

PRACTICES OF TOOTH BRUSH DISINFECTION AMONG THE STUDENTS AND INTERNS IN KARACHI, PAKISTAN

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ABSTRACT

Background: Objective: Toothbrush plays a key role in the cleaning of the oral cavity, and maintaining oral hygiene. Contamination of toothbrushes occurs early after initial use and increases with repetitive use. Toothbrush disinfection can prevent from many oral and systemic diseases. The objective of the study was to determine the knowledge and practice of dental students and house officers regarding toothbrush disinfection in a dental teaching hospital of Karachi. **Study Design:** A cross sectional study was conducted among the dental students and house officers of Baqai dental college, Karachi. Dental students of all four years and all house officers were included in the study. A structured questionnaire was used to collect the data about the toothbrush disinfection knowledge, attitude and practice. Data was analyzed in SPSS version 22. **Setting:** Baqai dental college, Karachi. **Period:** Mar 2019 to May 2019. **Material and Method:** A total of 254 participants were included in the study, 50 house officers and 202 students. **Results:** Male 35.3 % (n=89) and female 64.7 % (n=163) participated in the study. Majority of the participants i.e. 56.7% (n=143) had no knowledge about toothbrush disinfection and 80.2% (n=202) participants responded that toothbrush disinfection was not necessary 26.6% (n=65) were disinfecting their toothbrush. **Conclusion:** People are still not aware of the importance of toothbrush disinfection and its role in the prevention from oral and systemic diseases. A dentist is responsible for instructing their patients about the maintenance of oral health; therefore, for the clinical acceptance of toothbrush disinfection more awareness among the dentists and dental students is required so that they can spread the message to their patients.

Keywords: Toothbrush, Disinfection, Knowledge, Dental Students.

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INTRODUCTION

Toothbrush play a vital role in cleaning of the oral cavity, and maintaining oral hygiene¹ as oral health is the integral part of general health. Toothbrush is used in the removal of the dental biofilm responsible for causing dental caries and periodontal diseases.² The microbial burden in the oral cavity ought to be diminished by proper oral cleanliness to minimize the occurrence of oral diseases.³ A toothbrush which is left lying uncovered on a bathroom sink or any other location may collect germs and dirt.⁴ Toothbrush contamination occurs mainly from the oral cavity,

storage container, hands aerosol and environment.⁵ It can be a source of transmission of potential pathogens to the oral cavity. Contamination of toothbrush occurs early after initial use and increases with repetitive use.⁶ Toothbrush that is defiled may assume a significant role in numerous oral and systemic diseases, including septicemia and gastrointestinal, cardiovascular, respiratory and renal issues. Bacterial species more than 700, exist in the oral cavity.⁷ Prolonged use of the toothbrush as mentioned in several studies facilitates contamination by various organisms

like Staphylococcus, Lactobacilli, Pseudomonas, Klebsiella, Escherichia coli and candida.⁸ A toothbrush after use is rinsed only by plain water and kept in the bathroom or in the combined toilet/bathroom where there is more possibility that the toothbrush gets contaminated by millions of microorganisms, and they grow and multiply in the favorable warm and moist place.³ The oral and the other systemic diseases can be constrained by minimizing the microbial burden in the oral cavity and this is possible by cleanliness and by using clean tooth brushes every day(9), which may be achieved by sterilizing the toothbrush or using disposable toothbrush.¹⁰ However, the recommended hygiene should be economical and feasible to adapt by every common person in community.

Changing of toothbrush is recommended once every three months by American Dental Association.(11) The information about the use and management of toothbrush can be found in guidelines of the Centers for Disease Control. Studies suggest that people suffering from systematic diseases, organ transplant or chemotherapy should change their toothbrush more frequently. Patients with oral diseases experienced a decrease of symptoms when they changed their toothbrush during the disease.¹²

Dentists have a starring role in suggesting effective oral hygiene maintenance aids for good oral health.¹³ Concern is always shown to perform tooth brushing twice a day to prevent oral diseases but the message about knowledge and practice of toothbrush disinfection is not conveyed in the community, as it should be. One of the major issues is that there is a lack of evidence where maintenance of toothbrush is mentioned. The dental health practitioners give less attention to this issue. There is a dire need of research studies to guide the oral health practitioners about the disinfection of the toothbrush and its importance. The study was conducted to determine the knowledge and practices of toothbrush disinfection among the

dental undergraduate and house officers so that recommendations should be given to initiate the awareness programs regarding the importance of toothbrush disinfection among the dentists, dental students and community.

MATERIAL AND METHODS

A cross sectional study was conducted amongst the house officers and students of Baqai dental college, in the district of Karachi. The study was conducted during the time period of 6 months from July-December in 2018. All the registered house officers and dental students of all four years were included in the study. The students or house officers who were on leave or were not present on the day of data collection were excluded from the study. Total 254 people filled the questionnaire out of which 50 were house officers and 202 were students. A close ended structured questionnaire was used to collect the data,¹ which was modified according to target population. The questionnaire contained 10 items about the toothbrush use, knowledge, attitude and practice of toothbrush disinfection. The questionnaire was distributed among all the participants and they filled it by themselves. Informed written consent was obtained from all the participants. The ethical review board of Baqai dental college granted ethical Approval for the study. Data were entered and analyzed through SPSS version 22.¹⁴ Descriptive statistics were recorded in terms of percentages and frequencies for categorical data.

RESULTS

A total of 254 participants were recruited in the study, 50 house officers and 202 students. Male 35.3% (n=89) and female 64.7 % (n=163) participated in the study. Figure 1 illustrates the frequency of tooth brushing, majority i.e. 65.8% participants brush twice daily, 6.75% brush thrice daily and 27.38% brush once daily. Table 1 represent the responses regarding the toothbrush storage and preservation. Figure 2 displays the percentage of participants who have knowlegde regarding the tooth brush diinfection.

Table 2 shows the response regarding toothbrush disinfection.

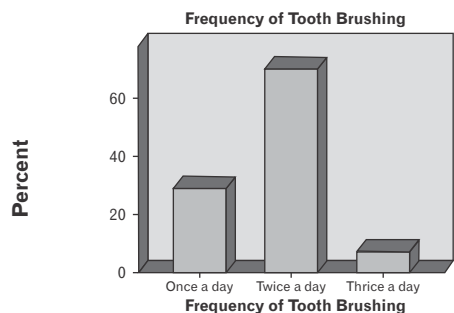


Figure 1. Displaying the tooth brushing frequency

Table 1. Responses regarding toothbrush storage and preservation			
QUESTIONS		Frequency	Percentage
Q-1	How often do you change your toothbrushes?		
	A-Once in a month,	74	29.4%
	b-Once in every 2 months	48	19%
	c-Once in every three months	130	51.6%
Q-2	Where do you keep your toothbrush?		
	a- In open environment like bathroom	79	31.3%
	b- In closed cabinet inside bathroom	109	43.3%
	c-Outside the bathroom	64	25.4%
Q-3	Where do you store your toothbrushes?		
	a-In a tooth brush holder share with other family members	77	30.6%
	b-Separately from tooth brushes of other family members,	174	69.0%
Q-4	Is contact between toothbrushes an important issue in your opinion?		
	a-Yes	50	19.8%
	b-No	202	80.2%
Q-5	Do you share your toothbrushes with other individual?		
	a-Yes	225	88.3%
	b-No	27	10.7%

Knowledge about tooth brush disinfection ■ No ■ Yes

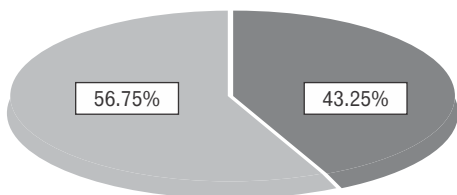


Figure 2. Displaying the knowledge about tooth brushes disinfection

Table 2. Responses regarding tooth brush disinfection			
QUESTIONS		Frequency	Percentage
Q-1	Practice of tooth brush disinfection		
	a-Yes	65	26.6%
	b-No	185	73.4%

Q-2	Disinfection of tooth brush is necessary		
	a-Yes	50	19.8%
	b-No	202	80.2%
Q-3	If toothbrushes disinfection is necessary, then for whom is it necessary?		
	a-Every body	144	57.1%
	b-Special patient group such as immune suppression, individual, hospitalized patient and children.	64	30.8%

Majority responded that they do not share their toothbrushes with others (n=225, 88.3%). Most of the participants had no knowledge about toothbrushes disinfection 56.7% (n=143) and those who had knowledge were 43.3% (n=109). Toothbrush disinfection was practiced by 26.6% (n=65) of the participants.

Toothbrush disinfection was reported as not necessary by 80.2% (n=202) and out of those who answered 'yes' that disinfection is necessary, 57.1% (n=144) reported that everyone should disinfect their toothbrush.

Most dentist brush their teeth twice daily (n=166, 65.9%), majority store their toothbrush in the closed cabinet in the bathroom (n=109, 43.3%), and most of them are the ones who keep their toothbrush separately from other family members (n=174, 69%), participants that thought the contact between toothbrush was not that important (n=202, 80.2%).

DISCUSSION

The contaminated toothbrush is the source for growing, retaining and transportation of microbes on the bristles. Ideal reservoir for environmental microorganisms and it could be a cause of re-infection of the person with pathogenic bacteria. Earlier in the literature it is stated that toothbrush get contaminated in the oral cavity by some of the microorganisms, and this can be cause of oral and systemic diseases. The heavily contaminated area on the toothbrush is where the tufts are anchored. The liquids and foodstuff drawn into to the spaces could lead to bacterial growth between the tufts. The oral health professionals does not consider

toothbrush disinfection, and is a neglected matter which requires enough attention in the literature. The present study provides an overview of the knowledge and behavior of toothbrush disinfection among the house officers and dental students of Baqai dental college, Karachi. It is necessary to know about toothbrush disinfection because oral health knowledge is important for general well being.

In the present study 56.7% (n=153) of the respondents have no knowledge of toothbrush cleaning and disinfection and only 26.6% (n=65) were disinfecting their toothbrush. Our results are in line with the study conducted in Ankara, Turkey by Peker et al. where most of the participants (60%) were unaware of the toothbrush disinfection and 80% of the respondents were not disinfecting their toothbrush. This could be because the oral health awareness at university and community level lacks the component of knowledge about toothbrush disinfection; more emphasis is given on the frequency of tooth brushing. A dentist's task is to encourage and instruct the patients about oral health behavior and knowledge about the preventive procedures.

The opinion of majority of the participants was that toothbrush disinfection is not necessary. Approximately 20% of the participants in the present study reported that toothbrush disinfection is necessary and should be performed by everyone. This is in contrary to the study by Peker et al, where 40% of the respondents believed that toothbrush disinfection should be performed by every person including healthy persons.

In our study majority of the participant's practice tooth brushing twice daily, that is in accordance with other studies that have similar results. This may be attributed to the similarity of profession as in some studies the data was collected from persons related to dentistry field and they are more aware of oral hygiene maintenance.

The American Dental Association acclaim that replaces the toothbrush every three to four months, or as soon the bristles seem damaged or spread out. In this study, most of the participants (51.6%) affirmed that toothbrush should be replaced once every three months, which are in accordance with the ADA recommendations.

Toothbrush have a significant influence in combating against tooth decay, contaminated toothbrush can prompt dental as well as systemic diseases, including septicemia, gastrointestinal, cardiovascular, respiratory, and renal issues and they can be counteracted by the proper storage and maintenance of toothbrush. Other factors like toothbrush location; storage circumstances affect the toothbrush contamination. In the present study majority of the participants, store their toothbrush outside the bathroom disjointedly from the other family members in closed cabinet.

CONCLUSION

Although millions of toothbrushes are sold every year throughout the world but there is lack of awareness regarding the contamination of toothbrush, there proper disinfection and storage. As most of the dental students and house officers themselves have no knowledge about disinfecting the toothbrush, how will they spread the message to public and their patients. Literature is available on the importance of tooth brushing and its relation to oral and systemic diseases but less is known about toothbrush disinfection.

Spread awareness and information about the importance of disinfecting the toothbrush among the oral health professionals who are responsible for the education of their patients and community.

Recommendations

Cup hooks should be used to hang the brushes, which are recommended for toothbrush storage, or a hole should be cut in the top of the carton box to store the brush, using closed and / or vented

containers, and using a brush box. Toothbrush should be disinfected or discarded at regular intervals for well being of individuals. Cleaning oral cavity with contaminated toothbrush will benefit less and will harm more it is therefore strongly emphasized to disinfect toothbrush at regular intervals. The American dental association recommends change of toothbrush every 3 months. The economical method for sterilization of toothbrush is the use of 0.12% chlorhexidine gluconate or 1% sodium hypochlorite which is proved efficient.

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CONFLICT OF INTEREST

There was no conflict of interest among the authors.

Ethical Approval

The ethical approval was sort from the Baqai Dental College Ethical Review Board (Reference number:BDC/ERB/2018/0001

Participants Consent

Informed written consent was obtained from all the participants.

AUTHOR'S CONTRIBUTION

Dr. Rubab Jawed contributed in the conception, design, analysis, and interpretation of data, revising it critically for intellectual content, Anoushia Nizam facilitated in data collection, Fatima Naseem A Khan helped in the critical analysis and drafting manuscript, Muhammad Khan helped in formulation of tables and interpretation of data, Naveed & Zakir Ullah facilitated in data collection.

REFERENCES

1. Peker I, Akarlan Z, Basman A, Haciosmanoglu N. Knowledge and behavior of dentists in a dental school regarding toothbrush disinfection. *Brazilian oral research*. 2015;29(1):1-8.
2. Komiyama EY, Back-Brito GN, Balducci I, Koga-Ito CYJBor. Evaluation of alternative methods for the disinfection of toothbrushes. 2010;24(1):28-33.
3. Karibasappa G, Nagesh L, Sujatha BJIJoDR. Assessment of microbial contamination of toothbrush head: an in vitro study. 2011;22(1):2.
4. Duke EM. Toothbrush holder and sterilizer. *Google Patents*; 1975.
5. Basman A, Peker I, Akca G, Alkurt MT, Sarikir C, Celik I. Evaluation of toothbrush disinfection via different methods. *Brazilian oral research*. 2016;30(1).
6. Frazelle MR, Munro CL. Toothbrush contamination: a review of the literature. *Nursing research and practice*. 2012;2012.
7. Peker I, Akca G, Sarikir C, Toraman Alkurt M, Celik IJTSWJ. Effectiveness of alternative methods for toothbrush disinfection: an in vitro study. 2014;2014.
8. Naik R, Mujib BA, Telagi N, Anil B, Spoorthi BJJofm, care p. Contaminated tooth brushes–potential threat to oral and general health. 2015;4(3):444.
9. Pesevska S, Ivanovski K, Mindova S, Kaftandzieva A, Ristoska S, Stefanovska E, et al. Bacterial contamination of the toothbrushes. 2016;9(1):6.
10. Lamothe D, Lamothe J. Toothbrush holder with bristle treatment liquid dispenser. *Google Patents*; 2018.
11. Nelson Filho P, Macari S, Faria G, Assed S, Ito IY. Microbial contamination of toothbrushes and their decontamination. *Pediatr Dent*. 2000;22(5):381-4.
12. Pobo A, Lisboa T, Rodriguez A, Sole R, Magret M, Trefler S, et al. A randomized trial of dental brushing for preventing ventilator-associated pneumonia. *Chest*. 2009;136(2):433-9.
13. Kumar G, Sethi AK, Tripathi RM. Assessment of knowledge, attitude, and practice of dental and

medical interns toward toothbrush maintenance and replacement in Bhubaneswar city, Odisha, India. *Journal of pharmacy & bioallied sciences.* 2018;10(2):77.

14. Morgan GA, Leech NL, Gloeckner GW, Barrett KC. *SPSS for introductory and intermediate statistics: IBM SPSS for introductory statistics use and interpretation.* 2012.

15. Ankola A, Hebbal M, Eshwar SJJodh. How clean is the toothbrush that cleans your tooth? 2009;7(4):237-40.

16. Bertolini PFR, Biondi Filho O, Pomilio A, Pinheiro SL, Carvalho MSdJJoas. Antimicrobial capacity of Aloe vera and propolis dentifrice against *Streptococcus mutans* strains in toothbrushes: an in vitro study. 2012;20(1):32-7.

17. Glass R. Toothbrush types and retention of microorganisms: how to choose a biologically sound toothbrush. *Journal-Oklahoma Dental Association.* 1992;82(3):26.

18. Jain N, Mitra D, Ashok K, Dundappa J, Soni S, Ahmed S. Oral hygiene-awareness and practice among patients attending OPD at Vyas Dental College and Hospital, Jodhpur. *Journal of Indian Society of Periodontology.* 2012;16(4):524.

19. Wagle M, Trovik TA, Basnet P, Acharya G. Do dentists have better oral health compared to general population: a study on oral health status and oral health behavior in Kathmandu, Nepal. *BMC Oral Health.* 2014;14(1):23.

20. Singh MS, Tuli AK. A comparative evaluation of oral hygiene practices, oral health status, and behavior between graduate and post-graduate dentists of North India: An epidemiological survey. *Journal of International Society of Preventive & Community Dentistry.* 2013;3(1):19.

21. Nascimento Cd, Sorgini MB, Pita MS, Fernandes FHCN, Calefi PL, Watanabe E, et al. Effectiveness of three antimicrobial mouthrinses on the disinfection of toothbrushes stored in closed containers: a randomized clinical investigation by DNA C heckerboard and C ulture. 2014;31(3):227-36.

AUTHORSHIP AND CONTRIBUTION DECLARATION			
Sr. #	Author's Full Name	Contribution to the paper	Author's Signature
1	Rubab Jawed	Conception, design and analysis and interpretation of data, revising it critically for intellectual content	
2	Muhammad Khan	Formulation of tables and interpretation of data	
3	Naveed	Compilation of write up drafting of data and provided substantial help in various aspects	
4	Fatima Naseem A. Khan	Corresponding and final drafting of the manuscript	
5	Ruqayah Hashmi	Review the manuscript and helps in various aspects	