

Formulation and evaluation of herbal toothpaste for bleeding gums:

Gaurav pal¹, Shashikant Maury^{*2}, Prof. (Dr) Mohd. Wasiullah³, Piyush Yadav⁴

1. Dept. of Pharmacy, Prasad Institute of Technology, Jaunpur (222001) U.P, India.

2. Assistant Professor, Dept. of Pharmacy, Prasad Institute of Technology, Jaunpur (222001) U.P, India.

3. Principal, Dept. of Pharmacy, Prasad Institute of Technology, Jaunpur (222001) U.P, India

4. Principal, Dept. of Pharmacy, Prasad Polytechnic, Jaunpur (222001) U.P, India

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ABSTRACT: The major goal of the research is to formulation and evaluation of herbal toothpaste. Toothpaste is typically used product with the aid of using all individuals. Toothpaste is normally used for cleansing of enamel and mouth. It is likewise used to deal with many issues of enamel. Many dentists propose to apply toothpaste to deal with disease like sensitivity, Chronic gingivitis, etc. Herbal formulation of toothpaste is prepared by using herbs like Neem powder extract, clove oil, ginger oil, tulsi. These herbal toothpastes is evaluated by different tests like Physical Examination, pH determination, Homogeneity, Sharp and edge abrasive particles, Determination of moisture and volatile matter, Spreadability, Stability study, Extrudability etc. The aim of this research is to formulate herbal toothpaste that is good for oral hygiene & to treat bleeding gums problem.

Keywords: Herbal ingredients, Neem powder extract, abrasive, antimicrobial activity, anti inflammatory agent, dental analgesic, etc.

I. INTRODUCTION:

Toothpastes have been developed and continually improved for several decades to promote oral Health [1]. It is well-known that both dental caries and gingivitis are caused by microbial biofilms Present on the tooth surface. Out of different preventive measures, tooth brushing is a key element to prevent those oral diseases. Especially the toothpaste plays an important role, because it supports the mechanical plaque removal of the toothbrush by abrasives such as hydrated silica and calcium Carbonate [2]. Herbal and herbal-based toothpaste has been used in Ancient Life for many years and is one of the most significant aspects of oral health care. The manufacture and development of toothpaste formulations dates back to 300-500 BC in China and India. During that time, abrasives such as

squashed bone, crumbled egg, and clam shells were used to clean teeth[3].

In the nineteenth century, modern toothpaste compositions were created. Chalk and soap were added to those compositions after advancements in the realm of medicine. Following independence, multiple formulation developments of various detergents began, with sodium lauryl sulphate serving as an emulsifying agent[4]. Toothpaste is a dentifrice that is used to keep teeth clean, maintain their health, and improve their appearance. Toothpastes primarily used to maintain oral hygiene, but it also functions as an abrasive, removing dental plaque and food particles from the teeth, assisting in the removal and/or veiling of halitosis, and releasing active chemicals like fluoride to help prevent tooth and gum disease (E.g., Gingivitis)[5]. The majority of the cleaning is done by the toothbrush's mechanical action, with the help of excipients included in toothpaste. Many herbal formulations are particularly successful because they contain active chemical components like polyphenols, gums, alkaloids, glycosides, and other compound. The main aim to write this is to make, formulate & evaluate the herbal toothpaste to treat bleeding gums[6].

Ideal properties of toothpaste:

- Good abrasive effect
- Non irritant and non-toxic
- Impart no stain in tooth
- Keep the mouth fresh and clean
- Prolonged effect
- Cheap and easily available
- It should not be harmful to the oral tissue & fluid. It should not stain teeth.
- It should not be scratching to the enamel surface of tooth. If it is ingested, it should not be harmful to the GIT[7].

II. MATERIALS AND METHODS:

Formulation of herbal toothpaste is prepared by using different ingredients as like Neem extract as antimicrobial activity, clove oil as a dental analgesic, ginger as antioxidant, Tulsi as antiseptic & anti-inflammatory etc. Of this mixture is prepared as active material and other preparation used as base containing[8].

Calcium carbonate as abrasive, acacia as binder, sodium lauryl sulphate as a foaming agent, glycerine as plasticiser, saccharin sodium as a sweetening agent, p-hydroxyl benzoic acid as a preservative, amaranth as a colouring agent, peppermint oil as a flavouring agent, water as a solvent[9].

Table 2.1 Active herbal ingredients

Sr. No	Ingredients	Quantity	Uses
1	Neem extract powder	3gm	Antimicrobial activity
2	Clove	5gm	Dental analgesic
3	Ginger oil	5gm	Antioxidant & anti-inflammatory
4	Tulsi	5gm	Antiseptic & Anti-inflammatory

Table 2.2 Base material

Sr. No	Ingredients	Quantity	Uses
1	Calcium carbonate	5gm	Abrasive agent
2	Acacia	3gm	Binding agent
3	Sodium lauryl sulphate	2.5gm	Foaming agent
4	Glycerine	3gm	Plasticiser
5	Sodium saccharine	1gm	Sweetening agent
6	P-hydroxyl benzoic acid	1gm	Preservative
7	Amaranth	0.5gm	Colouring agent
8	Water	Q. S	As a solvent
9	Peppermint oil	Q S	Flavouring agent

This prepared formulation is compared and evaluated with marketed herbal toothpaste. A method used for the formulation of herbal toothpaste is homogenization by using mortar and pestle for formation base of toothpaste[10].

2.1 Materials:

The weight of each ingredient was determined based on the results of a previous study on the composition of herbal toothpaste. All of the ingredients in this toothpaste have a combined percentage by weight of 100%, which implies that the whole quantity of toothpaste will yield 100gm of toothpaste formulation[11].

2.2 Methods of formulation:

There are two types of toothpaste formulation procedure that are-

1. Dry gum method
2. Wet gum method

2.3 Dry gum method:

2.3.1 Preparation of base:

- The solid ingredients calcium carbonate, sodium lauryl sulphate, glycerine, sodium saccharin was weighed accurately as mentioned in the formula and sieved with sieve no.80 so as to maintain the particle size.
- These ingredients were also mixed in a mortar and pestle, then triturated with precisely weighed glycerine until a semisolid substance was created[12].
- Addition of herbal ingredients (Neem powder extract, clove, tulsi).
- Accurately weighed herbal extract in form of ginger oil were added to the base.
- At the end, peppermint oil was added as a flavouring agent.

III. EVALUATION PARAMETERS OF HERBAL TOOTHPASTE:

3.1 Physical examination (colour, odour, taste, smoothness, and relative density):

The colour of the toothpaste was assessed visually. Smelling the product revealed the presence of odour. The taste of the formulation was

tested manually. The smoothness of the paste formulation was verified by rubbing it between the fingers[13].

3.2 PH

To make a 50% aqueous suspension, pour 10 grams of toothpaste from the container into a 50 mL beaker and add 10 mL of freshly boiled and cooled water (at 27°C). To ensure a complete suspension, stir thoroughly. Using a PH Meter, determine the PH of the suspension in 5 minutes[15].

3.3 Homogeneity

By applying normal force at 27°C, the toothpaste should extrude a homogeneous mass from the collapsible tube or other suitable container. Furthermore, the bulk of the contents must extrude from the container's crimp and be rolled out gradually[16].

3.4 Sharp and edge abrasive particles

To verify for the presence of any sharp or abrasive particles, the contents were placed on the finger and scratched on the butter paper for 15-20cm. I went through the same process at least ten times. There were no sharp or edge abrasive particles discovered[17].

3.5 Foam ability

The foaming power (flammability) of herbal toothpaste was measured by mixing 2g of

toothpaste with 5ml water in a measuring cylinder and shaking it for 10 times. The total volume of foam was calculated[19].

3.6 Determination of moisture and volatile matter

5gm of herbal toothpaste was placed in a porcelain dish with a diameter of 6-8cm and a depth of 2-4cm to determine moisture and volatile matter. At 105 degrees celsius, it was dried in an oven[19].

3.7 Determination of spread ability

Slip and drag characteristics of paste are used to determine the Spread ability technique. About 1-2g of herbal toothpaste was weighed and placed between two glass slides (10 x 10cm) that were stacked one on top of the other (no sliding was allowed), and the slides were moved in opposing directions. After 3 minutes, measure the amount of toothpaste that has spread (in cm). Repeating the experiment and calculating the average of three readings[20].

IV. RESULT AND DISCUSSION:

The formulation was prepared from neem powder extract, ginger oil, clove oil, tulsi and other excipients. The formulated herbal toothpaste greenish brown in colour and showed a good homogeneity with absence of lumps, and have good anti-microbial & inflammatory activity.

Following are the evaluation of the toothpaste-

Table 3.1 Physical examination

Sr. No	Parameters	Observations
1	Colour	Greenish brown
2	Odour	Characteristic
3	Taste	Characteristic
4	Smoothness	Smooth
5	Relative density	10.1

Table 3.2 Evaluation Result

Sr. No	Parameters	Observations
1	pH	8.5
2	Homogeneity	Good
3	Abrasiveness	Good abrasive
4	Foam ability	10(good)
5	Spreadability	3.5cm/sec
6	Viscosity	39751.7
7	Tube Extrudability	Good
8	Moisture content	16.5%
9	Stability	Stable

Table 3.3 Extrudability

Sr. No	Parameters	Observations
1	Net weight of formulation in tube(gm)	13.5gm
2	Weight of toothpaste extruded (gm)	12.2
3	Extrudability amount percentage	91.2%

Table 3.4 Stability

At 25°C+2°C/60%+5%RH (3rd month)

Colour	Appearance	Spreadability	pH
Greenish brown	Homogenous	3.5	8.5

At 30°C+2°C/65%+5%RH (3RD month)

Colour	Appearance	Spreadability	pH
Greenish brown	Homogenous	3.45	8.2

At 40°C+2°C/75%+5%RH (3rd month)

Colour	Appearance	Spreadability	pH
Greenish brown	Homogenous	3.0	7.9

V. CONCLUSION:

Neem's findings are taken in very small amounts due to bitterness, this bleeding act as anti-inflammatory component against the gums. Clove is applied on the gums (used topically) for aching, for pain management throughout dental work, and for a complication of tooth extraction known as "dry socket." It's conjointly applied to the skin as a counter pain in the neck for pain and for mouth and throat inflammation. It helps in the destruction of oral microorganisms by preventing oral pathogens such as pyorrhea and cavities. This herbal toothpaste is having prominent function in the maintaining the oral hygiene and preventing dental caries and most importantly best in treatment of bleeding gums and are safer with minimum side effect than chemical based synthetic toothpaste. All the marketed herbal toothpaste and lab-made had been evaluated and compared with the standards specified by Bureau of Indian standards. Formulated toothpaste is capable to maintain the tooth and oral hygiene and shows antimicrobial activity against microbes like E. Coli. Evaluation and comparison of results with commercial Herbal toothpaste are demonstrated that formulated herbal toothpaste is having equal helpful and fascinating over the marketed formulations (Colgate Vedshakti, Dabur Meswak, Patanjali Dantkanti and Dabur red). This preliminary in-vitro study demonstrated that Herbal toothpaste was equally efficacious as marketed popular toothpastes in terms of all evaluation properties of toothpaste. The formulated herbal toothpaste has good scope in the

future by increasing natural ingredients for manufacturing more and safer natural remedies, in the research and health of dental care of public, society and nation. It is concluded that formulated Herbal toothpaste was found to be good quality.

REFERENCES:

- [1]. Loveren, C.V. Toothpastes; Karger: Basel, Switzerland, 2013; Volume 23.
- [2]. Fejerskov, O.; Nyvad, B.; Kidd, E. Dental Caries: The Disease and Its Clinical Management; Wiley: Hoboken, NJ, USA, 2015
- [3]. Enax, J.; Epple, M. Die Charakterisierung von Putzkörpern in Zahnpasten. Dtsch. Zahnärztl. Z. 2018, 73,100–108.
- [4]. Epple, M.; Enax, J. Moderne Zahnpflege Australia chemischer Sicht. Chem. Unserer Zeit 2018, 52, 218–228
- [5]. Ersoy M, Tanalp J, Ozel E, Cengizlier R, Soyman M. The allergy of toothpaste: a case report. Allergol Immunopathol. 2008;36(6):368–70.
- [6]. Kokate CK, Purohit AP, Gokhale SB. Textbook of Pharmacognosy;2002
- [7]. Nema RK, Ks R, Dubey BK. Textbook of Cosmetics; 2009.
- [8]. Mangilal T, Ravikumar M. Preparation and Evaluation of Herbal Toothpaste and Compared with Commercial Herbal Toothpastes: An In-vitro Study. Int J Ayurvedic Herbal Med. 2016;5(10):2266–51.

- [9]. Dange VN, Magdum CS, Mohit SK, Nitlikar M. Review on Oral Care Product: formulation of toothpaste from various and extracts of Tender twigs of neem. *J of Pharm Res.* 2008;1(2):148–52.
- [10]. Mith BM, Saha RN. *A Handbook of Cosmetics*; 2017. P. 1–228.
- [11]. Mordue (Luntz) A. J., Nisbet A. J. Azadirachtin from the neem tree *Azadirachta indica*: its action against insects. *Anais da Sociedade Entomológica do Brasil.* 2000;29(4):615–632.
- [12]. Brahmachari G. Neem—an omnipotent plant: a retrospection. 2004;5(4):408–421.
- [13]. KP Sampath Kumar, Debit Bhowmik, Biswajit, Chiranjib, Pankaj and KK Tripathi Margret Chandira; Review article traditional indian herbal plants tulsi and its medical importance. *Journal of pharmacognosy and phytochemistry.* 2010 2(2): 103-108.
- [14]. Herlofson B.B, Barkvoll P. Sodium lauryl sulfate and recurrent aphthous ulcers. A preliminary study. *Acta Odont. Scand.* 1994;52:257–259.
- [15]. Girish K, Dhiren JP, Shah VD, Prajapati VC; Gums and mucilages: versatile excipients for Pharmaceutical formulations *Asian J. Pharm. Sci.*, 2009; 4 (5): 309-332.
- [16]. Shirwaikar A, Prabu SL, Kumar GA; Herbal Excipients in novel drug delivery systems, *Indian J. Pharm. Sci.*, 2008; 70 : 415-422.
- [17]. Pharmaceutical excipients — quality, regulatory and biopharmaceutical considerations, *European Journal of Pharmaceutical Sciences* (2015). Introduction
- [18]. Loveren, C.V. *Toothpastes*; Karger: Basel, Switzerland, 2013; Volume 23. [CrossRef]
- [19]. Fejerskov, O.; Nyvad, B.; Kidd, E. *Dental Caries: The Disease and Its Clinical Management*; Wiley: Hoboken, NJ, USA, 2015.
- [20]. Enax, J.; Epple, M. Die Charakterisierung von Putzkörpern in Zahnpasten. *Dtsch. Zahnärztl. Z.* 2018, 73,100–108.