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Formulation and Evaluation of Herbal Toothpaste Using Polyherbal Plants

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I. INTRODUCTION

The chemical agent that could supplant patient dependent.Mechanical plaque control and it reduce and prevent oral disease. Dental caries is a global oral health problem that as a distinctive variation.Dental caries is the most common oral disease that affects a significant portion.of.the.Indian.population.Herbal ingredients have several benefits: recent times it has been observed that many oral product manufacturers are formulating herbal or plant derived toothpastes.Toothpastes a dentifrice used to clean, maintain and improve the health of teeth. Toothpaste is mainly used to promote oral cleanliness and also act as an abrasive that helps to prevent the dental plaque and food particles from the teeth, aids in the removing and veiling of halitosis , and release active ingredients such as fluoride content and relatively low abrasive value has being assimilate. Desensitizing toothpaste, whitening toothpaste have being developed several studies whitening toothpaste show the ability to improve the tooth colour they have side effects. The most one is enamel dentinabrasion, which in turn leads to increase tooth sensitivity. This had led to paying increased attention on using natural herbal dentifrices.

Oral hygiene refers to the cleaning of mouth by brushing and flossing to prevent oral infection and gum diseases. In another word, oral hygiene is the practice of keeping the mouth and teeth clean to prevent oral infection and gum disease. Toothpaste is one of the most important parts of the body which is responsible for chewing, and in the case of non-health of the parts, various digestive and malnutrition problem occurs, and in addition teeth have an important role in the beauty of face and speaking. It can consider the oral and dental diseases including dental caries, gingival inflammation diseases, and periodontium tissue..In addition more than 35,000 plant species have been reported some of them are potent anti-microbial,.anti-diabetic,.anti-viral,.anti-.cancer,.anti-fungal.Oral hygiene is the practice of keeping the mouth and teeth clean to prevent dental problem most commonly dental cavities, gingivitis, periodontal disease and bad breath. Toothpaste is a dentifrice used to clean, maintain and improve the health of teeth. Toothpaste is mainly used to promote oral cleanliness and also acts as an abrasive that helps to prevent the dental plaque and food particles from the teeth, aids in the removing and veiling of halitosis, and releases active ingredients such as fluoride to aid in preventing tooth and gum disease (e.g. Gingivitis). The majority of the cleaning is performed by the mechanical utilization of the toothbrush with the help of excipients used in toothpaste. Active ingredient such has fluoride or xylitol are being used to prevent tooth and gum diseases. Recent advances in toothpaste enables high efficacy of oral health. Special toothpaste for kids with fluoride content and relatively low abrasive value has being assimilated. Desensitizing toothpaste, Whitening toothpaste have been developed. Dental caries is the destruction of enamel, dentin, or cementum of teeth due to bacterial activities, which if left untreated can cause considerable pain, discomfort, and treatment costs are very high. The early stage of dental caries is characterized by a destruction of superficial dental structures caused by acids, which are by-production

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Acts of carbohydrate metabolism by cariogenic bacteria. The mouth normal flora consists of opportunistic bacteria, which are normally non-pathogenic. The imbalance of this situation creates infection and tooth decay. Dental caries, with prevalence was as high as 60-80% in children, is a major public health problem in India.Tooth is one of the most important parts of the body which is responsible for chewing, and in the case of non-health of the parts, various digestive and malnutrition problems occurs, and in addition teeth have an important role in the beauty of face and speaking. It can consider the oral and dental diseases including dental caries, gingival inflammation diseases.

- **ANATOMY AND PHYSIOLOGY OF TEETH:**

There are 16+16=32 teeth in the mouth and are embedded in the alveoli or sockets of the alveolar ridges of the upper jaw and lower jaw.

The tooth is composed of three substance they are:

Dentine: it forms a major part of the tooth and has bone like structure.

Enamel: it is the outermost covering that covers the crown of the tooth and harder than the bone.

Cementum: It is the neck and it is hard as a bone.

Fig. no.1:- Oral Cavity

- **Advantages:**

1) It reduce ulcer
2) Protect against gum decay
3)provide freshning breath
4)Plaque Removal
5) Gum disease prevention
6)Teeth whitening
7) Keep teeth strorange

- **Disadvantage:**

1) Not suitable for children
2) Does not remove major stain
3) More brushing cause irritation

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Fig. no. 2: Recycling Toothpaste

- **TYPES OF TOOTHPASTE:**

Five major type of herbal toothpaste.
1. Children toothpaste
2. Smokers toothpaste
3. Teeth-whitening toothpaste
4. Sensitive teeth toothpaste
5. Herbal toothpaste

1. Children Toothpaste

Fig. no. 3: Children Toothpaste

Fig. no. 4: Benefits of Herbal Children Toothpaste

Promotes Healthy Teeth and Gums – Natural Kids Toothpaste provides complete dental care, right from the effective cleansing of the teeth to the strengthening of the gums. With its active ingredients, it becomes a perfect choice for cleaning teeth and gums.

Good for cleansing teeth – With all natural and ayurvedic ingredients, it cleanses the baby tooth effectively by eliminating cavities-causing bacteria.

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2. Smokers toothpaste

Fig. no. 5:Teeth Whitening Toothpaste

Fig. no. 6:

the powerful whitening properties of activated charcoal to strip away stains, It is enriched with natural ingredients that gives you a naturally healthy smile.
ideal stain remover by binding to the surface and removing it showing a whiter grin.

3. Teeth-whitening toothpaste

Fig. no. 7: Sensitive teeth toothpaste

Fig..no..8:.

Bentodent Earthy Natural Toothpaste Desensitizer Clovomintis an anti-sensitivity toothpaste. Oral hygiene may be compromised due to improper oral care or general wear and tear. This may expose the nerve endings of the teeth and cause pain and discomfort when our teeth come in contact with hot, cold, or sour foods

4. Sensitive teeth toothpaste

Fig..no..9: Herbal toothpaste

Fig..no..10: Benefits of Herbal toothpaste

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Herbal toothpaste Protects from sensitivity, Fight tooth decay, Keep gums healthy, Freshens breathe.

Herbal toothpaste is an anti-cavity toothpaste

II. LITERATUREREVIEW

1	Nikita M. Rathi, shitlav sirsat, et.al Formulation and evaluation studyon herbal toothpaste. IJNRD Vol-7 4 april 2022 page no. 968-974	Study.was.aimed.to.formulate.and.evaluate.Polyherbal toothpaste.using.commonly.available.plants.in.Malaysia in order to treat oral problem.
2	Pawan.Deshmukh,.Roshantelrandhe.Formulation and evaluation of herbal toothpaste INTJ. Pharm. Drug anal vol-5 oct-2017 Page no. 406-410	Used natural ingredients like Neem stem and bark, acacia.leaves,.clove,.etc.herbal toothpaste was evaluated for its organoleptic and physical properties.
3	Indian pharmacopeia, Government Of Health And.Family.Welfare..The.Indian.harmacopeia commission Ghaziabad. 2010 Vol-1 Sixth edition.	Literature regarding Herbal Ingredients studied from the Government of Health and Family Welfare
4	P..P..Sharma.cosmetics.Formulation.Manufacturing.and.quality.control..Vandana.publication 2014 edition fifth Page no. 52-57	Literature regarding Herbal Ingredients studied from the Pharmacopeia their identification assay, description, solubility other physical as well as chemical properties.
5	Mahesh Varma Dental research Indian Journal of Dental Research. Vol-29 Aug 2018 page no. 450-480	He.study.on.the.Demine.raliation.dentifies,.Oral Microflora, pH
6	Dr..Kamla.Pathak.&.Dr..Ankur.vidhaya cosmetic.science.concepts.and.principles. Nirali.prakashan.April.2022.Sixth.edition. Page no 9-2	The content are in accordance to the cosmetic science consumer products industry, researching, developing and testing from new cosmetic preparations by pharmacy council of the India.
7)	B. M. Mithal, R.N. Shaha. A handbook of cosmetics, Vallabh Prakashan.2020 First edition, 199-215	Literature for Dental care and Dental preparations. Study of tooth decay and cavities to understand and co-ordinate the formulation of toothpaste. Understanding of stable base as well as formulation of potent toothpaste.
8)	Mayer R. Rosen Cosmetology focus books, chemical publishing. Sep 2015 Vol-3 Ninth edition, page no. 2600	Study of formulation of herbal toothpaste. Studying standard parameters used in formulation and evaluation of toothpaste. Reviewing standard parameters for preparation of stable and potent toothpaste. Studying ideal characteristics for toothpaste
9)	Afroj Ayyaj Shaikh, Evaluation of herbal toothpaste, Formulation a preliminary in-vivo study..Indian.journal.of.pharmacy.& pharmacology, Oct 2023, Page no. 172- 173	Reviewing literature for the herbal ingredients used in the.formulation.of.the.toothpaste..Study.of.the geographical.source,.cultivation.and.other characteristics of the herbal ingredients.

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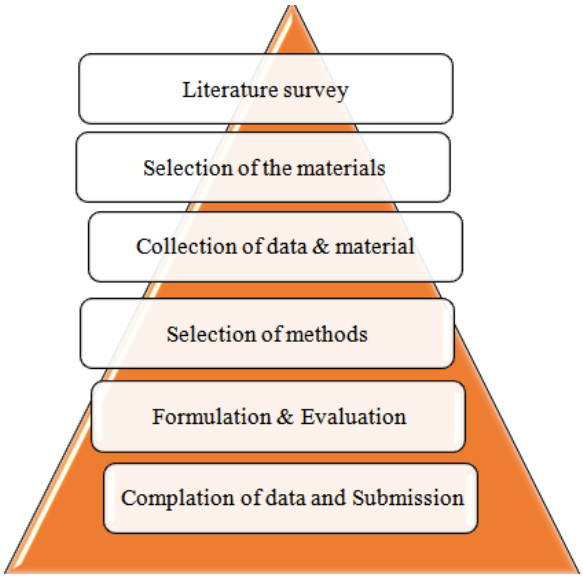
III. AIM AND OBJECTIVES

AIM: Formulation& Evaluationof Herbal Toothpaste Using PolyherbalPlants.

OBJECTIVES:

- To formulate herbal toothpaste using herbal ingredients
- To provide long-lasting fresh breath
- To improve gum health
- To reduce the swelling and pain of mouth ulcer
- To keep your mouth moist
- To preventing dental disease
- To reduce optimum amount of acid production in mouth
- To evaluate and stability and efficacy of the lab made herbal toothpaste by determining its organoleptic properties by physical evaluation

IV. PLAN OF WORK



V. TIMELINE

Sr. no.	Days	Work
1.	1-10 days	Literature Review
2.	11-12 days	Finalization Of Topic
3.	13-30 days	Analyzation& collection of the data
4.	31-40 days	Preparation of toothpaste
5.	46-48 days	Evaluation of herbal toothpaste
6.	48-50 days	Submission

VI. PLANT PROFILE

A) JAVAPLUM:(Syzygium cumini)

- **Biological source**: Is the ever green tropical tree syzygium cumini (L.) skeels.
- **Family:**Myrtaceae
- **Chemical constituent:**Beta- sitosterol, gallic acid, Tannic acid, Resorcinol.
- **Uses:** 1) It is ulcer reducing agent.

2) It regulate blood sugar level.
3) Anti- plague Bactria killing Agent.

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Table no. –1: Morphological Classification of Javaplum

Taxonomical Rank	Taxon
Kingdom	Plantae
Division	Magnoliophyta
Class	Dicotyledons
Order	Myrtoles
Genus	Syzygium cumini L.
Species	Mlavar Plum

Fig. no. 1: JAVAPLUM

B) CARDAMON:(Carclamom fruit)

Biological source: It consist of dried ripe fruits of Elettaria Cardamomum.
Family: Zingiberaceae

Chemical constituent:8% essential oil,Borneol, a-terpinyl acetate.
Uses:1) Mouth freshener.
2) Used as Antiseptic.
3) It helps to reduce ulcer.

Table 2: Morphological Classification of Cardamon

Taxonomical Rank	Taxon
Kingdom	Plantae
Division	Magnoliophyta
Class	Liliopsida
Order	Zingiberales
Genus	Elettaria
Species	Green cardamon

Fig. no. 2: CARDAMON

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C) NEEM WOOD:(Margosa)
Biological source: It is obtained from dried bark of azadirachta indica linn.
Family: Meliaceae
Chemical constituents: glycerides, saturated – unsaturated fatty acid.

Uses:1)Cleaning of teeth.
2) Treat throat infection.
3) Treat bacterial infection.
4)Boost immunity.

Table 3: Morphological Classification of Neem Wood

Taxonomical Rank	Taxon
Kingdom	Plantae
Division	Azadirachta indica
Class	Magnoliopsida
Order	Sapindales
Genus	Azadirachta
Species	Azadirachta indica

Fig. no. 3: NEEM WOOD

D) LEMON PEELS: (Citrus limon)
Biological source: lemon peels is obtained from the fresh ripe fruits of citrus limon.
Family: Rutaceae.

Chemical constituent: lemon peels contain volatile oil from 2 to 4 %, limonene 90%.
Uses: 1) preventing dental diseases.
2) Cleaning teeth.
3) Whitening of teeth.

Table 4: Morphological Classification of Lemon Peels

Taxonomical Rank	Taxon
Kingdom	Plantae
Division	Tracheophyta
Class	Dicotyledons
Order	Sapindales
Genus	Citrus

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Fig. no. 4: LEMON PEELS

E) HONEY: (Madhu)
Biological source: honey is sugar secretion deposited of apis melifera
Family: Apidae

Chemical constituent: glucose 35%, fructose 45%, sucrose 2%
Uses: 1) Sweeting agent.
2) Reduce amount of acid produced by mouth,
3) Cough suppression, humectant.

Fig. no. 5: HONEY

VII. MATERIALS AND METHODS :

7.1 MATERIALS:

- Javaplum powder: Reduce ulcer
- Neem wood powder: protect from bacterial infection
- Cardamon powder: flavoring agent
- Lemon peel powder: Antibacterial properties or maintain oral health
- Glycerine: Maintain moisture and hygiene
- Honey: anti-inflammatory and sweetening agent

7.2 METHODS:

1) Dry gum method:

The dry gum method involve mixing the emulsifying agent with water first to form a mucilage, then slowly adding the oil.

In contrast, the dry gum method adds the water all at once to the oil and gum mixture.

2) Wet gum method:

The wet gum method adds oil to a mucilage the emulsifying agent and water, while the dry gum method adds water to the emulsifying agent and oil.

Slowly add the oil to the mucilage, while continuously triturating to ensure proper emulsification.

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VIII. INGREDIENTS

Sr. No.	Ingredients	Uses
1.	Javaplum	Ulcer reducing agent
2.	Cardamon	Flavouring agent
3.	Neem wood	Cleaning of teeth
4.	Lemon peel	Whitening of teeth
5.	Honey	Sweetening agent
6.	Starch	Binding agent

IX. FORMULATION PROCEDURE OF HERBAL TOOTHPASTE: -

All the dry components weighed as per the requirements.

⇩

All the crude drugs are collect in the form of powder.
All the dry components for toothpaste preparation passed through sieve no.50.

⇩

Add liquid ingredient like water, glycerine & Oil to form a liquid phase and to form a mucilage.

⇩

After vigorous trituration calcium carbonate and all the active ingredients combined and, finally sodium lauryl sulfate added to the mixture.

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The formulated paste accurately weighed and filled into the tube. The tube sealed with the help of the manual sealing machine by folding two times lower end of the tube.

9.1 Additives / Excipients

Additives / Excipients	Abrasive Agent eg: Calcium Carbonate
	Binding Agent eg: MagnesiumAluminum Silicate,Starch
	Preservative eg: Propyl paraben
	Detergent eg: Sodium Lauryl sulfate
	Sweeteners eg: Saccharin
	Foaming Agent eg: Sodium Lauryl Sulfate
	Flavouring Agent eg: Peppermint oil Clove and Cardamom

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9.2 List of Equipment

Sr.No	Name of Instrument /Equipment	List of Model
1.	Mortar pestle	Lab. Equipment's
2.	homogenizer mixer	Lab. Equipment's
3.	Beaker	Lab. Equipment's
4.	Measuring Cylinder	Lab. Equipment's
5.	Glass rode	Lab. Equipment's
6.	Pipette	Lab. Equipment's
7.	Weighing balance	Lab. Equipment's

9.3 Formulation of Oral Ayurvedic Toothpaste

Sr. No.	Ingredients	Quantity used (g) (Batch A)	Quantity used (g) (Batch B)
1.	Javaplum	1g	2g
2.	Neem wood	1g	2g
3.	Cardamom	1g	2g
4.	Lemon peel	1g	2g
5.	Honey	1ml	1ml
6.	Calcium carbonate	20g	10g
7.	Starch	0.5g	0.2g
8.	Methyl paraben	q.s	q.s
9.	Sodium lauryl sulphate	0.05g	0.05g
10.	Saccharin	0.5g	1g
11.	Peppermint oil	q.s.	q.s.
12.	Distilled water	3ml	3ml

(BATCH A)

(BATCH B)

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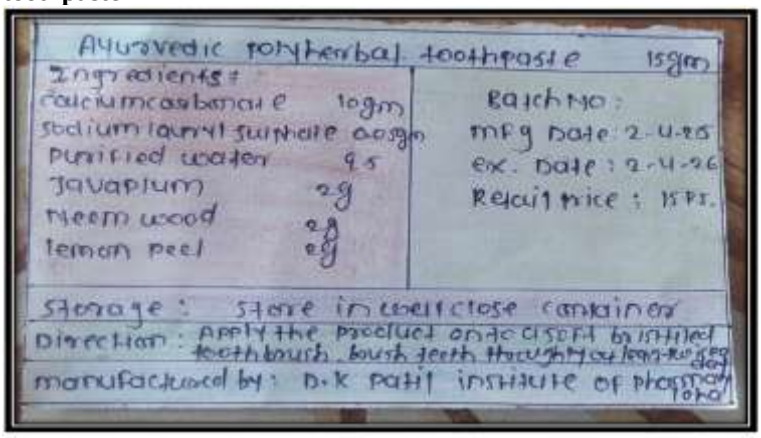
9.4 Label of herbal toothpaste



X. EVALUATION PARAMETER

1. Colour: The colour of toothpaste is slightly red the paste containdifferent types of herbs that gives you a good smell.
2. Odour: Toothpaste smell like mint with flavour including peppermint, designed to affect a feeling of freshness.
3. Taste:The taste of toothpaste is sweet and fruity due to addition of sucrose and javaplum fruits.
4. Appearance: Slightly gritty texture due to abrasive ingredients that help clean and polish teeth.
5. pH- pH level of toothpaste is slightly alkaline 7 to 10, depending on its additives
6. Foamability: The ability to produce foam is crucial for its cleansing and distribution effects, and is generally perceived as pleasant, as long as it does not form too much foam. Key quality characteristics that refers to how well the toothpaste foam and how stable the foam is.
7. Spreadability: A physical characteristics that can be measured by sandwiching a sample of toothpaste between two-glass plate and measuring the diameter of spread after a set of amount of time. Store at the temperature of
8. Stability study: To determine and check the how long toothpaste formulation remains Safe, effective and physically stable under various storage conditions. Store at temperature 37^0C.
9. Anti-bacterial activity: Evaluate the effectiveness of toothpaste against microorganism that causes oral diseases.
10. Organoleptic evaluation: It involves the sensory attributes like color, taste, odour, and texture through sensory and visual inspection. Ensuring the product is acceptable and palatable for consumers.
11. Moisture content:Moisture content of toothpaste vary from 5 to 70% by weight, but This toothpaste are between 20 to 40 % water. The moisture content for dentifrices is about 39%.

% Moisture content=Original sample weight− Dry sample weightOriginal Sample Weight.**x** 100

12. Storage stability: -It store in the well close container and protect from a harmful radiations.

XI. RESULT

The formulated toothpaste was evaluated for the physiochemical properties such as colour, odour pH from stability; the result are as the following:

Formulation	Evaluation	Observed
Herbal Toothpaste	1. Colour	Reddish brown
	2. Taste	Sweet fruity
	3. Odour	Sweet & mint like
	4. pH test	Alkaline (8)

XII. DISCUSSION

A. Procurement: -A javaplum peels of fresh javaplum is collected from nanded market and other ingredients from ayurvedic shop and laboratory.

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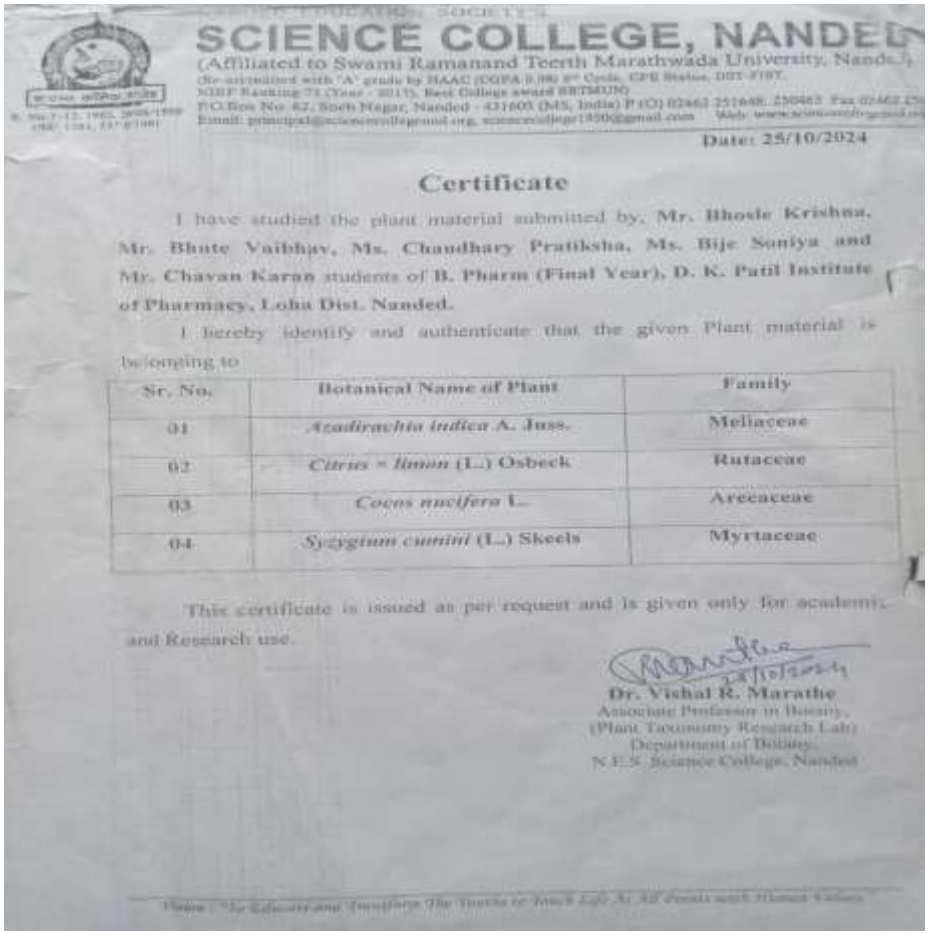
B. Authentication:-



SCIENCE COLLEGE, NANDED
(Affiliated to Swami Ramanand Teerth Marathwada University, Nanded)

Date: 25/10/2024

Certificate

I have studied the plant material submitted by, **Mr. Bhosle Krishna, Mr. Bhute Vaibhav, Ms. Chaudhary Pratiksha, Ms. Bije Soniya and Mr. Chavan Karan** students of **B. Pharm (Final Year), D. K. Patil Institute of Pharmacy, Loha Dist. Nanded.**

I hereby identify and authenticate that the given Plant material is belonging to

Sr. No.	Botanical Name of Plant	Family
01	*Azadirachta indica* A. Juss.	Meliaceae
02	*Citrus × limon* (L.) Osbeck	Rutaceae
03	*Cocos nucifera* L.	Arecaceae
04	*Syzygium cumini* (L.) Skeels	Myrtaceae

This certificate is issued as per request and is given only for academic and Research use.

Dr. Vishal R. Marathe
Associate Professor in Botany,
(Plant Taxonomy Research Lab)
Department of Botany,
N.E.S. Science College, Nanded

XIII. SUMMARY AND CONCLUSION:

Conclusion:

Herbal toothpaste offer a safe and effective alternative to conventional toothpastes, with studies suggesting they are equally effective in controlling plaque and gingivitis, while also potentially minimizing side effects.

The formulation of toothpaste was successfully evaluated using different standard parameters including antimicrobial properties.

Study also reflects that herbal toothpaste has shown greater zone of inhibition than the single herb containing toothpaste and marketed toothpaste.

Summary:

Herbal toothpaste, a paste or gel dentifrice, utilizes natural ingredients for oral hygiene, offering potential benefits like reducing dental caries and preventing other dental issues, reduce mouth ulcer.

The herbal toothpaste was then evaluated for its organoleptic characteristics and was observed for stability. Results of the sensory testing of the toothpaste shown colour (light brown), Smell (mint like), texture (smooth), Spreadability (good), pH (7 to 10) considered to satisfactory.

The toothpaste was also tested for microbial activity by using disc diffusion method in which the herbal toothpaste showed satisfactory zone inhibition against the marketed formulation.

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