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Review on Herbal Mouthwash for Management and Prevention of Oral Diseases

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Abstract:- General health and dental health are equally important. Periodontal disease, gingivitis, plaque, and sore throats may affect a higher proportion of the population these days. To support maintaining the best possible dental health, several formulae are available. To support maintaining the best possible dental health, several formulae are available. Using mouthwash is recommended to lessen plaque, discomfort, bacteria, and bad breath. Herbal mouthwash is preferred over chemical mouthwash since it has fewer side effects or almost no side effects, doesn't include alcohol, and is not irritating. Medicinal plants can be used for prevention, treatment and management of disease as they have antibacterial qualities against pathogens that afflict humans. Compared to synthetic mouthwash, herbal mouthwash has fewer or no negative effects because it is made from extracts of crude drugs. Several plant extracts are used to make herbal mouthwashes. The following herbs which are helpful in dentistry are mentioned in this article: clove, peppermint, miswak, Tulsi, wintergreen, guava, pomegranate, and cinnamon. Mouthwashes made with natural ingredients that people may easily make and use safely at home could improve dental health in general. Using natural mouthwash to maintain dental health is the main objective of this review.

Keyword:- *Review on Herbs-Based Mouthwash, Natural Ingredient-Based Mouthwash, Antiplaque, Gingivitis.*

I. INTRODUCTION

Dental plaque is the root cause of oral health concerns, and frequent removal of plaque from the oral cavity can stop many of those conditions [1]. Typically, plaque control is taking preventative steps to get rid of plaque formation and prevent its reoccurrence [2]. Plaque can be removed chemically or mechanically, and occasionally these two methods are combined.

Plaque formed on teeth's can be mechanically removed from the surface of teeth with consistent brushing. Periodontitis, gingivitis, and dental cavities can all be avoided by eliminating the bacterial plaque biofilm, even if toothpaste has very little effect in this process [3]. Dentifrices have been enhanced with a range of substances, mostly antibacterial agents, to provide this inhibitory impact on the development of plaque. It's been demonstrated that certain agents, such triclosan and chlorhexidine, work well [4,5]. The most potent biguanide antibacterial with broad-spectrum anti-plaque effects is chlorhexidine [6]. But because of many side effects, including staining of teeth, irritation due to alcohol, it is not advised to use for prolonged period for daily use [7,49]. Due to the growing awareness of indigenous medical traditions, the usage of natural medicine has created interest and led to formation of alternative natural therapies for healthcare all over the world [8,9]. For a while now, oral care products have included herbal ingredients, mostly in South region of Asia, to help people with dental problems such as gingivitis and to maintain better dental hygiene [10].

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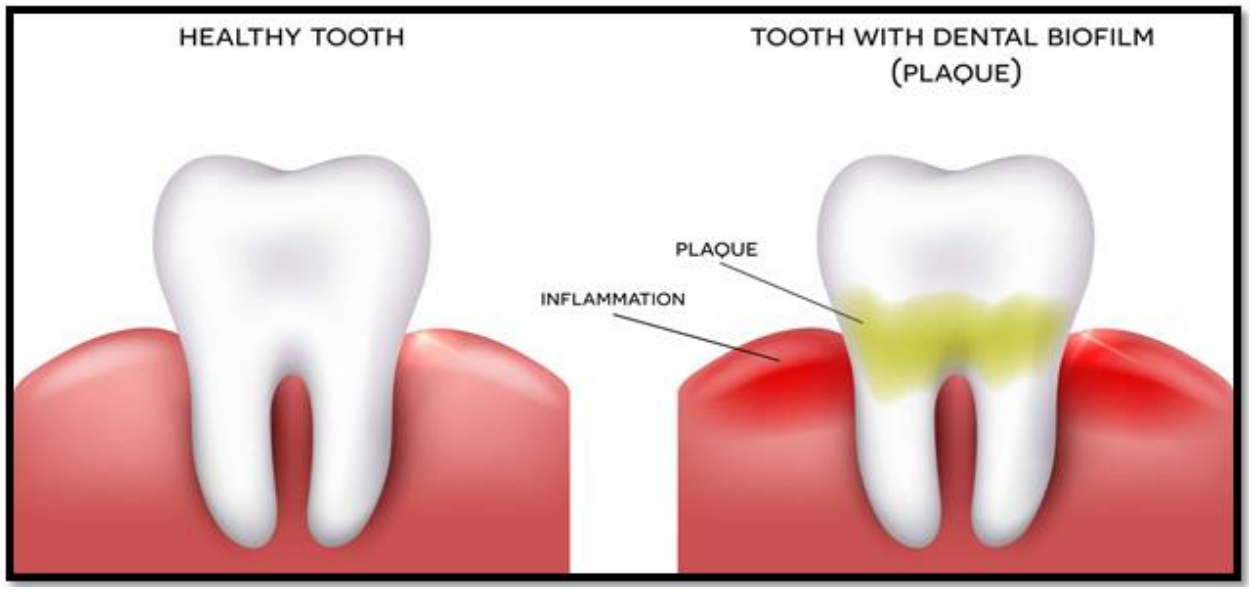

Fig 1 Dental Bioflim

Fig 2 Gum Disease

II. MATERIALS AND METHOD

A search is conducted on google scholar and PubMed. Following are combinations of keywords used: Herbal mouthwash, herbal mouthwash review, disadvantage of chemical-based mouthwash, neem containing herbal mouthwash, evaluation of herbal mouthwash. After each title that the search produced was evaluated, duplicates had been removed from the results that were obtained. We download the copies of the papers and looked through them by heading and summary. There was no handsearching done.

The following were the inclusion criteria: studies including patients who do not have any systemic disease, both female and male patients, intervention: studies that involve use of herbs in mouthwashes, comparison: studies that included chemical based mouthwashes, only RCTs, articles published from 2000 to 2024 in the English language, and articles from google scholar databases. A decrease in gingival irritation and dental plaque are one of the outcome measures. For both the control and intervention arms, the following criteria is used to analyse the results: the average reduction in the dental biofilm index (Plaque Index) using either the Silness plaque index or the modified Quigley-Hein plaque index or Quigley-Hein plaque index; subsequently, the average decrease in inflammation of gums using the Silness gingival index; and finally, the short-term side effects (research lasting for atleast one month).

The following patients were not included in the study: articles published before 2000, articles form languages other than English, articles that were not RCTs, and patients taking any antibiotic therapy either during the procedure or 15 days beforehand.

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Table 1 Previous Literature on Herbal Mouthwash

Name of Author and Year of Publish.	Paper/ Article Title.	Considered Population.	Design of Study and Size of Sample Population.	Conclusion/ Inference.
El Naggar, R. A. R., et al. 2024[22]	Effect of Green Tea extract mouthwash on Streptococcus mutans count in high caries risk dental students	The study was conducted on a sum of 36 dental students of age range 17 to 23 years.	The study involve 36 dental students of age 17 to 23 years that has been split up into two groups: green tea group and chlorhexidine group	chlorhexidine and green tea mouthwash have great antimicrobial efficacy against *Streptococcus mutans*, so green tea extract mouthwash could be regarded as a good substitute mouthwash to overcome drawbacks of chlorhexidine mouthwash.
R. Ambili.,et al. 2023[21]	Efficacy of a herbal mouthwash for management of periodontitis and radiation-induced mucositis e A consolidated report of two randomized controlled clinical trials	The study was conducted in two groups. First group is of patient having periodontitis and second one is patients having oral cancer undergoing radiotherapy.	The study was randomized controlled parallel group trial	Herbal formulation is. Significant and can be considered a potential therapeutic agent in the treatment and prevention of periodontitis as well as for the prevention and treatment of radiation-induced mucositis.
Akshayaa, L., et al. 2024[23]	Formulation of Quercetin Mouthwash and Anti-microbial Potential Against Critical Pathogens: An In-Vitro Evaluation.	All authors have confirmed that this study did not involve human participants or tissue	The Quercetin mouthwash's antimicrobial efficacy was evaluated using the Agar-Well Diffusion Method. Mouthwash dilutions were tested against five different organisms: *C. albicans*, *S. aureus*, *E. faecalis*, *S. mutans*, and *Lactobacillus.*	The present study elaborated on the antimicrobial efficacy of the potential oral pathogens. Quercetin mouthwash formulation has proven to have a potential broad-spectrum bactericidal activity comparable to commercially available herbal mouthwash. We observed that when the concentration of mouthwash increases, a significant zone of inhibition is created against oral pathogens. Therefore, the current research warrants extensive clinical trials and research on long-term effects.
Waqar, S. M.,et al. 2024[24]	Comparative evaluation of propolis mouthwash with 0.2% chlorhexidine mouthwash as an adjunct to mechanical therapy in	Subjects with mild to moderate chronic periodontitis.	144 people with mild to moderate chronic periodontitis were recruited for a double-blind, randomized,	The results of this study show that propolis and chlorhexidine mouthwash both

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	improving the periodontitis among perimenopausal women: a randomized controlled trial.		controlled clinical investigation. Following scaling and root planing, participants were divided into two treatment groups, which received twice-daily oral rinses of 0.2% chlorhexidine and 20% propolis for a period of six weeks. At baseline, six weeks, and twelve weeks, clinical measures such bleeding on probing (BOP), clinical attachment loss (CAL), and pocket probing depth (PPD) were examined.	positively enhance clinical metrics, however that propolis significantly improves BOP more than chlorhexidine does.
Bencze, B., et al. (2023)[25].	Development of a novel, entirely herbal-based mouthwash effective against common oral bacteria and SARS-CoV-2.	NA	The manufacturing procedure was standardized, and the created tincture was evaluated by GC/MS analysis for active compounds, experimentally tested in cell-based cytotoxicity, salivary protein integrity, cell-free antioxidant activity, anti-bacterial and anti-viral assays, and compared with three market-leading mouthwashes.	The developed product might be a useful tool to impede the transmission and spread of SARS-CoV-2 in interpersonal contact and aerosol-generating conditions. Our mouthwash can help reduce the oral bacterial flora and has an antioxidant activity that facilitates wound healing and prevents adverse effects of smoke in the oral cavity.
Uddeshavisharam, M. T., & Shantaram, M. B. D. 2023[26].	Formulation and evaluation of herbal mouthwash	NA	The formulated mouthwash was inoculated in the plate of agar media by streak plate method and a control was prepared. After being put in the incubator, the plates are incubated for 24 hours. After the incubation period plate were taken out and checked for microbial growth by comparing it with the control.	The data presented in this study; it was concluded that the developed herbal mouthwash Possess significant, therapeutically efficacious, suitable vehicle for drug delivery in low cost but with high potential. This study should be completed with more investigations and studies, to explore the product in long term follow-up and laboratory tests to improve all the effects and side effects of the

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				new products, since it will be used as medical product.
Fahim, M. F. M. (2023)[27].	Effect of Prepared herbal mouthwash in maintaining the Oral Health of School Children: A single-blind randomised control trial.	110 school children.	For a duration of thirty days, 110 schoolchildren were randomized to two groups: the test group, which received herbal mouthwash containing Anacyclus pyrenthrum DC, Punica granutum (pericarp), Capparis spinosa (root bark), and Quercus infectoria Oliv (galls), and the control group, which received mouthwash containing 0.2% chlorhexidine. The evaluation was conducted by DMFT. To ascertain the long-term impact of the intervention, salivary pH, the Oral Hygiene Index-Simplified (OHI-S), the Plaque Index (Loe & Silness) (PI), the Plaque Index Simplified (O'Leary et al., 1972) (PI-S), the Gingival Index (Löe-Silness) (GI), and Bleeding on Probing (BOP) were measured at baseline and 30 days. GI and PI were then evaluated on 60th, 90th, and 120th days.	According to this study, mouthwash that has been made is both safe and highly effective at preserving dental health.

III. RESULTS

A primary causative agent for periodontitis and gingivitis is plaque [11]. It's crucial to remove plaque every day to maintain healthy gingiva. Biofilm formed on teeth's can be mechanically removed from the surface of teeth by brushing on a regular basis [12]. But toothpaste isn't really very helpful in getting rid of it [13]. Because it causes gingivitis, periodontitis, and dental cavities, removing microbial dental plaque biofilm is essential [14]. To this end, mouthwashes and dentifrices have been enriched with a range of substances, chiefly antimicrobial agents [15].

The results of all the investigations demonstrated a considerable decline in both the herbal based and non-herbal based groups of mouthwashes; nevertheless, there is little variation in GI and PI scores between the two groups [16]. Southern et al.'s and Nayak et al.'s research demonstrated that the herbs based mouthwash did not result in a statistically significant drop in PI and GI scores as compared to the chemical mouthwashes, demonstrating the chemical mouthwashes superiority. Comparably effective to non-herbal alternatives were discovered to be herbal compounds such as tea tree, miswak, triphala herb, aloe vera plant and polyherbal groupings like Zingiber officinale, Rosmarinus officinalis, and Calendula officinalis [17,18,19,20,28]. Information were not sufficient enough to determine which mouthwash is more effective at preventing gingivitis and plaque, even though both groups showed comparable levels of effectiveness. The values did not differ much.

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IV. DISCUSSION

Herbal mouthwash is a natural oral care product that may help to maintain good oral hygiene. It is composed of a variety of spices and herbs with antiviral, antibacterial, and antiseptic qualities [50]. Herbal mouthwash is a natural alternative to commercial mouthwashes. It can help maintain oral hygiene, freshen breath, and may have other benefits depending on the ingredients used [29]. Certain herbal mouthwashes were tested in vitro and also in vivo as part of the quest for an appropriate alternative to mechanical therapy for long-term use [30]. Aloe vera has shown to be a strong antibacterial and to be useful in the treatment, prevention, and reoccurrence of plaque [31]. Given that it avoids adverse effects including toxicity, tooth discoloration, and sudden hypersensitivity, it can serve as a good herbal replacement. In a Kamath et al. study [32]. Although chlorhexidine is still the gold standard mouthwash, aloe vera exhibits promising results in reducing plaque and gingivitis scores, without any reported adverse effects [51]. According to study done by Bhat et al. it showed that herbal mouthwashes with constituents like S. persica, P. betel, T. Billerica, and E. cardamomum can prevent plaque. Many investigations have shown that S. persica, a toothbrush tree known as "Miswak" locally, is an effective antiplaque agent [33]. When we compared to chlorhexidine mouthwash with herbal mouthwash or herbal mouth rinse, herbal mouthwash was found to be just as effective as chemical mouthwash at reducing plaque and gingivitis.

TRP mouthwash was reported to lower inflammatory indicators in a study performed by Pradeep et al., which improved the gingivitis [34]. The outcomes approximated those of CHX mouthwash, which has been considered the "gold standard" for treating gingivitis and periodontitis. Thus, TRP mouthwash could be considered a useful for gingivitis treatment [35]. It seems that CHX-MW and triphala mouthwash are equally clinically effective in treating plaque-induced gingivitis. TRP is an accessible, affordable solution with few negative effects on gums [36]. Emami SA et. al., observed statistically insignificant reduction in the gingival and plaque ratings in the placebo group from baseline to day 14[37]. It was discovered that using a polyherbal mouthwash might safely and effectively reduce gingivitis and plaque [38,39,40]. The research conducted by Southern et al. revealed that the only rinse that exhibited a statistically significant impact on reducing mean GI and PI scores was chlorhexidine. When compared to herbal remedies and placebos, chlorhexidine was more successful in lowering gingival and plaque scores [41]. According to a Jalaluddin et al. study, PI and GI ratings reduced in both the herbal and chlorhexidine groups; however, a significant difference were only observed in the baseline values [42].

- *Herbal Mouthwash Consist Tea Oil , Basil Oil and Clove Oil:*

Tea oil (0.2–0.3%), clove oil (0.2–0.3%), and basil oil (0.2–0.3%) are ingredients. A broth microdilution experiment was done to determine the mouth rinse's minimum inhibitory concentration, and the results showed a 25% MIC [43].

- *Mouthwash Having Pomegranate Extract:*

To prepare a mouthwash containing pomegranate extract , peels of pomegranate were first sun-dried and then stored in the hot-air oven at 60°C for 7 days. After drying ground, it until it became powder. After that, a Soxhlet extractor was used to create an aqueous extract using the obtained powder. After 5 days, 20 grams of PPE had been produced. The same process is used to create pomegranate aril extract, but it must be kept for 15 days at 60°C in a hot air oven to dry. The sterilized grinder can be used to produce freshly made pomegranate juice. After heating 400 millilitres of pomegranate juice for an hour, a strong concentration is produced.[44]

- *Polyherbal Mouthwash:*

The contents of mixed herbal mouthwash include babool chaal (20% w/v), chameli leaves (10% w/v), darim leaves (10% w/v), mulethi (5% w/v), and neem (2% w/v). Some of the roles that various ingredients perform are as follows:Mulethi is astringent, babool chaal act as astringent agent, Chameli plant leaves act as antimicrobial agent, and neem is both as an astringent and also as antibacterial[45].

- *Neem Containing Mouthwash:*

100 g of neem sticks should be chopped into tiny sections and ground till it became a rough powder. This rough powder should be kept at 27 degree Celsius or room temperature. After the neem powder is soaked for two to four hours, put it into the distillation apparatus with ten parts waters. Heat it until sixty percent of the concentrate is obtained. After completely cooling, mix it in 1000 millilitres of distilled water to create a 2% neem solution, these neem solution is then formulated in the mouthwash [46].

- *Triphala Mouthwash:*

The following is how triphala mouthwash was made in one of the studies that was reported:

Dissolve 60 grams of triphala churna (consist of 3 herbs) in 1000 mL of double-deionized water, boil and strain and then mix 1 mL of pudina extract and 2 millilitre of glycerine. Pudina act as a flavouring ingredient and glycerine act as a sweetener.

Once it has cooled, pour 50 mL into amber-coloured bottles.[47]

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➢ *Arimedadi Oil:*

The constituents of Arimedadi oil are Lodhra plant , Lavang fruit, Gairic, Agaru plant, Padmakashtha plant, Nagarmotha stem, Manjishtha, Jeshthamadh stem, Laksha, Welchi seeds, Wadachi Paane, Dalchini leaves, Yashti, Jaiphala, Kapoor, Kankol, Kshudra Chandan bark, Dhayati phoole, Khairchaal, Lahan welchi, Nageshar, and Til tel[48].

V. CONCLUSION

Herbal mouthwash is a natural alternative to commercial mouthwashes. It can help maintain oral hygiene, freshen breath, and may have other benefits depending on the ingredients used. Depending on the oral diseases, a range of mouthwashes may be recommended. As a result, oral healthcare professionals need to be aware of the many etiologic factors and oral cavity predisposing diseases. It should go without saying that the best mouthwash is chlorhexidine. Herbal mouthwashes, however, can be a useful substitute when socioeconomic factors are considered, side effects and consumer preference for natural products need to be considered. Further investigation can be carried out to ascertain the disadvantages and advantages ,safety and efficacy of these herbal products.

VI. CLINICAL SIGNIFICANCE

Due to rising antibiotic resistance in bacteria or unfavourable long term and short-term side effects from chemical antiplaque treatments such as chlorhexidine mouthwashes, there is significant demand in developing alternative classes of natural antimicrobial agents for infection prevention and better oral health who have lesser side effects than chemical agents. An individual's oral health can be improved and maintained hygienic by using a mouthwash made of locally grown herbs and plants which have antibacterial properties.

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