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Preparation and Evaluation of Poly-Herbal Toothpaste

Suresh Gunaki[1*], E. N. Gaviraj[2], C. V. Nagathan[3], B. S. Hunasagi[4], Sandeep Chandakavate[5]

[1,3,4]*Assistant professor, Department of Pharmacognosy, BLDEA's SSM College of Pharmacy, Basawanbagewadi, India*

[2]*Head of the Department, Department of Pharmacognosy, BLDEA's SSM College of Pharmacy and Research Centre, Vijayapura, India*

[5]*Student, Department of Pharmacognosy, BLDEA's SSM College of Pharmacy and Research Centre, Vijayapura, India*

***Abstract*: In the present study the main aim was "preparation and evaluation of poly-herbal toothpaste and also investigation of phyto-chemical studies of these three plants. The formulation of poly herbal toothpaste containing plant extracts like Cassia siamea(pods), jyotishmatii (leaves), vateria indica (gum resin) was extracted by using ethanol in soxhlet apparatus and some are by using percolation method. The formulation evaluated by in vitro study and physical examination like colour , odour , taste ,homogeneity , pH ,spreadability, foaming characters , moisture contents ,stability study etc . Preparation of poly –herbal toothpaste is carried out by trituration method.**

***Keywords*: Poly–herbal toothpaste, phytochemical investigation and physical examination.**

1. Introduction

India is endowed with a rich wealth of medicinal flora. These floras have made a great contribution to the improvement of ancient Indian Materia medica. Maximum of these continue to be accrued from wild vegetation to satisfy the demand of the medical career. As a consequence, regardless of the rich historical knowledge - on how to use of plant drugs, little interest was paid to grow them as field crops inside the United States of America till the latter part of the 19th century [1]. Trees have been used at one time or another for medicinal purposes. Nowadays the polyhebral drugs used to treat various disease and to overcome usage of allopathic drugs. The several medicinal plants play an important in cure of disease and also practiced in Ayurveda, homeopathy, siddha and unani. These are very ancient and conventional systems in India. The plant based drug discovery was started and evaluation of active phytochemicals in parts of plants has been developed. The active ingredient of parts plant has found and used as medicinal drug. Most of plant herbal drug shown that promising cure disease and without causing any side effect. Medicinal plants have their effect due to its chemical composition such as alkaloids, glycosides and other constituents [2]. Toothpaste is a semi-solid dosage form available in power or gel form that has an effect on maintaining the health of teeth and an aesthetic effect in determining the abrasives activity of teeth. And Gingivitis (a gum disease) A removing dental plaque and food particles from teeth [3]. Toothpastes are a powder or gel form formulation product used to cleansing and maintaining oral hygiene with the help of a toothbrush. It is a common product used by the community for dental care. Although it is recommended by most dentists to brush your teeth twice a day and it is highly effective in removing plaque, one of the active toothpastes abrasives that help remove plaque. It constitutes at least 50% of the total toothpaste preparation. It really helps minimize periodontal disease. Commonly used abrasives are sodium bicarbonate, calcium carbonate, and aluminum hydroxide. Bleaching agents help remove stains on teeth, but the effect is temporary [4]. Toothpaste has been used since the ancient past and is one of main irreplaceable components of oral health care. The design of toothpaste formulations began in China and India, as 300-500 BC. During the period squashed bone, Most of the cleaning is done through the mechanical use of the toothbrush with the help of excipients and non-excipients used in toothpaste. Therefore the present study was done in preparing toothpaste containing these three plants extracts for preparation and evaluation physical and chemical properties of poly herbal preparation.

2. Methodology

1) Collection of plant material and Authentication

The collected plant materials was identified and authenticated by Dr. M.B.Mulimani Professor and Head of Department of Botany, S.B Arts and K.C.P Science College, Vijayapura, Karnataka. Voucher specimens of plant materials have been kept in the college herbarium. The collected plant materials were manually freed of dust and adhering material. The crude drugs were dried in shade at room temperature for about 10 to 15 days on mats indoors till they were crisp dry. The so dried plant materials was packed, stored in polythene bags

*Corresponding author: schandakavate61@gmail.com

and found to be free from microbial contamination prior to extraction.

The selected plant materials namely Cassia simmia plant pods (family:Fabaceae), celastrus paniculata leaves (family: Celastraceae), Vateria indica gum resin (family: Dipterocarpaceae)was either purchased from fields. Cassia simmia plant pods was purchased from KCP College botanical Department vijayapura,), celastrus paniculata leaves was purchased from RKM Ayurveda medical College Vijayapura, Vateria indica gum resin was purchased from Siddalingappa dharawadkar Ayurveda medical Vijayapura. All are separated, crushed and shade dried.

2) Extraction Cassia simmi [5,6]

Crude plant extract was Cassia simmia plant (pods), Celastrus paniculata (leaves) Vateria indica (gum resin) it was prepared by the Soxhlet extraction technique. Approximately 50 g of each powdered plant material was uniformly packed in a thimble and extracted with 250 ml of separate ethanol solvents. Solvents use ethanol. The process of the each extraction continues for 6 hours or until the solvent in the siphon tube of an extractor becomes colorless. After that, the extract was taken into a beaker and the ethanol was concentrated to dryness in vacuum at a temperature of 45°C using a rotary evaporator and stored in a desiccators.

3) Extraction of Babul leaves [7]

Extraction by maceration process 50 gm of Acacia nilotica dried crude drug has been extracted with hydro alcoholic solvent (Ethanol: Water: 80:20) using maceration process for 48 hrs, filtered and dried using vacuum evaporator at 40ºC.The extract was evaporated above their boiling points. The extracts were stored in airtight containers in the refrigerator at 4o C4.

4) Extraction of Ginger [8]

Ginger (Zingiber officinalis, Roscoe) it is one of the most widely used species in the ginger family and is a common condiment for various foods and beverages. Ginger plant is extracted using the variety of methods such as Soxhlet extractions, ultrasound-assisted extraction and autoclave shaker etc. Optimal extraction conditions: at a temperature of 80 ° C, at an extraction time of 60 minutes. That study applied that acetone is a better solvent and soxhlet extraction is a better method of determining optimal extraction conditions for fresh ginger to produce a high yield of ginger oil.

5) Extraction of Lemon [9]

Select the Clevenger apparatus for extraction lemon oil having density either higher than or lower than acetone. Take the accurately weighed 20gm of fresh lemon peel; reduce the material to coarse sized particles. Place the lemon feel in RBF of Clevenger apparatus. Add sufficient quantity of acetone solvent. Heat the mixture for 1 hour. Vapors of both acetone and volatile oil were passing through the condenser and then the collector tube. Allow the mixture to cool and separated. Read the volume of oil directly from the graduated tube. Then lemon oil was collected.

6) Extraction of turmeric [10]

20 g ground turmeric powder was weighed and embedded in a thimble and put in the Soxhlet apparatus which was gradually filled with acetone as the extraction solvent. The extraction experiment was carried out at 60 °C within 8 h. Upon completion of the extraction, the acetone was separated from the extract using rotary evaporator under vacuum at 35 °C. The residue was dried and weighed.

7) Phytochemical investigation

Qualitative phytochemical test was reported for above three plants extracted Cassia simmia plant (pods), Celastrus paniculata (leaves), Vateria indica (gum resin) to identify the various preliminary phytoconstituents.

Qualitative chemical investigation of extracts

- Protein tests [11]
- Carbohydrate Test [12]
- Tests for Steroids [13]
- Flavonoid test [14]
- Tests for tannins and phenolic compounds [15]
- Tests for volatile oil and fixed oil1 [6]

8) Preparation of poly –herbal toothpaste [17]

The poly-herbal toothpaste was prepared using Cassia simmia plant (pods), Celastrus paniculata (leaves),Vateria indica (gum resin) babul (leaves) are acts as possessing antibacterial properties and anti-inflammatory properties, ginger (rhizome), lemon oil acts as a antseptic activity,turmeric acts as aantimicrobial and anti-inflammatory properties , calcium carbonate acts as a abrasive agent , glycerine acts as humectants sodium lauryl sulphate as detergent , sodium saccharin acts as a sweetening agent , para hydroxyl benzoic acid is used for preservative, menthol used for flavouring agent amaranthacts as a colouring agent and water as aqueous media. All above herbal extract was used to formulate the poly-herbal toothpaste.

9) Trituration method

All the herbal extract was used to formulate the poly–herbal toothpaste. The extract ingredients was taken in a required quantities of the ingredients was weighed and taken in mortar.calcium carbonate , Sodium Lauryl sulphate , Glycerine , Sodium saccharin was mixed in water . Para –hydroxy benzoic acid, menthol, Lemon oil and amaranth have added and triturated well until a paste constancy is formed.

10) Composition of poly-herbal toothpaste

- Drug: Cassia simmia plant (pods), Celastrus paniculata (leaves), Vateria indica (gum resin)
- Ingredients: Babul leaves, Ginger, Lemon oil, Sodium saccharin, Turmeric, para-hydroxyl benzoic acid, Amaranth, Calcium carbonate, Glycerin, Menthol , Sodium lauryl sulphate, Water.

11) Formulation table

Table 1
Ingredients

S. no	Ingredients	Quantity (%)
1	*Cassia simmia, Celastrus paniculata, Vateria indica extracts*	9
2	Babul leaves extract	3
3	Ginger extract	4
4	Lemon oil extract	3
5	Sodium saccharin	0.25
6	Turmeric extract	3
7	Para-hydroxyl benzoic acid	0.1
8	Amaranth,	0.50
9	Calcium carbonate,	35
10	Glycerin,	25
11	Sodium lauryl sulphate	1
12	Menthol	1.5
13	Water	QS

The different quantities and ratios of extracts was added for formulation of 100gm toothpaste as per the table

12) Toothpaste evaluation

1. Color: The prepared toothpaste was evaluated for its color. Color was visually verified.
2. Odor: Odor was detected by smelling the product.
3. Taste: The flavor was verified manually by testing the product.

13) Storage Stability study

B. Procedure

A stability study has performed as per ICH guideline. The formulated paste was filled in collapsible tube and stored at different temperature and humidity conditions, 40°C ±2°C / 75% 5% RH for the period of one month and after one was studied for pH and spreadability.

1) Determination of spreadability [18]

C. Procedure

About1 gm. of tooth paste is weighed at the center of glass plate (10x10 cm) and another glass plate is placed over it carefully. At the center of the plate a 2 kg weight is placed. After 30 minutes, the diameter of the paste is measured in cm. The experiment is repeated thrice and average diameter is determined.

1) Determination of pH [19]

D. Process

10 g of toothpaste placed in a 150 ml beaker was weighed. 10 ml of boiled and then chilled water were added. Stirred vigorously to make as suspension. The pH of the suspension was measured using a pH meter.

1) Foaming Power [20]

Taken a suspension of the material in the measuring cylinder, stirred the suspension 12 times and measured the volume of the foam produced after stirring for 5 minutes. Procedure: 5 g of toothpaste was weighed into a 100 ml glass beaker. 10 ml of water was added; the glass beaker was covered with a watch glass and held aside for 30 minutes. Heat the suspension gently to dissolve the detergent present in it and stirred the suspension with glass rods and transferred it to a 250 ml measuring cylinder. Examined the paste and if no foam is produced (more than 2 ml). Transfer the residue retained in the beaker to the measuring cylinder by adding 5-6 ml of water. Then prepare the cylinder with 50 ml of water. Stir the contents in a top-down motion to obtain a uniform suspension at 30 ° C. After shaking, hold the cylinder aside for 5 minutes. And final note the volume obtained with foam + water.

2) Determination of humidity [21]

E. Process

10 g of toothpaste was weigh and oven dried at 105 ºc was cool to a constant weight. Weight loss was to be recorded and calculated using the given formula % moisture = original sample weight - dry sample weight × 100. Original sample weight.

3. Results

1) Phytochemical investigation

The prepared extracts were subjected to preliminary phytochemical tests. The results of phytochemical investigation are presented in given below table no 1. Phytochemical investigation of Cassia siamea plant (pods), celastrus paniculata leaves,Vateria indica gum resin by using ethanol solvent.

Table 2
Physicochemical investigation

S. no	Chemical Tests	Cassia siamea pods	Celastrus paniculata leaves	Vateria indica gum resin
1	Test for carbohydrates			
A	Molisch's test	+	+	+
A	Tests for reducing sugars			
A	Fehling's tests	+	+	+
B	Benedict's tests	+	+	+
2	Tests for proteins			
A	Biuret tests	+	+	-
B	Xanthotropic tests	+	+	-
C	Tests for protein containing sulphur	+	+	-
3	Tests for amino acids			

A	Ninhydrin tests	+	-	-
4	Tests for volatile oil and fixed oils			
A	Solubility tests	+	-	+
B	Filter paper stain tests	-	-	-
5	Tests for steroids			
A	Salkowaski tests	+	+	+
B	Liebermann-burchard tests	+	+	-
6	Tests for Flavonoids			
A	Shinoda tests	+	+	+
B	Lead acetate tests	-	+	+
7	Tests for Tannins and phenolic compounds			
A	5% FeCl3	+	+	+
B	Lead acetate xolution	+	+	+
C	Gelatin solution	-	+	+
D	Acetic acid solution	-	+	+
8	Tests for Terpenes and Triterpenoids			
A	Salkowski tests	+	+	+
B	2,4 Dinitrophenyl hydrazine	-	+	+

4. Discussion

The present study is preparation and evaluation poly-herbal toothpaste using the poly herbal drugs. The poly-herbal toothpaste formulation was prepared from Cassia simmia plant (pods), Celastrus paniculata (leaves), Vateria indica (gum resin), Babul leaves, Ginger, Lemon oil, Sodium saccharin, Turmeric, para-hydroxyl benzoic acid, Amaranth, Calcium carbonate, Glycerin, Menthol , Sodium lauryl sulphate, Water. Cassia simmia plant (pods), Celastrus paniculata (leaves), Vateria indica (gum resin). Babul leaves, Ginger, Lemon oil are extracted by ethanol and acetone solvent and extracted drugs are subjected preliminary Phytochemical investigation. The formulated poly-herbal toothpaste at the trial phase of formulation three batches were performed due to the problems like homogeneity, spreadability and foamability. The two batches discarded permanently and only single batch was selected for next steps. The formulated poly-herbal toothpaste is greenish brown in colour. Formulation of poly-herbal toothpaste was prepared by using trituration method and it was evaluated with the standard evaluation parameters for toothpaste. The test results of the evaluation tests was shown in above table no 3.

5. Conclusion

Products based on natural sources have an increasing demand in the market. People believe that using products made from naturally derived ingredients is safer with lower side effects than synthetic drugs. The formulated poly-herbal toothpaste was successfully evaluated using different standard methods and formulated poly-herbal toothpaste can be safer with minimum side effects compared with synthetic toothpaste. More studies are needed to improve the efficiency, safety of formulated poly-herbal toothpaste.

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