

**Microbial colonisation in tooth brushes: creating awareness among the unaware population**

<sup>1</sup>Dr. Sahana Pushpa. T, BDS, Dental Surgeon, India

<sup>2</sup>Dr. Balamurugan. R, MDS, Oral and Maxillofacial Surgeon, India

**Corresponding Author:** Dr. Balamurugan. R , MDS, Oral and Maxillofacial Surgeon, RYA COSMO Foundation Hospital

**Citation of this Article:** Dr. Sahana Pushpa. T, Dr. Balamurugan. R, “Microbial colonisation in tooth brushes: creating awareness among the unaware population”, IJDSIR- February - 2020, Vol. – 3, Issue -1, P. No. 220 – 223.

**Copyright:** © 2020, Dr. Balamurugan. R , et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. Which allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

**Abstract**

**Aim and objectives:** The purpose of this study was to investigate on the viable microorganisms in 1 month used tooth brushes.

**Materials and methods:** This study was carried out on 100 participants who reported to dental op in India. All the participants were provided with new tooth brush of same type with identical tooth paste and asked to follow their routine oral hygiene practices for a period of one month. Post a month tooth brushes from all the participants were collected and subjected for culture test to identify the viable microbial colonies. The results were evaluated and analysed with chi-square test using SPSS software.

**Results:** In the majority of toothbrushes, microorganism like streptococcus has formed 84 colonies, streptococcus and coagulase negative staphylococcus formed 63 colonies which showed clinical and statistical significant results (P=0.03; P=0.05) respectively. In addition to that, microorganism like ASB was seen in 5 among 100 tooth brushes and Enterococcus was seen in 3 tooth brushes showed insignificant results.

**Conclusion:** Oral health awareness program among the unaware population is mandatory to prevent the contamination of microorganisms predominantly in tooth brushes to lead a healthy mannered life in future.

**Keywords:** toothbrush; micro-organisms; oral awareness program

**Introduction**

Toothbrushes play an essential role in oral hygiene maintenance and are commonly found both in community and hospital settings. Toothbrushes in regular use can become heavily contaminated with microorganisms. Such contamination is due to retention and survival of infectious organisms that occur on animate or inanimate objects. In healthy adults, contamination of toothbrushes occurs early after initial use and increases with repeated use. Depending upon storage conditions the toothbrush can therefore serve as a reservoir for the potential pathogens such as mutans streptococci to create colonies. Microorganisms from storage environments also has higher tendency to grow, these include enteric bacteria via aerosols from toilet flushing or from contaminated fingers

and skin commensals and pseudomonads emanating from the bathroom and other wet areas.

### **Materials And Methods**

100 adult completely dentulous participants with age group of 20-50 years who reported to dental op in saveetha dental college, India were included in the study. Ethical committee clearance was obtained from the institutional review board. All the participants were explained about the study and informed consent was obtained. They were given a new tooth brush of the same brand and type, together with identical tubes of fluoridated toothpaste. They were requested to follow their routine oral hygiene practices for a period of one month, at the end of which each toothbrush was collected in a sterile paper bag and processed within 18 hours of its late use. Each tooth brush was then decapitated and the head transferred to a tube containing 10mL of sterile phosphate-buffered saline (PBS). The contents were then subjected to vigorous vortex mixing for 60 seconds, ultrasonic for 30 seconds followed by further vortex mixing for 15 seconds. Ten-fold dilutions spread onto plates of the media like blood agar (AN), the plates were incubated anaerobically at 37° in an atmosphere of CO<sub>2</sub>/H<sub>2</sub>/N<sub>2</sub> for a minimum of 72 hours while the remaining plates were incubated aerobically for 48-72 hours. Total counts and counts of individual colony types were completed and representative colonies from appropriate plates were gram stained. They were also tested for the presence of oxidase, catalase and fermentation tests were carried out as a requisite for preliminary microbial identification (fig 1). The results were evaluated and analysed with chi-square test using SPSS software.



Fig 1: Agar Plate

### **Results**

A total of 100 completely dentulous patients reported to dental op were included in the present study with age group between 20-50 years. Microbiological analysis using compound microscope revealed microorganism in one month used toothbrushes kept in the bathrooms with and without attached toilets. Variable micro-organisms were identified with maximum number of colonies formed microscopically in one month used toothbrushes. In the majority of toothbrushes microorganism like streptococcus has formed 84 colonies, streptococcus and coagulase negative staphylococcus formed 63 colonies which showed clinical and statistical significant results (P=0.03; P=0.05) respectively. In addition to that, microorganism like ASB was seen in 5 among 100 tooth brushes and Enterococcus was seen in 3 tooth brushes which showed statistical insignificant results (P=1.53; P=1.76) respectively (Table 1, fig 2).

Microorganisms	Number of Colonies	P Value
Streptococcus	84	0.03
Streptococcus, Coagulase Negative Staphylococcus	63	0.05
Asb	38	1.53
Enterococcus	26	1.76

Table 1: Chi-square test of significance (micro-organisms with number of colonies)

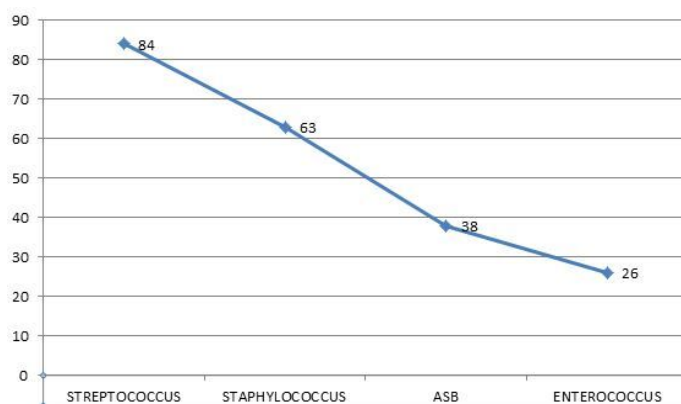


Fig 2: Microorganisms with number of colonies

### Discussion

The purpose of this study was to investigate on variable micro-organisms viable in the toothbrush affecting the health of unaware population. A great variety of microbes such as Streptococcus, Nisseria, Candida infect the oral cavity in the very first day of life itself [1]. However, mutans streptococci the main etiological agent of dental caries in humans infect the oral cavity only after the eruption of teeth. Svanberg et al [2] found that toothbrushes could be heavily infected with microorganisms especially mutans streptococci within 24 hrs of use. Toothbrushes play a major role in retention or retrieval of microorganisms. It poses a threat to certain patients at risk.

Studies [3-5] have shown that in subjects harboring high number of Actinobacillus actinomycetemcomitans in the sub gingival and supra gingival plaque, contaminated toothbrushes can lead to bacteremia. It is seen that

improperly cleaned or rinsed toothbrushes act as a factor for the growth of group A hemolytic streptococci which causes pharyngitis or tonsillitis in children. In our study, toothbrush was selected to assess the microbial contamination as it not only harbors microorganisms but also provide a favorable environment for their growth. The contamination of toothbrush could pose a significant risk of dissemination of infection for certain patients such as immunosuppressed, cardiopathic, organ transplants recipients [6].

Present study revealed that, microorganisms were found in 1 month used toothbrush included streptococcus, coagulase negative staphylococcus, ASB and enterococcus. Various microorganisms isolated in this study cause different diseases e.g. enterococcus cause urinary tract infections, bacteremia, bacterial endocarditis. The microorganisms isolated were not only oral pathogens but also general pathogens. The source of general pathogens could be improper storage of toothbrushes exposing them to unfavourable surrounding environment. oral commensals could also have contributed for contamination of toothbrushes. Toothbrushes contaminated with the microorganism will definitely pose a serious threat to oral as well as general health.

Dayoub MB et al [7] stated that wet environment is an ideal factor for the growth of microorganisms and the use of a disinfectant is a must at regular intervals. Frequency of change of toothbrushes based on fraying alone should not be considered. whenever hard deposits are appreciated on the head of toothbrush, it should be viewed as a nidus for microbial contamination. Ideally toothbrushes should not be kept in the bathroom with and without attached toilets as it is prone for contamination. Otherwise, toothbrushes should be kept in the anti-microbial solutions to prevent microbial contamination [8-10].

Several methods are available to preserve toothbrushes like usage of antimicrobial solutions, natural air drying and toothbrush sanitizer. Some of the commercially available antimicrobial solutions are 0.2% Chlorhexidine, 2% Triclosan, 1% Sodium hypochlorite, 3% Hydrogen peroxide. Homemade microbial solutions like 3% Neem that has antimicrobial property equivalent to that of standard antimicrobial solutions can also be recommended. The efficacy of salt water as an antimicrobial agent for preservation of toothbrushes should be tested and if proved efficient could be recommended.

### **Conclusion**

Maintenance of oral hygiene does not end by proper brushing and use of mouth wash to cleanse the oral cavity, it is necessary to maintain the toothbrush with antimicrobial solutions periodically and placement of toothbrush in a clean environment devoid of microbial contamination is mandatory. However, oral health education programs can improve awareness among the unaware population to lead a healthy mannered life in future.

### **References**

1. Glass RT, Lare MM. Toothbrush contamination: a potential health risk? *Quintessence Int* 1986;17:39-42.
2. Svanberg M. Contamination of toothpaste and toothbrush by *Streptococcus mutans*. *Scand J Dent Res* 1978;86:412-4.
3. Kozai K, Iwai T, Miura K. Residual contamination of toothbrushes by microorganisms. *J Dent Child* 1989;56:201-4.
4. Malmberg E, Birkhed D, Norvenius G, Noren JG, Dahlen CT. Microorganisms on toothbrushes at day-care centres. *Acta Odontol Scand* 1994;52:93-8.
5. Verran J, Leahy-Gilmartin AA. Investigations into the microbial contamination of toothbrushes. *Microbios*

- 1996;85:231-8.
6. Silver JG, Martin AW, McBride BC. Experimental transient bacteremias in human subjects with clinically healthy gingivae. *J Clin Periodontol* 1979;6:33-6.
7. Dayoub MB, Rusilko D, Gross A. Microbial contamination of toothbrushes. *J Dent Res* 1977;56:706.
8. Taji S, Rogers A. The microbial contamination of toothbrushes. A pilot study. *Aust Dent J* 1998;43:128-30.
9. Nelson FP, Faria G, Silva RAB et al. Evaluation of the contamination and disinfection methods of toothbrushes used by 24 to 48 month old children. *J Dent Child* 2006;73:152-8.
10. Sogi SH, Reddy SD, Kiran SN. Contamination of toothbrush at different time intervals and effectiveness of various disinfecting solutions in reducing the contamination. *J. Indian Soc Pedod Prev Dent* 2002; 20:81-5.