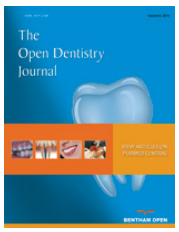

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RESEARCH ARTICLE

# Self-reported Knowledge and Practice of Saudi Dental Hygiene Students Towards the use of Chlorhexidine Mouthwash

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**Abstract:**

***Aim:***

To assess the knowledge and practice of Saudi dental hygiene students regarding the use of mouthwashes in clinical practice.

***Background:***

Mouthwashes are chemical plaque control agents which are widely used for the prevention of tooth decay, gaining fresh breath, reducing plaque and calculus formation, and reducing gingival inflammation. Chlorhexidine is considered a gold standard mouthwash because of its substantivity action. Thus, it is very important for dental practitioners to understand the knowledge and practices regarding the use of Chlorhexidine mouthwash

***Objective:***

The primary objective of this study was to find dental hygiene students' knowledge about chlorhexidine mouthwash and its side effects and also identify their practice toward the use of mouthwashes as plaque inhibiting agents.

***Methods:***

An online version of a pre-tested and validated questionnaire was used to test the knowledge and practices towards the use of Chlorhexidine mouthwash. Thus, A Cross-sectional questionnaire survey was carried out in Saudi Arabia on dental hygiene students.

***Results:***

A total of 144 filled questionnaires were obtained out of which 88% were male and 12% were female. After converting the scores into percentages, any score <60% was categorized as a poor score, 60-80% as an average score, and >80% as a good score. Dental hygiene students showed an average knowledge about Chlorhexidine mouthwash with a score of 62.27% and also poor practice with a score of 57.98%.

***Conclusion:***

The findings of this cross-sectional study demonstrate that most of the Dental hygiene students in Saudi Arabia have got average knowledge and poor practice about the usage of Chlorhexidine mouthwash.

***Clinical Significance:***

Being the oral health care providers, it is mandatory for dental hygiene students to have adequate knowledge regarding the usage of mouthwashes. With optimum knowledge, they will be able to deliver the right information to the patients thereby ensuring the proper practice of the same.

**Keywords:** Chlorhexidine, Mouthwash, Dental hygiene students, Knowledge and practice, Cross-sectional study, Plaque.

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|---|---|---|---|

## 1. INTRODUCTION

Although oral diseases such as dental caries, gingivitis, and periodontitis are considered multifactorial, dental plaque plays a major role in the establishment of these diseases. Past literature has confirmed a very strong relation between these [1 - 3]. Various procedures are carried out to eliminate the cause of these diseases. Likewise, periodontal therapy is carried out to eliminate the bacterial plaque thereby avoiding a further build-up of plaque bacteria which would lead to disease progression [4 - 6]. Non-surgical as well as surgical periodontal

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therapy are two mechanical methods used for the same [7, 8]. Along with mechanical methods, various chemical plaque-controlling agents have also been used as an adjunct. Chemical plaque-controlling agents have proven to be beneficial in patients with limited dexterity, associated systemic illness, post-surgical management, *etc*. [9 - 11].

Mouthwashes are one such chemical plaque control agent which has been used widely to obtain beneficial results in terms of gaining fresh breath, prevention of tooth decay, reducing plaque and calculus formation, and reducing gingival inflammation [12, 13]. Mouthwash contains active ingredients such as chlorhexidine gluconate, cetylpyridinium chloride, hydrogen peroxide, hexetidine, methyl salicylate, domiphen bromide, thymol, eucalyptol, menthol, benzalkonium chloride, methylparaben, and sometimes fluoride, enzymes and calcium [14]. It also contains water, and sweeteners namely sucralose, sorbitol, xylitol, and sodium saccharine. Chlorhexidine, triclosan, and listerine are the most commonly used mouthwashes [15]. Chlorhexidine is considered gold standard mouthwash because of its substantivity action which is, it has the ability to stay for a longer duration in the mouth by binding to hard and soft tissues [16, 17].

As dental practitioners have a greater role in educating patients regarding the beneficial use of mouthwashes. The hypothesis of this study is that adequate knowledge regarding mouthwashes will lead to optimum practice towards their uses by dental hygiene students. Thus, this study was conducted amongst Saudi dental hygiene students to assess their knowledge and practice towards the use of mouthwashes in clinical practice.

## 2. MATERIALS AND METHODS

A cross-sectional study was conducted among the dental hygiene students of Saudi Arabia to assess their knowledge and practice regarding chlorhexidine mouthwash. The study period lasted from February 2021 to August 2021. At the beginning of the study, ethical clearance was taken from the Institutional review board of the College of Dentistry, Qassim University. The study questionnaire was validated and pre-tested amongst the Dental Hygiene students at Qassim University. For Validation, 4 subject experts were asked for their valuable recommendations after rating every question. The questions were thus modified and used on 40 Dental hygiene students from Qassim University. The students gave a report on how well they could understand the questions. And the final Questionnaire of 18 questions was prepared based on their feedback. Based on the results of the pilot study, a sample size of 140 was calculated using the formula: n = (S^2 [Z _(1-α/2) +Z _(1-α/2)]2)/([x-μ] ^2), a 95% confidence level (α = 0.05) and 5% confidence interval to attain a significant result. The questionnaire was forwarded to dental hygiene students studying in various colleges in Saudi Arabia, by employing a convenience snowball sampling technique. They were invited to participate in the study through various social media platforms. Personal messages and e-mails were also sent to achieve maximum participation. Google forms were used to prepare the questionnaire. Any questionnaire that was completely filled was included. Anonymity and confidentiality of the provided data were guaranteed to the study participants. The submitted questionnaire was regarded as consent to participation by the students.

The research questionnaire comprised three parts; the first part contained questions related to sociodemographic details, the second part contained seven questions related to knowledge, and the third part contained six questions related to practice regarding chlorhexidine mouthwash. All the data were then tabulated and subjected to statistical analysis using the Statistical Package of Social Science (SPSS) version 16.

## 3. RESULTS

A total of 144 filled questionnaires were obtained at the end of the timeline. Out of which 88% were male and 12% were female. The maximum number of students were from Qassim University. Table **1** shows demographic data.

**Table 1. Demographic data of the participants (N = 144).**

| Study Variable | N (%) |
|---|---|
| **Gender** | |
| • Male | 127 (88%) |
| • Female | 17 (12%) |
| **Institution** | |
| • Qassim University | 65 (45%) |
| • King Saud University | 24 (17%) |
| • King Abdulaziz University | 6 (4%) |
| • Al Baha University | 13 (9%) |
| • Prince Sattam Bin Abdulaziz University | 12 (8%) |
| • Inaya Medical College | 16 (11%) |
| • Mustaqbal University | 8 (6%) |
| **Academic Year** | |
| • First-year | 43 (30%) |
| • Second year | 36 (25%) |
| • Third year | 65 (45%) |

When asked about the type of mouthwashes they knew, 67% of students were aware of Chlorhexidine mouthwash (Fig. **1**).

The questionnaire consisted of seven questions regarding knowledge and six questions regarding the practice of chlorhexidine mouthwash. The participants had to choose from the options given for each question in the questionnaire. Every correct answer scored 1 whereas the wrong answer was 0. Based on Bloom's cut-off point, the score was categorized as poor, average, or good score (Table **2**).

Interpretation of the scores after converting into percentages was; Poor for less than 60%, Average for 60% - 80%, and Good for scores above 80%. Thus, the dental hygiene students had an average knowledge of Chlorhexidine mouthwash with a score of 62.27% and also poor practice with a score of 57.98%.

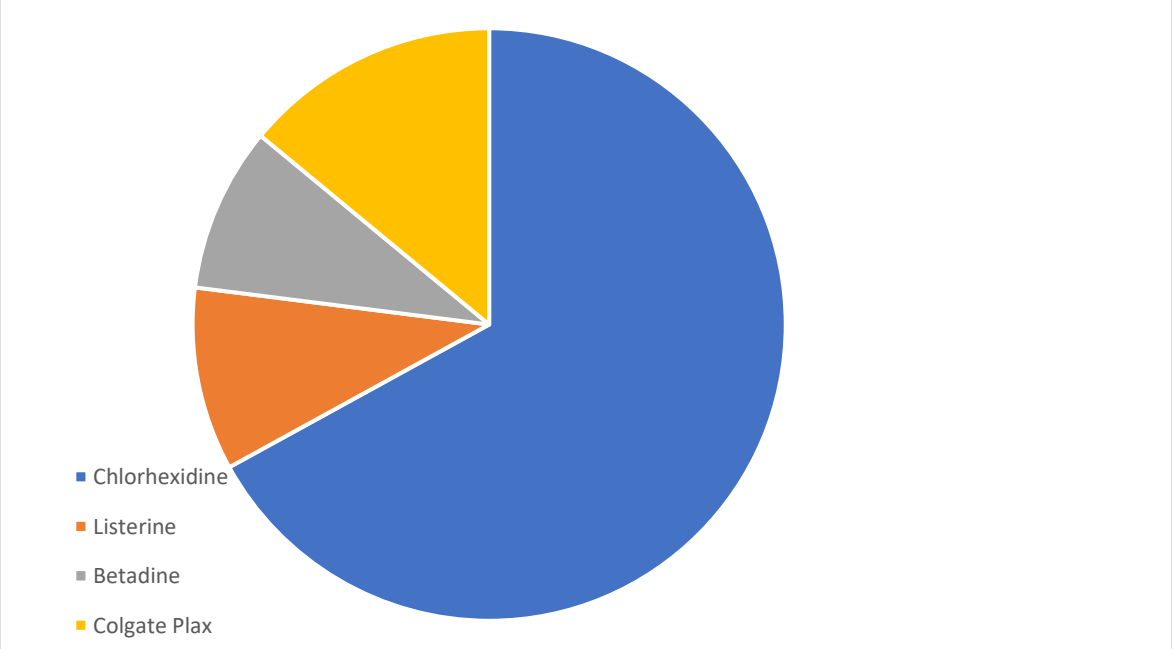


**Fig. (1).** Knowledge of dental hygiene students regarding type of mouthwashes.

**Table 2. Responses for each question.**

| **Responses** | | | | |
|---|---|---|---|---|
| **Knowledge Related Questions** | | **Correct** | **Wrong** | **Total** |
| What is the role of mouthwash | N | 105 | 39 | 144 |
| | % | 72.91 | 27.09 | 100 |
| What is the taste of mouthwash | N | 96 | 48 | 144 |
| | % | 66.66 | 33.34 | 100 |
| Where patients could get Chlorhexidine mouthwash | N | 79 | 65 | 144 |
| | % | 54.86 | 45.14 | 100 |
| Does Chlorhexidine cause Allergic reactions? | N | 97 | 47 | 144 |
| | % | 67.36 | 32.64 | 100 |
| What are other effects of mouthwash | N | 90 | 54 | 144 |
| | % | 62.5 | 37.5 | 100 |
| How long does the taste remain in the mouth after rinsing | N | 71 | 73 | 144 |
| | % | 49.3 | 50.7 | 100 |
| **Practice Related Questions** | | | | |
| How many times per day do you advise your patient to use the mouthwash | N | 98 | 46 | 144 |
| | % | 68 | 32 | 100 |
| When do you use mouthwash | N | 78 | 66 | 144 |
| | % | 54.16 | 45.84 | 100 |
| How long to keep the mouthwash in the mouth | N | 90 | 54 | 144 |
| | % | 62.5 | 37.5 | 100 |
| Do you dilute the mouthwash | N | 63 | 81 | 144 |
| | % | 43.75 | 56.25 | 100 |
| What is the time interval that you keep between mouthwash and eating/drinking | N | 55 | 89 | 144 |
| | % | 38.2 | 61.8 | 100 |
| Do you think there is a need for more awareness programs about in detailed usage of the mouthwash | N | 117 | 27 | 144 |
| | % | 81.25 | 18.75 | 100 |

## 4. DISCUSSION

Poor oral hygiene causes the accumulation of dental plaque. This can lead to inflammation of the periodontal tissues causing gingivitis and periodontitis. Mechanical removal of plaque is considered important to remove plaque. There are conditions in which chemical agents are also used along with mechanical techniques to aid in the treatment [18 - 20]. Thus, mouthwashes are regularly prescribed by dentists to fasten the healing of periodontal inflammation. Mouthwashes are commonly prescribed by dental practitioners for obtaining improved oral health post-oral prophylaxis treatment. As mouthwashes are indicated for various conditions, they are now being used for daily oral hygiene. However, it has been documented that regular use of mouthwashes is connected with certain side effects [21]. Authors have reported that frequent use of mouthwashes can be a risk factor for developing diabetes. Various other effects such as the development of calculus and extrinsic staining have also been reported. In the 1940s, Chlorhexidine, a bisbiguanide was developed in the UK and was used and sold as a general disinfectant. It was after a while that its antiplaque activity was discovered. Chlorhexidine mouthwash was available as mouthwash only by 1976 [22].

It is necessary to have proper knowledge regarding the use of chlorhexidine mouthwashes. The findings of this Cross-sectional study demonstrate that most of the Dental hygiene students in Saudi Arabia have got average knowledge and poor practice about the usage of Chlorhexidine mouthwash. Thus, the results do not support the research hypothesis.

This study was carried out to assess the knowledge and practice of dental hygiene students of Saudi Arabia regarding the use of chlorhexidine mouthwash. Research has been carried out on dental students, but not on dental hygiene students in Saudi Arabia [23]. Out of the total seven colleges, 144 students participated. 12% were females and 88% were male students. The reason could be that more male students enrolled than females in the field of dental hygiene. In the present study, most of the students were aware of the chlorhexidine mouthwash as compared to the other mouthwashes. When compared to another study conducted by Benjamin *et al*., most of the participants in their study used Betadine mouthwash. This difference in the findings can be suggestive of the difference in the geographic setting [24].

In the present study, nearly half of the study participants reported that chlorhexidine mouthwash causes allergic reactions whereas 11% of students mentioned extrinsic stains. The lack of sufficient knowledge regarding the side effects of chlorhexidine mouthwash can be a reason for the over-prescription of mouthwashes even for unwanted cases. Chlorhexidine is used for various purposes which can be either a therapeutic reason or prophylactic. When used in the ideal dosage, side effects can be minimalized and efficacy can be maximized [25]. Previous studies have reported various commonly observed side effects such as a change in taste, feeling of numbness, pain, xerostomia and tooth discoloration, and calculus formation. Less frequently observed was parotid gland swelling. Paraesthesia and desquamation of the oral mucosa. But the main issue is the discoloration of the tooth which discourages the patients and results in discontinuing the use [26 - 28].

As regards to the role of Mouthwash, students responded that mouthwash can be used for Gingivitis, Periodontitis, Bad breath & Dental caries. Chlorhexidine can be used either for presurgical cases or post-surgical cases (short-term maintenance and long-term maintenance). Chlorhexidine rinse is done pre-operatively to reduce the bacterial load intraorally prior to the commencement of the treatment. For short-term post-operative care where toothbrushing is contraindicated, chlorhexidine rinse is advised. For other cases where long-term postoperative management is required to reduce the inflammation, local administration in the form of a chip is advised [29 - 31].

Also, regarding the taste of mouthwash, there were differences in the opinions of students. 67% of students described it as bitter in taste, 13% described it to be as tasteless, 11% as Sugary and 9% students described it as Salty. In this study, most of the students (55%) reported that Chlorhexidine mouthwash is available at the pharmacy. Chlorhexidine is an antimicrobial agent which is available in different formulations such as varnishes, mouthwashes, gels, and chips. All of these are available by prescription at hospitals & pharmacies [32 - 34].

According to the study by Nevada *et al*., almost 75% of dental practitioners prescribe and encourage patients to use mouthwash twice daily [34]. In our study too, the majority of Dental hygiene students (68%) prefer to advise the use of mouthwash twice a day. Also, most of the students in this study (54.16%) responded that they use mouthwash after brushing which is, as per, the studies conducted by Shahid Mitha *et al*. [35].

Around 56.25% of the students mentioned that they dilute the mouthwash and around 62.5% mentioned that they keep the mouthwash for more than 30 seconds. But for optimum effect Chlorhexidine mouthwash should be used undiluted. Chlorhexidine is a broad spectrum that affects Gram-positive, and Gram-negative bacteria and also fungi. It acts either by inactivating the microorganisms or by killing them. Its mode of action depends upon the concentration used. Within 30 seconds, chlorhexidine is found to kill all Gram-positive and Gram-negative bacteria. When used in low concentration, the integrity of the bacterial cell wall is affected. With respect to the time interval of use of mouthwash and eating/drinking, only 38.2% of students mentioned about 1 hour. It is always advised to keep an interval of more than 1 hr between the use of any agents and rinsing. Various agents tend to deactivate chlorhexidine thereby reducing its efficacy. Insoluble salts are formed when in contact with anionic compounds commonly found in detergents, carbomers, acrylates, *etc*. [36].

Similar studies were carried out to assess the knowledge and practice regarding mouthwash among dental students and practitioners. Although both study participants showed adequate knowledge but dental practitioners showed excellent practice as well [ 24, 37]. In the present study, the majority of the responses were from Qassim University, which could be a reason for bias in the results obtained. Also, the study was conducted through a questionnaire which could have also led to

bias. These are the limitations observed by the author in this study. As this is the only study conducted on Saudi Arabian dental hygiene students, the insights obtained from this study may be of assistance for future research.

## CONCLUSION

To the best of the author's knowledge, this is the first study conducted to assess dental hygiene students of Saudi Arabia. Through our findings, it can be concluded that Dental hygiene students in Saudi Arabia have got average knowledge and poor practice about the usage of Chlorhexidine mouthwash.

Since dental hygiene students are going to be Dental health practitioners, it is important for them to have adequate knowledge, correct attitude, and motivation toward the proper use of mouthwashes. More knowledge should be imparted to them regarding mouthwashes through their curriculum and seminar & workshops. They must be aware about the various types of mouthwashes available in the market along with their indications and side effects. This will help them in the proper prescription of mouthwashes and improve the oral health of the community.

## LIST OF ABBREVIATIONS

| | | |
|---|---|---|
| **SPSS** | = | Statistical Package of Social Science |
| **STM** | = | Short-term Maintenance |
| **LTM** | = | Long-term Maintenance |

## AUTHORS' CONTRIBUTION

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Institutional Review Board of the College of Dentistry, Qassim University.

## HUMAN AND ANIMAL RIGHTS

No animals were used in this study. All procedures performed in studies involving human subjects were in accordance with the ethical standards of the institutional and research committee and with the 1975 Declaration of Helsinki as revised in 2013.

## CONSENT FOR PUBLICATION

Informed consent was obtained from all subjects involved in the study.

## AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on request from the corresponding author [M.M].

## STANDARDS OF REPORTING

STROBE guidelines were followed in this study.

## FUNDING

This research received no external funding.

## CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

## ACKNOWLEDGEMENTS

Declared none.

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