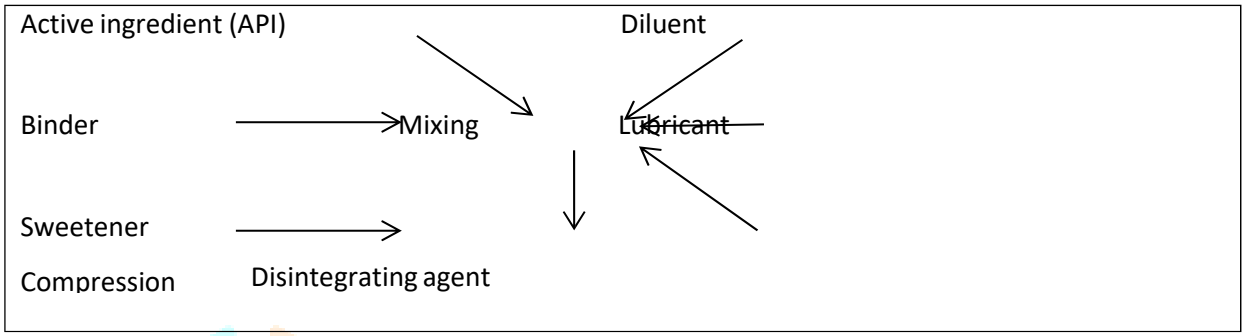
30 minutes later, 100 microliters of 95 percent ethanol were injected.
↓

After transferring the solution into 96-well plates, the absorbance at (595 nm) was measured.

**Formulation of tablets**

**DIRECT COMPRESSION METHOD**

The most cutting-edge technology is direct compression, which solely comprises compression and mixing. Speedy manufacturing may be readily accomplished because to less needs for unit activities, less machinery, fewer workers, shorter processing times, and more stable products.




**Direct Compression Process**

The direct compression process was used to create the effervescent pills. Magnesium stearate and talc were added last as a lubricant after all the components for the Neem Effervescent Tablets were weighed.

The 500 mg mixture was then compacted in a tablet punching machine using a 12 mm punch. Each pill was 500 mg in size.

## Formulation Tablet

| S.No. | INGREDIENTS | F1 (mg) | F2 (mg) | F3 (mg) | F4 (mg) | F5 (mg) |
|---|---|---|---|---|---|---|
| **1.** | Neem | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 |
| **2.** | Citric acid | 0.57 | 0.85 | 0.85 | 0.85 | 0.85 |
| **3.** | Sodium bicarbonate | 0.5 | 0.75 | 0.75 | 0.75 | 0.75 |
| **4.** | Mannitol | - | - | 0.06 | 0.12 | - |
| **5.** | Talc | 2 | 2 | 2 | 2 | 2 |

**Physicochemical Properties of Neem**

**Various physicochemical properties of Neem includes:-**

- Colour
- Solubility
- Melting point
- pKa value

**PRE-FORMULATION STUDIES**

In pre-formulation investigations, the physicochemical characteristics of the drug material are characterised using biopharmaceutical principles in order to create the best drug delivery system.

The current study seeks to use super disintegrants of natural origin for the direct compression method to create effervescent neem pills.

**a) Bulk density (Db)**

It is the ratio of the total mass of powder to its total mass volume. It was calculated by adding the measured powder (40-work that has been pre-sieved) to a measuring device and then recording the volume. The bulk volume refers to this underlying volume. From there, the following equation is used to get the bulk density.

$$Db = M/Vb$$

Where, M is the mass of powder

V is the bulk volume of the powder

**b) Tapped density (Dt)**

In order to determine the final tapped volume (Vt), 100 tapings of the powder with the known mass were performed in a bulk density device. The calculated numbers were used in the calculation to calculate the tapped density.

$$Dt = M/Vt$$

Where, M is the mass of powder

Vt is the tapped volume of the powder

**c) Angle of repose (Θ)**

Through a broad mouth funnel that was linked to a stand, the powder mixture was poured. After obtaining the mixture's heap, its height (h) and base's radius (r) were measured and calculated using the following formula:

$$\text{Tan } (\Theta) = h/r$$

$$\Theta = \tan^{-1}(h/r)$$

Where, Θ is the angle of repose H is the height of the pile in cmsR is the radius of the pile in cms

**Angle of repose and type of flow**

| Angle of repose | Type of flow |
|---|---|
| <25 | Excellent |
| 25-30 | Good |
| 30-40 | Passable |
| >40 | Very poor |

## POST-FORMULATION STUDIES

According to I.P. recommendations, all of the created pills were assessed for the following factors:

### a. Weight variation

The weight variation test is carried out by weighing each of the 20 tablets separately, determining the average tablet weight, and comparing the results to the average weight.

**Weight variation parameters**

| Average weight | Percentage difference |
|---|---|
| 130 mg or less | 10 |
| More than 130 mg through 324mg | 7.5 |
| More than 324 mg | 5 |

### A. Wetting time

In a petri dish with an internal diameter of 6.5 cm and 6 ml of water, a piece of tissue paper that had folded in half was preserved. The appropriate time for the tablet's complete soaking was quickly determined once the tablet was placed on the paper. The method was altered by maintaining a 37°C water temperature. Six tablets were randomly selected from a batch and their wetting times were recorded while a total of six tablets were inspected for wetting time.

### B. Hardness

Tablets or hardness Using a Monsanto/Pfizer tablet hardness tester, crushing strength, which is the force needed to break a tablet in a diametric compression, was assessed.

### C. Friability

The Roche friabilator (USP) was used to assess the friability of tablets. Six tablets, which had been pre-weighed, were put in the friabilator and rotated for 100 revolutions at 25 rpm.

**% friability = (initial wt. – final wt. / initial wt.)×100**

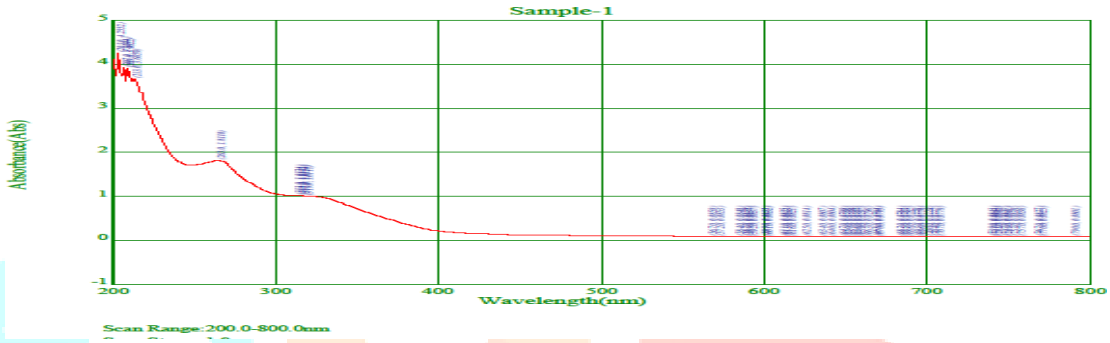
# Result & Discussion:

## Physicochemical Properties of neem leaves extract

- **Colour** : dark green
- **Solubility**: Freely soluble in water,
- **Melting Point** : 180-182˚C
- **pKa value**: 5.8

## UV analysis of neem extract

### a) Determination of λ max (lambda maximum)




**λmax of Neem (279nm)**

**Calibration curve data for Neem extract**

| Concentration (µg/ml) | Absorbance at 279nm |
|---|---|
| 0 | 0 |
| 1 | 0.020 |
| 2 | 0.039 |
| 3 | 0.059 |
| 4 | 0.079 |
| 5 | 0.098 |
| 6 | 0.117 |
| 7 | 0.140 |
| 8 | 0.159 |
| 9 | 0.180 |
| 10 | 0.200 |

## Minimum Inhibitory Concentration:

1 OD600 =109 Cfu/ml-0.8 107 at 600nm

50 ul in 950 µg/mL Dilute 0.1 OD and incubate for 24 hour

Measure OD at 600 nm

| | |
|---|---|
| Bacteria-96 | 0.1488 µg/mL |
| Bacteria-44 | 0.0418 µg/mL |
| Bacteria-1607 | 0.2551 µg/mL |
| Bacteria-741 | 0.0607 µg/mL |
| Bacteria-8145 | 0.2234 µg/mL |
| Bacteria-1425 | 0.3288 µg/mL |

**Anti-bacterial Study**

In this study, the bacterium survival time at various concentrations was examined, and it was shown that p. aeruginose did not live for 12 hours at concentrations of 0.1 ml.

**For Bacteria P.aeruginose**

| Time (hours) | 0.001 ml | 0.01 ml | 0.1 ml | 1 ml |
|---|---|---|---|---|
| 12 hours | + | + | - | - |
| 24 hours | + | + | - | - |
| 48 hours | + | - | - | - |

**For Bacteria *B.pumilis*:**

In this investigation, the bacterium survival time at various concentrations was checked, and it was shown that B. pumilis did not live for 12 hours at concentrations of 0.01 ml.

| Time (hours) | 0.001 ml | 0.01 ml | 0.1 ml | 1 ml |
|---|---|---|---|---|
| 12 hours | + | - | - | - |
| 24 hours | + | - | - | - |
| 48 hours | + | - | - | - |

**For Bacteria M.lylae:**

M. lylae did not live for 12 hours at concentrations of 0.01 ml, according to this study, which examined the bacteria's survival times at various concentrations.

| Time (hours) | 0.001 ml | 0.01 ml | 0.1 ml | 1 ml |
|---|---|---|---|---|
| 12 hours | + | - | - | - |
| 24 hours | + | - | - | - |
| 48 hours | + | - | - | - |

**For Bacteria A.baurmani:**

This investigation was conducted to determine the bacteria's period of life at various concentrations, and it was shown that A. baurmani did not live for 48 hours at concentrations of 0.001 ml.

| Time (hours) | 0.001 ml | 0.01 ml | 0.1 ml | 1 ml |
|---|---|---|---|---|
| 12 | + | - | - | - |
| 24 | + | - | - | - |
| 48 | - | - | - | - |

**For Bacteria B.subtilis:**

In this investigation, the bacterium survival duration at various concentrations was checked. It was found that B.subtilis did not live for 24 hours at concentrations of 0.01 ml.

| Time (hours) | 0.001 ml | 0.01 ml | 0.1 ml | 1 ml |
|---|---|---|---|---|
| 12 | + | + | - | - |
| 24 | + | - | - | - |
| 48 | - | - | - | - |

**For Bacteria S.aureus:**

S. aureus did not live for 48 hours at concentrations of 0.1 ml, according to this study, which examined the bacteria's survival period at various concentrations.

| **Time (hours)** | 0.001 ml | 0.01 ml | 0.1 ml | 1 ml |
|---|---|---|---|---|
| **12** | + | + | + | - |
| **24** | + | + | + | - |
| **48** | + | + | - | - |

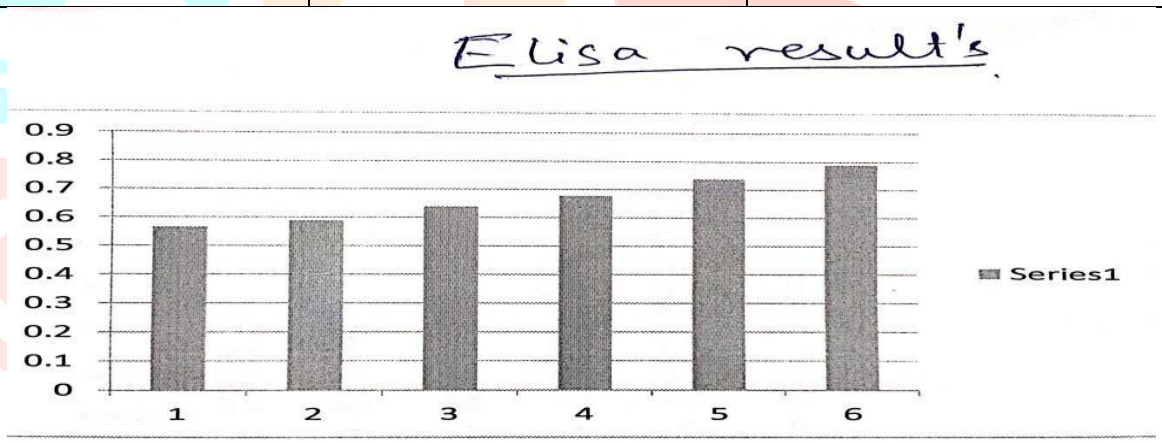
Thus, these tests demonstrated that the majority of bacteria were found dead after 24 hours at 0.1 ml concentration of neem extract.

Therefore, it is discovered that 0.1ml of concentration for 24 hours is efficient for bacteria. After soaking plaque-covered teeth in 10 ml of neem extract for 24 hours, it was discovered that bacteria had not developed on the teeth. SEM was used to observe the bacterial attachment to the surfaces of the teeth.

**Cell Surface hydrophobicity (CSH) assay:**

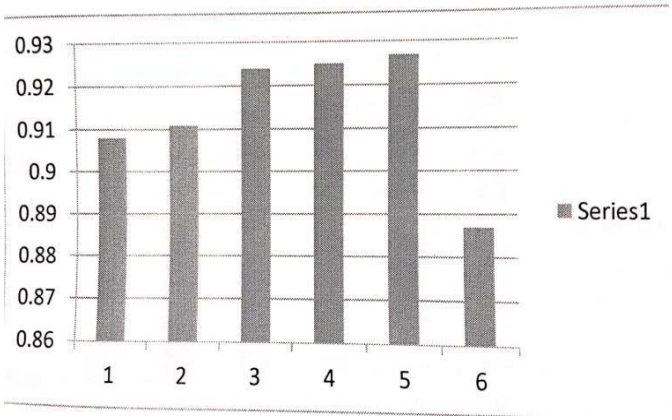
For Bacteria P.aeruginose cell hydrophobicity

| Concentrations (ml) | Abs at 595 nm | SD |
|---|---|---|
| 1 ml | 0.434 | 0.566 |
| 0.5 ml | 0.411 | 0.589 |
| 0.2 ml | 0.361 | 0.639 |
| 0.1 ml | 0.322 | 0.678 |
| 0.06 ml | 0.261 | 0.739 |
| 0.03 ml | 0.211 | 0.789 |




**For Bacteria S.aureus**

| Concentrations | Abs at 595 nm | SD |
|---|---|---|
| 1 ml | 0.092 | 0.908 |
| 0.5 ml | 0.089 | 0.911 |
| 0.2 ml | 0.076 | 0.924 |
| 0.1 ml | 0.075 | 0.925 |
| 0.06 ml | 0.073 | 0.927 |
| 0.03 ml | 0.113 | 0.887 |

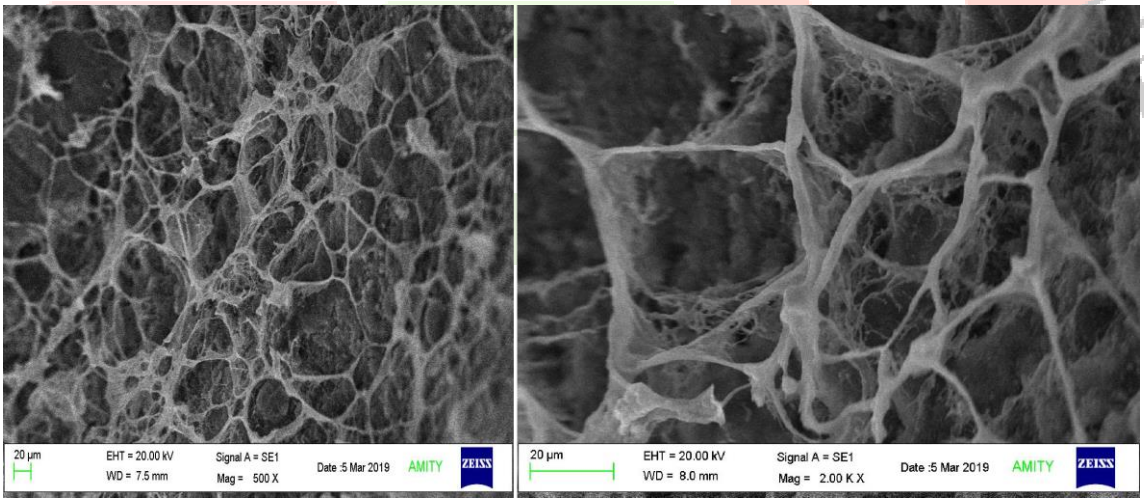



**For Bacteria B.subtilis**

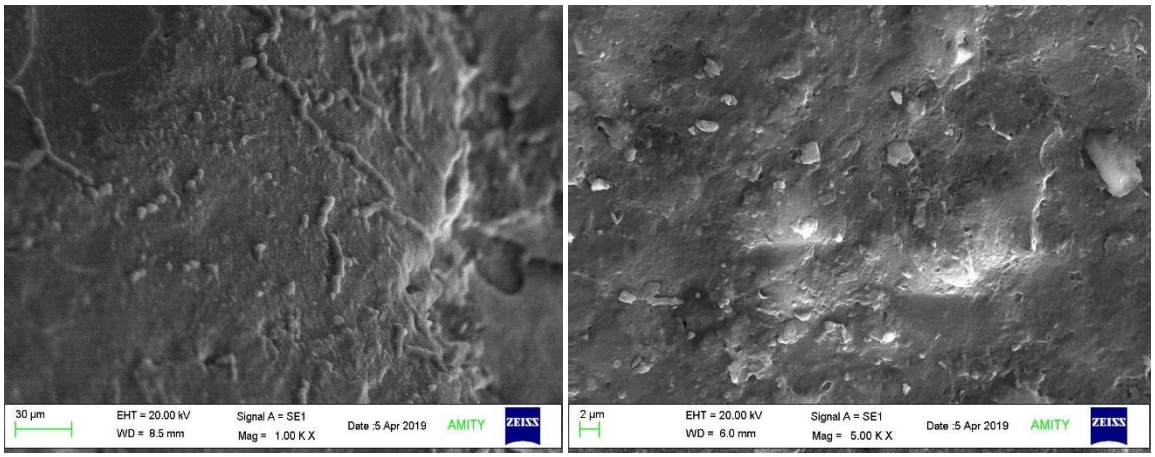
| Concentrations | Abs at 595 nm | SD |
|---|---|---|
| 1 ml | 0.130 | 0.870 |
| 0.5 ml | 0.100 | 0.900 |
| 0.2 ml | 0.080 | 0.920 |
| 0.1 ml | 0.070 | 0.930 |

**SEM RESULTS:**

**1. Without Treatment**



2. **With treated neem effervescent tablet**




**Future Perspectives:**

Commercially available liquid mouthwashes with artificial active components have a number of drawbacks, including tooth discoloration, a higher alcohol content, strange flavours, xerostomia, and stability problems. Azadirachta indica and Curcumin, which have antimicrobial, antibacterial, antiplaque, and anti-inflammatory properties, were used to create the oral hygiene solid preparation (US6428770B1) in the form of herbal effervescent mouthwash tablets (CN106619318A, US8728446B2). A 33 factorial design was used to carry out the optimisation investigation for effervescent granules. The fusion process was used to create a total of 27 early experimental batches with different ratios of citric acid, tartaric acid, and sodium bicarbonate. Using scanning electron microscopy, the mixture of curcumin and hydroxypropyl cyclodextrin was further investigated. The pre- and post-compression properties of the produced tablets were assessed. S. mutans was the subject of an in vitro antibacterial experiment using the Agar well diffusion method.

**Discussion:**

By regularly brushing your teeth, you may maintain good oral hygiene and prevent diseases, bad breath, and other issues from developing in your mouth. According to the WHO, dental caries affects everyone on the planet. In response to demographic risk identification, campaigns have been created to increase awareness of oral health. Teeth are cleaned in the oral cavity by removing dental plaque from them and preventing periodontal disease, gingivitis, and cavities (dental caries). Most microorganisms live in "bio films," which are cell-based communities comprised of extracellular matrix that act as homes for the organisms and promote their proliferation on damaged tissues. The pharmaceutical industry does not provide a herbal formulation for dentures, and only allopathic medications are useful in treating biofilm and plaque infections on dentures. However, several researchers are still trying to find a cure for these diseases. But research indicates that some medicinal plants have more potent antibacterial capabilities.

**Conclusion:**

According to the aforementioned findings, persons who wear dentures are given neem effervescent tablets so that the neem, which has antibacterial qualities, would kill the bacteria on the dentures and prevent it from creating biofilm and plaque. Comparing the composition of effervescent pills to amoxicillin antibiotic tablets, the best results are obtained. They developed herbal effervescent neem tablets. Following an assessment of the available literature, neem was selected as the therapeutic candidate. For the creation of effervescent tablets, manitol, sodium bicarbonate, citric acid, and pvp were used as the excipients. There were experiments conducted before and after the formulation. Formulation F3 dissolved in water in 33 seconds based on its physicochemical properties. F3 was shown to be the formulation with the greatest effectiveness as a consequence. Neither formulation could entirely dissolve in water; Formulation F2 showed 28 seconds while Formulation F1 showed 1 minute. While completely dissolved in water, F4 displayed 38 seconds, F5 displayed 34 seconds, and F6 displayed 37 seconds. In Formulation F3, mannitol was employed 0.6% as a lubricant. Therefore, F3 outperformed the formulae in terms of performance. Further research is required to solve the mottling issue in the tablets, and their ability to hide flavours must be assessed by a human taste panel.

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