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FORMULATION AND EVALUATION OFHERBAL MOUTHWASH

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ABSTRACT

The **aim** of this study is to formulate mouthwashes containing herbal extracts obtained from the leaves of Syzygium *aqueum* (watery rose apple), Mangifera *indica* (mango). The formulated mouthwashes will be evaluated for its effectiveness. **Materials and Methods:** Phytochemical screening of above mentioned plant was done. Leaf extraction was carried out for the preparation of mouthwash. Formulation and evaluation ofall three formulation was done. **Result:** Phytochemical screening of herbal extracts obtained from the leaves of Syzygium *aqueum* has revealed the presence of compounds like alkaloids, carbohydrate, glycosides, saponins, tannins, flavonoid, phenols. phytosterols, fixed oil and in Mangifera *indica* leaf extracts has revealed the presence of many compounds, including, alkaloids, carbohydrate, glycosides, saponins, terpenoids, tannins, flavonoid, phenols. Three formulations of mouthwash were prepared by using Mangifera *indica*, Syzygium *aqueum*, mint oil, saccharin, sodium lauryl sulphate, glycerol, salt solution, purified water and evaluated for different parameters like colour, odour, taste, pH, viscosity, foaming ability, stability studies and antimicrobial test. **Conclusion:** Based on the results of evaluation, it shows that formulation F1 have pH 4.85 and in antibacterial study formulation F1 have better antibacterial activity when compared to other two formulations.

INTRODUCTION

Cosmetics can be defined as any product intented to be rubbed, poured, sprinkled or sprayed on, or introduced into, or otherwise applied to the human body or any part thereof for cleansing, beautifying, promoting attractiveness, or altering the appearance, includes any article intented for use as component of cosmetic.[1]

ORAL CAVITY

Refers to the mouth. It includes the lips, the lining inside the cheeks and lips, thefront two thirds of the tongue, the upper and lower gums, the floor of the mouth under the tongue, the bony roofof the mouth, and the small area behind the wisdom teeth.

Vestibule: It is the space between lips/cheeks, and the gums/teeth. The vestibule communicate with the mouth proper via the space behind the third molar tooth, and with the exterior through the oral fissure.

Mouth proper: The mouth proper lies posteriorly to the vestibule. It is bordered by a roof, a floor, and the cheeks. The tongue fills a large proportion of the cavity of the mouthproper.

Roof: The roof of the mouth proper consist of hard and soft palate.

Hard palate is found anteriorly, it's a bony plate that separates the nasal cavity, it is covered superiorly by respiratory mucosa and inferiorly by oralmucosa.

Soft palate is the posterior continuation of the hard palate. In contrast to the hard palate, it is a muscular structure.

Cheeks: The cheeks are formed by the buccinator muscle, which is lined internally by the oral mucous membrane. The buccinator muscle contracts to keep food between the teeth when chewing, and is innervated by the buccal branches of the facial nerve.

Floor: The floor of the oral cavity consist of several structures.

Muscular diaphragm: It provides structural support to the floor of the mouth, and pulls the larynx forward during swallowing.

Tongue: Connected to the floor by frenulum of the tongue, a fold of oral mucosa.

Salivary glands and ducts[2]

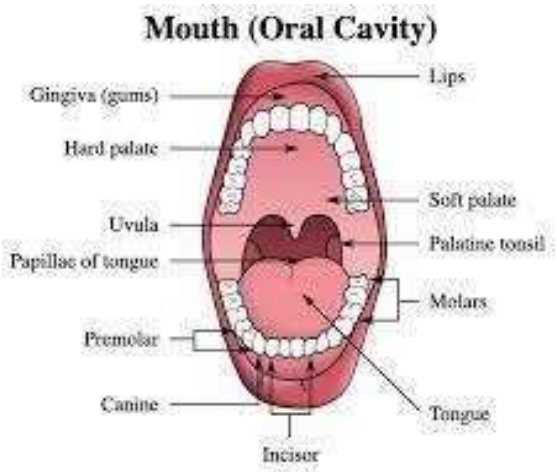

Figure no 1: Structure of oral cavity.

MOUTHWASH

Mouthwash is a medicated liquid used for cleaning the oral cavity and treatingmucous membranes of the mouth, maycontribute to surface softening andincreased wear of dental resins and composite materials.

Types of Mouthwash

- Antiseptic
- Natural (herbal)
- Fluoride
- Cosmetic
- Total care

Advantages of mouthwash

- Fresh breath
- Helps to get rid of food and debrisstuck between the teeth
- Prevent buildup of space
- Helps to fight cavities
- Whitens the teeth
- Cure canker sores

Disadvantages of the mouthwash

 Mouthwash can be dangerous to children below 6 years.

 Mouthwash can stain and darkenteeth.

- It can damage some parts of themouth.
- Many mouthwash contain alcohol that make teeth more sensitive.[3]

Oral diseases

1. Dental Caries

Mouth ulcers are small sores that form on gums, lips, inner cheeks or palate (roof of mouth). They can be triggered by several different factors, including minor injuries,hormonal changes and emotional stress.[8]

Caries is the most typical oral infection and illness. A persistent, contagious illness called caries is brought on by bacteria that consume sugar to generate an acidic environment that erodes teeth. This process causes holes (cavities) in thetooth's structure over time. [4,5]

2. Candidiasis

A candida species infection of the oralmucosa is known as candidiasis. Oral candidal infections are more common among immunocompromised people, such as the elderly, young children, HIV- positive people, cancer patients, diabetics. People who take certain treatments, like chemotherapy, inhaled steroids.[6]

3. Gingivitis

An reversible form of gingival inflammation is gingivitis. A gentle form of periodontal disease.

There are three classifications

Plaque-induced, non-plaque-induced, and systemic diseases and medication-induced gingivitis. Poor dental hygiene/plaque formation, primary or secondary tooth emergence, and dental equipment (braces, dentures) are riskfactors for gingivitis.[7]

4. Mouth Ulcer

HERBAL MOUTHWASH

Herbal mouthwashes are designed and prepared with extracts and essential oils from phytotherapeutic plants, containing a mixture of active agents such as catechins, tannins, and sterols. The mixture of natural compounds inside the herb- or plant-derived substances usually performs gentle remedial effects.[9]

Advantages of Herbal Mouthwash

- They have very minimal or no sideeffect and they are less harmful.
- All herbal mouthwashes do not contain alcohol and/or sugar.
- Herbal mouthwash is gentle for even the most sensitive mouth.
- Herbal mouthwashes has naturally antibacterial property.
- It contain no harsh additives.

- Herbal mouthwash doesn't cause drymouth.
- It is highly in demand.
- It keeps your mouth healthy.[10]

Uses of Herbal Mouthwash

- Use of herbal mouthwash is toimprove oral hygiene.
- It help to control dental plaque.
- It can be use in gum diseases.
- Used for killing germs in oral cavity.
- It freshen breath and covers badbreath.
- It is use to clean septic sockets.
- It relieve pain and inflammation.
- In treatment of Mucositis and Halitosis.
- Used in Periodontal diseases.[11]

MATERIALS AND METHODSMANGO LEAVES

Mango (Mangifera *indica L*.) ascribed to the family Anacardiaceae. A major bio- macromolecule present in mango leaves is protein. The most active biological constituent of mango leaves is mangiferin, followed by phenolic acids, benzophenones, and other antioxidants such as flavonoids, carotenoids, quercetin, isoquercetin, ascorbic acid, and tocopherols. Mangiferin is the main contributor of most of the biological activities of mango leaves extract. Mango leaves have a great anti-microbial, antioxidant, anti-diabetic, anti-tumour, and immunomodulatory effects. Mango leave oil (MLO) contains monoterpenes, sesquiterpenes, minor quantities of other analogues, and trace amounts of non-terpenoid hydrocarbons and oxygenated hydrocarbons.[12]

Figure no. 2: Mango (Mangifera *indica*) leaves.

WATERY ROSE APPLE LEAVES

Watery rose apple is a plant of myrtle family, Myrtaceae, constitutes over 5500species, and *Syzygium* is considered the largest genus of the flowering plants within the family. The watery rose apple, *Syzygium aqueum*, is a traditional medicinal plant with various bioactive compounds distributed in all plant parts. These include phenolic compounds, flavonoids, tannins, terpenoids, and essential oils. *S. aqueum* extracts and their isolated compounds showed multiple beneficial biological effects such as antibacterial, antifungal, antidiabetic, analgesic, antimalarial, antioxidant, anti-inflammatory, and anticancer activities.[13]

Figure no. 3: Watery rose apple (Syzygium *aqueum)* leaves.

METHOD OF COLLECTION ANDPREPARATION

The leaves of Mangifera *indica* (mango) and Syzygium *aqueum*(watery rose apple) were collected locally and authenticated by Dr. Ratheesh Narayanan. M. K, HOD, Assistant Professor and Research guide, P.G Department of Botany, Payyanur College, and the leaves were sun dried for 48 hours. The dried leaves were then powdered and enclosed in a airtight container in a cool place.[14]

Figure no. 4: Dried powder of mango (Mangifera *indica*) leaves.

Figure no. 5: Dried powder of watery rose apple (Syzygium *aqueum*) leaves.

Method of extraction: Cold maceration method was used for the extraction of Syzygium *aqueum* and mangifera *indica* leaves. Both the powder were weighedabout 20 g and added to two separate stoppered conical flask then 150 ml of alcohol was added to the flask that contain syzygium *aqueum* and 150 ml water in the mangifera *indica* containing flask it was shaken for 5-6 times in 24 hours. After 24 hours it was strained through the muslin cloth and the extract was collected. It was then transferred to petridish and placed on hot plate until the solvent gets evaporated.

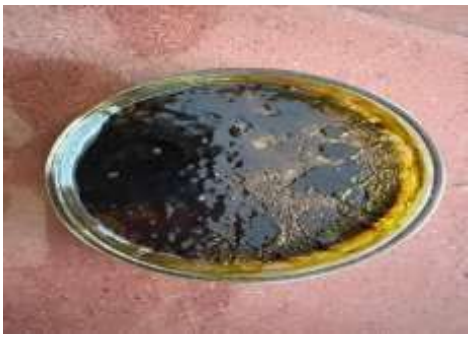

Figure no. 6: Extract of Mangifera *indica* leaves.

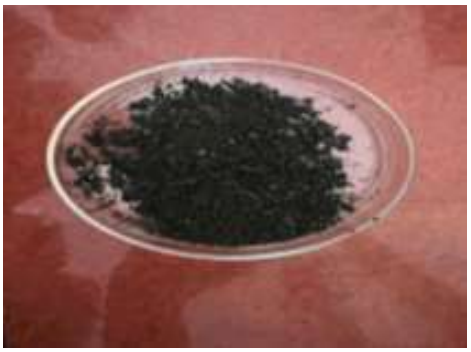

Figure no. 7: Extract of Syzygium *aqueum* leaves.

FORMULATION OF HERBALMOUTHWASH

We have formulated herbal mouthwash containingextracts obtained from the leaves of Syzygium *aqueum* (watery rose apple), Mangifera *indica* (mango)

as active ingredient. Mint oil was usedas a flavouring agent. Saccharin assweetener. Sodium lauryl sulphate as surfactant and glycerol as co-surfactant. Salt was used as preservative. Purified water was the vehicle we used. Three formulations of herbal mouthwash were prepared; F1, F2, and F3. All the ingredients were weighed accurately. The weighed quantity of herbal extract was mixed with small amount of water in a mortar and pestle, then saccharin and salt solution were added. Mint oil was added drop wise and mixed thoroughly to prevent the formation of lump. Sodium lauryl sulphate and glycerol were then added and mixed thoroughly. Finally, water was added to make up the volume up to 100 ml. The formulations were transferred to an attractive, well-closed container.[15]

Table no. 1: Formulation design ofherbal mouthwash.

Ingredients	F1	F2	F3
Mangifera *indica*	200 mg	_	100 mg
Syzygium *aqueum*	_	200 mg	100 mg
Mint oil	0.1 ml	0.1 ml	0.1 ml
Saccharin	0.1 mg	0.1 mg	0.1 mg
odium lauryl sulphate	0.1 g	0.1 g	0.1 g
Glycerol	8.5 ml	8.5 ml	8.5 ml
Salt (10% w/v solution)	2 ml	2 ml	2 ml
Purified water	qs to 100 ml	qs to 100 ml	qs to 100 ml

METHODOLOGY

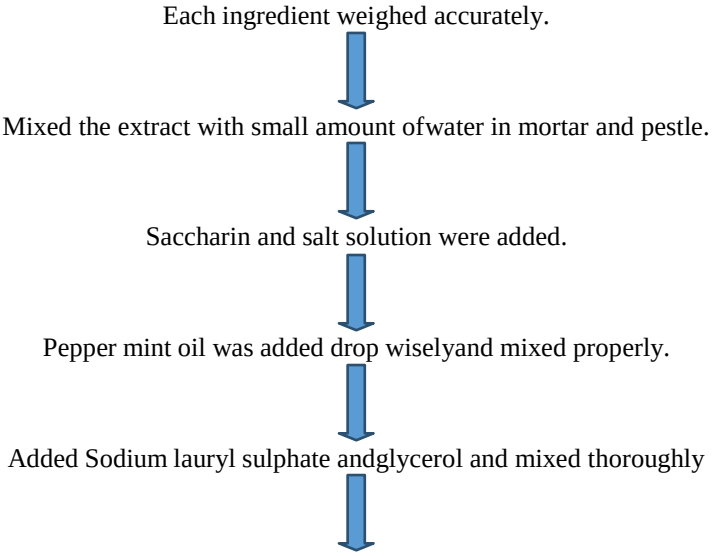

Figure no. 8: Flow chart offormulation procedure.

EVALUATION OF HERBALMOUTHWASH

The prepared herbal mouthwash formulations (F1, F2, F3) were subjectedto various evaluation test.

Physical Evaluation

The formulated herbal mouthwashes were subjected to physical evaluation for their colour odour and taste.

pH determination

pH of prepared herbal mouthwash was measured by using digital pH meter at constant temperature.

The pH meter was calibrated using standard buffer solution (Acetate buffer solution pH 4) then 70 ml of the formulation was taken in a beaker, the probe was dipped in to the beaker andits pH was measured.

Viscosity determination

Viscosity of formulated mouthwashes were measured by using ostwald viscometer. The viscometer was mounted in vertical position on a suitable stand. The formulation was filled into the viscometer up to mark A. The time required for formulation to flow from mark A to B was recorded. The viscosity was determined three times. Average time was calculated and standard deviation was found.

Foaming ability

10 ml of the formulation was mixed with 40 ml of distilled water, the mixture was transferred into 100 ml measuring cylinder. The mixture was vigorously shaken for 25 times, after which it was kept aside. The height of the foam formed was measured.

Stability studies

The prepared formulations were kept at room temperature for a period of one month, during and after this period formulations were tested for its colour,odour, and physical appearance.

Antibacterial Test

The method used for the antibacterial testing of formulated mouthwash is Cup-plate method.

Preparation of media : 2.8 g of nutrient agar was taken in a sterile conical flask, and 100 ml water was added and dissolved the nutrient agar properly, it was sterilized in an autoclave at 121^0C for 15 minutes. After sterilization the culture was added, and this culture media was transferred to the petridish which was previously sterilized. It kept for some time to get solidify.

Test: After the solidification of culture media, with the help of a sterile borer one cavity was made in each plate. The cavities were filled with formulated mouthwashes and incubated the plates at 37^0C for 24 hours. After the incubation period we measured the zone of inhibition.[15]

RESULTS AND DISCUSSION

Three formulations F1, F2, F3, of herbal mouthwashes containing leaf extract of Mangifera indica and Syzygium aqueumwere prepared and evaluated.

The photographs of mouthwashes are shown below

Figure no. 9: Photograph of formulated herbal mouthwash.

Phytochemical screening of leaf extracts

- Phytochemical screening of mango leaf extracts has revealed the presence of many compounds, including, alkaloids, carbohydrate, glycosides, saponins, terpenoids, tannins, flavonoid, phenols. Phytosterols andfixed oils were absent in the mango leaf extract.
- Phytochemical screening of Syzygium *aqueum* leaf extracts has revealed the presence of compounds like alkaloids, carbohydrate, glycosides, saponins, tannins, flavonoid, phenols. Phytosterols, fixed oils and terpenoidswere absent in the Syzygium *aqueum* leaf extract.

The following evaluation tests were performed on formulated mouthwash,

Physical evaluation

The formulated mouthwashes were inspected for their colour, odour, and appearance by sensory and visual examination. Results are shown below in table 4.

Table no. 5: pH of the formulatedherbal mouthwashes.

Formulation	pH ± Standard deviation
F1	4.91±0.06
F2	4.71±0.095
F3	4.64±0.092

n= 3 ± SD

Table no. 4: Physical evaluation offormulated herbal mouthwashes.

Formulation	Colour	Odour	Appearance
	Gold Yellow	Pleasant (Coolmint)	Clear
F1			
	GreenishYellow	Pleasant (Coolmint)	Clear
F2			
	Gold Yellow	Pleasant (Coolmint)	Clear
F3			

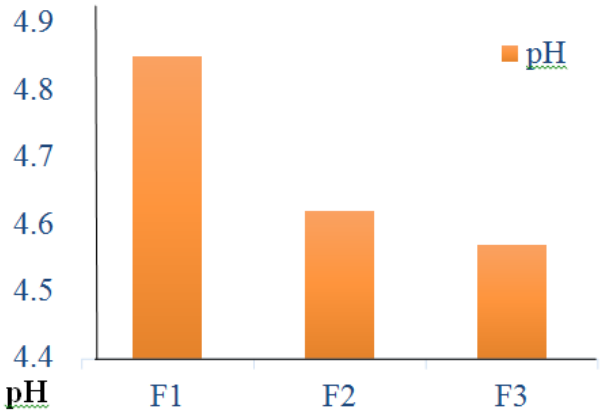

Figure no. 10: pH of the formulatedherbal mouthwashes.

The pH of all formulated mouthwash was found to be within the ideal pH range for herbal mouthwash that is between 4.1 - 7.9.

Determination of pH

pH of the prepared herbal mouthwash was measured by using digital pH meter at constant temperature, and the pH values and standard deviation were found and given in the table 5.

Viscosity

Viscosity of formulated mouthwashes were measured by using ostwald viscometer. The viscosity was determined three times. The viscosity and standard deviation were found and given in the table 6.

Table no. 6: Viscosity of the formulatedherbal mouthwashes.

Formulation	Viscosity (cP) ± Standarddeviation
F1	1.32 ±0.0416
F2	1.34 ± 0.0493
F3	1.12 ± 0.0208

n = 3 ± SD

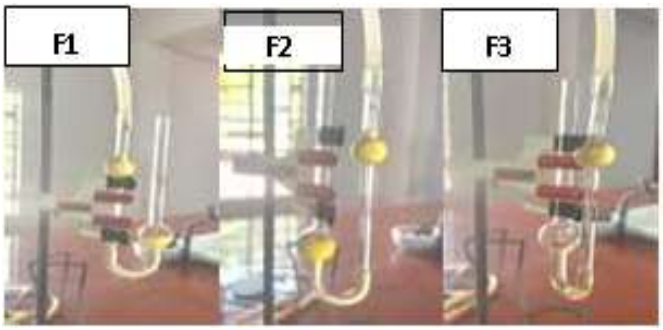

Figure no 11: Viscosity of formulated herbal mouthwashes.

Foaming ability

Foaming ability of all formulated herbal mouthwashes were determined. Results are shown in table 7.

Table no. 7: Foam height of theformulations.

Formulation	Foam height (ml) ± Standard deviation
F1	6.6 ± 1.1547
F2	8.6 ± 1.5275
F3	6.3 ± 0.5773

n = 3 ± SD

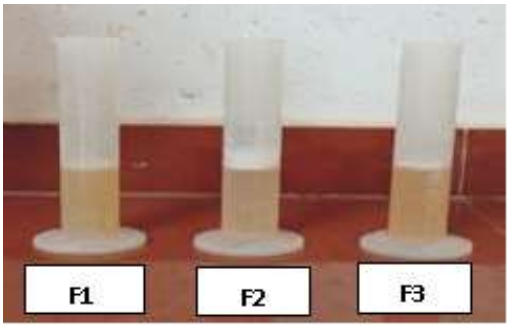

Figure no. 12: Foam height of theformulations.

Antibacterial activity

All formulated mouthwashes were subjected to antibacterial study and zone of inhibition was determined.

Table no. 8: Determination of antibacterial activity.

Formulation	Zone of inhibition (mm)
F1	15
F2	12
F3	13

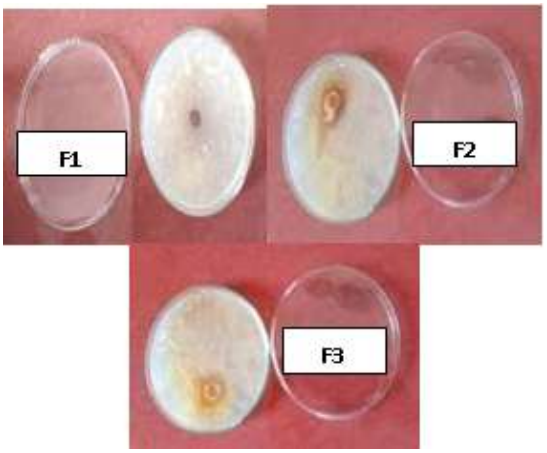

Figure no. 13: Zone of inhibition of formulations.

The zone of inhibition of F1 was found to be 15 mm which is more than the zone of inhibition for other formulations. This shows that F1 has better antibacterial activity compared to other formulations.

CONCLUSION

Oral health is important as overall health. Herbal mouthwash are preferred over chemical mouthwash as it shows less side effects and it is non-irritant, less toxic, and do not contain alcohol. Medicinal plants because of their antiviral and antibacterial action against human microorganisms and it has no or less side effects as compared to synthetic mouthwash. Herbal mouthwashes are prepared from various plant extracts.

The herbs used in this study are Mangifera *indica* and Syzygium *aqueum.* This study was aimed to formulate herbal mouthwash and to evaluate it. The formulated mouthwashes were evaluated for variousparameters such as physical parameter, pH, viscosity, foaming ability, stability and anti bacterial study. Based on the results of evaluation, it shows that formulation F1 have pH 4.85 and in antibacterial study formulation F1 have better antibacterial activity when compared to other two formulations.

REFERENCES

1. Draelos ZD, Cosmetics: The Medicine of beauty. Journal of Cosmetic dermatology, 2015; 14(2): 91.
2. Campanile, G.L., Ippolito, V., Lotti, T.M. Morphology of the Oral Cavity. In: Lotti, T.M., Parish, L.C., Rogers, R.S. (eds) Oral Diseases. Springer, Berlin, Heidelberg, 1999. https://doi.org/10.1007/978-3-642- 59821-0_3
3. https://ensuredentalcare.comadvanta ges-and-disadvantages-of- mouthwash/ accessed on 15/4/2024.
4. Kidd EA. Clinical threshold for carious tissue removal. Dent Clin North Am., 2010 Jul; 54(3): 541-9. [PubMed] [Ref list]
5. Schwendicke F, Dörfer CE, Schlattmann P, Foster Page L, Thomson WM, Paris S. Socioeconomic

inequality and caries: a systematic review and meta-analysis. J Dent Res., 2015 Jan; 94(1): 10-8. [PubMed] [Ref list]
6. Fangtham M, Magder LS, Petri MA. Oral candidiasis in systemic lupus erythematosus. Lupus., 2014 Jun; 23(7): 684-90. [PubMed] [Reflist]
7. Marchesan JT, Girnary MS, Moss K, Monaghan ET, Egnatz GJ, Jiao Y, Zhang S, Beck J, Swanson KV. Role of inflammasomes in the pathogenesis of periodontal disease and therapeutics. Periodontol 2000, 2020 Feb; 82(1): 93-114. [PMC free article] [PubMed] [Ref list]
8. https://my.clevelandclinic.org/health /diseases/21766-mouth-ulceraccessed on 26/3/2024
9. Cai H, Chen J, Panagodage Perera NK and Liang X: Effects of herbal mouthwashes on plaque and inflammation control for patients with gingivitis: A systematic review and meta-analysis of randomised controlled trials. Evidence-Based Complement Altern Med., 2020.
10. https://www.dentalherb.com/blog/1 0-reasons-natural-mouthwash/ accessed on 15/4/2024.
11. Tayles N., Domett K., Halcrow S. Can Dental Caries Be Interpreted as Evidence of Farming? The Asian Experience. Front. Oral Biol., 2009; 13: 162–166. Doi: 10.1159/000242411. [PubMed] [CrossRef] [Google Scholar]
12. Ribeiro, S.M.R.; Schieber, A. Bioactive Compounds in Mango (Mangifera indica L.). In Bioactive Foods in Promoting Health; ElsevierBV: Oxford, UK, 2010; 507–523.
13. Mouna yassir, Widad ben bakrim, Mona F. Mahmoud, Watery Rose Apple: A Comprehensive Review of Its Traditional Uses, Nutritional Value, Phytochemistry, and Therapeutic Merits against Inflammation-Related Disorders- Oxid Med Cell Longev, 2022; 29.
14. Manoj Kumar, Vivek Saurabh, Maharishi Tomar, MuzaffarHasan, Sushil Changan, MinnuSasi, Chirag Maheshwari, Uma Prajapati,-Mango (Mangifera indica L.) Leaves: Nutritional Composition, Phytochemical Profile, and Health-Promoting Bioactivities, 2021; 10(2): 299.
15. Preeti Chaudhary, Raghavdeep Sharma, Sayali Rupanar, Preperation and Evaluation of herbal mouthwash containing hydroalcoholic extract of pongamia pinnata - Asian journal of biological and life science, 2023; 12(1): 172-178.
16. Samruddhi M.Jagdale, Harshada S.Nawale, Prof.Vikas D.Kunde; Formulation and evaluation ofherbal mouthwash- IJNRD, 2023; 8: 909.
17. Shivani Suresh Uttarwar, Formulation and evaluation of herbal mouthwash -IJCRT, 2022. 10 https://ijcrt.org/papers/IJCR T2202359.pdf
18. Rajeshkumar Shanmugam,Sulochana Govindharaj, Padmapriya Arunkumar, Ganji Sai Sanjana, Pradeep Manigandan- Preparation of a Herbal Mouthwash With Lemongrass and Mint- Mediated Zinc Oxide Nanoparticlesand Evaluation of Its Antimicrobialand Cytotoxic Properties, 2024; 16(2).
19. Shohreh Alipour1, Shadab Dehshahri, Afshin Afsari- Preparation and Evaluation of a Herbal Mouthwash Containing Oak Husk of Quercus brantii and Zataria multiflora, 2018; 13(3). https://brieflands.com/articles/jjnpp-13420
20. Devyani Nigam, Poojashree Verma and Mahavir Chhajed -Formulation and Evaluation of Herbal Mouthwash against Oral Infections Disease, IJPLS, 2020.
21. Abel Olusola, Nwamaka Henrietta, Oreoluwa Ayomide, Chijioke- Herbal mouthwash formulated with the leaf extract of Jatropha gossypiifolia Linn. (Euphorbiaceae) exhibited in vitro antimicrobial activity against selected oral pathogens, 2021; 18(3): 207-214.
22. Suchita Gokhale, Raj M Pitambare, Priyam S. Pawar, Ashwini H. Pawshe, Srushti P. Patil-Formulation Development and Evaluation of Herbal Mouthwash, Am. J. PharmTech Res., 2020; 10(4).
23. Suhani A Shah-To formulate and evaluate herbal mouthwash, JPP., 2024; 13(1): 11-18.
24. Yadav, Akshay R,Mohite, Shrinivas K, Magdum, Chandrakant S- Preparation and Evaluation of Antibacterial Herbal Mouthwash against Oral Pathogens; Asian Journal of Research in Pharmaceutical Science, 2020; 10(3).
25. Masriadi, Sukmawati, Hasta Handayani Idrus-Formulation herbal mouthwash combination extract of Ginger and Lemongrass as antibacterial causes of Halitosis in Diabetes mellitus patients, Indian Journal of Forensic Medicine & Toxicology, 2021; 15(4).
26. Arpita Nandy, Masdia Khatun, Ritam Ghosh, Soumallya Chakraborty, Somenath Bhattacharya, Dr. Amitava Roy, Dr. Arin Bhattacharjee-Formulation and Evaluation of Poly Herbal Mouth Wash against Different Mouth Disorder, IJRASET, 2023.