



AMERICAN JOURNAL OF PHARMTECH RESEARCH

Design and Development of Tooth Paste Containing Alcoholic Extract of *Psidium Guajava* Leaf

Shrishail M. Ghurghure¹, Priyanka R. Surwase^{1*}, Mahewash A. Pathan¹, Parikshit D. Shirure¹

*1.PG Pharmaceutics Department, D.S.T.S. Mandal's College of pharmacy, Solapur -413004
Maharashtra, India*

ABSTRACT

The intension of present work is to incorporate economically cheap, easily available but effective herbal ingredient in personal hygiene products. Leaves of species *Psidium Guajava* belonging to family *Myrtaceae* (Guava) have many properties like antibacterial, anti-cancer, anti-diabetic, anti-oxidant etc. The leaf extract of guava has traditionally been used for its health benefits. Toothpaste is a dentifrice used 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 dental plaque and food particles from the teeth. The main aim of this investigation is to incorporate the herbal ingredient to that toothpaste that can effectively cleanse oral bacteria. Guava leaves were obtained from domestic garden. Guava leaves were washed with distilled water and shade dried for three days and then powdered for extraction. Guava leaf extraction was performed by Soxhlet apparatus with 70% ethanol for its antibacterial activity. This extract was used as principle ingredient for herbal toothpaste. Toothpaste formulation performed at laboratory level. The formulation was subjected to various evaluation tests like pH, spreadability, foaming ability, moisture content and zone of inhibition. All the results of evaluation tests found within the limits. For getting antibacterial property extraction is done against ethanol and agar well diffusion method used to identify its antibacterial activity shown by guava leaf extract on *Escherchia coli*, *staphylococcus aureus* depends on saponins, tannins and flavonoids. Even the extract can be used directly for treatment of inflamed gum. Pentacyclitri-terpenoid guajanoic acid is main constituent of guava leaf extract.

Keywords: *GuajavaPsidium*, Herbal Toothpaste, Antibacterial, Soxhlet, alcoholic extract.

*Corresponding Author Email: priyankasurwase4595@gmail.com

Received 15 March 9 Accepted 23 March 2019

Please cite this article as: Ghurghure SM *et al.*, Design and Development of Tooth Paste Containing Alcoholic Extract of *Psidium Guajava* Leaf. American Journal of PharmTech Research 2019.

INTRODUCTION

Invention of toothpaste took place in China and India in 300 – 500 BCC. During that period, squashed bone, pulverized egg and clam shells were utilized as abrasives as a part of tooth cleaning. Further evolutions in toothpaste formulation took place in 19th century. It is known as modern toothpaste in which chalk and soap was included. After 1945, several formulation advancements of different detergents had begun, sodium lauryl sulphate had been used as emulsifying agent. But now scene has changed, instead of excipients focus is shifted on principle ingredient of formulation. The focus is shifted to treat various oral diseases along with cleansing^[1]. 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 remove the dental plaque and food particles from the teeth, aids in the removing and/or veiling of halitosis, and releases active ingredients such as fluoride to aid in preventing tooth and gum diseases. Toothpaste is applied with help of mechanical device like toothpaste which play major role in removal of plaque and food material stuck in oral cavity^[1]. The aim of this formulation is to use herbal, easily available, economically cheap, very effective ingredient instead of chemical antibacterial agent.

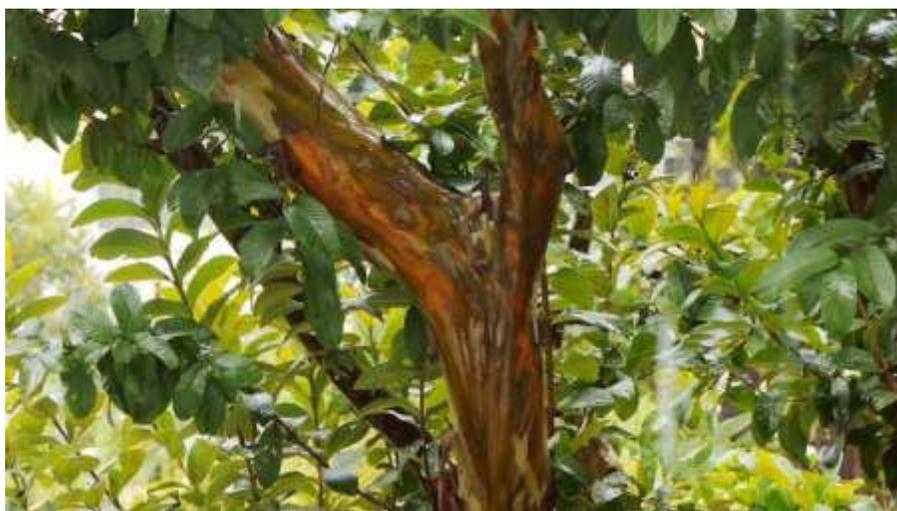


Figure 1: Psidium guajava tree from which leaves were extracted

GUAVA LEAF: - VERSATILE INGRDIENT

Guajava leaves tea and aqueous extracts of guajava leaf has been recommended for pre-diabetes by FOSHU (foods for specified health uses) in Japan. Guajava extracts with water and guajava tea inhibited the invitro activities of maltase, sucrose and alpha amylase according to dose given^[2].

Guava leaves have several chemical constituents such as coumarins, essential oils, flavonoids, triterpenes and ellagitannins which are known to have antimicrobial properties. The leaves of *Psidium guajava* tree have a long history of medicinal uses that are still employed today. Guava

leaves and fruit juice has also been tested in treatment of infantile diarrhoea and the results showed that, those who were treated with guava recovered at 3 days^[5].

Guava leaf has been studied for its anti-cancer activity. It contains components like secondary plant metabolites with certain polyphenols with potential intrinsic antioxidant, anti-inflammatory, and antiviral properties (Gutierrez *et al.* 2008; Deguchi *et al.* 1998; Ojewole, 2006; Mai *et al.* 2007). Several guava components have been postulated as having anticancer effects *in vitro*, and the most frequently reported are ascorbic acid (vitamin C), flavonoids (apigenin), and lycopene^[9].

MATERIALS AND METHOD

Materials

Guava leaves were collected from local farm of Solapur. Ethanol, bromelain, calcium carbonate, sodium lauryl sulphate, sorbitol, sodium saccharine, methyl cellulose, methyl paraben, propyl paraben, titanium dioxide, menthol, etc. were of laboratory grade. Distilled water was made in lab.

Method

(A) Preparation of extract^[2]

Alcoholic extract of guava leaf was made by soxhlation Guava leaves were collected from domestic backyard garden and washed with distilled water. Further these leaves are shade dried for a week and powdered in a mixer. This powder is passed through sieve number 6 to get desired sized powder. 200ml ethanol (70%) taken for 20 gm of guava leaf powder. Soxhlation was carried out for 6 hours. Obtained extract was dried to get powder.

(B) Preparation of toothpaste

Take all required ingredients in a mortar and pestle in desired quantity. Add ingredients in increasing order of weight and triturate. Add desired amount of water to form a paste of desired thickness. Fill in a container and store. Formulation of toothpaste is given in detail in table no. 1

FORMULATION TABLE

Table 1: Herbal toothpaste formulation ingredients

Sr. no	Ingredients	Quantity used (% w/w)
1	<i>Psidium guajava</i> leaf extract	20
2	Bromelain	10
3	Calcium carbonate	35
4	Sodium lauryl sulphate	1.5
5	Sorbitol	30
6	Methyl cellulose	0.5
7	Sodium saccharine	0.3

8	Methyl paraben	0.1
9	Propyl paraben	0.02
10	titanium dioxide	0.5
11	Menthol	1.5
12	Purified water	q.s



Figure 1 :Extraction by Soxhlet apparatus

ANTIBACTERIAL ACTIVITY OF EXTRACT [2]

wash the guajava leaves with distilled water and kept in incubator at 40^o C for 4-5 days and grinded into powder form. Now this material dissolved in 70% ethanol, 80% methanol, ethyl acetate and hot water. Quantity of plant material should be 1g in 10ml of solvent. Now kept this mixture in sterilized beaker and covered with aluminium foil and put this beaker in a dark room for 3 days. Now this mixture filtered by Whatman no. 1 and kept it in incubator at 40^o C until all solvent evaporated from mixture. After this all mixture dissolve in di methyl sulfoxide and different test tried for anti-bacterial properties against bacterial culture. Phytochemical research has proved that the antibacterial properties of guajava leave depend on Saponins, tannins and flavonoids.

METHOD [1,13]

The well-diffusion method was used to identify the antibacterial activity of toothpaste as per the standard of the National Committee for Clinical Laboratory Standards. The antibacterial activity of plant extracts was carried out using Mueller Hinton II plates. Initially, plates were streaked with bacteria, punches were made with 5mm diameter into the medium using a sterile cork borer A

bacterial strain i was grown in pure culture. Using a sterile swab, a suspension of the pure culture is spread evenly over the face of a sterile agar plate. The extract is applied to the centre of the agar plate (in a fashion such that the antimicrobial doesn't spread out from the centre). A hole can be bored in the centre of an agar for extract. The agar plate is incubated for 18-24 hours (or longer if necessary), at a temperature suitable for the test microorganism. It was found that growth of test bacterium was inhibited in 3cm area around the extract.

EVALUATION OF TOOTHPASTE ^[1,14]

Determination of spreadability

One gram of toothpaste placed on a glass slide (10 x 10 cm), cover with another glass slide. Then carefully place two kg weight of on covered glass slide (sliding, shall not take place). Measure the spreading (in cm) of the toothpaste after 3 minutes. Repeating the experiment and note the average value of three readings.

pH determination

Weigh 10 g of toothpaste placed in 150 ml beaker. Allow 10 ml of boiled and then cooled water. Stir vigorously to make a suspension. Measure the pH of the suspension using pH meter

Foaming power

Take a suspension of the material in measuring cylinder and shake the suspension for 12 times. And measure the volume of the foam produced after shaking for 5 minutes.

Procedure: weigh 5 g of toothpaste in a 100 ml glass beaker. Add 10 ml of water, cover the glass beaker with a watch glass and stand for 30 minutes. Heat the suspension gently to dissolve the detergent if present in it. Stir the suspension with glass rods and transfer it to 250 ml measuring cylinder. Examine if no foam is produced (more than 2 ml). Transfer the residue retained in the beaker to measuring cylinder by adding of 5-6 ml of water. Then make up the cylinder with 50ml of water. Stir the contents with up-down movements to get uniform suspension at 30⁰C. after shaking, keep the cylinder stand for 5 minutes. And final note the volume obtained with foam + water.

Stability

The stability test was performed at different temperatures. It was performed at 30⁰C, 45⁰C and 60⁰C for one month and studied for appearance, pH and spreadability.

Loss of Drying

Weigh 5 g of sample placed in a porcelain dish containing 6-8 cm in diameter and 2- 4 cm depth in it. kept the sample in an oven at 105⁰C for 24 hours. After 24 hours sample was removed from oven and weighed again to get total moisture content. Results are given in table no.2.

Calculation

% by mass = $100 M1 / M$

M1 - loss of mass (in grams) on drying

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

RESULTS AND DESCUSSION

Table 2: Results of evaluation tests

Sr.no	Evaluation tests	Result
1	Spreadability (cm)	5.2
2	pH determination (10% aq. Solution)	7.5
3	Foaming power	74
4	Moisture and volatile matter (% by mass)	1.6

Above tests performed to evaluate formulated toothpaste. The pH of toothpaste was found 7.5 which is compatible with oral mucosa.

Table 3: Stability tests results

Temp.tests	30°C	45°C	60°C
pH	7.5	7.5	7.5
spreadability	5.2	5.2	5.2

Due to presence of herbal ingredients stability of product is prime important, toothpaste passed the test for stability it did not showed change in colour, odour or texture.

CONCLUSION

The intension of this preparation was to incorporate herbal antimicrobial agent instead of using chemical agent and it is achieved. The resultant product that is the toothpaste passed all tests carried to evaluate the same. This research will definitely change thinking towards herbal ingredients. Research like this will help to increase approach toward herbal toothpaste and other personal care products.

ACKNOWLEDGEMENT

I am very much thankful to Prof. R Y Patil principal and Mr. K. A. Kamlapurkar, Assistant professor at DSTS Mandal's College of Pharmacy Solapur, Maharashtra, India. for his continuous support, guidance and encouragement.

REFERENCES

1. Mangilal T., Ravikumar M. Preparation and Evaluation of Herbal Toothpaste and Compared with Commercial Herbal Toothpaste: An *invitro* Study. International Journal of Ayurvedic and Herbal Medicine. 2016;6(3):2266-2273.

2. Parwal V. Singh P, Gurjar D. A Comprehensive Study on Different Methods of Extraction from Guajava Leaves for Curing various Health Problems. International journal of Engineering Research and Applications.2012;490-496.
3. Deshmukh P.,Shende V.,Gunde M. Formulation and Evaluation of Herbal Toothpaste.www.researchgate.com,2017.
4. Correa MG., Couto JS., Teodoro AJ. Anticancer Properties of *Psidium Guajava* – A Mini-Review. Asian Pacific Journal of Cancer Prevention.2016;4199-4204.
5. Garode AM., Waghmode SM. Antibacterial Activity of *Psidium Guajava Linn* (Guava) Leaves Extract on Bacterial Pathogen. International Journal of Bioassay2014; 3920:1794-1796.
6. Ashraf A, Sarfraz RA., Rashid MA., Mahmood A., Shahid M., Noor N. Chemical Composition, Antioxidant, antitumor, Anticancer and Cytotoxic Effect of *Psidium Guajava* leaf extracts. Pharmaceutical .2016;1971-1981.
7. Sarata S., Kanta J., Sarisuta N., Temsiririrkkul R.,suvathi Y.,SamranriK., Chumnumwat S. Development of Guava Extract chewable Tablets for AnticariogenicActivity Against Streptococcus Mutans. Mahidol university journal of Pharmaceutical Sciences.2008;35(1-4):18-23.
8. Seo J., Lee S., Elam ML., Johnson SA., Kang J. and Arjmandi BH. Study to find the Best Extraction Solvent for Use with Guava Leaves (*Psidium Guajava L.*) for High Antioxidant Efficacy.Food Science and Nutrition.2014;174-180.
9. Stato R., Dang KM., McPhenson BG., Brown AC. Anticancer Activity of Guava (*Psidium Guajava*) Extracts. Journal of Complementary and Intergative Medicine.2010;1-12.
10. Biswas B., Rogers K., McLaughlin F., Daniels D., Yadav a. Anti-microbial Activities of Leaf Extracts of Guava on two Gram-Negative and Gram-Positive bacteria. International Journal of Micro Biology.2013,1-7.
11. Metwally AM., Omar AA., Ghazy NM.,Harroz FM., Sohafy SM. Monograph of *Psidium Guajava L.* leaves. Pharmacognosy Journal.2011,89-104.
12. Chen YH., Zhou T., Zang YJ., Zou ZF., Wang F., Xu DP. Evaluation of Antioxidant and Anticancer Activities of Guava. International Journal of Food Nutrition and safety.2015,6(6),1-9.

13. Arthur L. Barry, Marie B. Coyle, Clyde Thornsberry, e. Hugh Gerlach and Ronald W. Hawkinson. Methods of Measuring Zones of Inhibition with the Bauer-Kirby Disk Susceptibility Test. *Journal of Clinical microbiology*.1979,885-889.
14. Roshan T., Pavan D., Mahendra G. formulation and evaluation of herbal tooth paste: compared with marketed preparation. *International journal of Pharmaceutics and drug analysis*.2017,5(10),406-410.

AJPTR is

- Peer-reviewed
- bimonthly
- Rapid publication

Submit your manuscript at: editor@ajptr.com

