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Formultion and Evalution of Polyherbal Toothpaste

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Abstract-In this research work formulation of toothpaste is done which is a fully herbal product it's a great demand nowadays of the various herbal products, for the treatment and cure of various disease and health problems. Many of the persons suffers with various dental and oral health problems There are plenty of the teeth related disorder and diseases and for the treatment of these the dentists refer multiple of drugs and treatments some of them are painful and discomfort, literally for the oral and the dental hygiene we use multiple synthetic toothpaste which are produced by using chemical combinations as this chemicals can cause Sevier side effects and toxicity, so the consumer believe that polyherbal toothpaste are effective, safe and less toxicity because of use of purely herbal natural ingredients besides the synthetic chemicals, this formulation consist of herbal products which are some medicinal plant like Neem, Tulsi, Clove and some of safe chemical components or excipients like Calcium carbonate, mannitol, sodium lauryl sulphate, Papermint oil etc. This research the formulation and evaluation parameters like physical characteristics, Foamability, pH , Spreadability, LOD etc was perform successfully within the permitted limit.

Keywords-Toothpaste ,Polyherbal Formulation, Medicinal plants, Oral hygiene.

I. INTRODUCTION

A. *Toothpaste*-Toothpaste is a paste or gel to be used with a toothbrush to maintain and improve oral health and aesthetics**.** [1] The oral cavity contains the teeth, tongue,cheeks,palatesand gums (Gingival tissues). The teeth and gums are major sources of consumer concerns, many of them related to dental plaque and the tooth deposit[2]Historians have estimated that it was around 5,000 B.C.

when ancient Egyptians first used a paste-like substance to clean their teeth. This was true despite the fact that the toothbrush had not been invented yet. Shortly after, the Greek and Roman Empires caught on, many followed suit. For example, Indian and Chinese cultures adopted toothpaste around 500 B.C. The purpose of toothpaste then was essentially the same as it is now, to keep the teeth and gums clean and healthy. A powder derived from the hooves of an ox was once an ingredient in ancient toothpastes. Some societies of Greece and Rome preferred a rather abrasive kind of toothpaste containing crushed bones and oyster shells, powdered charcoal, and bark. Common ingredients include ashes, burnt eggshells, and pumice stone. Herbs like peppermint and others were added for the benefit of a clean flavor and fresh-smelling breath. Chinese civilizations were used ginseng, herbal mint, and salt. Toothpaste was finally joined by the toothbrush- its inseparable companion by around 3,500-3,000 B.C. [3]

B. Oral disease

1*) Halitosis (bad breath)*

The most common cause of halitosis is bad oral hygiene. If particles of food are left in the mouth, their breakdown by bacteria produces sulfur compounds. Keeping the mouth hydrated can reduce mouth odor. The best treatment for bad breath is regular brushing, flossing, and hydration.

Brushing and flossing ensure the removal of small particles of food that can build up and slowly break down, producing odor. A film of bacteria called plaque builds up if brushing is not regular. This plaque can irritate the gums and cause inflammation between the teeth and gums called periodontitis. Dentures that are not cleaned regularly or properly can also harbor bacteria that cause halitosis. (4)

2*)Gingivitis*-You may find the gum swollen or puffy, reddish blue in color and that it hangs loosely about the tooth. It may be no painful but bleeds rather easily when touched. With these changes there is usually found an accumulation of food and calculus (tartar) about the teeth, this condition is gingivitis. [5]

3*) Periodontitis*-If this gingivitis has been present for any length of time you may notice pockets or crevices between the tooth and the gum. This usually indicates that the bone supporting the tooth is in the process of being destroyed because the inflammation is no longer confined to the gum but has now spread to the deeper structures. This condition is periodontitis or pyorrhea, and if allowed to continue unchecked may eventually cause the loss of the tooth [5]

a) Aggressive periodontitis occurs in patients who are otherwise clinically healthy. Common features include rapid attachment loss and bone destruction and familial aggregation.
b) Chronic periodontitis results in inflammation within the supporting tissues of the teeth, progressive attachment and bone loss. This is the most frequently occurring form of periodontitis and is characterized by pocket formation and/or recession of the gingiva. It is prevalent in adults, but can occur at any age. Progression of attachment loss usually occurs slowly, but periods of rapid progression can occur.
c) Necrotizing periodontal disease is an infection characterized by necrosis of gingival tissues, periodontal ligament and alveolar bone. These lesions are most commonly observed in individuals with systemic conditions such as HIV infection, malnutrition and immunosuppression. [6]
4*) Tonsil Stones (Tonsillitis*)
Your tonsils are filled with nooks and crannies where bacteria and other materials, including dead cells and mucous, can become trapped. When this occurs, the debris can become concentrated in white formations that occur in the pockets. [7]
5*) Tooth Decay*-Tooth decay, also known as cavities, is the second only to the common cold as the most prevalent disease in the United States. Tooth decay occurs when plaque, the sticky substance that forms on teeth, combines with the sugars and/or starches of the food you eat. This combination produces acids that attack tooth enamel.

You can get cavities at any age they aren't just for children. As you age, you can develop cavities as your tooth enamel erodes. Dry mouth due to age or medications can also lead to cavities [8]

C. Herbal remedies

1)*Neem* -Neem has been extensively used in Ayurveda, Unani and Homoeopathic medicine and has become a wonder tree of modern medicine. It has been used traditionally for the treatment of inflammation, infections, fever, skin diseases and dental problems.
The phytochemical constituents present in neem are nimbi din, nimbin, nimbolide, Azadirachtin, gallic acid, epicatechin, catechin, and margolone. All these exhibit potent antibacterial activity.
Neem dental care products contains Neem leaf or bark extract. Neem leaf is rich in antioxidants and helps to boost the immune response in gum and tissues of the mouth. Neem offers a good remedy for curing mouth ulcers, tooth decay and acts as a pain reliever in toothache problems.[9]
2)Tulsi -Tulsi leaves are quite effective in treating common oral infections. Also, few leaves when chewed help in maintaining oral hygiene.
Carracrol and Tetpene are antibacterial agents present in this plant. Sesquiterpene b-caryophyllene also serves the same purpose. This
Constituent in FDA approved food additive which is naturally present in Tulsi.
Tulsi can act as COX-2 inhibitor, like modern analgesics due to its significant amount of eugenol (1-hydroxyl-2methoxy-4 allyl benzene)
Ocimum sanctum leaves contain 0.7% volatile oil comprising about 71% eugenol and 20% methyl eugenol.[10]
3)Clove-According to The History of Dentistry by Walter Hoffmann-Axthelm, the first reference to cloves in dentistry was made by 10th-century Arabian dentist Al-Gazzar, where he mentions them for controlling mouth odors and pain. Nowadays we know that eugenol – the main compound in clove – is to thank for its powerful analgesic (pain relieving) and antiseptic properties.[11]
Our mouths contain over 700 types of bacteria—some beneficial, others harmful. Rather than killing all the bacteria, which is what antibiotics and harsh mouthwashes do, bacteria should be "managed" to encourage the growth of beneficial microorganisms. Good bacteria produce hydrogen peroxide that keeps harmful bacteria under control. Many strains of bad bacteria develop resistance to antibiotics. But according to a report published in the journal Compendium, bad bacteria usually don't develop resistance to clove oil. [12]

1) Material used:-

Sr.No.	Ingredients	Collection
1)	Neem leaves	Near area of osmanabad
2)	Clove powder	From market in osmanabad
3)	Tulsi leaves	Near area of osmanabad
4)	Tragacanth	Rajesh chemicals ,mumbai
5)	Cal. Carbonate	Rajesh chemicals ,mumbai
6)	Mannitol	Rajesh chemicals ,mumbai
7)	Methyl paraben	Rajesh chemicals ,mumbai
8)	SLS	Rajesh chemicals ,mumbai
9)	Papermint oil	Rajesh chemicals ,mumbai
10)	Glycerin	Rajesh chemicals ,mumbai

Table No. 3: List of Apparatus and Instruments

Sr. No.	Apparatus	Name of company
1.	Morter and pestle	Rajesh chemicals, Mumbai.
2.	Sieve	Rajesh chemicals, Mumbai.
3.	Measuring cylinder	Rajesh chemicals, Mumbai.
4.	Beaker	Rajesh chemicals, Mumbai.
	Instruments	
1.	Weighing balance	BL 220H Shimadzu,Japan.
2.	pH meter	EQUIP - TRONIS EQ 614A
3.	Hot Air Oven	BIO TECHNICS INDIA
4.	Laminar Air Flow	Dolphine
5.	Incubator	SUN - SCIENTIFIC

II. Experimental Work:

A. *Drying:*
The leaves of all the four plants were cleaned, washed in running tap water to remove dirt and they were dried firstly in air and then in hot air oven at 55oC temperature till constant weight were achieved. [13]

B. *Preparation of the toothpaste*-The binder was mixed with solid abrasive and other powders and then poured into suitable mixture along with the aqueous solution of preservative, surfactant and sweetener mixing was done. After the homogenous paste was formed, the flavor was added. [14, 15]

Formulation Table.

SR.NO	INGRIDIENT	QUANTITY
1)	Neem Powder	0.30 g
1)	Clove powder	0.20 g
2)	Tulsi leaves	0.30 g
3)	Tragacanth	0.24 g
4)	Cal. Carbonate	9.30 g
5)	Mannitol	6 g
6)	Methyl paraben	0.03 g
7)	SLS	0.26 g
8)	Papermint oil	0.20 ml
8)	Glycerin	2 ml
9)	Water	Q.S.

III. Evaluation of Polyherbal Toothpaste

Physical Appearance--The formulated cream were observed for their visual appearance, transparency,color, consistency.

Appearanc- Semisolid in nature.

Color - Brown.

Transparenc- Non- transparent.

Consistency-Smooth.

A)*pH*-The net quantity of 5gm of samplewas accurately weighed and placed in a150Ml beaker to this 45 ml of freshly Boiled and cooled water was added at 27° C it was stirred well to make through Suspension the pH was determined with in 5 min using pH meter. [14]

B)Consistency –The consistency of formulated creams were determined by hands. Take pinch of a cream and rubbed it with fingers.

C)Spreadability-The spreadability of the formulated cream were determined by 1mg of the cream was sandwiched between 2 slides. A weight of 2kg was placed on upper slide. After 30 mins the diameter of the paste is measured in cm .The experiment is repeated a thrice and average diameter is determine. [14]

D)Foamability-Foaming power: 5gm. of sample was taken in 100 ml. glass beaker. To this 10 ml. of water was added. Then beaker was shaken with glass rod & allowed to stand for 30 min. The content of beaker was stirred & transferred to 250 ml. measuring cylinder. The residue left in beaker transferred with further portion of 5-6 ml. of water to cylinder. The content of cylinder adjusted to 50 ml. by sufficient water. Stirred content of cylinder with glass rod. As soon as temperature of content reached 30 min. the cylinder was stopped stirring and 12 complete shakes were given to it. The cylinder was allowed to stand for 5 min. & then the foaming power was calculated. [14]

E)Determination of moisture and volatile matter

5g of formulation placed in a porcelin dish containing 6-8 cm in diameter and 2-4cm depth in it. Dry the sample in an oven at 105^0C. [16]

E)Antimicrobial Activity **[17]**-When the wound has been occurred then there may be chances for bacterial or microbial infection from environment and Tulsi and Neem act as antimicrobial and anti-inflammatory activity.

Agar disc diffusion method-This method is also called as cup plate method which is suitable for organism that grows rapidly over night at 35-37°C. This method is used to check the antibacterial activity of formulation. The activity is determined by measuring the diameter of zone of inhibition of formulated cream and standard marketed cream.

Medium- 3.5g of Nutrient Agar is added to 100 ml distilled water and autoclaved at 121° C for 15 minutes at 15 lbs. and poured in sterile Petri plates up to a uniform thickness of approximately 4mm and the agar is allowed to set at ambient temperature and used.

IV. RESULT

RESULT-The polyherbal Toothpaste was formulated by adding the required amount of herbal ingredients and other excipients as given in formulation table. These prepared polyherbal toothpaste was evaluated for various parameters like appearance, determination of moisture content, foam ability and stability, pH determination, Antimicrobial activity against E.coli.

EVALUATION PARAMETERS	OBSERVATION
Appearance	Brownish colour, lavender odour,
% Moisture content	46%
pH	6.5
Foam volume	4.2ml
Antimicrobial activity against E.coli	1.7 cm
spredabilty	Good spredable

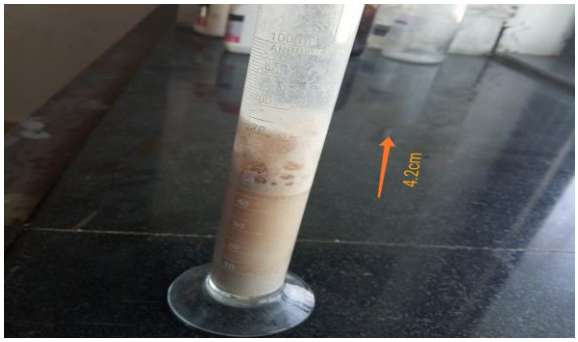

Fig : Foamability Test

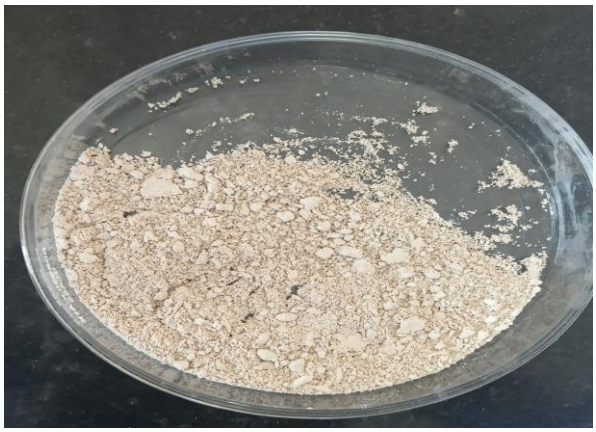

Fig1. Moisture Content test

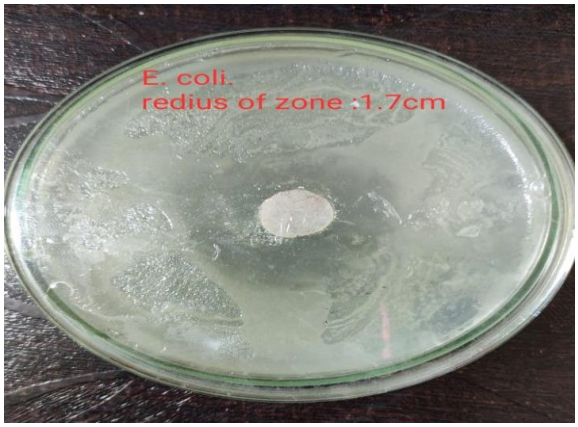

Fig : Zone of inhibition of Test sample

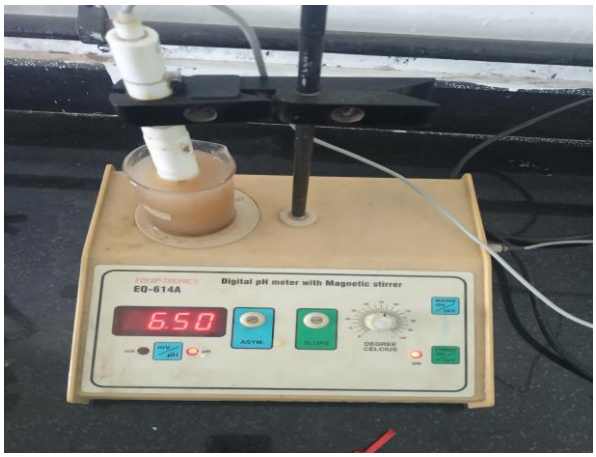

Fig. 2Ph Test

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