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Formulation, Evaluation and Antimicrobial Activity of Melia Dubia Bark Extract Toothpaste.

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A B S T R A C T

A herbal toothpaste was formulated using the bark extract of Melia dubia. Ayurvedic cosmetics, mainly plant-based, are valued for their antibacterial and antimicrobial properties, useful in oral health The formulation contained Melia dubia bark extract, decyl glucoside, honey, sorbitol, Acacia, calcium carbonate and sodium chloride. It was standardized through organoleptic, phytochemical, physiochemical and TLC analysis. These parameters ensured quality standards for the formulation. The study confirmed its effectiveness in reducing plaque and gingival inflammation.

Keywords: Melia dubia, formulation, evaluation, quality control, TLC

INTRODUCTION

Herbal formulations have been used in India since ancient times, with growing preference today due to natural sources and healthier lifestyles. Herbal medicines have been widely studied for their antimicrobial, antiviral, antifungal, and antioxidant properties. according to the WHO, about 80% of people use herbal remedies for primary health care. Dental caries is a common infectious diseases caused by dental plaque micro organisms. Streptococcus mutants is the primary species responsible for initiating dental caries. herbal Extracts with antimicrobial activity can help reduce plaque and maintain oral hygiene. unlike synthetic products, herbal remedies are safer, cheaper and have fewer side effects. Melia dubia, containing chemical constituents such as alkaloids, tannins, carbohydrates, saponins, flavonoids, tri terpenoids, polyphenols and glycosides shows promising antimicrobial and pharmacological properties. Herbal toothpastes are being developed as natural alternatives to commercial formulations. This study aims to formulate and evaluate a herbal based toothpaste for oral health benefits.

MATERIALS AND METHODS

1. Collection and identification of a plant materials.

All herbal ingredients of anti microbial tooth paste were collected from S.J.M. college of pharmacy garden Chitradurga all plant materials were cleaned and shade dried according to pharmacognostic procedure before use.

2. Preparation of Anti microbial toothpaste .

All herbal materials including Melia dubia bark extract were dried and pulverized. The required quantity of ingredients were weighed and taken in mortar, combined and distilled water was added drop wise and triturated well until a paste consistency is formed.

3. Organoleptic evaluation.

Organoleptic evaluation refers to evaluation of formulating by color , odour, taste , etc. The organoleptic characters of the sample product were carried out on the official method.

4. Method of Extraction .

Antimicrobial toothpaste is made using the maceration extraction process. The process entails putting the powdered Melia dubia in an appropriate container, adding the solvent water, sealing the container, and letting it remain at room temperature for a long time-usually five to seven days- while stirring it occasionally to encourage extraction. After filtering the mixture to remove the liquid, the solvent is evaporated at 40^0C, and the dry extract is collected.

5. Phytochemical investigation of raw material.

A. Test for alkaloids

- **Mayer's test**
- **Hager's test**
- **Wagner's test**
- **Dragendorff's test**

B. Test for carbohydrates

- **Barford test**
- **Molisch test**
- **Benedict's test**
- **Fehling's test**

C. Test for flavonoids

- **Ferric chloride test**
- **Lead acetate test**
- **Shinoda test**

D. Test for glycosides

- **Legal's test**
- **Keller-kiliani test**

E. Test for tannins

- **Ferric chloride test**
- **Lead acetate test**
- **Gelatin test**

F. Test for tri terpenoids

- **Liebermann-Burchard test**

DETERMINATION OF PHISIO-CHEMICAL PROPERTY

6. DETERMINATION OF EXTRACTIVEE VALUE

When plant materials are extracted using solvents, this techniques is used to count the number of active components in a specific quantity. When a medication's constituents cannot be easily assessed by any other method, extractive values are helpful for evaluating phytoconstituents. Additionally, these values reveal the type of active ingredients that are present in a crude drug.

7. DETERMINATION OF WATER SOLUBLE EXTRACTIVE VALUE

- This is carried out by maceration. Approximately 2.5g of previously weighed air-dried powdered individual ingredients of Melia dubia bark powder were taken in a glass stopper flask and macerated with 100 ml chloroform water (1:99). It was shaken frequently and then allowed to stand for 24 hrs. It was filtered rapidly taking precautions against loss of the solvent.25 ml of the filtrate was evaporated to dryness in a tared flat bottomed petri dish, dried at 105^0C, cooled in desiccators and weighed. The percentage of water-soluble extractive was calculated with reference to the air-dried drug.

8. **DETERMINATION OF LOSS ON DRYING**

- Loss on drying was determined by weighing 2-5 g of air-dried Melia dubia powder in a pre-dried,tared bottle. The sample was dried in an oven at 100-105^0C for 15 minutes. It was cooled to room temperature in a closed bottle and reweighed. Drying was repeated until two consecutive weights differed by less than 5 mg.

9. **DETERMINATION OF FOREIGN ORGANIC MATTER**

- About 250g or the quantity specified in the individual monograph, of the original sample to be weighed accurately and spread out in a thin layer. The samples to be inspected with the unaided eye or with the use of a magnifying lens (6X or 10X) and the foreign organic matter has to be separated manually as completely as possible and weighed. The percentage of foreign organic matter should be weighed and determined with reference to the weight of the drug taken.

10. **EVALUATION OF PHYSICAL PARAMETERS**

- **Foaming ability:** In a 250 ml beaker,5 g of toothpaste and 50 ml of deionized water were mixed with mechanical agitation for 20 minutes. After that, the mixture was put into a 250 ml measuring cylinder and shaken mechanically for 10 minutes. Before recording the water height (VI) and the total height following foaming (V2), The contents in the cylinder were given 5 minutes to rest. This is how the foaming ability was computed.

Foamability (%) = V2-V1

- **Spread ability:** Using the alip and drag method, the herbal toothpaste's spread ability was evaluated by sandwiching 1-2 gm of the formulation between two glass slides that were 10x10 cm and positioned one above the other without sliding. The slides were then pilled in opposing directions. After 3 min, the paste's spread in centimeters was measured, and the experiment was conducted 3 times to get an average result.

11. **CHROMATOGRAPHY**

Using appropriate chemical assays, phytochemical evaluation is utilized to identify the type of phytoconstituents found in the plant. A through examination is necessary to characterize the phytoconstituents both qualitatively and quantitatively, and this can be accomplished by confirmation using various chromatographic techniques like TLC. Chromatographic fingerprinting has long been utilized for single chemical entity medical drugs and is a significant analytical tool for the separation, identification, and estimate of chemicals contained in plants. It has recently emerged as one of the most effective instruments for herbal medication quality control. Chromatographic fingerprinting for herbal medications often focuses on identifying and evaluating the long-term stability of single chemical entity medicinal ingredients. The use of chromatographic fingerprinting for herbal drugs has recently emerged as one of the most potent tools for identifying and evaluating the stability of the chemical constituents observed by various chromatography techniques, including HPLC,TLC,HPTLC,GC, capillary electrophoresis, liquid chromatography, and paper chromatography.

- **THIN LAYER CHROMATOGRAPHY**

  - **Principle:** A dependable method for separating, identifying, and estimating individual or mixed components found in different extracts is thin layer chromatography, in which the solute is distributed between two phases, such as stationary and mobile phases. Differential migration, which happens when solvent flows over the thin layer of the stationary phase, is the primary basis for the separation.

Procedure: Among all the stages evaluated in the mobile phase, which primarily consisted of Toluene: Ethyl acetate: Formic acid (5:4:1) and iodine, TLC was utilized to identify quercetin and phenolic compounds utilizing silica gel plates. The bark extract sample from Melia dubia contained quercetin.

- Standard used - Quercetin
- Sample used – Melia dubia bark extract
- Mobile phase – Toluene : Ethyl acetate : Formic acid (5:4:1)

Rf = DISTANCE TRAVELLED BY SOLUTE / DISTANCE TRAVELLED BY SOLVENT

12. **ANTIMICROBIAL ACTIVITY :**

An extract from Melia dubia was tested for Antimicrobial activity using the agar diffusion method. Water was used to remove bark from Melia dubia using the maceration method., and the plates were incubated for 24 hours at 370^0C to look for micro organism. The zone of incubation's diameter in (ml) was used to measure the antimicrobial activity.

Procedure: Dissolving a 2.8gm of nutrient agar with 500ml of water in a conical flask, the flask is placed in an autoclave for 15 minutes. Then, within 5- 6 minutes, the E.coli is transferred to a petri dish. The petri plate containing the bark extract from Melia dubia is then incubated for 24 hours in an incubator. After 24 hours, the zone of incubation with the highest concentration is observed.

RESULTS

Table No: 01 Ingredients for formulation of herbal toothpaste.

SL NO	INGREDIENTS	FUNCTIONS	QUANTITY
1	Melia dubia bark extract	Antioxidant , Antimicrobial	2 gm
2	Calcium carbonate	Abrasive	19 gm
3	Sodium lauryl sulphate	Foaming agent	1 gm
4	Glycerin	Humectant	4 ml
5	Sodium chloride	Gentle abrasive	0.5 gm
6	Liqourice	Sweetening agent , Preservative	0.5 gm
7	Cinnamon	Flavoring agent	1 gm
8	Peppermint oil	Flavoring agent	1 ml
9	Ginger	Anticaries	1 gm
10	Water	Vehicle	q.s

Table No: 02 Organoleptic evaluation

NAME OF THE SAMPLE	COLOUR	ODOUR	TASTE
Melia dubia	Brown	Slight bitter	Bitter

Table No: 03 The extractive value of Melia dubia bark powder

SL NO	NAME OF THE SAMPLE	WATER EXTRACT	ETHANOL EXTRACT	ETHER EXTRACT
01	Melia dubia	4%	1.5%	1%

Table No : 04 Phytochemical investigation of water extracts of the ingredients

TEST	RESULTS
Alkaloids	+ ve
Carbohydrates	+ ve
Flavonoids	+ ve
Glycosides	+ ve
Tannins	+ ve
Triterpenoids	+ ve
Steroids	-ve

Table No:05 Physical parameter

SL NO	NAME OF THE SAMPLE	SPREADABILITY	FOAMING %
01	Melia dubia	2.7 cm	29.58 %

Table No : 06 TLC of water extract

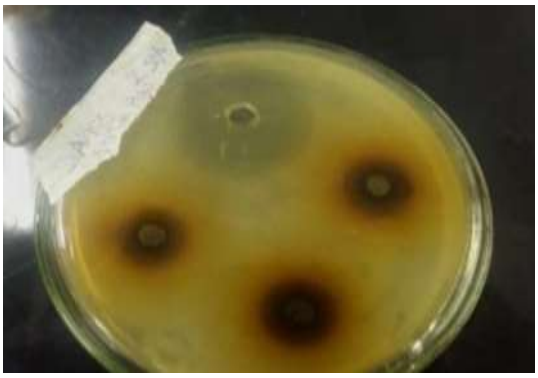
SL NO	EXTRACT	SOLVENT SYSTEM	NO OF COMPOUNDS REPORTED	Rf VALUE FOR STD	Rf VALUE FOR TEST
01	Melia dubia	Toluene : Ethyl acetate : Formic acid (5:4:1)	2	0.53	0.46

Table No : 07 Determination of PH

SL NO	FORMULATION	PH
01	Herbal toothpaste	7.8

Table No :08 Antimicrobial activity

Antimicrobial activity : Table No:08 below displays the antimicrobial activity of the herbal toothpaste formulation against some pathogenic microorganisms.



The antimicrobial activity of formulated herbal toothpaste showed good results of zone of inhibition against.

DISCUSSION

The bark of Melia dubia was ground into a powder and extracted using the maceration process. The resulting extract was added to toothpaste together with preservatives, calcium carbonate, glycerin, and sodium lauryl sulphate. When the toothpaste's pH foaming, abrasiveness, homogeneity, and stability were evaluated, it demonstrated adequate consistency, acceptable pH foaming capabilities, a smooth texture, and stability over time. Melia dubia bark extract toothpaste is a botanical product that shows promise for improving dental health. The Rf values were determined to be 0.53 to 0.46. TLC is primarily utilized for qualitative screening of bark extract, which is a crucial instrument in the overall phytochemical research studies.

CONCLUSION

After analysis of bark extract of Melia dubia by different parameters such as moisture content, water and alcohol soluble extractive and TLC chromatogram shows good result . so it can be concluded that the formulation Melia dubia bark extract toothpaste. cantains a all good characteristics it was found to be effective and economic. The study shows that the content formulation are of good quality and purity, all these investigations were may be helpful in authentication of toothpaste the result of present study will also serve as reference monograph in preparation of drug formula.

BIBLIOGRAPHY

1. Davies R, Scully C, Preston AJ. Dentifrices-an update. Med Oral Patol Oral Cir Bucal. 2010 Nov 1;15(6):e976-82.
2. Jardim JJ, Alves LS, Maltz M. The history and global market of oral home- care products. Brazilian oral research. 2009;23:17-22.
3. Ersoy M, Tanalp J, Ozel E, Cengizlier R, Soyman M. The allergy of toothpaste: a case report. Allergologia et immunopathologia. 2008 Dec 1;36(6):368-70.
4. Lippert F. An introduction to toothpaste-its purpose, history and ingredients. Toothpastes. 2013 Jun 28;23(10.1159):000350456.
5. Parveen A, Ahmad QZ, Rashid M, ur Rahman A, Rehman S. Study of antimicrobial activity of Unani poly herbal toothpaste "Sunoon Zard". Heliyon. 2021 Feb 1;7(2).
6. Goswami M, Bhagta S, Sharma D. Melia dubia and its Importance: A Review. International Journal of Economic Plants. 2020;7(1):029-33.
7. Dinesh B, Mahesh P, Shanthala M, Shalini V, Sindhu R, Viji KN, Rajashekara S. Evaluation of the Phytochemical, Antioxidant and Anti-microbial Activities obtained from the Methanolic Leaf Extracts of Melia dubia Cav. Transactions on Science and Technology, 2020 ;7(4):189-97.
8. Chandakavathe BN, Kulkarni RG, Dhadde SB. Formulation and assessment of in vitro antimicrobial activity of herbal toothpaste. Proceedings of the National Academy of Sciences, India Section B: Biological Sciences. 2023 Jun;93(2):317-23. DEPT.OF PHARMACOGNOSY,SJMCP,CHITRADURGA Bibliography
9. Deshmukh P, Telrandhe R, Gunde M. Formulation and Evaluation of Herbal Toothpaste: Com-pared With Marketed Preparation. International Journal of Pharmaceutics and Drug Analysis. 2017;5(10):
10. Gautam D, Palkar P, Maule K, Singh S, Sawant G, Kuvalekar C, Rukari T, Jagtap VA. Preparation, Evaluation and Comparison of Herbal toothpaste with marketed Herbal toothpaste. Asian Journal of Pharmacy and technology. 2020;10(3):165-9.
11. Akotakar AM, Thenge RR, Patil AV, Ghonge AB, Bhaltadak MB. Formulation and comparative standardization of toothpaste. International journal of pharmaceutical science and research. 2018;3(4):12-5.

12. Bhattacharjee S, Nath S, Bhattacharjee P, Chouhan M, Deb B. Efficacy of toothpastes on bacteria isolated from oral cavity. Int. J. Med. Public Health. 2018 Apr 1;8(2):89- 92.

13. Hema S, Dinesh V, Uma S. PHYTOCHEMICAL EVALUATION, ANTIOXIDANT AND ANTIBACTERIAL ACTIVITIES OF THE FLORAL EXTRACT OF MELIA DUBIA. Biochemical & Cellular Archives. 2024 Oct 2.