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Research article

PREPARATION AND EVALUATION OF GALLS EXTRACT MOUTHWASH

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Abstract

Medical plants and Herbs played great role in drug development by their sources of ingredient. They have antimicrobial and antibacterial activities which can prevent disease. By aqueous extract of Oak gall was prepared antibacterial herbal mouth wash. The mouth wash act against the oral staphylococcus aureus, Escherichia Coli (E. coli) for checked mouth wash' s anti-microbial activity by agar diffusion method. From Oak gall Extract 's mouth wash we can made herbal formulation. Oak gall has tannin and bioactive compounds. This mouth has properties like antimicrobial, anti – inflammatory, and antioxidant there for this mouth wash used for maintain oral hygiene.

This mouth wash improving oral health by reducing Plaque formation, preventing gingivitis. Safe and well – tolerated results of Gall's extract mouthwash is Promising alternative from alternative traditional mouthwashes. For further benefits and for oral case there are need to explore research. This formulation was alcohol free and water based in mouth this mouth wash was found effective for controlling and demolishing microbial growth and pathogens. Prepared mouth wash's Physicochemical tested which give assure that, this mouth wash has good antibacterial activity. The potential action of mouth wash in a liquid formulation.

Key words: Gall oak, Ulcer, Mouth wash, Herbal, Anti-bacterial

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Introduction

Objective - First collection of raw materials of herbal mouth wash and preparation of extract for mouthwash then prepare and development of mouth wash

Herbal drugs: Herbal treatments or supplements are made of natural materials that are extracted from the leaves, bark, roots, seeds, or flowers of plants. They may provide therapeutic benefits if used in addition to prescription drugs. The active ingredients in herbal remedies derive from real plants. They have been used for thousands of years even before traditional medicine was created. Some people use herbal remedies in addition to prescription and over-the-counter treatments, but many people prefer them over some doctor-prescribed ones.
Ancient Chinese people utilized plants for therapeutic purposes long before written history. Additionally, Egyptian papyrus texts from 3,000 BC mention the usage of plants for therapeutic purposes [1].

How to take herbal supplements: The form of an herbal supplement determines how it is taken by an individual. In addition to fresh or dried plants, they can be found as tablets, capsules, teas, powders, and extracts.
Herbal supplements can be used in various ways, such as ingesting them as pills, powders, or tinctures; applying them topically as lotions and gels; mixing them with bath water; or brewing them as teas [2].

Table 1: Herbal supplements

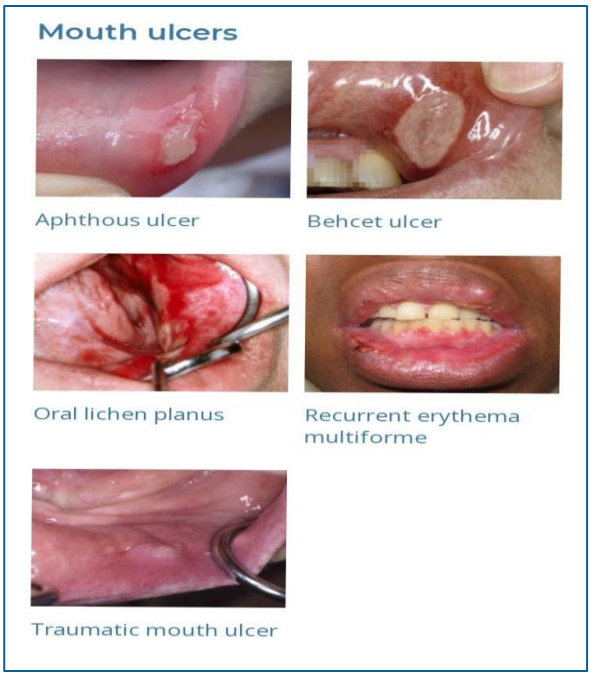
Herbal supplements	Cure
Aloe Vera	Burns and other skin injuries psoriasis digestive issues
Garlic	Elevated cholesterol levels
Ginger	Mild nausea due to pregnancy and chemotherapy, unsettled stomach cramping with menstruation
Turmeric	Digestive problems bone wellness
Soy	Obstructions or diarrhoea may have an impact on thyroid function in iron deficient individuals

Ulcer: Ulcer is a molecular necrosis-induced disruption in the epithelium's continuity. Patients most frequently seek the advice of a physician or dental surgeon for mouth ulcers. Usually, discomfort, burning sensations, and redness are the main symptoms. Any section of the oral cavity can have them, but if they appear in a moveable location, it might be unpleasant [3].

Pathophysiology: We still don't fully understand the cause of recurrent apotheosis stomatitis (RAS). Tumor necrosis factor-alpha (TNF-a) and T-cell production are likely involved in an inflammatory process that is primarily cell-mediated. Under both a light and an electron microscope, oral aphthous ulcers were found to have a deep and early lympho-monocyte infiltration of the epithelium. Looking at the oral ulcer epithelium under light microscopy, a Lehner study found considerable intercellular edema and degenerative changes. The basement membrane next to the ulcer was the only part affected by epithelial hyperplasia; the other portion appeared to be untouched. The epidermis' basal cell and prickle cell layers are typically penetrated by mononuclear cells. Although neutrophil polymorphs have also been found superficially and close to the ulcer, these cells are mainly lymphocytes and monocytes [4].

Only the basement membrane next to the lesion showed signs of epithelial hyperplasia throughout the membrane. Normally, mononuclear cells pierce the basal cell and prickle-cell layers of the epidermis. Although neutrophil polymorphs have also been discovered superficially and in close proximity to the ulcer, the bulk of these cells are lymphocytes and monocytes.

Figure 1: Picture of Mouth ulcer



Sign and symptoms of mouth ulcer: Poor dental hygiene, food, and drink can exacerbate the pain associated with ulcers. Begin as excruciatingly painful oral ulcers Recur rapidly, giving the impression that infections are ongoing Grow in size, finally merging to form a massive, jagged ulcer Take ten or more days to heal Appear anyplace in the mouth. They are more common in elderly persons and tend to be detected in more females than males [5].

Cause of mouth ulcer: Even though the precise cause of mouth ulcers is still unknown and varies from person to person, there are a number of common causes as well as a lot of variables that can exacerbate them: fruits, such as spicy and extremely acidic citrus meals. Internal tongue or cheek biting [6].

Principles of diagnosis: In order to arrive at a conclusive diagnosis and a differential, it is crucial to employ a methodical approach to extracting the ulceration pattern.
Included in this ought to include the following: Location, size, and form of the ulcer. Count of ulcers in a single crop [7].

Quality control parameter for raw materials: Organoleptic parameter, pH, Viscosity, Density, Antibacterial study, Antimicrobial study, Stability study, FTIR

Table 2: Herbs used in mouth ulcer

Sr. No.	Herb	Medicinal property	Portion	Form	Reference
1	Turmeric	Analgesic, antibacterial	Dried rhizome	Mouthwash, pest	8
2	Aloe Vera	Antibacterial	Juice extract	Gel	8
3	Tulsi	Antibacterial	Leaves	honey and Tulsi ice chips	8, 12
4	Oak gall	Anti-oxidant, anti-bacterial, anti-tumour, anti-microbial	Fruits	Mouth wash, Gel	8,9,10,11
5	Curcumin	Anti-oxidant	Fruit	powder	13
6	Clove	Anti-septic, anti-microbial	stem	Oil	14
7	Cinnamon	Anti-bacterial	stem	Oil	15
8	Menthol	Anti-bacterial	Crystal	Powder	16
9	Thymol	antibacterial, antioxidant, anti-inflammatory	Leaf	Leaf powder	17

Material and methods:

Collection of raw materials: Gathering and confirming the components for the herbal mouthwash and creating the mouthwash. After obtaining the oak galls from the nearby market, they were cleaned at room temperature using distilled water.

Preparation and development of mouth wash

Preparation of extract for mouthwash - Drug sample were taken from the natural sources. Fruits were taken and crushed till the fruits were converted in the form of powder. They were washed and dried properly.

Extraction method of Oak Gall's: They became too dry in the air and were turned into powder. Using the Soxhlet equipment, five grams of powder were extracted for six hours using 90 mL of water/methanol (1:1) as the extract solvent. Later that day, the solvent was evaporated at 60°C and 10 mm Hg of reduced pressure with a rotavapor device. 0.5 mg of the extract was taken out of the Soxhlet device [14].

Extraction method for Tulsi: The leaves were pulverized and soaked in sterilized distilled water to generate the aqueous extracts. The mixture was then left to incubate for 72 hours at 37±2°C and filtered through Whatman paper [15].

Preparation of mouth wash: Mouth wash was prepared by mixing method. Take tannic acid, which was extracted from the oak galls by Soxhlet apparatus. Other ingredients were weighed and mixed with water properly.
Solution obtained by mixing tannic acid and other ingredients with water was filtered with muslin cloth. The solution obtained after the filtration was collected in transparent container and was stored in proper condition.

Ingredients

1. Gall's extract
2. Tulsi extract
3. Menthol
4. Sodium bicarbonate
5. Borax
6. Water

Determination of physical parameter
Determination of pH: A digital pH meter was used to measure the mouthwash's pH after it was made using herbs. A standard buffer was used to calibrate the pH meter. A one-millilitre amount of mouthwash was weighed and diluted in fifty millilitres of distilled water, and its pH was determined using the pH meter [16].

Determination of viscosity: The viscosity of mouth wash was determined by Oswald viscometer [17].
Equation of viscosity – $\frac{n1}{n2} = \frac{s1t1}{s2t2}$
n1=sample viscosity
n2=water viscosity
s1=density of sample
s2=density of water
t1=sample take time for run in viscometer mark a to b
t2=water take time for run in viscometer make a to b

Density: Density of mouth wash measure by special gravity bottle method [18]
Equation of density - $p = \frac{mass}{volume}$

Table 3: Formulation of Mouthwash for 100 ml

Serial number	Ingredients	F1	F2	F3	F4	F5
1	Gall's Extract	1%	2%	3%	4%	5%
2	Tulsi's Extract	2%	3%	4%	3%	4%
3	Menthol	1%	2%	1%	2%	1%
4	Sodium bicarbonate	1%	2%	1%	2%	1%
5	Borax	1%	2%	2%	3%	1%
6	Water	QS	QS	QS	QS	QS

Antibacterial: Streptococcus aureus isolates were tested in vitro for antibacterial activity. The agar-well diffusion technique was used to identify the zone of inhibition. Sauer strains were inoculated into pre-made agar plates. Plates were dried, and four wells were created using a 6 mm agar well cutter. Each well was loaded with 20µl, 40µl, 60µl, and 80µl of produced mouthwash. The agar plates were left undisturbed to allow for the passive diffusion of herbal mouthwash into the agar culture media. The plates were incubated at 37±2°C for 24 hours. The zone of inhibition was determined in millimetres [19].

Antimicrobial effect: We tested the antibacterial activity of Streptococcus aureus isolates in vitro. The zone of inhibition was found using the agar-well diffusion technique. Prefabricated agar plates were infected with the Sauers strains. After the plates were dried, four wells were created using a 6 mm agar well cutter. A measured amount of prepared mouthwash (20µl, 40µl, 60µl, and 80µl) was added to each well. To enable the passive diffusion of herbal mouthwash into the agar culture media, the agar plates were left undisturbed. Subsequently, the plates were incubated for a full day at 37±2°C. The inhibitory zone was computed in millimetres [19].

Stability study: Without adequate stability studies of the prepared product, the formulation and preparation of any product are inadequate. Accelerated stability studies, which involve subjecting the product to elevated temperatures in accordance with ICH rules, are a general way of forecasting the stability of any product. For the duration of one month, a brief, expedited stability investigation was conducted on the developed formulation. The temperature ranges at which the samples were kept were 3–50°C, 25–60% RH, and 40–22% RH. Ultimately, the samples were maintained under expedited research conditions, taken out every week, and examined [20].

Result and Discussion

Quality control parameter of herbal mouthwash and developed mouthwash

Organoleptic parameters - Extracts used in the herbal mouthwash were vacuum dried powder.

Organoleptic character:

Table 4: Organoleptic characters of extract and Mouth wash

Extract, Mouth wash	Colour	Odour	Taste
Gall's extract	Dark brown	Characteristic	Astringent
Tulsi's extract	Brown	Characteristic	Astringent
Mouth wash	Brown	Mint	Mint

Physical Parameter

pH - pH value of all ingredients of all herbal mouthwash and developed mouthwash are given in Table 5.

The pH of prepared mouthwash was 8. If using mouthwash have pH value between 8.01-9.82 pH, this pH value mouthwash is good for buccal cavities. This can be protecting the enamel layer of teeth.

Table 5: pH value of Herbal mouthwash ingredients

Ingredient	pH
Gall's Extract	6
Tulsi's Extract	7
Sodium bicarbonate	8.5
Borax	9.13
Menthol	7
Water	7

Table 6: pH value of Herbal mouth wash

Formulation	pH
F1	7.5
F2	7.9
F3	7.7
F4	8
F5	8.5

Viscosity - Viscosity of mouth wash was found by Oswald viscometer and viscosity of mouthwash found to be 0.9.

Calculation

Equation $-\frac{\delta 1 t 1}{\delta 2 t 2}$

$$n1 = \frac{n2\delta 1 t1}{\delta 2 t2}$$

$$n1 = \frac{1 \times 0.96 \times 19}{1 \times 20}$$

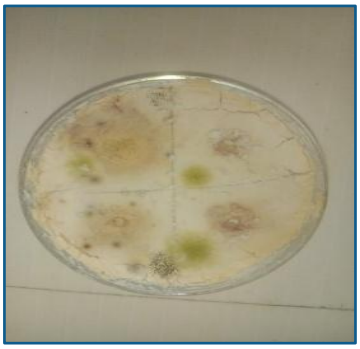
$$n1 = o.9$$

This mouthwash preparation's viscosity value was within the range according to the standard mouthwash preparations ranging from 0.8-1.0

Density - Density of mouthwash was measure by special gravity bottle and it was found to be 0.96.

Antibacterial effect - Using the agar diffusion method, the antibacterial properties of mouthwash were assessed based on mouthwash concentration. These findings indicated the herbal mouthwash's effective antibacterial properties and its capacity to prevent the growth of bacteria in the oral cavity. Given the well-established link between oral microbial burden and oral disease, using this herbal mouthwash can encourage maintaining excellent dental health. Additionally, this prepared herbal mouthwash was created to improve buccal cavity health issues and cure mouth ulcers

Figure 2: Agar Diffusion Method for Anti bacteria



Antimicrobial study - Antimicrobial study of mouthwash was evaluated by streak plate method. By the streak plate method, we observed that herbal mouthwash showed good antimicrobial activity. Herbal mouthwash can be killing the microbes and it is preventing the mouth cavity from the microbes.

Stability study - Mouth wash was prepared by gall extract is stable for 3-6 month. It is giving good stability.

Table 7: Stability study of mouthwash

Temperature	Humidity	Colour	Homogeneity	Phase separation
25ºC	60 %	Brown	Yes	No
40ºC	75 %	Brown	Yes	No

FTIR - In FTIR we found that tannic acid was present and also compatible with other excipients

Summary and conclusion

A study was conducted to find a way to blend the beneficial components in galls extract into a polyherbal mouthwash that works well and does not include alcohol. Galls extract was utilized in the current investigation due to its documented antibacterial and antimicrobial properties. The zone of inhibition results also indicated that the patients favoured the flavour, simplicity of use, and duration of the herbal mouthwash in their mouths after cleaning, as well as its ability to eliminate the growth of germs in the oral cavity.

For the treatment of oral ulcers, they can therefore be employed in addition to mechanical therapy. The results of this study will be crucial in developing a low-cost, highly effective herbal oral health intervention for lower socioeconomic groups. This product is developed with only natural components. This mouthwash is made with a basic pH that promotes tooth health and improves the state of the buccal cavity. Additionally, this mouthwash freshens the breath and stops unsuitable aromas from coming through. This mouthwash generally stays stable for a period of three months or longer, and it has a completely stable formulation.

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