

## THE EFFECT OF CUR Q FRESH MOUTHWASH ON PREVENTION OF PLAQUE ACCUMULATION FOR DENTAL STUDENTS AGED (18-22) YEARS

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### ABSTRACT

**Aims:** To evaluate the efficacy of CUR Q Fresh mouthwash on prevention of plaque accumulation for dental students aged (18-22) years, to compare between the efficacy of CUR Q Fresh and 0.12 chlorhexidine gluconate mouthwash and to compare the effects between males and females, and to determine any oral disturbance or discomfort following the use of CUR Q Fresh and 0.12 chlorhexidine gluconate mouthwashes. **Materials and Methods:** The study sample consisted of 60 Students from College of Dentistry/ University of Mosul (30 males and 30 females). Their ages were ranged between 18-22 years. Study students were divided into two groups. Group A (30students) (15 males and 15 females) students were advised to use experimental CUR Q Fresh mouthwash. Group B (30students) (15 males and 15 females) students were advised to use 0.12% chlorhexidine gluconate mouthwash. The period of study was 21 days. Plaque index was assessed at baseline, after 14 days, and after 21 days. **Results:** Both mouthwashes were similarly effective in reducing plaque levels, throughout the study period. Although Group A showed slightly better results numerically, this difference was not statistically significant. Also in Group A and Group B no significant gender-related differences in plaque index were observed. In Group A, 10% noticed a disruption in their usual sense of taste and 6.6% percent reported differences in how food tasted to them; yet these effects were not seen in Group B. Also 6.6% of Group B experienced burning sensations in various parts of the oral mucosa and 6.6% showed a change in tooth color according to the VITA Tooth Guide 3 D. MASTER. **Conclusions:** CUR Q Fresh mouthwash is more effective than 0.12 chlorhexidine gluconate to reduce dental plaque accumulation.

**KEYWORDS:** Chlorhexidine, CUR Q Fresh, Dental student, Plaque, Plaque index.

### INTRODUCTION

Dental plaque is a complex structure also known as "biofilm" and is composed of bacteria, especially *Streptococcus mutans*. Bacterial biofilms are present in the mouth, especially on the surfaces of teeth and oral mucosa such as gums and periodontal tissues. Dental plaque deposits bacteria on the surfaces of teeth and along the gum line, leading to irritation and the formation of gum pockets. Mechanical plaque control through brushing and flossing is the most recommended and effective method for maintaining oral hygiene and periodontal health<sup>[1]</sup> and preventing dental caries.<sup>[2-4]</sup> In addition to mechanical plaque control, various antimicrobial agents are also added to chemical plaque control agents (such as toothpaste and mouthwash) to inhibit the growth of dental plaque biofilm<sup>[5,6]</sup> especially

in areas of the mouth that are not easily reached by brushing.<sup>[7,8]</sup> The use of oral care products such as toothpaste and mouthwash is the most important means of preventing periodontal disease. Indeed, chlorhexidine is used with some success for the management of periodontal disease, particularly as an adjunct to oral hygiene and non-surgical therapy.<sup>[9]</sup> Chemical plaque control agents have good substantivity in the oral cavity, which allows them to maintain oral hygiene between brushings. Toothpastes and mouthwashes contain various antimicrobial agents or compounds whose effectiveness in controlling plaque and preventing gingivitis and periodontitis is well established and continues to be studied.<sup>[10-12]</sup>

Chlorhexidine mouthwash is arguably one of the most widely used antimicrobial agents, used by dentists and the general public with and without oral disease to reduce the bacterial load in the oral cavity under the pretext of preventing and treating oral disease. Chlorhexidine mouthwash has also been shown to reduce plaque formation and gingivitis in patients.<sup>[12]</sup> Chlorhexidine mouthwash can have a number of side effects, such as discoloration of tooth surfaces, restorations, and the tongue. Also, some people may notice a change in their sense of taste during treatment. In rare cases, a permanent change in taste can occur after treatment is complete.<sup>[13]</sup>

CUR Q Fresh Mouthwash is made from herbal compounds and contains turmeric extract (*Curcuma longa*), tulsi extract (*Ocimum sanctum*), eucalyptus oil (*Eucalyptus globulus*), clove oil (*Syzygium aromaticum*), thyme oil (*Thymus vulgaris*), tea tree oil (*Melaleuca alternifolia*), and honey.<sup>[14]</sup> CUR Q Fresh Mouthwash has shown positive results in reducing plaque buildup. These findings support the growing body of evidence that turmeric-based herbal formulations are effective in combating plaque. It contains curcumin, a polyphenol known for its anti-inflammatory, antimicrobial, and antioxidant properties, which has been shown to be effective in disrupting oral biofilms and reducing microbial colonization.<sup>[15]</sup>

This study aimed to evaluate the efficacy of CUR Q Fresh mouthwash on prevention of plaque accumulation for dental students aged (18-22) years, to compare the efficacy with 0.12 chlorhexidine gluconate and to compare the effects between males and females, and to determine any oral disturbance or discomfort following the use of CUR Q Fresh and 0.12 chlorhexidine gluconate mouthwashes.

## MATERIALS AND METHODS

### The Samples

The study sample consisted of 60 students from College of Dentistry/ University of Mosul (30 males and 30 females). Their ages were ranged between 18-22 years, with mild to moderate plaque accumulation. Study students were divided into two groups.<sup>[16]</sup>

Group A: (30 students) (15 males and 15 females) students were advised to use experimental CUR Q Fresh mouthwash.

Group B: (30 students) (15 males and 15 females) students were advised to use 0.12% chlorhexidine gluconate mouthwash. Before the examination, demographic information was obtained for each person including name, age, gender, medical history and allergy.

### Inclusion criteria

Dental students aged 18-22 years, systemically healthy with mild to moderate plaque accumulation.<sup>[17]</sup>

### Exclusion criteria

Mouthwash use in past 3 months, orthodontic and prosthetic appliances, systemic disorders, pregnancy, smoking and patients with established periodontitis.<sup>[17]</sup>

## METHODS

Group A: Students were advised to use 5ml of CUR Q Fresh mouthwash. According to instruction the patient should brush his/her teeth 30-40 minutes before using the mouthwash. After that, the patient should use the mouthwash, gargle for 1 minute and then spit out three times daily. The product was produced by [BSA Pharma Inc] at Ambala (Haryana, 2007).

Each 100 ml contains of Cur Q Fresh 100ml Oral Rinse Liquid. Contain.

Haldi ( <i>Curcuma Longa</i> Extract)	0.1%
Tulsi ( <i>Ocimum sanctum</i> Extract)	0.05%
Eucalyptus ( <i>Eucalyptus globulus</i> Oil)	0.09%
Clove ( <i>Syzygium aromaticum</i> Oil)	0.05%
Thymol ( <i>Thymus vulgaris</i> Oil)	0.05%
Tea Tree ( <i>Melaleuca alternifolia</i> Oil)	0.1%
Honey 5%	

Group B: Students were advised to use Chlorhexidine gluconate (CHX) 0.12% Mouthwash. According to instruction the patient should brush his/ her teeth 30 minutes before using the mouthwash. After that, the patient should use the mouthwash, gargle for 1 minute and then spit out twice daily.



### Ethical Consideration

A signed agreement was obtained from the students and gave them/her a paper explaining the purpose of the research. His/her information is kept with the researcher only, and he or she is free to decline or withdraw at whatever time. The confirmation review letter from the Research Ethics Committee of the College of Dentistry, University of Mosul, was obtained carrying number 4S/995;at date 5/19/2024.

### Instruments and Supplies

Instruments and supplies that had been used include: Cotton rolls. Disposables plane mouth mirrors, Gloves

and masks, Disposables trays, Shade guide, 3D-Master, Autoclave, WHO periodontal probes.

### Clinical Examination

The plaque index by (Silness and Loe, 1964)<sup>[18]</sup> was used to evaluate dental plaque accumulation using WHO periodontal probe. Six index teeth examined were: 16, 12, 24, 36, 32 and 44.<sup>[19]</sup> Parameters were recorded for plaque index at baseline 14<sup>th</sup> day, and 21<sup>st</sup> day.

These questions were asked to students after using the mouthwash.

Do you notice any changes related to oral cavity when you use the mouthwash?

- A transitory interference with normal taste.
- Burning sensations in various parts of the oral mucosa.
- Dryness sensation.
- Alterations in food taste.
- Soreness of oral mucosa, tongue and gingiva

### Inter and Intra Examiner Calibration

Inter examiner calibration was done by examining 5 persons by researcher and comparing the results with those made by an expert dentist, while intra examiner calibration was done by examining the same persons on two separate periods of one week. Clinical examination conducted included DMFT, Plaque Indices. The findings indicated that there were no statistically significant differences at a significance level of  $p > 0.05$ .

### Statistical analysis

The data were analyzed as Means  $\pm$  standard deviation SD by One Way ANOVA using Duncan's test among periods, and t-test between the two groups at same period with significant level at  $p \leq 0.05$  using computer statistical software (Sigma-Plot Version 12.5).

## RESULTS

The plaque index scores for participants in Group A showed a statistically significant reduction over the course of the study. A repeated measures ANOVA was employed to evaluate changes in plaque accumulation at three different intervals: Baseline, Day 14, and Day 21. The analysis revealed a highly significant decrease in plaque levels over time  $p < 0.001$ , indicating that the mouthwash had a notable effect on reducing plaque formation.

Post-hoc analysis using Bonferroni correction indicated that all time-point comparisons were statistically significant ( $p \leq 0.05$ ), as indicated by the differing superscript letters (A, B, C). This suggests a progressive and consistent improvement in plaque control throughout the 21-day study period (Table 1).

**Table (1): Comparison of plaque index for Group A among study intervals.**

Interval	Plaque index
Baseline	1.01 $\pm$ 0.338 A
Day 14	0.373 $\pm$ 0.218 B
Day 21	0.191 $\pm$ 0.11 C
Probability value	<0.001

Data as mean  $\pm$  S. D (N=30 group). Significantly at  $p \leq 0.05$ .

The plaque index scores for Group B participants using 0.12% chlorhexidine gluconate mouthwash showed a statistically significant reduction over time. A repeated measures ANOVA was applied to assess changes in plaque accumulation at three different time intervals: Baseline, Day 14, and Day 21. The results revealed a highly significant reduction in plaque index values, with a  $p$ -value  $< 0.001$  (Table 2).

Post-hoc analysis with Bonferroni correction demonstrated that all pairwise comparisons between time points were statistically significant ( $p \leq 0.05$ ), as reflected by the different superscript letters (A, B, C) next to each mean value. These findings confirm a progressive and consistent reduction in plaque levels throughout the 21-day follow-up period.

**Table (2): Comparison of plaque index for Group B among study intervals.**

Interval	Plaque index
Baseline	0.969 $\pm$ 0.36 A
Day 14	0.405 $\pm$ 0.26 B
Day 21	0.247 $\pm$ 0.14 C
Probability value	<0.001

Data as mean  $\pm$  S. D (N=30 group). Significantly at  $p \leq 0.05$ .

Table (3) compares the plaque index between Group A and Group B across three time intervals. The use of the same superscript letter "A" across all values indicates that there were no statistically significant differences between the two groups at any time point ( $p \leq 0.05$ ).

Both CUR Q Fresh and chlorhexidine mouthwashes were similarly effective in reducing plaque levels, with no significant difference between the two groups throughout the study period. While Group A showed slightly better results numerically, this difference was not statistically significant.

**Table (3): Comparison of plaque index between Group A and Group B.**

Groups	No.	Baseline	Day 14	Day 21
Group A	30	1.01± 0.33 A	0.373 ± 0.21 A	0.191 ± 0.11 A
Group B	30	0.969 ± 0.36 A	0.405 ± 0.26 A	0.247 ± 0.14 A
Probability		0.651	0.614	0.107

Data as mean ± S. D (N=30 group). Significantly at  $p \leq 0.05$ .

Table (4) presents the comparison of plaque index values between males and females participants in Group A across three study intervals. The superscript letters (A) indicate no statistically significant difference at any time

point between the genders. Both males and females demonstrated a progressive reduction in plaque accumulation over time. However, no significant gender-related differences were found significant ( $p = 0.197$ ).

**Table (4): Comparison of plaque index for Group A between Males and females.**

Groups A	No.	Baseline	Day 14	Day 21
Males	15	1.05± 0.4 A	0.44± 0.26 A	0.21± 0.14 A
Females	15	0.96± 0.96 A	0.30± 0.12 A	0.16 ± 0.08 A
Probability		0.509	0.074	0.197

Data as mean ± S. D (N=30 group). Significantly at  $p \leq 0.05$ .

Table (5) displays a gender-based comparison of plaque index among participants in Group B (across three different time intervals). Throughout the study, no significant gender-related differences in plaque index were observed. The use of 0.12% chlorhexidine

gluconate mouthwash led to a consistent reduction in plaque accumulation in both males and females. The shared superscript letter “A” in all entries confirms that no statistically significant differences were found at any time point ( $p \leq 0.05$ ).

**Table (5): Comparison of plaque index for Group B between Males and females.**

Groups	No.	Day 0	Day 14	Day 21
Males	15	1.09± 0.35 A	0.44± 0.3 A	0.25± 0.18 A
Females	15	0.84± 0.34 A	0.36± 0.22 A	0.23 ± 0.1 A
Probability		0.06	0.457	0.776

Data as mean ± S. D (N=30 group). Significantly at  $p \leq 0.05$ .

### Taste and shade guide

Regarding students answer to the questions about taste alteration, 10% of students who used the CUR Q FRESH mouthwash had a transitory interference with normal taste and 6.6% had alterations in food taste, and 6.6% patient used the Chlorhexidine Gluconate 0.12 mouthwash had burning sensations in various parts of the oral mucosa.

### Shade guide test

Two students who used the Chlorhexidine Gluconate 0.12 mouthwash had shade guide change (VITA Tooth guide 3D-MASTER) the first one had alteration in shade guide from 2L1.5 to 2L2.5 and the second had alteration from 1M2 to 2L1.5. While no change was seen in students who used CUR Q Fresh mouthwash.

### DISCUSSION

Effective plaque control measures are essential for recovering individuals with gingival disorders. Dental plaque not only initiates gingivitis but is one of multi factors for dental caries formation.<sup>[20-22]</sup> The current study demonstrated a statistically significant reduction in plaque index scores among participants in Group A who used CUR Q Fresh herbal mouthwash over a 21-day period. The repeated measures ANOVA revealed a highly significant overall decrease in plaque accumulation ( $p < 0.001$ ), with post-hoc Bonferroni

analysis confirming that each time-point comparison (Baseline vs. Day 14, Day 14 vs. Day 21, and Baseline vs. Day 21) was statistically significant ( $p \leq 0.05$ ). The progressive decline in plaque scores—starting from a baseline mean, on Day 14, and reaching by Day 21—indicates that the mouthwash provided effective and consistent plaque control.

These findings are consistent with growing evidence supporting the anti-plaque potential of turmeric-based and herbal formulations. contains curcumin, a polyphenol with documented anti-inflammatory, antimicrobial, and antioxidant properties that are effective in disrupting oral biofilms and reducing microbial colonization.<sup>[23]</sup>

The additional components found in CUR Q Fresh play a role in its effectiveness well. Clove oil (*Syzygium aromaticum*) tea tree oil (*Melaleuca alternifolia*) and Tulsi (*Ocimum sanctum*) are among these ingredients that help inhibit the growth of common bacteria responsible for oral health issues like plaque build up as mentioned in a study.<sup>[24]</sup>

The current study demonstrated a significant and progressive reduction in plaque index scores among participants in Group B who used 0.12% chlorhexidine gluconate mouthwash over a 21-day period. The mean



plaque index significantly decreased from Baseline to Day 14 and Day 21. A repeated measures ANOVA confirmed the statistical significance of this reduction ( $p < 0.001$ ), and subsequent Bonferroni-adjusted post-hoc tests validated that each time point differed significantly from the others ( $p \leq 0.05$ ).

Chlorhexidine gluconate remains the most effective and widely studied antiseptic in the prevention and control of dental plaque due to its potent antimicrobial properties and strong substantivity, which allows it to bind to oral tissues and release slowly over time.<sup>[25]</sup>

The findings contrast the effectiveness of a CUR Q Fresh mouthwash and a 0.12 percent chlorhexidine gluconate mouthwash in managing dental plaque during a 21 day observation with dental students involved in the study. Even though there wasn't any significant difference between the two groups at any specific time throughout the study, the consistent numerical trends favored CUR Q Fresh indicating its potential clinical edge, in reducing plaque buildup.

Both groups showed plaque index values at the start (Baseline) indicating uniformity before any treatment was administered. After two weeks (Day 14) both groups saw a decrease in plaque scores; Group A (CUR Q Fresh) average was slightly lower than Group B (chlorhexidine). This pattern persisted until Day 21 when Group A maintained a lower mean plaque index compared to Group B score. Although there were no statistically significant differences between the two groups at any time point ( $p \leq 0.05$ ), the consistent and significant decrease in Group A suggests that enhanced effectiveness of CUR Q Fresh could be credited to its herbal blend that mainly consists of turmeric a well-known ingredient, for its antimicrobial properties and anti-inflammatory and antioxidant effects.<sup>[26]</sup> In addition to rest of the herbal found in CUR Q Fresh mouthwash like Tulsi (*Oimum sanctum*) clove oil, eucalyptus oil, thymol and tea tree oil. It is known that these extracts have anti-inflammatory properties, which might work together to improve oral health by decreasing microbial levels and inflammation without causing the common side effects related to chlorhexidine, such tooth discoloration, mucosal irritation and changes, in taste perception.<sup>[21]</sup>

The current gender-based analysis of plaque index in participants using CUR Q Fresh they looked at three different time points. The starting point (Baseline), Day 14 and Day 21. The findings indicated a decrease in plaque buildup over the course of the study, for both males and females participants which supports the effectiveness of using CUR Q Fresh for maintaining good oral hygiene and reducing plaque buildup. While there weren't any differences between male and female participants at any point (with  $p$  value  $> 0.05$ ) the numbers hint at a slight improvement, among the female group.

The results align with research showing better oral health outcomes in female. This could be because women are more aware of health practices and tend to follow them more diligently due, to higher motivation.<sup>[27]</sup>

The information provided of the report compares how plaque levels changed over three weeks for males and females using a mouthwash in Group B at different time intervals. Baseline, Day 14 and Day 21. The findings suggest that while both males and females participants experienced a decrease in buildup during the study period there were no notable differences based on gender at any point, throughout the study.

By the day of the study period the plaque index showed a gradual decline, with males at  $0.25 \pm 0.18$  and females at  $0.23 \pm 0.10$ . Interestingly there was no difference between the genders ( $p=0.776$ ) suggestive of a similar reduction in plaque buildup for both groups by the study's end. This indicates that chlorhexidine gluconate mouthwash is equally effective for both males and females, in reducing plaque accumulation over time.<sup>[28,29]</sup> Gender variations in health can sometimes be detected in specific situations like the impact of hormones on gum inflammation or variations, in oral hygiene habits.<sup>[30]</sup>

The study's findings show that 6.6% occurrence of burning sensations imply that while chlorhexidine is efficient it might lead to discomfort in a minor group of users. Therefore, it's crucial for healthcare providers to take into account patient comfort in addition, to effectiveness when suggesting mouth rinses. Additionally the results of this study are consistent, with research that indicates oral mucosal irritation and burning sensations linked to the use of chlorhexidine commonly diminish over time and go away once the usage is stopped.<sup>[31]</sup>

The discovery that 6.6% of students using 0.12% Chlorhexidine Gluconate mouthwash showed a change in tooth color according to the VITA Tooth Guide 3 D. MASTER is a finding that deserves further exploration. The shifts in shade seen in two student— particularly from 3ML to 3MM and from 4MM to 3ML – indicate the possible impact of chlorhexidine on teeth's color or staining over time, as a known side effect of this mouthwash.<sup>[32]</sup>

Despite its plaque and gingivitis control properties and effectiveness in oral care maintenance efforts, Chlorhexidine gluconate has been found to potentially lead to tooth staining when used over prolonged periods of time. This staining is attributed to its interaction with proteins, in saliva and bacterial cell membranes which could consequently result in the discoloration of tooth enamel.<sup>[33]</sup>

## CONCLUSIONS

The efficacy of herbal mouthwash (Cur Q Frash) was more effective in reducing plaque as compared to

chlorhexidine mouthwash and may be considered as a good alternative. The chlorhexidine mouthwash was reported with many side effects which limits its acceptability and long-term use, whereas the presently tested herbal mouthwash had no side effects apart from mild burning sensation.

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