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FORMULATION AND EVALUATION OF HERBAL MOUTHWASH CONTAINING NATURAL EXTRACTS OF TULSI, NEEM, TURMERIC, CLOVE, LIQUORICE, AND PEPPERMINT

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ABSTRACT:

Many different types of bacteria may be found in the mouth. Although some types of oral bacteria are innocuous, others may lead to plaque buildup, poor breath, and even health problems in the mouth. As a result, it's crucial to your oral and OVERALL, health to practice regular, thorough dental hygiene. Herbal remedies are seen as more beneficial than pharmaceutical ones. The antibacterial and antifungal action of medicinal plants against human pathogen has been recognized for decades as an integral part of the healing process. Plaque on teeth can be reduced, bacterial development can be slowed, bad breath may be eliminated, and teeth can be cleaned with herbal remedies. To complement regular dental care routines like brushing and flossing, herbal mouthwashes may be utilized. They may be utilized in a supportive periodontal treatment because of their potent anti-inflammatory and anti-plaque capabilities. Neem, turmeric, clove, and peppermint are just a few examples of the many herbal products and extracts that have shown to be superior than their chemical counterparts. Medicinal herbs have been used for decades as a therapy option due to their antibacterial, antiviral, and antifungal effects against human infections. There may be considerable benefits to using a natural mouthwash instead of a chemical one. If such a formulation could be developed, it would allow individuals to safely produce and utilize natural products in the comfort of their own homes. The population's oral health may improve as a result. Herbal mouthwashes are popular due to their ability to eliminate oral pathogens, provide instantaneous pain relief, and have few to no adverse effects. Dental caries and periodontal disease are among the most widespread infectious illnesses, affecting a large number of the population at some point in their lives. This analysis is an effort to describe the kinds of natural compounds that may serve as useful mouthwashes. The purpose of research is to create a multi-herbs mouthwash that is effective against germs.

KEY WORDS – Herbal mouthwash, Natural extracts, Neem leaves extract, Turmeric rhizome extract, Clove buds extract, Liquorice stolon extract, Peppermint leaves extract.

INTRODUCTON:

From ancient times to now, people have understood the value of keeping their mouths and teeth clean.

• Even while modern dental technology has allowed us to effectively treat and prevent many kinds of oral disease, our forefathers nevertheless relied heavily on mouthwashes to maintain healthy mouths.

Brief history of oral hygiene:

• In Ayurveda and Chinese medicine, which both dates back to roughly 2700 BC, mouth washing is first mentioned. The use of mouthwash as part of an efficient home care system for oral hygiene might be thought of as a kind of chemotherapy.

• Hippocrates advocated washing the mouth with a solution of salt, alum, and vinegar after mechanically cleaning the teeth, a practice that became widespread among the higher classes in Greece and Rome.

•Some of the earliest examples of artwork to highlight the value of personal grooming and presentation may be traced back to Ancient Egypt. Purity was supposed to be absent from a dirty body. The following is the mouthwash combination that Greek physician and surgeon Pedanius Dioscorides (40-90) recommended for the cure of foul breath.

• Pedanius Dioscorides, a Greek physician, devised a mouthwash combination of decoction derived from the olive leaves, milk, wine, and oil, peelings of pomegranate, nutgalls, and vinegar.

•The Romans used human urine as a hidden component in their mouthwash. They believed that the urine of Portuguese individuals would give them an advantage, so they began importing it. Because of the ammonia it contained, urine was used as a primary active element in the prevention and treatment of oral infections, particularly those

that produced Sulphur,

• In the 18th century. Native North American and Mesomerican societies employed mouthwashes, frequently crafted from herbs like Coptis trifolia, long before the arrival of Europeans to the Americas.

Depending on the method used, a mouthwash may be passively kept in the mouth or actively swilled about the mouth by contracting the perioral muscles and/or moving the head. While most mouthwashes are formulated to kill or at least slow the growth of bacteria, viruses, and fungi, some may be prescribed for their analgesic, anti-inflammatory, or antifungal effects. Some rinses may even replace saliva, neutralizing acid and keeping the mouth moist in medical conditions like dry mouth. Cosmetic mouth rinses mask the unpleasant smell and taste of foul breath momentarily. Herbal There is a strong demand for mouthwashes due to their ability to kill off oral germs, alleviate pain quickly, and have fewer negative side effects. Hydrogen peroxide and chlorhexidine are used in chemical mouthwashes and work quickly to whiten teeth, kill bacteria, and alleviate tooth discomfort, but they also have the potential to discolor teeth and cause other unwanted side effects. Dental caries and periodontal diseases are among the most prevalent infectious illnesses, affecting a large number of the population at some point in their lives. Mouth washes are a concentrated aqueous antibacterial solution used to combat oral germs in order to prevent illness, cleanse the mouth, eliminate bad breath, provide a pleasant burst of antiseptic flavor, and so on. The mouthwash plays a crucial function in maintaining good oral hygiene by reducing the discomfort associated with gingivitis and other gum conditions. Additionally, it was utilized effectively to eliminate harmful microorganisms. Most people who go to the dentist utilize mouth washes to alleviate their foul mouth (xerostomia), sore throat, and hypersensitive teeth. Before performing oral surgery on a patient, a dentist would always use mouthwash as an antibacterial agent to help sterilize the upper membrane of the swollen gums and teeth.

Definition of mouthwash:

Mouthwash a medicinal fluid kept in the mouth and swirled by the action of the oral muscles to remove microbes present in the mouth. This aqueous solution is often used for plaque treatment. Herbal mouthwashes are those that are made from actual herbs and botanicals. Herbal mouthwashes include natural extract derived from a wide variety of plant sources, including leaves, fruits, seeds, and tree oils.

What makes herbal mouthwash the better option?

In addition to being effective against oral diseases, discomfort may be alleviated immediately by using a herbal mouthwash, and there are less negative effects. Hydrogen peroxide and chlorhexidine are used in chemical mouthwashes and work quickly to whiten teeth, kill bacteria, and alleviate tooth discomfort, but they also have the potential to discolour teeth and cause other unwanted side effects.

Herbal mouthwash has gained popularity over chemical mouthwashes because it is less irritating, does not discolour teeth, and does not contain alcohol. Other benefits include being less hazardous and having fewer or no adverse effects. There is no alcohol or sugar in any herbal mouthwash. Even those with very sensitive mouths may use herbal mouthwashes without discomfort. Herbal mouthwashes have a natural antibacterial effect and are free of harmful chemicals. Since it does not create dry mouth, herbal mouthwash is in great demand.

Benefits of herbal mouthwashes:

• Better oral hygiene.

• Following chemicals which are known to be harmful are not found in herbal mouth washes.

1. Sugar
2. Synthetic dyes and pigments
3. Fluoride stannous
4. Synthetic sweetener
5. SLS (Sodium Lauryl Sulphate).
6. Toxic chemical used as a preservative
7. Dyes

Herbal mouthwashes are used for a wide variety of reasons, from freshening the breath to combating potentially fatal infections like oral mucosa inflammation in patients under treatment of bone marrow transplantation.

Effective treatment with mouthwash requires both an accurate diagnosis of the problem along with familiarity with the product. Herbal mouthwash may help you maintain clean teeth and gums. Plaque on teeth is reduced as a result.

Usefulness of herbal mouthwashes:

1.It may be helpful in treating gum disease.
2. Effective against oral bacteria.
3. It covers up foul breath while also making it feel fresher.
4. Prevention of gum disease by the use of mouthwash is highly recommended.
5. It may be used to disinfect septic plugs.
6. It reduces swelling and soreness.
7. Mucositis and bad breath treatments.
8. Periodontal disease treatment.

Collection of plant materials:

The Neem leaves were collected from Herbal Garden of Fabtech College of Pharmacy, Sangola, Dist. Solapur Maharashtra and Clove, Turmeric and Liquorice were purchased from local ayurvedic shop and all were authenticated from department of Botany, Science College Sangola.

Tulsi:

Botanical Name: Occimum Sanctum
Part Used: Entire herb.
Family: Labiatae.
Efficacy against both bacteria and yeast. Tulsi's antimicrobial and antifungal activities have been shown against a broad variety of microbes. This means that it has the potential to treat a wide range of oral infections without the need of synthetic chemicals.
The ability to reduce inflammation. Tulsi's anti-inflammatory characteristics make it useful for alleviating oral inflammation. Because of this, it has therapeutic promise for disorders including gingivitis and periodontitis.
Immunosuppressive effects. Tulsi may aid in immune system regulation due to its immunomodulatory qualities. Autoimmune illnesses like rheumatoid arthritis and lupus may benefit from this.
antibacterial qualities. Tulsi's antibacterial qualities make it effective against oral pathogens including germs and fungus. Plaque, gingivitis, and periodontitis are all diseases that may be avoided if you do this.
Capacity to heal and restore. Tulsi's therapeutic qualities may speed up the recovery of injured oral tissues. This may aid in easing discomfort, decreasing inflammation, and speeding up the healing process.
Possessing antioxidants. Tulsi's high antioxidant content means it may shield the mouth from free radical damage. Unstable free radicals may harm cells and have a role in the onset of chronic illnesses including cancer and cardiovascular disease.

Fig.1: Tulsi leaves collected for extraction

Neem:

Botanical Name: Azadrachta indiica
Part Used: Entire plant.
Family: Meliaceae.
Efficacy against bacteria, both fungi and yeast. Studies have revealed that neem is effective against many different kinds of bacteria, fungus, and even protozoa. This means that it has the potential to treat a wide range of oral infections without the need of synthetic chemicals.
The ability to reduce inflammation. The anti-inflammatory qualities of neem make it useful for treating oral inflammation. Because of this, it has therapeutic promise for disorders including gingivitis and periodontitis.

Antibacterial qualities:

Because of its antibacterial qualities, neem may be used to combat oral pathogens including bacteria and fungus. Plaque, gingivitis, and periodontitis are all diseases that may be avoided if you do this.

Capacity to heal and restore:

Neem's healing qualities may speed the recovery of injured oral tissues. This may aid in easing discomfort, decreasing inflammation, and speeding up the healing process. Potential additional advantages to health. Neem may potentially be beneficial to your health in other ways, as well.
Neem has been studied for its potential to assist diabetics control their blood sugar levels. It's

possible that the neem plant might help fight cancer. Neem has shown promise as a treatment for diarrhea. Neem has shown effectiveness in inhibiting malaria.

Fig.2: Neem leaves collected for extraction

Turmeric:

Botanical Name: Curcuma longa
Part Used: dried as well as fresh rhizomes.
Family: Zingiberene.
It has ability to reduce inflammation. It has been demonstrated that turmeric, a powerful anti-inflammatory drug, may reduce inflammation in a number of different tissues and organs. As a result, it has therapeutic promise in the treatment of continuing pain, inflammatory bowel disease & arthritis.
Possessing antioxidants. Antioxidants, which may stave against free radical damage to cells, are abundant in turmeric. Unstable free radicals may harm cells and have a role in the onset of chronic illnesses including cancer and cardiovascular disease.
Effective against cancer. The anti-cancer effects of turmeric are being studied as a possible therapy for many different types of cancer.
Protective properties for the brain and spinal cord. Turmeric has been shown to have neuroprotective properties, which suggest it may help protect the brain against diseases like Alzheimer's and Parkinson's. Advantages for the heart and blood vessels. There is some evidence that turmeric may help protect against heart disease, cut cholesterol, and reduce blood pressure.
Aids digestion. The anti-nausea, anti-vomiting, and anti-indigestion properties of turmeric have been well-documented.
Evidence suggests that turmeric may also improve dental health. For instance, a mouthwash containing turmeric was shown to be efficient in decreasing plaque and gingivitis, according to research published in the journal Phytomedicine. Journal of Natural Medicines released another research finding that turmeric may aid in warding against tooth disease.
Potential additional advantages to health. Evidence suggests that turmeric may also enhance health in several additional ways:
People who suffer from arthritis may get relief from arthritic pain and inflammation with the aid of turmeric.
Mood and depression may both benefit from turmeric's antidepressant properties.
It's possible that turmeric may prevent Alzheimer's disease-related brain damage.

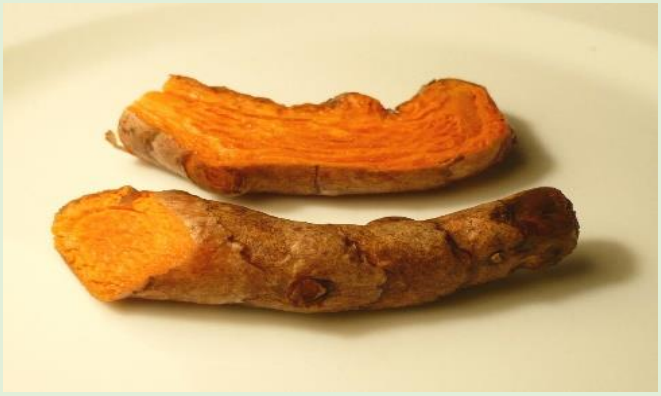

Fig.3: Turmeric collected for extraction

Clove:

Botanical Name: Eugenia caryophyllus
Part Used: dried immature flower buds.
Family: Myrtaceae.
It has effectiveness against bacteria's, yeast and molds. Clove oil's antimicrobial and antifungal activities have been shown against a broad variety of microorganisms. This means that it has the potential to treat a wide range of oral infections without the need of synthetic chemicals.
The ability to reduce inflammation. Because of its anti-inflammatory characteristics, clove oil is useful for alleviating oral discomfort. Because of this, it has therapeutic promise for disorders including gingivitis and periodontitis.
Capable of reducing pain. Oral discomfort may be alleviated with the use of clove oil's analgesic qualities. This suggests that it may be useful in relieving tooth pain and other forms of oral discomfort.

Possessing antioxidants. Because of the high antioxidant content of clove oil, it may be useful in preventing free radical damage to the mouth. Unstable free radicals may harm cells and have a role in the onset of chronic illnesses including cancer and cardiovascular disease.
Potential additional advantages to health. There may be further health advantages from using clove oil, as well.
a) Clove oil may assist those with diabetes control their blood sugar levels.
b) Clove oil may have anti-cancer effects, according to some research.
c) Clove oil has shown promise as a treatment for diarrhea.
d) Clove oil may be useful in warding against malaria.

Fig.4: Clove collected for extraction

Liquorice:

Botanical Name: Glycyrrhiza glabra
Part Used: dried stolons.
Family: Leguminoseae.
Antibacterial and antifungal properties. Liquorice has an antibacterial and antifungal actions against a variety of microorganisms, like bacterium, fungi, and protozoa. This makes it a potential natural remedy for a variety of infections, such as toothache, gum disease, and mouth ulcers.
Capable of reducing inflammation. Liquorice's anti-inflammatory effects make it useful for alleviating oral inflammation. Therefore, it may be used to treat gingivitis and periodontitis.
Possessing antioxidants. Liquorice's high antioxidant content means it helps save oral tissue from free radical damage. Unstable free radicals have been linked to cancer, cardiovascular disease, and other long-term illnesses.

Fig.5: Liquorice collected for extraction

Peppermint:

It has efficacy against both bacteria and fungus. Several types of microbes, including bacteria, fungus, and protozoa, have been demonstrated to be ineffective against peppermint's antibacterial and antifungal activities. This means that it has the potential to treat a wide range of oral infections without the need of synthetic chemicals.
The ability to reduce inflammation. Peppermint's anti-inflammatory qualities make it useful for treating oral inflammation. Because of this, it has therapeutic promise for disorders including gingivitis and periodontitis.
antibacterial qualities. Because of its antibacterial qualities, peppermint may be used to combat oral pathogens. Plaque, gingivitis, and periodontitis are all diseases that may be avoided if you do this.
Capacity to heal and restore. Healing of injured oral tissues may be aided by peppermint's regenerative capabilities. This may aid in easing discomfort, decreasing inflammation, and speeding up the healing process.

Fig.6: Peppermint collected for extraction

METHOD OF PREPARATION:

Tulsi Extract:

The Tulsi leaves were distilled water cleaned and dried in the shade in an environment that was sterile.
A fine powder was made by grinding dried leaves in a grinder. The leaf powder (25g) was extracted using the Soxhlet method and then mixed with 250 ml of a 9:1 methanol solution.
This concoction was kept in a Soxhlet device at 60 degrees Celsius for 10-12 hours.

Neem Extract:

Powdered neem leaves have been boiled for 6 hours with distilled water in a 1:10 ratio in a distillation assembly. In order to get the final distillate, the collected condensed vapours were redistilled in the distillation assembly. To get aqueous leaf extract, this distillate was evaporated over a hot water bath. To produce a 10% concentration, 10 grammes of extract was added to 100 millilitres of distilled water. The bitterness was covered up by adding only 0.001% syrup. Amber containers were used to keep the finished mouthwash.

Turmeric Extract:

A fine powder was made by grinding dried rhizomes in a grinder. The powder (25g) was extracted using the Soxhlet method and then mixed with 250 ml of a 9:1 ethanol solution.

Clove Extract:

To a 250 ml conical flask holding 100 ml of double-distilled water, 10 grammes of clove powder were weighed and added. After sealing the flask with aluminium foil, we left it in a dark spot for 24 hours without opening it. The resulting filtrate was then filtered twice further with Whatmann filter paper grade no. 1. The extract was placed in an amber glass jar and kept at 4 degrees centigrade for later use.

Liquorice Extract:

The plant's roots were exposed to the light for two days before being ground into a powder. Liquorice root aqueous solution was made by shaking together 30 grammes of dry powder with 150 millilitres of distilled water in a flask. first that was complete, the process was carried out twice: first via a muslin cloth to remove large particles, and then again using Whatman no. 1 filter paper. The finished product was stored at 4 degrees Celsius in an airtight, amber-coloured container until needed.

Peppermint Extract:

To prevent chemical breakdown from exposure to sunshine, drying took place in the shade for over a month. The dry ingredients were ground into a coarse powder using a grinder. A microwave extraction was used to get the desired results. Fat was removed from the raw powder. microwaving while adding ethyl acetate for extraction. The surplus solvent in the system was removed via evaporation.
•Using a mortar and pestle, thoroughly combine each component by weight with a very tiny amount of water, then add the rest of the ingredients, one by one, while continuing to mix well.
•Care will be taken to prevent lumps from forming while adding clove oil and mint oil.
•Then, the PEG 40 will be added slowly while being well combined.
•Because the extracts had such strong antibacterial effect, no additional preservative was needed, and the finished product was packaged in an appealing, airtight container.

The prepared formulations:

Fig 9: Prepared and labelled formulations

Formulation of herbal mouth wash:

Constituent	Use	Preparations		
		F1(mg)	F2 (mg)	F3 (mg)
Neem Extract	Active Constituent	300	600	1200
Tulsi Extract	Active Constituent	300	600	1200
Clove Extract	Active Constituent	0.2ml	0.25 ml	0.30 ml
Mint Extract	Flavouring agent	0.2 ml	0.2 ml	0.2 ml
Liquorice Extract	Taste enhancer	0.2 ml	0.2 ml	0.2 ml
PEG 40	Surface Active Agent	6 g	6 g	6 g
Purified water	Up to 100 ml	Up to 150 ml	Up to 150 ml	Up to 150 ml

Table. 1: Formulation Table

EVALUATION PARAMETERS:

Colour: Visual inspection was used to decide.
Smell: This was a human-determined factor.
Appearance: It was decided by how it looked
Homogeneity: Visual Inspection Determination
Smell test: The validity of this method relied on the judgement of each individual user. We polled five individuals to gauge their scent preferences. The following factors were used to assess the quality of the aromas.
A) The aroma was just as pleasant as my regular mouthwash.
B) The smell wasn't great, but it was on level with the standard hand soap.

CHEMICAL PARAMETERS:

Determination of pH value: The pH value tested using digital pH meter equipment and the pH of herbal wash was found to be 6.1

Fig 10: pH test for Herbal Hand Wash

Viscosity: Herbal hand wash's viscosity was measured using a computerised Brookfield viscometer.
Foam Height: One millilitre of the sample herbal hand soap was diluted with fifty millilitres of distilled water and then transferred to a measuring cylinder with a capacity of one hundred millilitres of water in a 500-millilitre stopper. The height of the foam was measured after 25 strokes were administered and the aqueous volume reached 100 ml. It was found to be 4.4 cm.
Foam Retention: The herbal hand wash was measured out (50 ml) and shaken (ten times) in a graduated cylinder (250 ml). Foam volume was measured at one-minute intervals. At least 5 minutes of consistent retention is required.
Washability test

Fig 11: Hand Wash Test

Irritancy Test: Visual inspection of the formulation after its application to the skin. The skin did not get irritated or inflamed.

RESULTS:

Evaluations	Results
PH	6.1
Colour	Greenish
Odour	Strong Aromatic and Pleasant.
Consistency	Smooth
Homogeneity	Good
Appearance	Good
Stability	Good
Washability	Easy to wash
Foam Retention	Stable for 1 min.
Foam height	4.4 cm
Fragrance	Pleasant

Table.2: Physical and chemical parameters

CONCLUSION:

This article makes an effort to include some of the more widely accessible herbs and plants that may be used as excellent mouthwashes by anybody.

Some frequent dental issues may be resolved if more individuals adopted and advocated for low- or no-risk strategies for preserving their oral health.

The correct usage of herbs is essential to their beneficial effects. Herbal dental treatments should only be used if they have been shown to be both effective and safe.

They will strengthen defences and promote faster recovery from oral infections.

Additionally, it was shown that the optimal mouthwash formulation was more stable when stored at 25 °C.

This study's formulation of a polyherbal mouthwash shows promise for optimising and commercialization for the purpose of preserving oral health due to its stability and antibacterial capabilities. Herbs may be quite beneficial, but only if utilised correctly.

The active components in herbs might have unintended reactions when used with conventional medicine.

Infectious agents in the mouth may be eliminated thanks to the antibacterial properties. In light of these findings, the time-honoured practise of using herbal mouthwash has expanded in scope.

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