FORMULATION AND EVALUATION OF HERBAL EFFERVESCENT TABLETS FROM NEEM PLANT FOR DENTAL CARE

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Abstract

The aim of this study was to define and assess dental caries, which is caused by the presence of bacteria in the biofilm (dental plaque) on the surface of teeth, leading to the localized disintegration of the hard tissues. This disintegration is mostly caused by acids. These "cavities" are known as dental caries. Using Azadirachta indica and Curcumin, which have antimicrobial, antibacterial, antiplaque, and anti-inflammatory properties, a herbal effervescent mouthwash tablet was developed as a solid oral hygiene preparation due to the drawbacks of commercially available liquid mouthwashes with artificial active ingredients, such as tooth discoloration, increased alcohol content, peculiar tastes, xerostomia, and stability issues. This study focuses on formulation and investigates how adherence, biofilm accumulation, and cellular floor hydrolysis are affected by the extracted product from natural formulation. Staphylococcus aureus, Bacillus pummels, Bacillus subtilis, Acinetobacter baumannii, Micrococcus Lyle, and Pseudomonas aeruginosa are the bacteria used in this investigation.

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

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Introduction

Regular tooth brushing will help you to 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. The discovery of population risk has prompted the establishment of campaigns to increase public awareness of dental health. Teeth are cleaned in the oral cavity by removing dental plaque from them and preventing cavities (dental caries), gingivitis, and periodontal disease. The word used to describe the sticky, yellow film of bacteria that develops on the surface of teeth is dental biofilm, often known as dental plaque. It is noticeable at the gum line. It's important to maintain clean dentures and other dental equipment. Before going to bed at night, dentures should be taken out. Saliva's mild cleansing and antibacterial properties against bacteria, candida albicans, and dentures stomatitis are reduced when sleeping with a denture on. Elderly people who wear dentures while they sleep are more likely to have pneumonia because of pain and infection in the oral mucosa beneath the denture. Staphylococcus aureus can live in the oral cavity in a number of ways, including via producing biofilms and extracellular enzyme extravasations. It's possible for bacteria to grow and colonize in the oral cavity. The ability to form biofilms multi cellular aggregates that naturally form inside of solid teeth—is possessed by this virus. [1,2]

Most microorganisms live in communities known as "bio films," which are composed of cells derived from extracellular matrix. These communities act as homes for the organisms and promote their growth on damaged tissues. Effervescent tablets are solid oral dosage forms that aid in maintaining proper dental hygiene by getting rid of oral germs and preventing the buildup of biofilm and plaque on dentures. [3]

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. [1,4]

Pathophysiology

The component of tooth enamel that includes fermentable carbohydrates after food has been eaten is essential for the formation of plaque bacteria. The inorganic material that is often swallowed with saliva when food is around. Carbohydrate-rich diets cause dental plaque to have a lower pH, which causes the mouth cavity to lose inactive minerals. Lactobacillus, Staphylococcus aureus, and Streptococcus mutans are examples of acidic organisms. For example, S mutans consumes carbohydrates and continues to produce acid long after the meal. [5]

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.

Advantages

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

The recommended dosage form is effervescent pills. Solid dosage forms are the most often used because of their various benefits, which include being more affordable than other dosage forms, easy administration, precise dosage, patient compliance, and self-medication. The solid dose forms that are most frequently utilized are tablets and capsules. Pharmaceutical experts developed effervescent pills, a novel oral medicine delivery method that dissolves quickly in water in a matter of seconds. This early breakdown of the tablet, as opposed to traditional dose forms, initiates the drug's solubility and absorption, hence improving the bioavailability and initiating pharmacological activity. The European Pharmacopoeia defines effervescent tablets as uncoated tablets that dissolve quickly in water after being submerged for 59 seconds.

Properties of effervescent tablets

1. Tablets must dissolve easily and fast in water in order to be effective.
2. It would be ideal if it worked well with the other excipients; tablets should have a significant amount of medicine loading.
3. No residue should remain in the water after delivery, and it should be very resistant to environmental variables like humidity and temperature.[6]

Advantages of Effervescent Tablets

1. Simpler patient administration.
2. Patients' compliance may be improved.

3. Effervescent pills make it easier to take medications.
4. When preparing solid doses, it offers benefits over liquid medications.
5. Following rapid absorption, pharmacological action on dentures starts to take effect right away.

Limitations of Effervescent Tablets

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

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**
2. **Compaction Method**
3. **Spray-drying method**
4. **Sublimation**
5. **Effervescent method**

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 [7]

Mechanism of tablet disintegration

The following are the main techniques used in tablet disintegration:

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

Methodology (Materials & Methods)

List of all chemicals and equipments that was used in research listed in table 1 and 2 respectively.

List of Chemicals

Table 1: List of Chemicals

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

List of Equipments

Table 2: List of Equipments

Sr. No.	Name	Company
1	Tablet Punching Machine	Rinek
2	Dissolution Apparatus	Electrolab
3	Melting Point Apparatus	tional 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	tional Scientific Instrument

Preparation Neem Extract

After chopping 50 grams of neem leaves into small pieces, boil the leaves in water for 10 minutes, and then strain the extract. Gather the powder after the liquid has been lyophilized. At 400 nm in UV light, the spectral absorbance of the neem extract was recorded.

Formulation and Development of tablets

Direct Compression Method

Direct compression, which just consists of compression and mixing, is the most advanced technology. Because there are fewer unit activities required, fewer machines, fewer laborers, shorter processing periods, and more stable products, faster manufacturing may be easily achieved.

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. [4,8]

Formulation Tablet

The working formula for formulation of Neem Tablet given in table 3.

Table 3: Formulation of Neem 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 characterized 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.

1. 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. [9]

$Db = M/Vb$

Where, M is the mass of powder

V is the bulk volume of the powder

2. 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. [10]

$Dt = M/Vt$

Where, M is the mass of powder

Vt is the tapped volume of the powder

3. Angle of repose (Ɵ)

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:

Tan Ɵ= h/r

Where, Ɵ is the angle of repose H is the height of the pile in cmsR is the radius of the pile in cms.[11]

Table 4: Angle of repose and type of flow

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

4. Carr's Index

5. Hausner's Ratio

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.[12,13]

Table 5: 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

b. 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.[14,15]

c. 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.[16]

d. 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. [16]

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

e. In Vitro Disintegration Time

f. Drug Content Uniformity

Evaluation Parameters for Powder Blend & Tablet

SEM Study

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

Determination of Λ Max (Lambda Maximum)

λmax of Neem = (279nm)

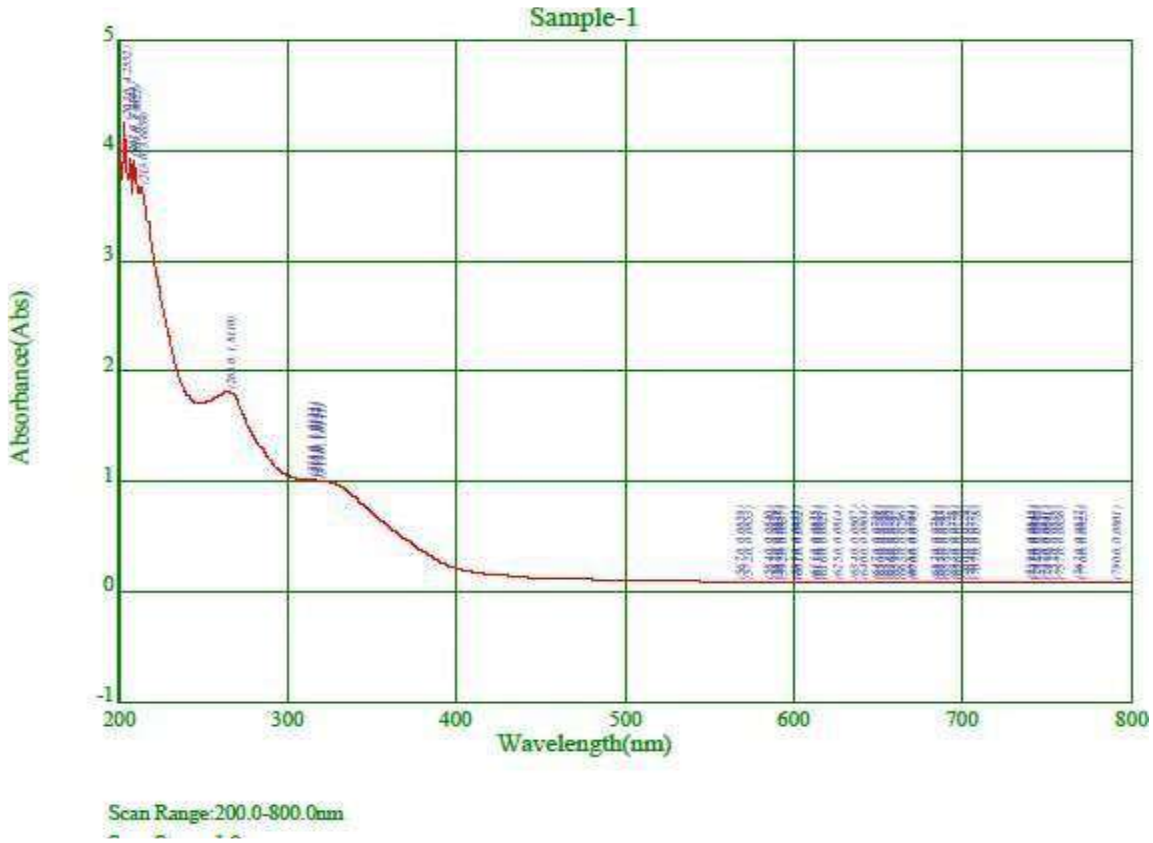

Figure 1: λmax of Neem (279nm)

Table 6: 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

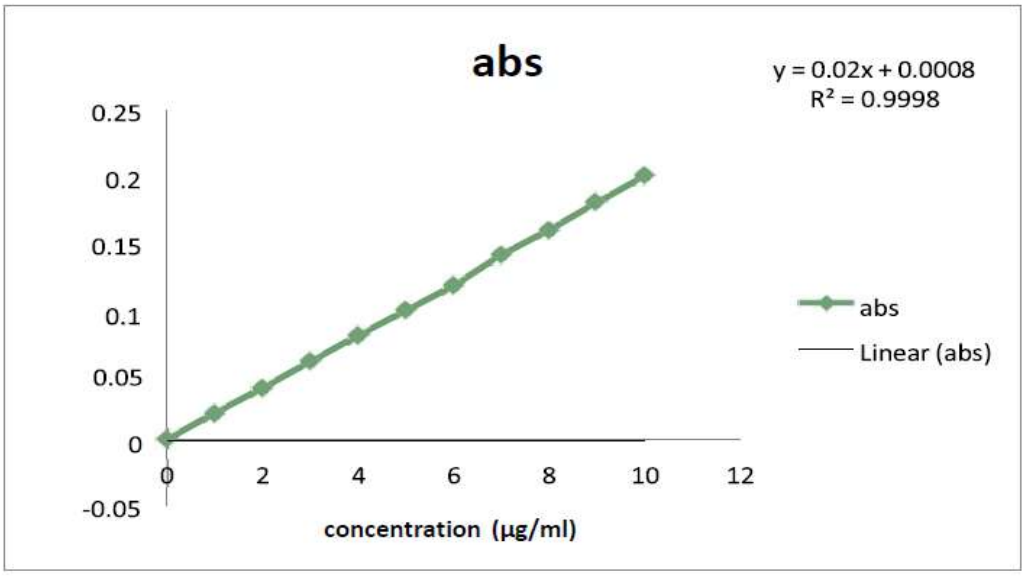

Figure 2: Calibration curve Plot for Neem extract

Minimum Inhibitory Concentration

1 OD 600 =109 Cfu/ml-0.8 107 at 600nm 50 ul in 950 µg/mL Dilute 0.1 OD and incubate for 24 hours Measure OD at 600 nm

Table 7: Minimum Inhibitory Concentration

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.[17]

For Bacteria P.aeruginose

Table 8: Anti-bacterial Study 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.

Table 9: Anti-bacterial Study for Bacteria B.pumilis

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.

Table 10: Anti-bacterial Study for Bacteria M. lylae

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.

Table 11: Anti-bacterial Study for Bacteria A.baurmani

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.

Table 12: Anti-bacterial Study for Bacteria B. subtilis

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.

Table 13: Anti-bacterial Study for Bacteria S.aureus

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

Table 14: For Bacteria P.aeruginose cell hydrophobicity assay

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

Table 15: For Bacteria S.aureus cell hydrophobicity assay

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

Table 16: For Bacteria B.subtilis cell hydrophobicity assay

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

Evaluation of Pre-compression parameters

1. Bulk density

Table: 17 Bulk Density (Formulation Mixture)

Batches	Mass(g)	Volume (cm^3)	Bulk density(g/cm^3)
FT1	8	20	0.4
FT2	8	20	0.4
FT3	8	20	0.4
FT4	8	20	0.4
FT5	8	20	0.4
FT6	8	19.3	0.41

2. Tapped density

Table: 18 Tapped Density of Formulation

Batches	Mass(g)	Volume(cm^3)	Tapped density(g/cm^3)
FP1	8	17	0.47
FP2	8	17.3	0.462
FP3	8	16	0.5
FP4	8	16	0.5
FP5	8	16.8	0.476
FP6	8	16	0.5

3. Angle of repose (Ɵ)

Table: 19 Angle of Repose (Formulation)

Batches	Height(cm)	Radius(cm)	of repose (Ɵ)
FT1	1.866	3.5	27.3
FT2	1.9	3.6	27.4
FT3	1.63	3.5	24.9
FT4	2.0	3.3	30.9
FT5	1.633	3.53	24.7
FT6	1.866	3.4	28.3

Formulation (FT3) has excellent flow, whereas formulations (FT1, FT2, FT5, FT6) have good flow and formulation FT4 has passable flow property.

4. Carr's index (or) % compressibility

Table: 20 Carr's index

Batches	Tapped density(g/cm^3)	Bulk density(g/cm^3)	ressibility (%)
FT1	0.48	0.4	16.6
FT2	0.48	0.4	16.6
FT3	0.48	0.4	16.6
FT4	0.45	0.4	11.1
FT5	0.45	0.4	11.1
FT6	0.49	0.41	16.3

Formulations (FT4 & FT5) have excellent flow description; whereas formulations (FT1,FT2, FT3, FT6) have good flow description.

5. Hausner Ratio

Table: 21 Hausner Ratio

Batches	Tapped density(g/cm^3)	Bulk density(g/cm^3)	Hausner ratio
FT1	0.48	0.4	1.2
FT2	0.48	0.4	1.2
FT3	0.48	0.4	1.2
FT4	0.45	0.4	1.125
FT5	0.45	0.4	1.125
FT6	0.49	0.41	1.225

All the formulations have good flow.

Evaluation of Post-compression parameters

a) Weight variation

Table 22: Weight of individual tablets randomly selected from each batch

ablet No.	FT1 g	FT2 g	FT3 g	FT4 g	FT5 g	FT6 g
1	386	395	400	399	407	400
2	391	385	397	387	400	392
3	385	388	396	385	410	393
4	380	395	390	387	394	388
5	389	388	400	394	396	387

6	392	389	390	380	403	390
7	394	387	400	385	387	420
8	400	398	393	404	396	401
9	384	388	384	395	386	396
10	381	409	389	410	391	398
11	400	395	383	394	396	406
12	382	406	381	395	390	403
13	394	401	384	395	400	404
14	400	383	400	396	394	397
15	386	400	385	397	412	397
16	393	391	383	389	397	386
17	394	392	397	384	395	393
18	383	398	388	382	408	393
19	400	399	393	388	402	396
20	390	380	400	406	400	398
Avg. wt. ±SD	390.2 ± 6.516134	393.3 ± 7.411309	391.65 ± 6.627782	392.6 ± 7.946068	398.2 ± 7.089429	396.9 ± 7.575619

b) Wetting time

Table 23: wetting time

Batch	Wetting time (In seconds)
FT1	15seconds
FT2	10seconds
FT3	12seconds
FT4	13seconds
FT5	11seconds
FT6	10seconds

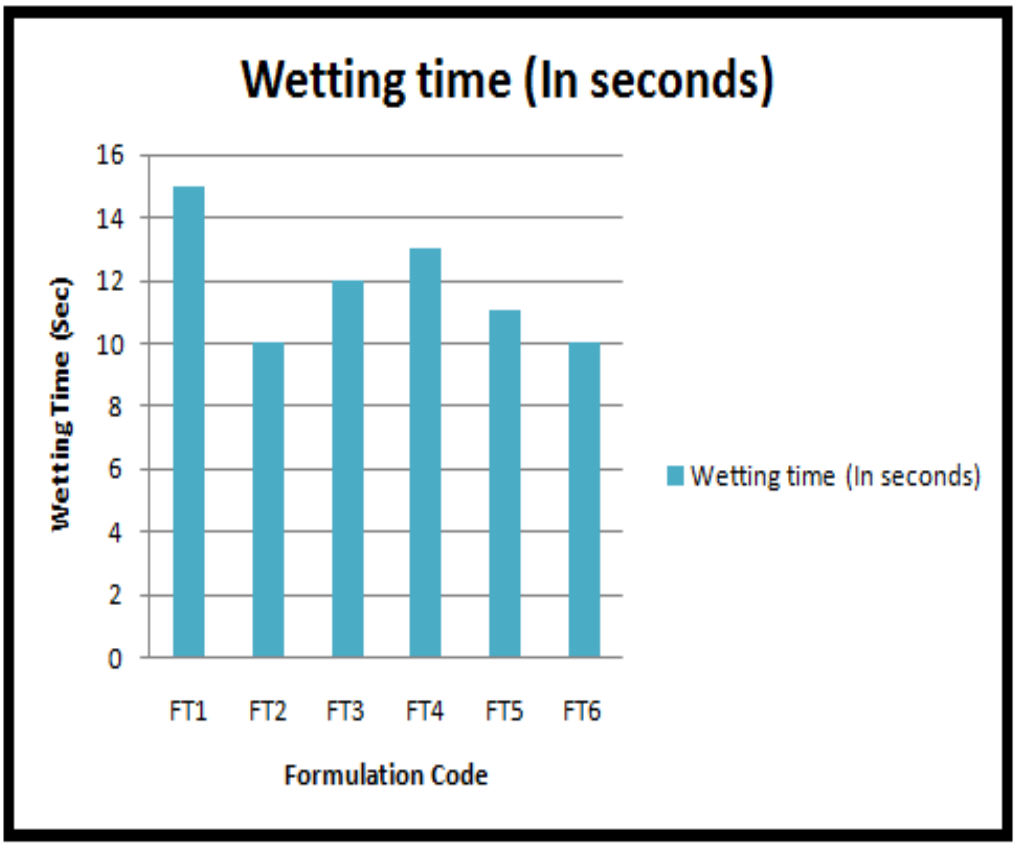

Figure 3: Wetting Time Graph

c. Hardness

Table 24: Hardness

Batch	Hardness (kg)
FT1	3.56±0.094
FT2	3.5±0
FT3	3±0
FT4	3.5±0
FT5	3±0
FT6	3.1±0.094

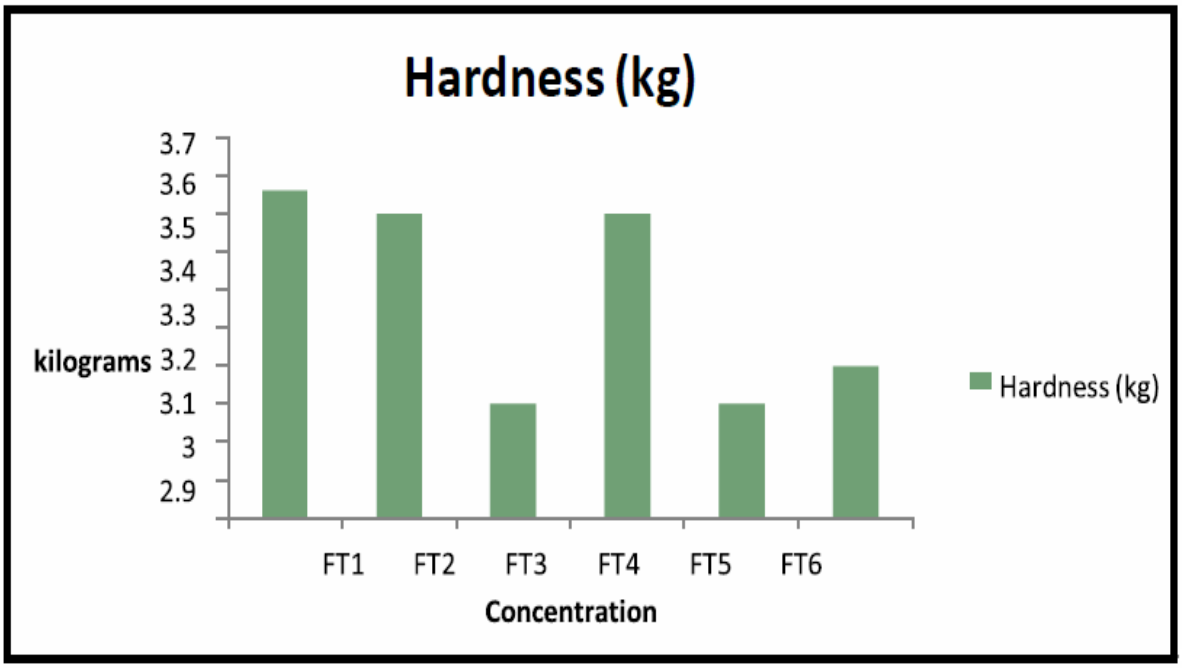

Figure 4: Hardness plot

a) Friability

Table 25: Percentage Friability of tablets

Batch	l weight (g)	Final weight(g)	Friability (%)
FT1	2.35	2.34	0.42
FT2	2.36	2.35	0.42
FT3	2.35	2.34	0.42
FT4	2.35	2.345	0.212
FT5	2.41	2.40	0.41
FT6	2.36	2.355	0.211

b) In vitro disintegration time

Table 26: Disintegration time of Tablets

Batch	Disintegration time (In seconds)
F1	59sec
F2	28sec
F3	33sec
F4	38sec
F5	34sec
F6	37sec

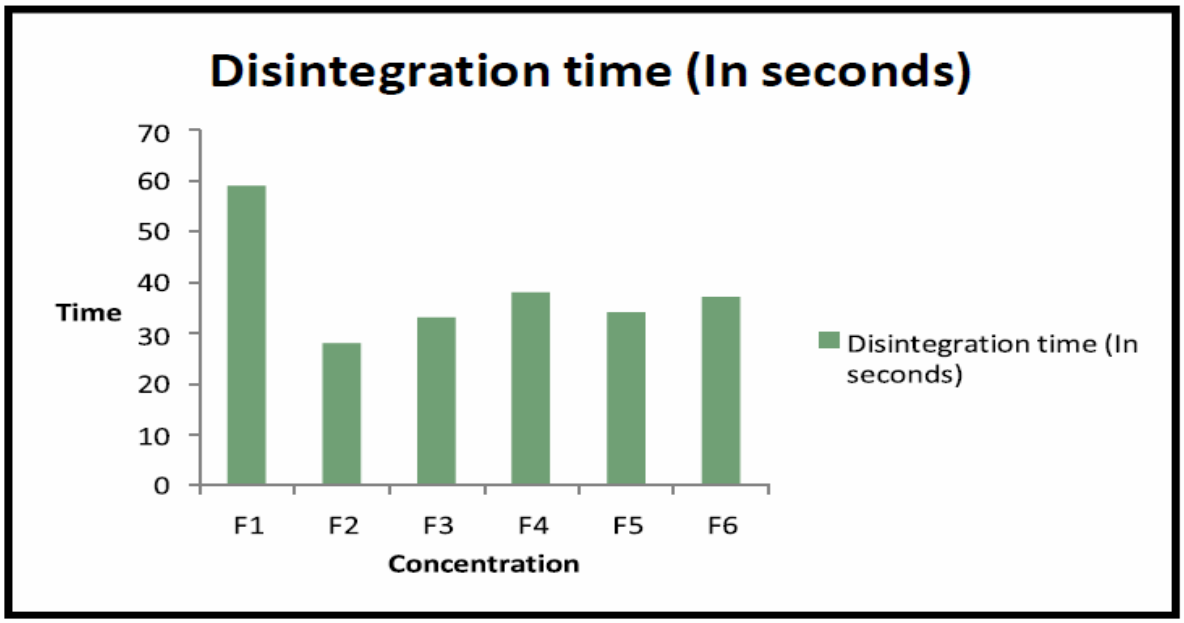

Figure 5: Disintegration Time plot

c) Drug content uniformity

Table 27: Drug content uniformity (%) of tablets

Batch	Absorbance(nm)	nt uniformity (%)
F1	0.2868	95.9
F2	0.2848	98.9
F3	0.2788	99.9
F4	0.2686	90.9
F5	0.2795	96.3
F6	0.2860	99.5

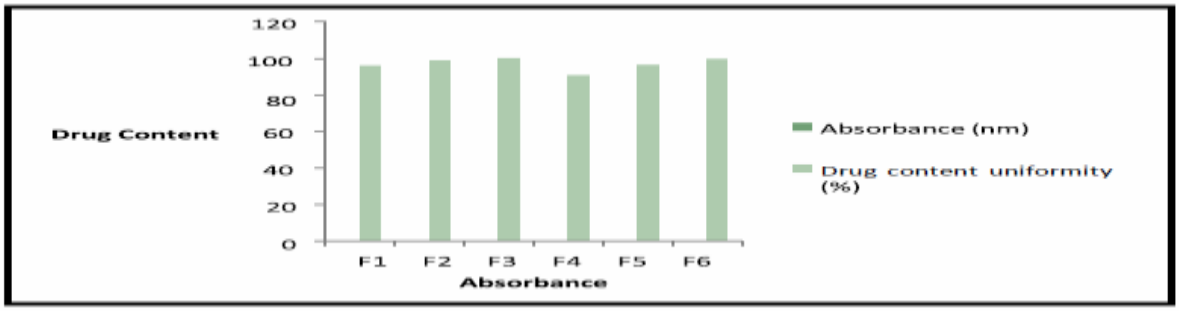

Figure 6: Drug Content Uniformity Plot

Evaluation Parameters of the blend

Table 28: Evaluation Parameters of blend

Batch	Evaluation Parameters				
	Bulk density (g/cm^3)	Tapped density (g/cm^3)	ngle of pose (Θ)	Compressibility (%)	usner ratio
FT1	0.4	0.47	27.3	16.6	1.2
FT2	0.4	0.462	27.4	16.6	1.2
FT3	0.4	0.5	24.9	16.6	1.2
FT4	0.4	0.5	30.9	11.1	1.125
FT5	0.4	0.47	24.7	11.1	1.125
FT6	0.41	0.5	28.3	16.3	1.225

Evaluation Parameters of Tablets

Table 29: Evaluation Parameters of Tablets

Batch	Evaluation Parameters				
	Wetting time (In seconds)	dness (kg)	bility (%)	Disintegration time(In seconds)	Drug content uniformity (%)
FT1	15	3.56±0.094	0.42	60	95.9
FT2	10	3.5±0	0.42	28	98.9
FT3	12	3±0	0.42	33	99.9
FT4	13	3.5±0	0.212	38	90.9
FT5	11	3±0	0.41	34	96.3
FT6	10	3.1±0.094	0.211	37	99.5

SEM RESULTS

1. **Without Treatment**
2. **With treated Neem effervescent tablet**

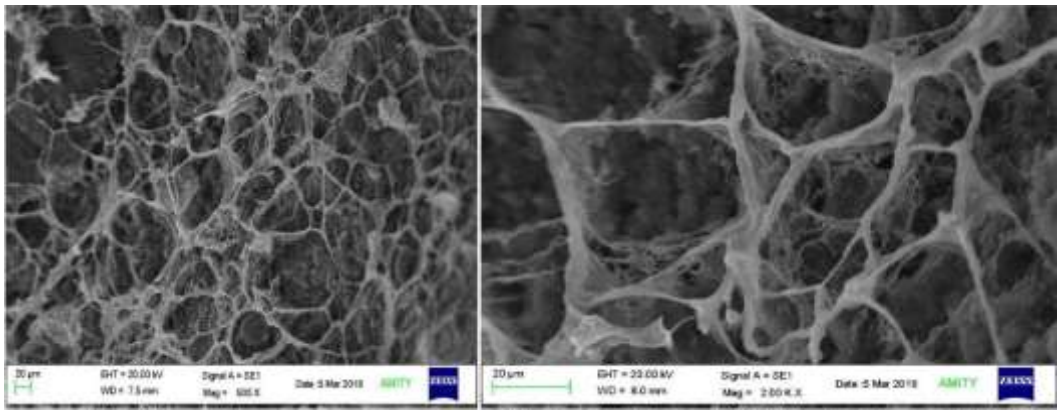

Figure 7: Without Treatment

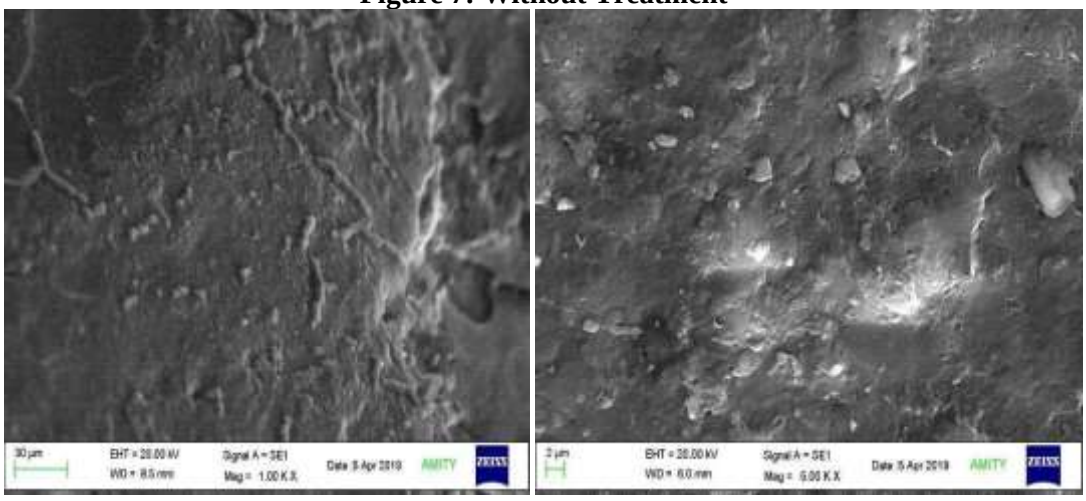

Figure 8: With treated Neem effervescent tablet

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.[18,19]

DISCUSSION

You can keep your mouth healthy and avoid illnesses, foul breath, and other problems by cleaning your teeth on a regular basis. Everyone on the earth is impacted by dental caries, according to the WHO. Campaigns to raise awareness of dental health have been developed in response to the identification of demographic risk. By clearing away dental plaque, teeth in the oral cavity are kept free of cavities, gingivitis, and periodontal disease (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

The aforementioned research indicates that people who wear dentures are given neem effervescent pills. This is because neem possesses antibacterial properties that help destroy bacteria on dentures and stop it from forming biofilm and plaque. The best results are obtained when the composition of effervescent pills is compared to antibiotic tablets containing amoxicillin. They created effervescent herbal neem pills. After evaluating the extant literature, neem was chosen as the potential treatment choice. Citric acid, manitol, sodium bicarbonate, and pvp were the excipients utilized to make the effervescent tablets. 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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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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