

Comparison of two mouthwashes in relation to perceived dryness

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ABSTRACT

Background: Mouthwashes are medicated solutions used for gargling and rinsing. It is used as an adjuvant to mechanical procedures like brushing for removing dental plaque. Dental plaque is the main etiologic agent for the development of oral diseases such as dental caries and periodontal diseases. Mouthwashes have been used for their antimicrobial, anti-inflammatory, antiseptic, and analgesic effect. It is used for treating halitosis, gingivitis, gingival bleeding, removal of oral biofilm, demineralize teeth, and for providing freshness of breath. Along with the beneficial effects of mouth wash, its adverse effect must also be taken into consideration. With increased sales of over the counter sales of mouthwashes over the past decade, its adverse effects have become more pronounced. Moreover, there is always an assumption that alcohol-containing mouthwashes have more adverse effects like causing xerostomia compared to non-alcohol containing mouth wash. Hence, the aim of the study to compare the measurement of dry mouth following the use of alcohol-based mouthwash (Listerine Antiseptic) and a non-alcohol-based mouthwash (Colgate Plax) on a healthy individual with normal salivary flow using Bluestone Mouthfeel Questionnaire (BMQ). **Material and Methods:** Two commercially available mouthwashes with and without alcohol content were given to study participants and were asked to rinse for about 20 ml of solution for 30 min. BMQ was distributed that responses were asked to mark, immediately after rinsing and 1 h post rinsing, and the data were subjected to statistical analysis. **Results:** The results were inconsistent with both groups and did not have any statistically significant difference. **Conclusion:** Hence, it was concluded that use of alcoholic mouthwash is not associated with dry mouth when compared to non-alcoholic mouthwash.

KEY WORDS: Alcohol based, Bluestone mouthfeel questionnaire, Dry mouth, Mouthwash, Xerostomia

INTRODUCTION

Mouthwash is a solution, often containing antiseptic, astringent, and breath-sweetening agents, used for cleansing the mouth. Mouthwashes clearly offer certain benefits. They are medicated solutions used for gargling or rinsing. It has wide range of activity against gingivitis, oral biofilm, halitosis, and remineralize teeth. A mouthwash may be recommended as an antimicrobial agent, a topical anti-inflammatory agent, and a topical analgesic or for caries prevention. Many different mouthwashes are available in the market nowadays. Selection of an appropriate mouthwash depends on the patient's oral health condition, disease risk, efficiency, and safety of mouthwash.

Dental plaque accumulation is the main etiologic agent for development and progression of dental caries and periodontal diseases. Mechanical removal of plaque by regular tooth brushing is the mainstay for prevention and removal of plaque accumulation. Mouthwashes act as an adjuvant modality for removal of accumulated plaque. Mouth washed must always be used in conjunction with mechanical brushing for effective plaque control measures. Mouthwashes may be a mainstay of treatment in patients who lack dexterity, skill and who are mentally or physically challenged.

The use of mouth wash to control plaque accumulation can be dated back to 5000 years when Chinese used child's urine for the treatment of gingivitis.

The patient's ability to perform mechanical oral hygiene practices, oral health status, gingiva, oral

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mucosa, xerostomia, systemic illness, and the efficacy of mouthwash and its potential side effects must be kept in consideration before prescribing a mouthwash.^[1,2]

Adverse effects of mouthwash products may include extrinsic tooth staining, dysgeusia, tooth sensitivity, xerostomia, parotid swelling, mucosal erosion, altered taste sensation, and dental erosion.

Xerostomia is the most common side effect and which can be appreciated easily by the patients. Xerostomia is defined as the subjective complaint of dry mouth, which may affect speech, chewing, swallowing, denture-wearing, and general well-being. The most frequent cause of dry mouth is the use of certain medications, followed by radiotherapy to the head and neck, and Sjögren's syndrome, depression, anxiety, and stress, or malnutrition. Certain day to day activities like using mouthwash, caffeine also plays a major role in causing dry mouth which is normally neglected during diagnosis. Xerostomia remains an unresolved common complaint especially among the geriatric population, despite seeking medical or dental consultation. Rampant dental caries, oral fungal infections such as candidiasis, taste changes, halitosis, or burning mouth are caused by hyposalivation.^[1,3,4]

Saliva plays an important role in maintaining good oral and general health. Saliva is a complex fluid, which is composed of 99% of water and only 1% of non-organic and organic substances. These constituents are from within the gland and transported from the blood. The major role of these components present in the saliva is to provide prophylactic, therapeutic, and diagnostic properties to saliva.^[5]

Based on the association of bacterial plaque with the initiation of chronic gingivitis and progression of chronic periodontitis, chemical antiplaque agents have been employed both in prevention of periodontal diseases and for its treatment. Extrinsic tooth staining remains the greatest problem. The side effects of alcohol-containing mouthwashes in supragingival plaque control regimens limit their long-term use for prevention. Short-term prevention for antiplaque uses for chlorhexidine include^[6,7] as an adjunct to mechanical cleaning in the initial oral hygiene phase of treatment,^[8,9] in situations where mechanical oral hygiene is difficult, including (i) post-surgery, (ii) intermaxillary fixations, (iii) fixed orthodontic therapy, (iv) physically and mentally handicapped individuals, and (v) systemic diseases with oral manifestations such as leukemia. More recent interest in chlorhexidine has resulted from the delivery of compounds subgingivally (Periochip) in the treatment of chronic periodontitis. Such methods have extended the use of chlorhexidine into areas inaccessible to the action of antimicrobial drugs delivered by conventional means such as tooth brushing or mouth rinsing.

Available evidence suggests that chlorhexidine may not be as effective as some antimicrobial drugs, but is actively more specific for those organisms considered particularly pathogenic to the periodontal tissues.^[10-13]

Over the past two decades, there has been a dramatic increase in over the counter sales of mouthwashes, as teenagers and young adults are purchasing these products as mouth rinsing became a part of the normal grooming process. This often leads to use of inappropriate, incorrect mode of treatment, failed treatment outcome with added side effects. There is often a misconception that over-the-counter drugs are safe to use. Moreover, these drugs are indicated for short-term illness, but it is been misused for a long time leading to adverse effects.

Alcohol-based mouthwash (LA) is a mouth freshener that can be used effectively in oral cavity which reduces the bacteria, but frequent use of it cause dry mouth, burning sensation on delicate mucous membrane.^[11] Alcoholic mouthwash cannot be used in children, diabetes, and undergoing chemotherapy. Whereas, use of alcohol-free mouthwash does not have burning sensation, alleviates dry mouth, can be used by all groups of people, and helps to preserve natural balance of saliva in the mouth.^[10] The difference between alcohol-containing mouthwash and without alcohol is dry mouth. To test this hypothesis that alcohol-containing mouthwash causes dry mouth, this study was aimed to evaluate the perceived dryness between commercially alcohol and non-alcoholic based mouthwash.

MATERIALS AND METHODS

Materials used in the study are:

- Alcohol containing mouthwash (Listerine Antiseptic)
- Non-alcohol containing mouthwash (Colgate Plax)
- Bluestone Mouthfeel Questionnaire (BMQ).

Criteria

A total of 30 patients attending a dental hospital were selected according to convenience sampling technique, based on the following inclusion and exclusion criteria. Inclusion criteria included generally healthy males and females aged 18 years and older with a normal salivary flow rate and who were willing to participate in the study. Exclusion criteria were as follows: Xerostomia, a history of oral cancer or radiation therapy to head-and-neck region, Sjogren syndrome, current or recovering alcoholism, known allergies to any of the test product ingredients, any medical conditions that may interfere with the study, and participants who are pregnant and lactating. Participants were informed about the need and procedure of the study. The study was conducted after obtaining an informed oral consent.

Methods

The mouthwashes were provided to the study participants in wrapped containers labeled with numbers; hence, the participants are blinded about the type of mouthwash used, thereby avoiding any bias in the study. Of 30 study participants, 15 were provided with an alcohol-based mouthwash and the other 15 were provided with non-alcohol based mouthwash. The participants were instructed to rinse their mouth with 20 ml of solution for 30 s. Patients were distributed with BMQ and were asked to fill in their response. Then, the patients were asked to be seated and were refrained from drinking and eating for 1 h. Post 1 h, the BMQ was again distributed and patients were asked to mark their response according to their present oral conditions. The outcome of perceived dryness after 1 h is recorded by subjective measure using BMQ. The BMQ has been proved to be reliable and valid tool and has shown moderate correlation with flow rates, and hence can be used to accurately differentiate between the two groups. Data collection and statistical data analysis of BMQ and BMQ assessed on visual analog scale (VAS) will be recorded. The statistical analysis used is adherence risk scale method.

BMQ

Patients were assessed for their subjective perception of mouth dryness (xerostomia) and general “mouthfeel” using eleven items from the BMQ assessed on a VAS. The BMQ measure was recorded. Participants are instructed that for each question, please mark your answer with a vertical line “|” on the line between “Not at all” to strongly agree” [Figure 1]. The marks were converted to the corresponding millimeters on the scale of 0–100 mm [Figure 2] BMQ assessed on VAS.

RESULTS

Based on BMQ items-my mouth feels fresh, my mouth feels dry, my mouth feels tingly, my feels moist, and my lips feel dry shows no statistically significant difference between alcohol and non-alcohol-based mouthwash in perceived dryness [Table 1]. BMQ assessed on VAS also shows no significant difference between two groups [Figure 3]. On the basis of subjective endpoints, it is concluded that use of alcoholic mouthwash is not associated with dry mouth when compared to non-alcoholic mouthwash.

Based on statistical methods (adherence risk scale method):

BMQ Analysis

The percentage of questionnaire agreed by the patients as follows:

VAS Representation

The visual analogue scale representation of the amount of dryness perceived by the patient.

We are studying the way in which people describe their mouths under different conditions. For each question, please mark your answer with a vertical line, “|”, on the line between “Not at All” to “Strongly Agree.”

- My mouth feels fresh
Not at all _____ Strongly Agree
- My mouth feels dry
Not at all _____ Strongly Agree
- My mouth feels tingly
Not at all _____ Strongly Agree
- My mouth feels moist
Not at all _____ Strongly Agree
- My mouth feels stale
Not at all _____ Strongly Agree
- My lips feel dry
Not at all _____ Strongly Agree
- My mouth feels clean
Not at all _____ Strongly Agree
- My saliva feels thick and pasty
Not at all _____ Strongly Agree
- I have difficulty swallowing
Not at all _____ Strongly Agree
- I have plenty of saliva
Not at all _____ Strongly Agree
- My mouth feels sticky
Not at all _____ Strongly Agree

Figure 1: Bluestone mouthfeel questionnaire questions

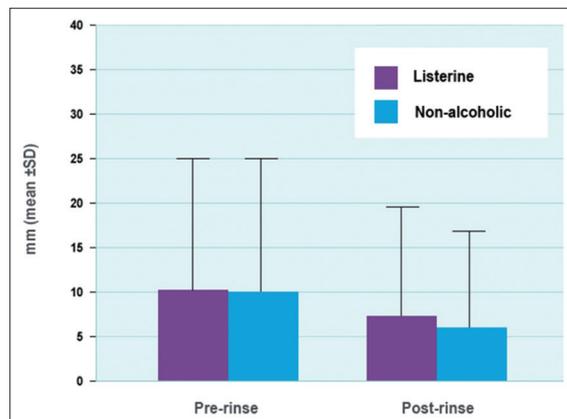


Figure 2: Bluestone mouthfeel questionnaire assessed on visual analog scale

Table 1: Description of mouth condition

Bluestone mouthfeel questionnaire assessment	Group A (%)	Group B (%)
My mouth feels fresh	80	82
My mouth feels dry	15	12
My mouth feels tingly	60	40
My mouth feels moist	80	87
My mouth feels stale	10	10
My lips feel dry	22	18
My mouth feels clean	85	83
My saliva feels thick and pasty	60	57
I have difficulty in swallowing	12	10
I have plenty of saliva	78	82
My mouth feels sticky	50	35

VAS Results

- Group A - 30 mm of perceived dryness in pre-rinse and 35 mm in post-rinse.
- Group B - perceived dryness is 30 mm in pre-rinse and it remains same in the post-rinse.

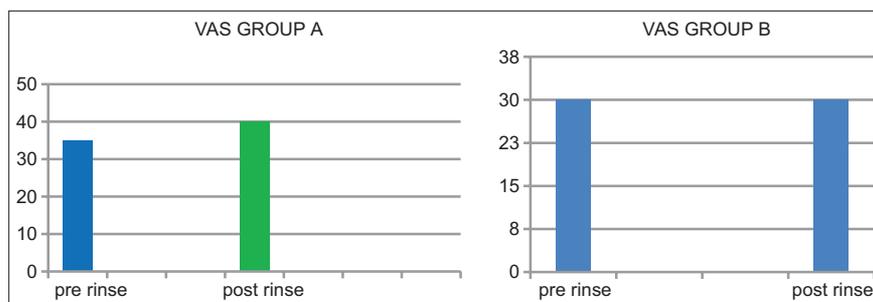


Figure 3: Visual analogue scale comparison between pre rinse and post rinse mouthwash

DISCUSSION

From the visual analog representation of Groups A and B, it can be seen that in Group A, there is 30 mm of perceived dryness in pre-rinse and 35 mm dryness in post-rinse, whereas in Group B, there is a perceived dryness of 30 mm in pre-rinse and it remains the same in post-rinse. We demonstrated that there was no difference in subjective measures of dry mouth between patients with normal salivary flow using an alcohol-containing mouthwash and patients using non-alcohol-containing mouthwash following 1 h after use. About 82% of Group B users agreed that their mouth felt fresh post-rinse compared to the 80% of Group A users that felt the same. About 15% of the patients in Group A while only 12% of Group B felt a higher sense of dryness in their mouth. About 60% of Group A users and 40% of Group B users said that their mouths felt a little tingly. About 87% of users of Group B mouthwash agreed that there is an increase moistness in their mouth compared to 80% of the Group A patients who felt the same. About 10% of users in both Group A and B complains of staleness in their mouth post-rinse. Dryness of lips is one of the complaints by 22% of Group A users and 18% of Group B users. Nearly 85% of Group A and Group B patients said that they felt an extra sense of oral hygiene post-rinse. Thickness in viscosity of saliva is seen in 60% of Group A users and 57% of Group B is users. About 12% of Group A users and 10% of Group B users said they had a difficulty swallowing post-rinse compared to how they felt pre-rinse. About 82% of Group B users agreed that they have plenty of saliva post-rinse compared to the 78% of Group B users that felt the same. About 50% of Group A users said that their mouth felt stickier post-rinse, while only 35% of Group B users felt like their mouth was stickier.

This pilot study was designed to explore whether the use of alcohol-containing mouthwash in patients with normal salivary flow rates might cause dry mouth, as measured by subjective (perceived) experience of a dry mouth using BMQ. On the basis of subjective endpoints (i.e., item 2 – my mouth feels dry and factor 2 – strongly agree in the BMQ) and VAS results, there were no significant differences between the

two groups. The alcohol content in each mouthwash products varies. Cool mint and other flavored Listerine products have an alcohol content of 21.6%, whereas original Listerine has a higher alcohol content of 26.9%. Therefore, the results cannot be generalized to all alcohol-containing mouthwash. Moreover, this study is more subjective rather than objective.

A study was conducted to determine the validity and reliability of BMQ with salivary flow rates and was concluded that BMQ can differentiate subjects defined as dry mouth compared to subjects without dry mouth, with 80% accuracy. Hence, BMQ is a valid and reliable tool for assessing dry mouth.^[13]

A randomized study for 3 months and a pilot study for a week on objective and subjective measures of salivary flow and perceived dryness was carried out by Kerr *et al.* in New York University Bluestone Center for Clinical Research. On comparison of two mouth rinses in relation to salivary flow and perceived dryness gave results that extended use of an alcohol mouth-based mouth rinse is no more likely to cause reduction in salivary flow or perceived dryness in individuals with normal salivary flow compared with non-alcohol-based mouth rinse which is consistent with the results of our study.^[3,14]

A study conducted on elderly patients to assess xerostomia severity difference in using alcohol and non-alcohol containing mouthwash using VAS scale. The final results revealed no significant difference; hence, xerostomia severity is not altered by alcohol and non-alcohol induced mouthwashes.^[15]

Even with the current scientific evidence that alcohol-containing mouthwashes can be beneficial, when they are used following proper guidelines provided by dental professionals and manufacturers, people have a misconception and avoid use of alcohol-containing mouthwashes. Hence, a study was conducted for a review based evidence about the safety of daily use of alcohol-based mouthwashes and was finally remarked that despite some literature indicating adverse effects, alcohol-containing mouth wash can be used every day with proper usage guidelines.^[16,17]

In terms of the effect of exposure to topical alcohol on the oral mucosa, other measures such as assessing the quality and quantity of saliva, such as salivary composition^[18] and/or measures of mucosal wetness and salivary film thickness^[19,20] may be worth exploring.

CONCLUSION

Thus, use of alcohol-containing mouthwash is no more likely to cause perceived dryness (based on validated measures of xerostomia by the BMQ) in individuals with normal salivary flow rates and there were no differences in subjective measures of mouth dryness between alcohol and non-alcohol containing mouthwash use, in non-xerostomic subjects. Since it is a pilot study without large sample size, more studies are needed to determine the effects of these factors on the subjective experience of dry mouth.

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