

Knowledge, Perception And Practice About Toothbrush Sterilization Among Dental Students And Faculty In Chennai, South India - A Cross Sectional Study

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ABSTRACT

Toothbrushing is generally used as an oral hygiene tool to keep up oral health. Tooth brushes act as a reservoir for many germs. The aim of this study is to know the knowledge perception and practice of toothbrush sterilization among dental students and faculty in chennai city.

MATERIALS AND METHODS

This study is based on questionnaires among dental students and faculty in a private dental college. A pre-validated questionnaire was prepared and mailed in the form of google forms for the participants. The results were obtained and statistically analysed using SPSS software version 23. Descriptive statistics and inferential statistics were performed to present the responses.

RESULT

Nearly 73.53% of the respondents are aware about toothbrush sterilization. About 64.7% of the population used boiling water for sterilization and 19.61% used ultraviolet (UV) light for their toothbrush sterilization. Nearly 38.23% of the population believe that *Escherichia coli* in tooth brushes causes diarrhoea. The difference in the knowledge, perception and practice of toothbrush sterilization among male and female participants was not significant ($p>0.05$).

CONCLUSION

Though dental students and faculties are aware about toothbrush sterilization they are not practicing it in their day to day life. Awareness in this regard needs to be created among the dental students, faculties to inculcate the same to their patients.

KEY WORDS: Tooth brush, sterilization, sanitization, dental students; faculty; innovative technique

INTRODUCTION

In our day to day life maintaining our oral hygiene is important and toothbrushes are the major aid to do this job. But prolonged use of these toothbrushes causes contamination in it. The use of unsanitized or unsterilized toothbrushes causes many oral related and other health problems. The most basic go-to method of sanitizing your toothbrush is to run hot water over the bristles before and after each use. This gets rid of bacteria that may have collected on the toothbrush in the hours between brushings. It also eliminates new bacteria which may have accumulated after each use. Toothbrushing is generally used as an oral hygiene measure to keep up oral health.

In the early 1920's toothbrushes were invented. Tooth brushes act as a reservoir for many germs. The germs in the tooth brushes cause many disorders such as Gastrointestinal disorder, respiratory problems and renal problems. A new toothbrush after being used for one week starts growing germs in it (1) . Toothbrushes play a major role in removing dental biofilm and help in prevention of dental caries and periodontal disease. Continuous use of toothbrushes causes contamination in it and disinfection is required for maintaining the tooth brush (2). Toothbrush disinfection, important to wash out pathogenic microbes on toothbrush transmitted during brushing (3) from our oral cavity or kept with other tooth brushes with tap water, is merely sufficient for daily use (4).

The American Dental Association recommends that toothbrushes need to be changed every 3 months. Patients undergoing organ transplantation or chemotherapy or system disease are needed to change their toothbrushes more often (5) . Some in vitro studies related to tooth brush sterilization are carried out, some such studies are being performed with volunteers (6) (7,8). Our team has extensive knowledge and research experience that has translated into high quality publications (9–28). However, the knowledge, attitude and practice of toothbrush sterilization has not been evaluated among the dental practitioners The aim of this study is to assess the knowledge perception and practice of toothbrush sterilization among dental students and faculty in chennai city.

MATERIALS AND METHODS

A cross-sectional study was conducted among 102 dental faculty and students practicing in South India. Non-probability convenience sampling technique was employed. A pre-validated and reliable questionnaire containing 10 questions in English was distributed to the participants (Annexure 1) through an online google form link. The internal consistency of the questionnaire using Cronbach's α was found to be 0.85. The questionnaire contained the question items pertaining to their knowledge, attitude and practice on the toothbrush sterilization. All dental faculty and students of various dental colleges from south india had been included in the study. Oral consent from the participants had been obtained after explaining the need for the study. Prior approval to carry out the study was obtained from the Institutional Research Committee (IRB) of the authors University. Statistical analysis was performed in Statistical Package for the Social Sciences (SPSS) software version 23.0 (IBM, Chicago, USA). Descriptive statistics was performed to present the frequency distribution of the options of the question items.

RESULTS

This survey is taken among dental students and faculty in chennai city regarding toothbrush sterilization. Nearly 73.53% of the respondents are aware about toothbrush sterilization (Figure 1) .

About 73.53% of the respondents were Under Graduate (UG), 14.7% of my respondents were Post Graduate (PG) and 5.88% were the dental faculty. About 64.7% of the population used boiling water for sterilization. Nearly 15.69% of the respondents do not sterilize their tooth brush and 19.61% use ultraviolet (UV) light for their toothbrush sterilization (Figure 2). About 51.96% of the population do not use toothbrush sanitizer (Figure 3). Nearly 51.96% of the dental students and faculty do not use toothbrush sanitizer regularly. About 67.65% of the population believe that placing their toothbrush in boiling water for 2-3 mins acts as an effective sanitizer. Nearly 38.24% of the population believe that bacteria can live for a few hours on the tooth brush. But actually bacteria can live for upto 3 days in our toothbrush. About 34.31% of my population believe this (Figure 4). Nearly 38.23% of the population believe that *E coli* in tooth brushes causes diarrhoea. About 41.18% of the respondents believe that one uncovered tooth can harbour 100 million bacteria (Figure 5). About 48.04% of the population believed that 3% of H₂O₂ solution works as an effective toothbrush sanitizer. Nearly 38.23% of my respondents are aware that *E.coli* in uncovered toothbrushes causes diarrhoea (Figure 6). About 23.53% of males and 14.71% of females are aware that *E.coli* in a tooth brush causes diarrhoea. Blue colour represents may be, Green colour represents no and Beige colour represents yes. Most of the male and female participants are aware that *E.coli* in toothbrushes causes diarrhoea. This difference was not significant (Chi-square; p=0.473) (figure 7). Nearly 21.57% of males and 19.61% of females are aware that uncovered tooth brushes can harbour 100 million bacteria in it. Blue colour represents 1 million, green colour represents 100 million and beige colour represents less than 10 million. Most of the female participants answered as 100million and most of the male participants answered 1 million. This difference was not significant (Chi-square; p=0.194) (figure 8). Nearly 27.45% of males and 21.57% of females are aware to sanitize their toothbrushes using 3% H₂O₂ solution. Blue colour represents 10% H₂O₂ solution, Green colour represents 2% NaCl in warm water and beige colour represents 3% H₂O₂ solution. Most of the male and female participants answered that 3% H₂O₂ solution. This difference was not significant (Chi-square; p=0.003) (figure 9).

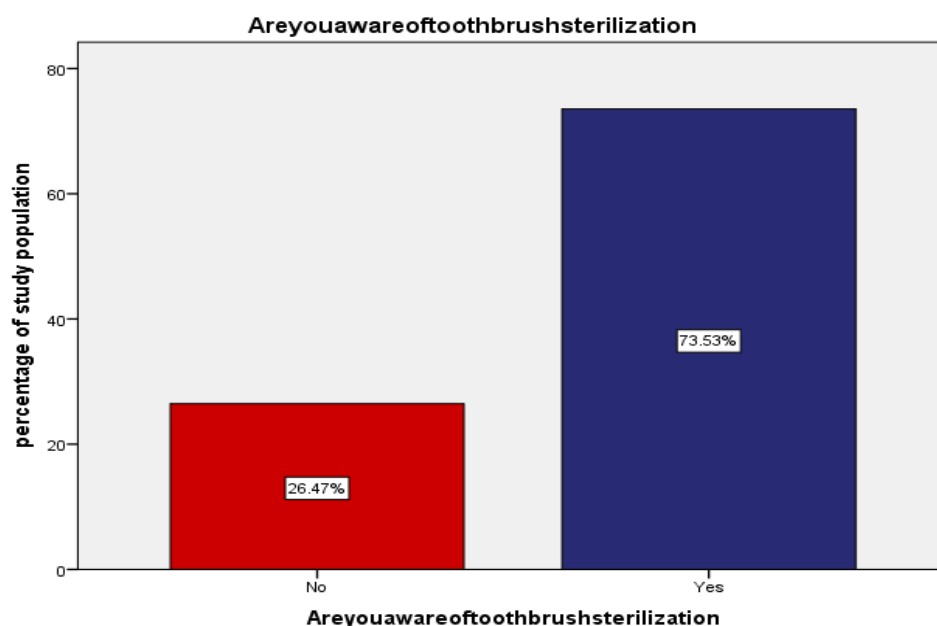


FIGURE 1: Bar graph represents the respondents awareness on toothbrush sterilization. 73.53 % of the respondents are aware about toothbrush sterilization (blue) and 26.47% are not aware of it (red).

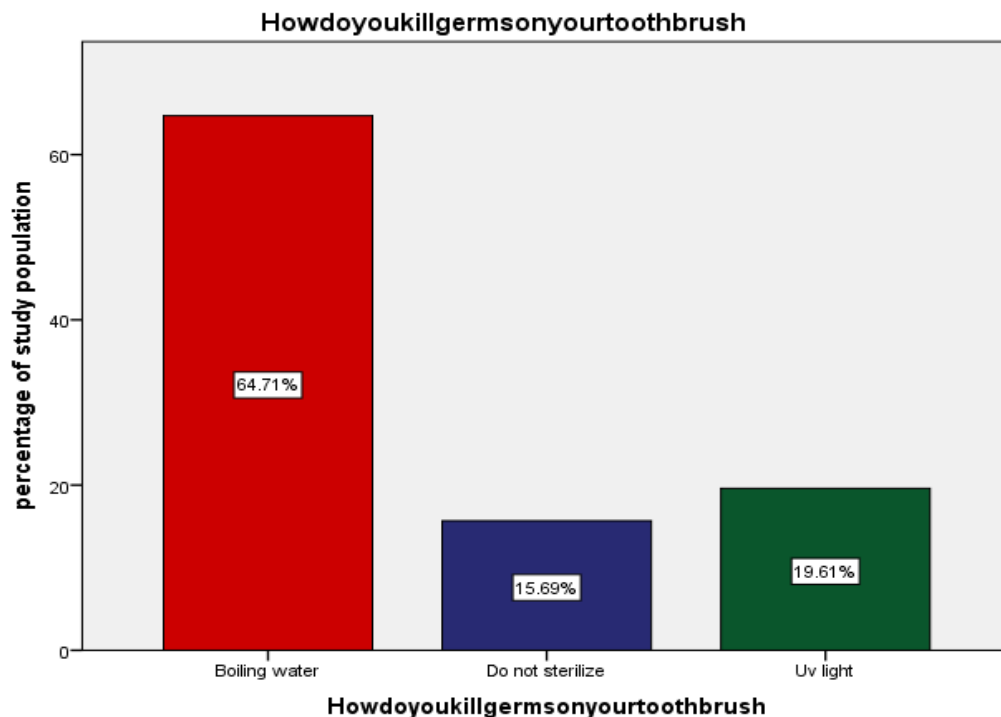


FIGURE 2: Bar graph represents the methods of killing germs in the tooth brush. 64.71% of the respondents use boiling water for tooth brush sterilization (red), 15.69% of the respondents don't even sterilize their toothbrush (blue), 19.61% of the respondents use UV light for toothbrush sterilization (green).

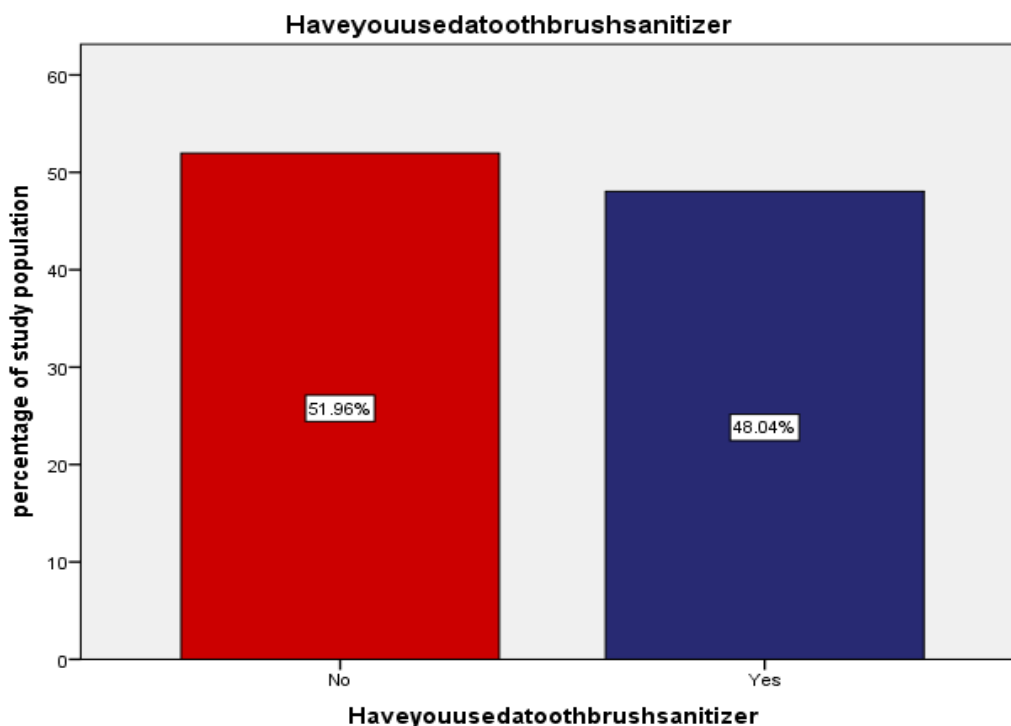


FIGURE 3: Bar graph represents usage of toothbrush sanitizer. 51.96% of the respondents do not use toothbrush sanitizer (red), 48.04% of the population uses toothbrush sanitizer (blue).

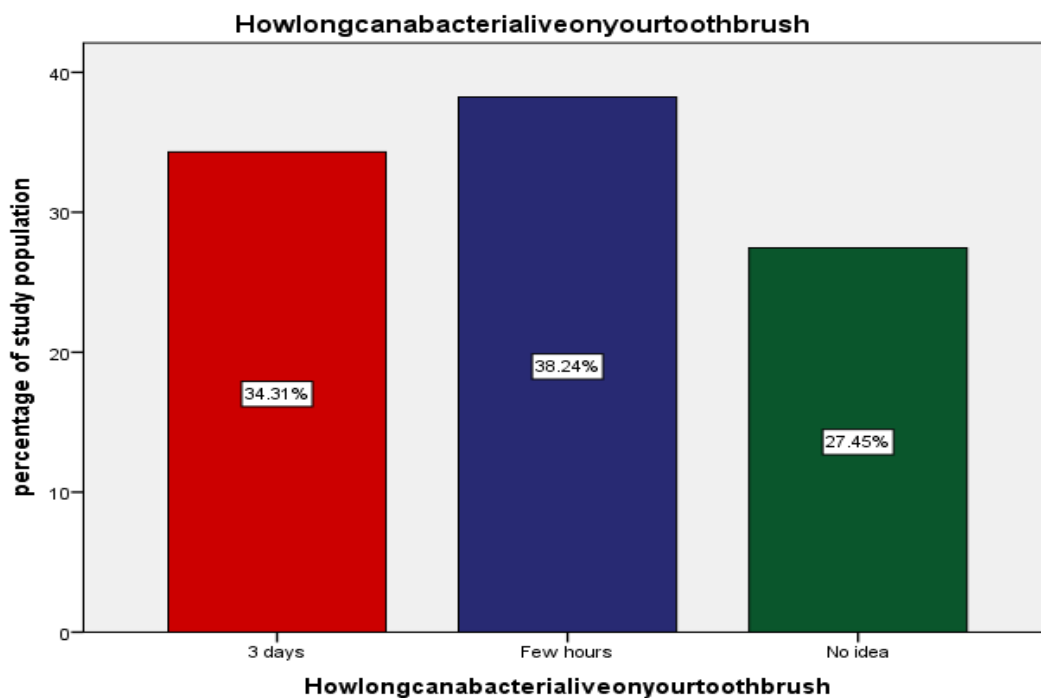


FIGURE4: this bar graph represents the life span of bacteria in a toothbrush. 38.24 % of my respondents answered that a bacteria can live for few hours in a toothbrush (red), 34.31% of the respondents answered that a bacteria can live for 3 days in a toothbrush (blue) and 27.45% answered no idea (green).

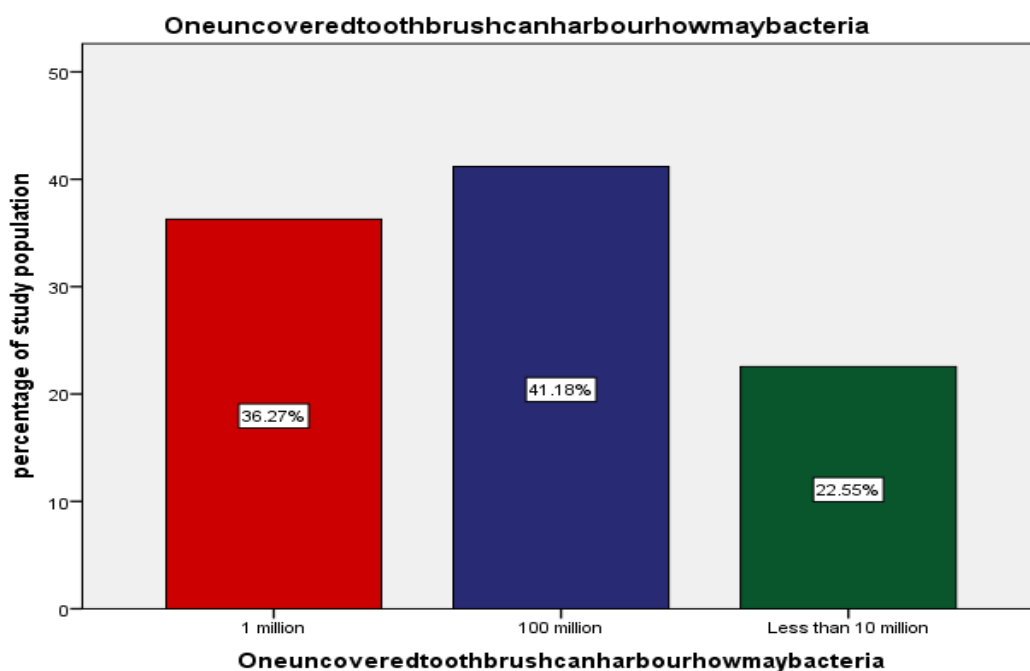


FIGURE 5: the bar graph represents the bacterial contamination in an uncovered toothbrush. 41.18% of the respondents answered that 100 million bacteria are present in an uncovered toothbrush. 36.27% of the population answered that 1 million bacteria are present in an uncovered toothbrush.

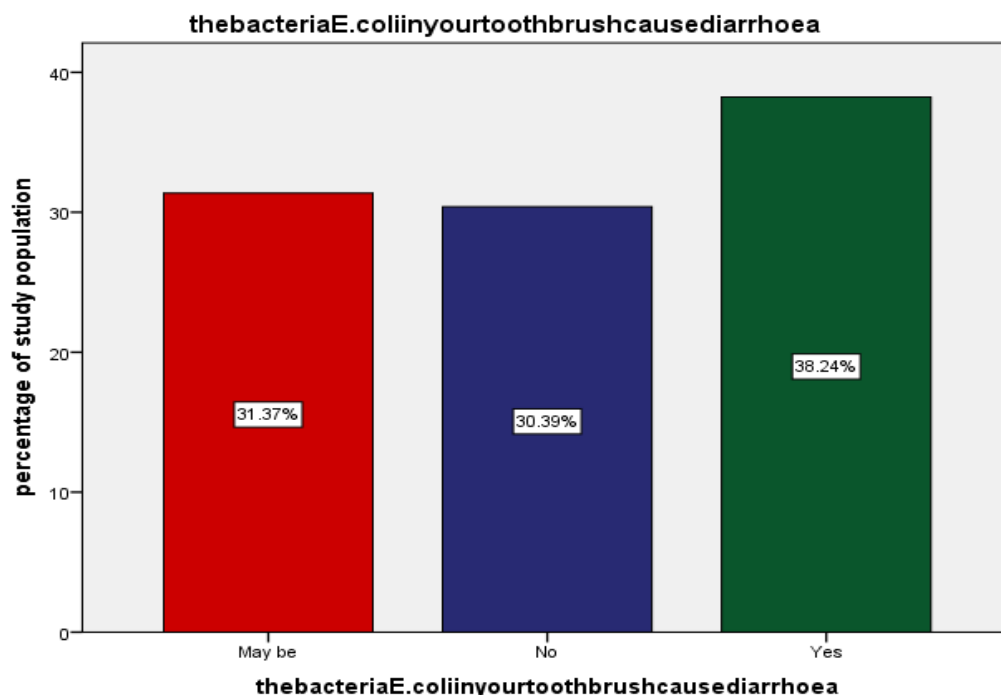


FIGURE 6: Bar graph represents that *E.coli* in toothbrush causes diarrhoea. 38.24% of the population answered yes as e coli in tooth brush causes diarrhoea. 30.39% of the respondents answered no that e coli in an uncovered toothbrush do not cause diarrhoea.

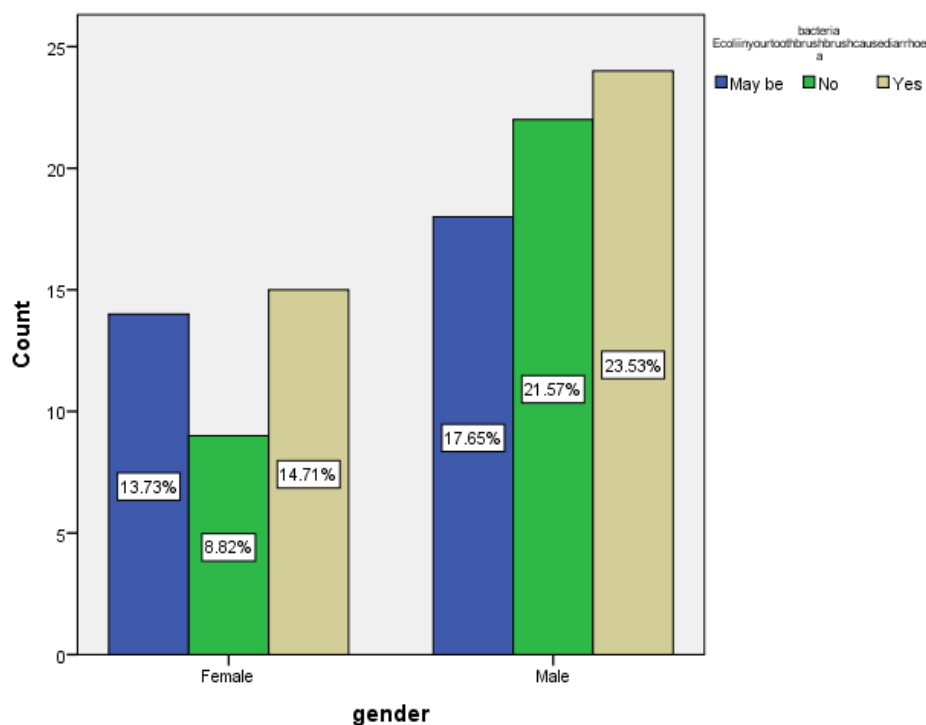


FIGURE 7: The above bar graphs shows the association between the responses based on gender and whether the respondents are aware that *E.coli* in a tooth brush causes diarrhoea. X axis represents gender and Y axis represents count in percentages. Blue colour represents may be, Green colour

represents no and Beige colour represents yes. Most of the male and female participants are aware that E.coli in toothbrushes causes diarrhoea. This difference was not significant (Chi-square; $p=0.473$).

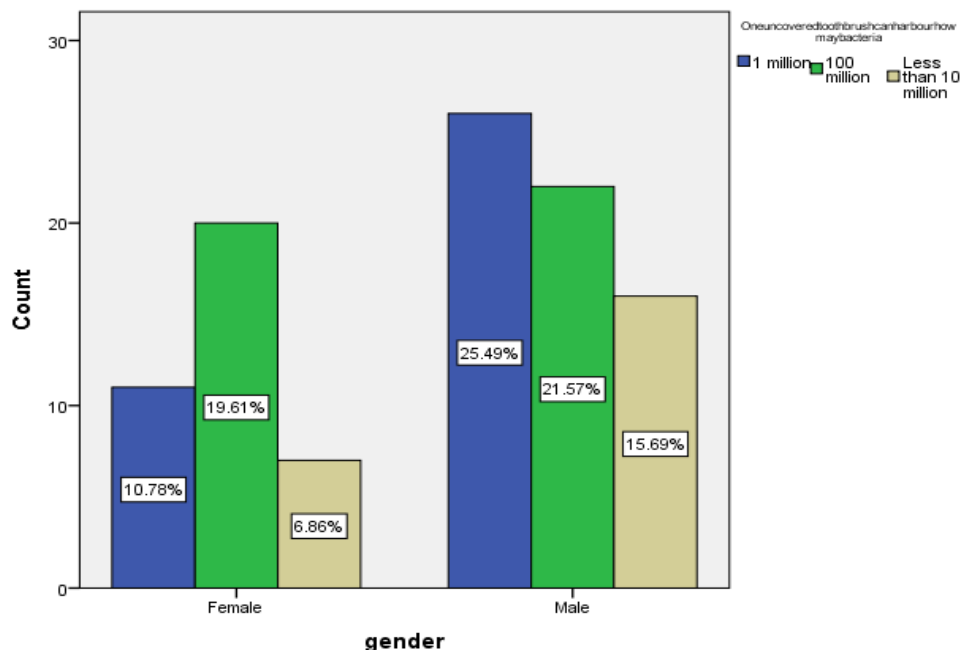


FIGURE 8: The above bar graphs shows the association between the responses based on gender and whether the respondents are aware that uncovered tooth brushes can harbour bacteria in it. X axis represents gender and Y axis represents count in percentages. Blue colour represents 1 million, green colour represents 100 million and beige colour represents less than 10 million. Most of the female participants answered as 100million and most of the male participants answered 1 million. This difference was not significant (Chi-square; $p=0.194$).

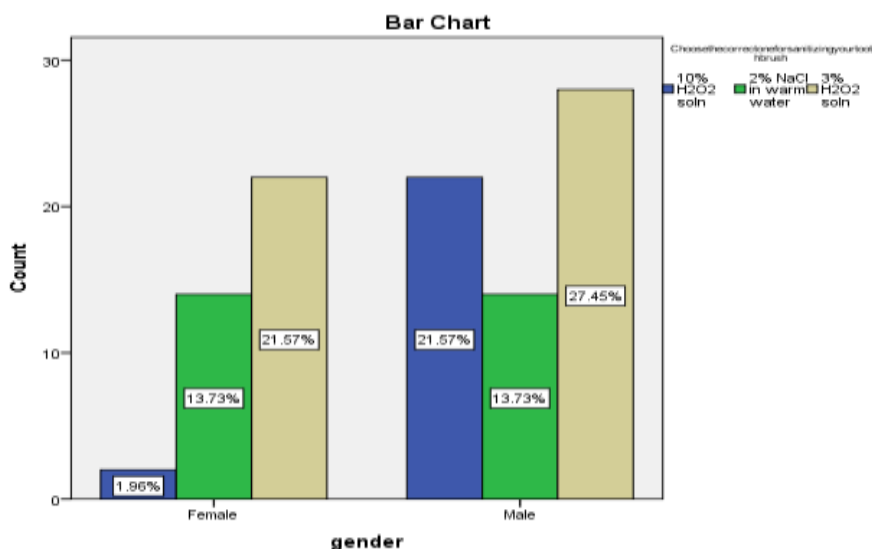


FIGURE 9: The above bar graphs shows the association between the responses based on gender and whether the respondent sanitizes their toothbrush. X axis represents gender and Y axis represents count in percentages. Blue colour represents 10% H₂O₂ solution, Green colour represents 2%NaCl in warm water and beige colour represents 3%H₂O₂ solution. Most of the male and female participants answered that 3% H₂O₂ solution. This difference was not significant (Chi-square; $p=0.003$).

DISCUSSION

In this study we observe that 3% of H₂O₂ solution works as an effective disinfection method for toothbrush sanitization for dental students and faculty. In this correcting survey UG students answered more than PG students and dental faculty. 73.53% of dental students and faculty are aware about toothbrush sanitization. Tooth brushes can be sanitized using various methods such as Ultraviolet light and boiling water. In one month 100% of contamination can be seen in the tooth brush (29) . 64.71%v of the population of my respondents use boiling water for toothbrush sterilization. In a study made by Farah Rami et al, hot water helps in control of bacillus species in our toothbrush (30)

About 51.96% of the dental students and faculty do not use toothbrush sanitizer. Methods for sanitizing toothbrushes are immersing toothbrushes in 1% NaOCl for 10 mins and tooth brushes were placed in MW for 10 mins tooth brushes were immersed in 10% vinegar for 10 mins(31). About 38.24% of the responded population believed that tooth brushes that are not disinfected cause diarrhoea. *E.coli* in tooth brushes causes septicemia, UTI (urinary tract infections; septicemia) (32) . 59.80% of the population use toothbrush sanitizer. The bacterial count significantly reduced after using UV sanitization (33). This study helps in maintaining oral health and prevents many diseases such as diarrhea which is transmitted through unsterilized toothbrushes. The limitation of this study is, this study is done on a small population and a convenient sampling method has been used. In the future more precise questionnaires can be done so that a clear result can be obtained.

The teeth were coated with white titanium oxide and brushed in a machine twice for 1 minute each. 12 different brush heads with an oscillating-rotating action were tested. After brushing, the teeth were scanned, the black surfaces were assessed planimetrically and a modified plaque index for orthodontic patients (PIOP) was obtained. Tooth areas, which were black again after brushing showed tooth surface contact of the filaments and were revealed as a percentage of total area. The remaining white areas around the brackets revealed 'plaque-retentive' niches. Analysis of variance was done for individual comparison of the brush types (34).

About 20 female college students in Gangwon were separated into five equal groups instructed to brush their teeth for four weeks. After four weeks of brushing their teeth, their toothbrushes were collected and immersed in 10 ml of 0.2% chlorhexidine gluconate (CHX) solution for group I, 10 ml of 7.5% povidone iodine (PVI) solution for group II, and 10 ml of sodium bicarbonate-normal saline solution for group III. The bristles of the toothbrushes were soaked in each solution for 10 minutes. For group IV, the toothbrushes were placed in a UV toothbrush sterilizer for 5 min and 30 seconds.. For group V, the toothbrushes were placed in 10 ml of sterile distilled water for 10 min as a control group. The experiment results showed that there were statistically significant differences among the 5 groups (35)

CONCLUSION

Though dental students and faculties are aware about toothbrush sterilization they are not practicing it in their day to day life. Awareness in this regard needs to be created among the dental students, faculties to inculcate the same to their patients. Dental students and faculties have to be an initiator in toothbrush sterilization so that they can make sure that the society is performing good oral health practices.

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CONFLICT OF INTEREST

All the authors declare that there was no conflict of interest in the present study.

AUTHORS CONTRIBUTIONS

Ashwin Krishna B: Literature search, data collection, analysis, manuscript drafting .

Arthi Balasubramanian: Data verification, manuscript drafting.

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ANNEXURE 1

- 1). Highest level of academic achievement
 - i). UG
 - ii). PG
 - iii). Faculty
- 2). Are you aware of toothbrush sterilization
 - i). Yes
 - ii). No
- 3). How do you kill germs on your toothbrush
 - i). Boiling water
 - ii). Donot sterilize
 - iii). UV light
- 4). How do you kill germs on your toothbrush
 - i). Yes
 - ii). No
- 5). Do you sterilize your toothbrush regularly
 - i). Yes
 - ii). No
- 6). Do you think placing your toothbrush in boiling water for 2-3 mins works as an effective sanitizer
 - i). Yes
 - ii). No

- iii). May be
- 7). How long can a bacteria live on your toothbrush
- i). Few hours
 - ii). 3 days
 - iii). No idea
- 8). Are you aware that the bacteria (E.coli) in your tooth brush brush cause diarrhoea
- i). Yes
 - ii). No
 - iii). May be
- 9). One un covered toothbrush can harbour how many bacteria
- i). 1 million
 - ii). 100 million
 - iii). Less than 10 million
- 10). Choose the correct one for sanitizing your toothbrush
- i). 3% H₂O₂ soln
 - ii). 10% H₂O₂ soln
 - iii). 2% NaCl in warm water