



HARSHODENT – “Innovative Herbal Tooth Paste”

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ABSTRACT:

Herbal products have a great eminence and elegance fortifying effect in our daily healthy life. Because of this enormous engage of herbal products in our daily life, the current trend espouse towards the herbal products. Tooth paste is one of the most widely used semi-solid dosage forms available in the paste (or) gel forms which have a great effect in maintaining the health of the teeth and aesthetic effect by ascertaining the abrasive action to the teeth. Because of that herbal tooth pastes have increased demand and awareness. The harsodent is free from artificial ingredients like parabens, SLS, saccharin, NaF (Fluoride source) and chlorine sources. In the present work Clove oil, Neem oil and Syzygium cumini (Neredu) powder are the active pharmaceutical ingredients (API) which helps in maintaining the activities of the herbal tooth paste. In the present investigation three formulations were prepared F1, F2, F3 by mixing the polymers like micro crystalline cellulose MCC, methyl cellulose MC and sodium carboxy methyl cellulose SMC and the remaining ingredients constantly in every formulation. More over the formulated tooth paste is said to be available to the consumers in cheap and cost effective manner.

Key words: Herbal tooth paste, Semi-solid dosage form, Toothache (Dentalgia), Abrasive action, Active pharmaceutical ingredients (API).

INTRODUCTION:

History of tooth paste

In ancient days Indians, Egyptians and Romans are using the powdered ashes, egg shells and myrrh to cleaning their teeth. In ancient china and Greece peoples were used the crushed oysters and crab shells along with crushed bones and horns of various animals in their tooth powders, on that occasion they achieve the good abrasive action with their formulated tooth powders. In early 17th and 18th century peoples made the tooth paste for their convenience to daily use. Although the first tooth powder was formulated by Chinese and Romans, mainly in their formulation containing the charcoal (or) bark powder, ginseng, mint and salt are the common ingredients. However they believe that tooth pastes are useful to fix the

loose teeth, strengthening the gums and whitening of teeth as well as promote the relief from toothache. More over the first organic tooth paste was invented by a dentist named as Dr. Washington Wentworth Sheffield somewhere around early 1850's, similarly the Colgate Company makes a claim that consists of they are the first tooth paste inventors in the world.

Definition of tooth paste:

Tooth paste is a semi-solid dosage form available in the paste (or) gel forms which have a fortifying effect in the maintaining the health of the teeth and aesthetic effect by ascertaining the abrasive action to the teeth. And also it is used to achieve the suppressive actions like toothache (Dentalgia), Halitosis and Gingivitis (a gum disease) by eliminating

the dental plaque and food particles from the teeth.

The modern statement towards the tooth paste is majority of the cleaning action of the teeth was attained by the mechanical action of the toothbrush rather than the tooth paste. However in our daily routine activities we cannot be separated from tooth brushing with a toothbrush and toothpaste. Tooth brushing activities should be done 2-3 times a day mainly carried out after every meal.

Types of Tooth pastes exist in Market

Tooth pastes are mainly categorized into two types.

1. Organic tooth pastes
2. Herbal tooth pastes

Organic tooth pastes

Organic tooth pastes are the oral hygienic products consisting of mainly the organic ingredients which are intended for ensuring dental hygiene and removal of dental plaque.

Applications

- The fluoride present in the organic tooth pastes help in the preventing of cavities by means of remineralization activity which means reformation of enamel and bones so that helpful in the Halitosis treatment.
- It facilitates the good oral hygienic nature and fresh breath.
- Organic tooth pastes having good germ killing activity because of this which it is helpful in suppression of Dentalgia and Gingivitis.
- Calcium source present in the organic tooth paste gives marked good feel of free from germs and elevates the mouth freshening phenomenon.
- Organic tooth paste posses stringent property due to glycerin and pH

- More over most of the organic tooth pastes are engaged in strengthening the teeth and gums.

Disadvantages

- SLS present in organic tooth paste causes the drying out of tissues present in mouth and ultimately SLS responsible for mouth cancer. If more amount of organic tooth paste was swallowed, it causes the harmful effects like gastric irritation purgative activity and in some cases it causes liver damage.
- Fluoride source present in the organic tooth paste may be responsible for fluorosis and also over dose leads to matting (a tooth disease), cancer, renal (or) kidney failure and more.
- Triclosan is an active ingredient in some organic tooth pastes which consists of chlorine. The chlorine converted in to chloroform by reacting with tap water, here chloroform is a probable carcinogenic agent. And also many more studies state that bacteriae may develop the tolerance against Triclosan (Triclosan present in majority of European tooth pastes).
- Most of the organic tooth pastes having the Diethylene glycol (DEG) used as a polymer and moisturizing agent in the formulation may cause the toxicity to the consumer. Because of this reason Chinese officials recall the DEG containing tooth pastes products in 2007.
- Tooth pastes containing SLS may alter the taste perception by break down of phospholipids that enable the bitterness to the food materials by inhibiting the taste buds.
- All the organic tooth pastes in the market containing the artificial

sweetener sodium saccharin gets converted into bitter taste upon addition of excess amount of saccharin source or prolong storage of tooth paste products.

Herbal tooth paste

Herbal tooth pastes are the oral hygienic products maintaining the health of the teeth, containing mostly plant products (or) plant derivatives meant for protecting the teeth and gums from the germs and useful in strengthening of the teeth without causing any sort of irritations and harmful effects to the teeth. Basically herbal tooth pastes are very much safe in daily usage.

Applications

- Herbal tooth pastes are non-toxic and non-irritant in nature.
- Herbal products ensure high degree of purity and affectivity in daily use.
- Herbal tooth pastes resorts the perfect germ killing and dental analgesic properties. Because of this reason it is helpful in suppression of Dentalgia, Gingivitis and Halitosis.
- More over these herbal products are not responsible for any sort of dangerous consequences upon daily usage.
- Latest researches concluded that Herbal tooth pastes are also used in the treatment of pimples.
- However most of the herbal tooth pastes are free from SLS, parabens, fluoride (NaF) and chlorine (Triclosan) sources. And also free from artificial sweetener sodium saccharin.

MATERIALS AND METHODS

Clove oil, Neem oil, Syzygium cumini (Neredu, Jamun powder), Glycerin, Propylene glycol, Calcium carbonate, Chalk, Micro crystalline Cellulose, Methyl cellulose, Sodium CMC, Soap

nut powder (kunkudukai), Stevia leaves powder, Sodium benzoate, Titanium di oxide, Oil of winter green and Purified water.

Tooth paste Ingredients list

Apart from API tooth paste mainly consists of the following agents.

Abrasives:

Abrasives are the specialized agents useful in removing food particles and waste materials between the teeth thereby responsible for whitening of teeth.

Examples: CaCO_3 , chalk, calcium phosphate, colloidal silica etc.

Humectants:

Humectants are the agents which gives mechanical strength and also wetting nature to the tooth paste. These are also called as anti clustering agents and moisturizers

Examples: Glycerin, PG, PEG, sorbitol, etc.

Polymers (or) binders:

These agents are intended for binding aspects and show the consistency of the tooth paste.

Examples: PEG, PG, MCC, MC, SCMC, HPMC.

Surfactants:

Surfactants are the detergents responsible for foaming character in tooth paste. These are also called as foaming agents.

Example: SLS, soap nut powder, etc.

Preservatives:

Mainly intended for preservation purpose and eventually these are anti microbial in nature.

Example: Methyl paraben, propyl paraben, sodium benzoate etc.

Sweetener:

Gives sweetness to the tooth paste and enhances the customer willingness towards the product.

Example: Na-saccharin, stevia leaves etc.

Flavoring agents:

These are responsible for flavoring aspects in tooth paste and give freshness to the costumer.

Example: Peppermint oil, wintergreen oil, fennel, eucalyptus oil etc.

METHODOLOGY**Methods for formulation of herbal tooth paste**

In the formulation of herbal tooth pastes the following methods are

Method: 1

Mix the humectants and polymer for 1 minute in a motor and pestle. Then add the surfactant (or) detergent to the above mixture present in a motor and pestle and triturate. Later add the vehicle and preservative to the mixture and stir well. Later API's drugs are to be added and mixed uniformly. After 15 min trituration, add the sweetener and mix well. After that abrasives are to be added to the above mixture. To the above mixture add the flavoring agents and opacifier and mix well. Then the prepared tooth paste has to be packed in container.

Method: 2

Dissolve the preservatives in water at 72° C (solution S) in a beaker. Mix the humectants

and the polymer for 1 minute in a stainless steel bowl. Add solution S, mix for 2 min. Homogenize for 3 min. Transfer into the homogenizer at 20° C. Add the Sweeteners, the API and the flavor, mix for 1 min 30sec under vacuum. Add the abrasives, mix for 3 min under vacuum. Add the surfactant (or) detergent, mix for 1 min 30sec under vacuum. The total manufacturing time, and the time T necessary for the dispersion of the carbonates are measured for each paste prepared.

Method: 3 (Optimized method)

Mix binder (or) polymer, humectants and also vehicle (in an amount of 5-40% by weight of polymer) in motor and pestle. To this mixture add API's and mix for 2min. After that abrasives and surfactant are to be added triturated uniformly. After that remaining amount of humectants are to be added. To the above mixture preservative, sweetening agent, flavouring agent and opacifier are to be added with remaining portion of vehicle and triturate uniformly. The prepared paste has to be packed in a neatly cleaned and dried tooth paste container.

Of all these method-3 was found to be the most suitable formulation of herbal tooth paste.

Table 1: Formulation of herbal tooth paste (Net weight 20 g)

S.No	Ingredient	Category	F1	F2	F3
1.	Clove oil	API	3 ml	3 ml	3 ml
2.	Neem oil	API + Flavor	3 ml	3 ml	3 ml
3.	Syzygium cumini (Neredu, Jamun powder)	API + Abrasive	4 g	4 g	4 g
4.	Glycerin	Moisturizer + Anti crusting agent	3 ml	3 ml	3 ml
5.	Propylene glycol	Moisturizer + Polymer (Binder)	2 ml	2 ml	2 ml
6.	Calcium carbonate	Abrasive	4 g	4 g	4 g
7.	Chalk	Abrasive	2 g	2 g	2 g
8.	Micro crystalline	Polymer (Binder)	4 g	-	-

Cellulose				
9. Methyl cellulose	Polymer (Binder)	-	4 g	-
10. Sodium CMC	Polymer (Binder)	-	-	4 g
11. Soap nut powder (Kunkudukai)	Foaming agent (Surfactant, Detergent) + Flavor	3 g	3 g	3 g
12. Stevia leaves powder	Sweetening agent	0.5 g	0.5 g	0.5 g
13. Sodium benzoate	Preservative	0.1 g	0.1 g	0.1 g
14. Titanium di oxide	Opacifier	0.5 g	0.5 g	0.5 g
15. Oil of winter green	Flavor	3 drops	3 drops	3 drops
16. Purified water	Vehicle	q.s	q.s	q.s

Microbiological Assay {Illustrating the Germ killing activity}

Petri dish containing medium and three wells (4 mm in diameter and 3 mm deep) were made using a sterile metallic template, with a rubber teat in each plate. The inoculums were prepared and adjusted to 0.5 McFarland turbidity standards, according to National Committee on Clinical Laboratory Standards (NCCLS) guidelines. About 10 agar medium containing plates were streaked with stock culture microorganisms. Using a sterile inoculating needle, the toothpastes were dispersed into the wells. At that point, the plates were incubated at 37°C for 48 hours in the respective environments that is, E.coli and Staphylococcus aureus are inoculated in the medium. After incubation, zones of inhibition (that is, locations where no growth of bacteria was present) were examined around the wells that contained the dentifrice. Diameters of the zones were measured with a scale. The mean diameter of the well's measurements (in mm) represented the inhibition value of the tested product. The zone of inhibition of the tooth paste found to be 6 cm in diameter.

EVALUATION OF HERBAL TOOTH PASTE

Evaluation of tooth paste was done according to "Bureau of Indian Standards" and these tests were performed for all Herbal tooth

paste formulations (**F1, F2, F3, Meswack and Babool**). These tests include.

Determination of hard and sharp edged abrasive particles

The paste was extruded about 15 to 20 cm length from collapsible tube of each sample on a butter paper. Then all the samples were tested by pressing it along its entire length by a finger for the presence of hard and sharp edged abrasive particles for all samples.

Determination of spreadability

About 1 gm of each sample was weighed and placed at the centre of the glass plate (10x10 cm) and another glass plate was placed over it carefully. Above the glass plates 2 kilogram weight was placed at the centre of the plate to avoid sliding of the plate. The diameter of the paste in centimeters was measured, after 30 min for all samples. The experiment was repeated three times and the averages were reported for all samples.

Determination of fineness

10 g of each sample was accurately weighed and placed in a 100 ml beaker. To this 50 ml of water was added and allowed to stand for 30 min with occasional stirring until the toothpaste was completely dispersed. This solution was passed through to 150 micron Indian standard sieve. Then the sieve was washed with running tap water. Washing

should be continued until all the matters passed by through the sieve. After washing, the residue remained on sieves was collected and dried in an oven at 105°C.

Calculation: For all the samples fineness was calculated by using the following formula, Percentage by mass = $100 M1 / M$

M1 - Mass of residue in grams retained on sieve.

M - Mass of material in grams taken for the test.

Determination of pH

5 gm of sample was accurately weighed and placed in a 150 ml beaker. To this 45 ml of freshly boiled and cooled water was added at 27°C. It was stirred well to make a thorough suspension. The pH was determined for all samples within 5 minutes by using pH meter.

Determination of foaming power

About 5 g of each sample was weighed and placed in a 100 ml glass beaker. To this 10 ml

of water was added and the beaker was covered with a watch glass and allowed to stand for 30 min. The contents of the beaker were stirred and were transferred to a 250 ml graduated measuring cylinder, during this transfer ensure that no foam was produced and no lump paste went into the measuring cylinder. The residue left in the beaker was transferred with further portion of 5-6 ml of water to the cylinder. The content of cylinder was adjusted to 50 ml by adding sufficient water and the content has to be maintained at 30°C. Stir the contents of the cylinder with a glass rod to ensure a uniform suspension. As soon as the temperature of the content reached 30°C, the cylinder was stoppered and 12 complete shakes were given to it. The cylinder was allowed to stand for 5min and the volume of foam was noted for all samples.

Determination of foaming power

Foaming power = $V1 - V2$

V1 - Volume in ml of foam with water

V2 - Volume in ml of water only

RESULTS AND DISCUSSION

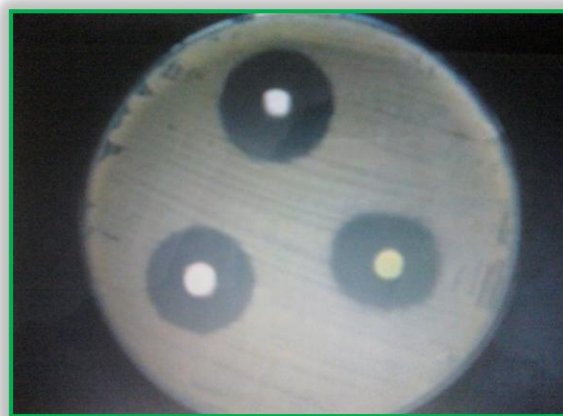


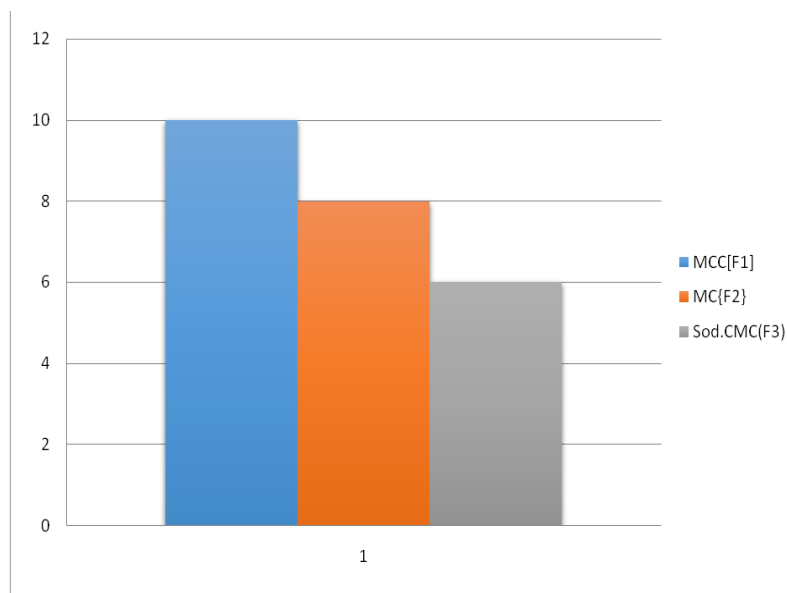
Fig. 1: Microbiological assay of herbal tooth paste formulations {F1, F2, F3}

Table 2: Evaluation tests for the herbal tooth paste

S.No	Evaluation tests	F1	F2	F3	Meswack	Babool	Standard values
1.	Hard and sharp edged abrasive particles	Absent	Absent	Absent	Absent	Absent	Absent
2.	Spreadability (cm)	5.2	5.6	6.1	5.9	5.7	(Max.) 8.5
3.	pH	6.2	6.5	6.8	6.9	6.4	5.5-10.5
4.	Fineness (% by mass)	0.41	0.37	0.39	0.40	0.42	(Max.) 0.5
5.	Foam formation (ml)	57	54	52	54	55	Min 50 ml

Activity testing, acceptance criteria and comparison studies**Table 3: Herbal tooth paste activity testing and acceptance criteria**

S.No	Formulation	Taste	Flavor	Foaming nature	Tooth whiteness criteria	Tooth pain removal property	Over all acceptance
1.	F1	Satisfactory (Bitter taste)	Good	Fair	Excellent	Excellent	Fair
2.	F2	Good	Good	Fair	Fair	Fair	Fair
3.	F3	Good	Good	Good	Fair	Fair	Fair
4.	Meswack	Good	Good	Good	Satisfactory	Good	Good
5.	Babool	Good	Good	Good	Satisfactory	Poor	Satisfactory

**Fig. 2: Herbal tooth pastes activity relationship**

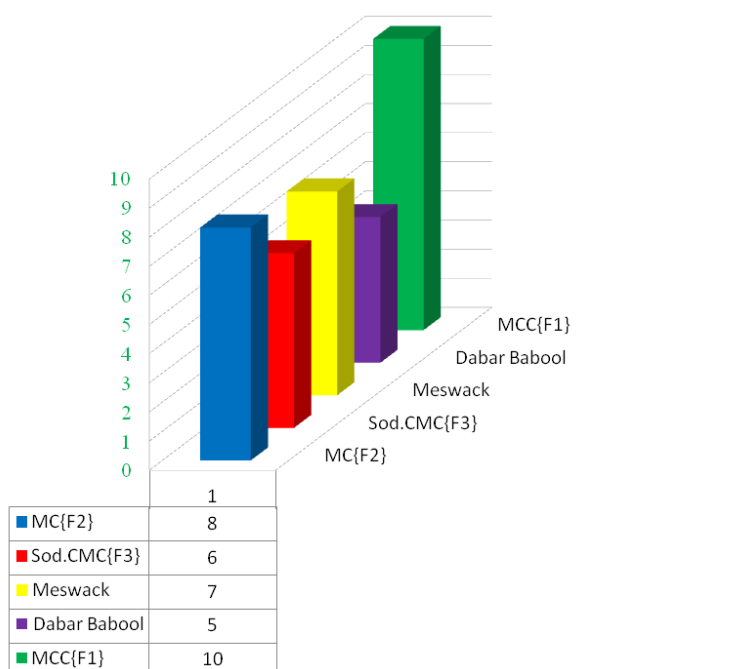


Fig. 3: Activity comparison study of formulated herbal tooth pastes with marketed herbal tooth pastes

7. CONCLUSION

The ingredients used in this present work was screened and selected to possess oral hygiene property thereby it gives a great antibacterial effect. Generally herbals are safe in use for long term, so paste is the part of our

daily life it must be free from chemicals as possible because of that herbal toothpaste is the better choice for daily use, the herbal toothpaste is considered safe to use twice a day. This herbal toothpaste gives a reliable safe an oral hygiene with low cost.

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