

Scientific Literature

on bristles bacterial contamination

(collection of clinical quotes)

Object of the collection: relationships between microorganisms and management method of home dental hygiene instruments equipped with bristles.

Aim of the collection: to know the correct way to store toothbrushes.

oo

*The purpose of this collection has the sole and precise intent to demonstrate, in an impartial manner, the clinical benefits carried out by **the dry preservation method of the dental brushes.***

This document is strictly reserved to Eliaga's interlocutors, in support of their assessments as operators in the sector.

Eliaga Srl

Analysis of Microbial Contamination and Antibacterial Effect Associated with Toothbrushes

Ji-Hyang Kim, Da-Ae Kim, Hee-Soo Kim, Ji-Yeon Baik, So-Hee Ju, and Seol-Hee Kim - Department of Dental Hygiene, College of Medical Science, Konyang University, Daejeon 35365, Korea

J Dent Hyg Sci Vol. 18, No. 5, 2018

There is a lack of awareness among the general public about toothbrush contamination, and most people do not recognize how important it is to store their toothbrush properly. As a result, toothbrushes are usually stored in an environment in which they can easily become contaminated by microorganisms.

Microbial contamination according to toothbrush storage location

Microbial contamination levels assessed according to toothbrush storage location revealed that toothbrushes stored in a humid environment had more general bacteria than those stored in a dry environment ($p > 0.05$). In particular, the amounts of coliform bacteria and *S. aureus* were three times higher in a humid environment than in a dry environment ($p < 0.05$; Table 3).

Table 3. Microbial Contamination according to Toothbrush Storage Location (CFU/ml)

	Humid environment (n=35)	Dry environment (n=10)	p-value
General bacteria	4,301.29±5,197.44	4,230.00±4,162.28	0.968
Coliform bacteria	715.86±1,369.09	276.00±846.89	0.216
Staphylococcus aureus	1,379.43±2,938.75	36.50±86.70	0.011

This is the primary material used for bristles, as it absorbs less water and dries faster than natural bristles, to minimize bacterial growth (17). However, water flows down the toothbrush bristles and collects at the bottom of the bristles, where humidity is maintained, thereby creating an environment that is conducive to bacterial growth. If a toothbrush is not cleaned or is stored in a humid environment after tooth brushing, it gets contaminated by microorganisms from the oral cavity and bacteria in the air. Millions or even billions of microorganisms live on toothbrushes, which are returned to the mouth when people brush their teeth, and these can cause diseases such as food poisoning in people with a weakened immune system (18).

Jo et al. (22) detected coliform bacteria not only on toothbrushes but also in storage cups and toothbrush holders, suggesting that hygiene care of the implements used for storing toothbrushes is also important. As for toothbrush storage location, general bacteria were found more often when toothbrushes were stored in a humid environment than in a dry environment. Importantly, microbial contamination with coliform bacteria and *S. aureus* was found to be three times higher in a humid than a dry environment. It is, therefore, important to reduce the risk of microbial contamination by storing toothbrushes in a clean place where they can dry easily; this is the generally recommended method.

References

17. Han SM, Yang SM, Lee YM, et al.: *The study on toothbrush filaments. J Periodontal Implant Sci* 32: 857-864, 2002.
18. Kim JS, Kim JB: *Prevalence and toxin genes of food-borne pathogens isolated from toothbrush in childcare center. J Food Hyg Saf* 30: 242-248, 2015.
22. Jo SH, Kim CI, Ha SD: *Outbreak pattern forecasting of food-borne disease in group food services in Korea. J Food Hyg Saf* 24: 19-26, 2009.

Toothbrush Contamination: A Review of the Literature (Review Article)

Michelle R. Frazelle¹ and Cindy L. Munro^{1, 2} - Hindawi Publishing Corporation Nursing Research and Practice Volume 2012,

It is crucial to recognize the importance of toothbrush care and store toothbrushes in a dry place and replace them periodically

Toothbrushes can become contaminated from the oral cavity, environment, hands, aerosol contamination, and storage containers.

Storage and Environment

Toothbrushes can become contaminated through contact with the environment, and bacterial survival is affected by toothbrush storage containers. Dayoub et al. found that toothbrushes placed in closed containers and exposure to contaminated surfaces yielded higher bacterial counts than those left open to air [18]. Mehta et al. found that the use of a cap for toothbrush storage increased bacteria survival [10]. Glass found that increased humidity in the environment increased bacterial survival on toothbrushes [12]. In addition, Glass found that bacteria survived more than 24 hours when moisture is present [12].

Dayoub et al. (1977) [18].

PURPOSE: To determine the degree of bacterial contamination of toothbrushes after contamination and storage in vented containers or in air.

DESIGN: Experimental

SAMPLE: N103 toothbrushes

RESULTS: The numbers of bacteria on toothbrushes stored in room air after use decrease more quickly than on brushes in containers.

Mehta et al. (2007) [10].

PURPOSE: To determine the extent of bacterial contamination of toothbrushes after use, evaluate the efficacy of chlorhexidine and Listerine in decontamination, and effectiveness of covering the toothbrush head with a cap.

DESIGN: Experimental

SAMPLE: N10 patients

RESULTS: Toothbrushes become contaminated during use; retention of moisture and the presence of organic matter may promote bacterial growth. Toothbrush contamination may lead to colonization and infection. Caps increase bacterial growth.

References

[10] A. Mehta, P. S. Sequeira, and G. Bhat, "Bacterial contamination and decontamination of toothbrushes after use," *The New York State Dental Journal*, vol. 73, no. 3, pp. 20–22, 2007.

[12] R. T. Glass, "Toothbrush types and retention of microorganisms: how to choose a biologically sound toothbrush," *Journal—Oklahoma Dental Association*, vol. 82, no. 3, pp. 26–28, 1992.

[18] M. B. Dayoub, D. Rusilko, and A. Gross, "Microbial contamination of toothbrushes," *Journal of Dental Research*, vol. 56, no. 6, article 706, 1977.

Micro-organism according to Storage Method of the Toothbrush

International Journal of Clinical Preventive Dentistry Volume 9, Number 4, December 2013

Jung-Hyeon Oh¹, Mi-Ra Lee², Jung-Hee Seo³, Yeon-Soo Chang

Department of Oral Health, Graduate School of Public Health & Social Welfare, Dankook University, Cheonan, Department of Dental Hygiene, Baekseok University, Cheonan, Department of Dental Hygiene, Gangneung Yeongdong College, Gangneung, Korea

It was recommended to manage the toothbrush storage method can be introduced as to get one more toothbrush, frequently exchange of toothbrush and clean well with dry after use the toothbrush, in order to reduce the micro-organism at the toothbrush.

Introduction

Many toothbrushes are contaminated because they are stored in places that are not dry. The habit of using the toothbrush and the method of storing it can change the life of toothbrush. A lot of germs that develop from various environments can grow in toothbrush, therefore toothbrush needs to be properly stored to reduce micro-organism multiplication. For proper toothbrush storage, use of containers that have sterilizing/bacteriostatic effects is recommended **as well as storing in clean and dry places and keeping each toothbrush separately** (1,2).

There are not many methods that can be practically used. The most basic and easiest method to properly store the toothbrushes is to understand the importance and problems of toothbrush management, and to manage them according to the toothbrush storing methods.

References

- 1. Kim JB, et al. Clinical preventive dentistry. 5th ed. Seoul: Komunsa; 2011:65-91, 289-303.*
- 2. Kang HK, et al. Periodontology. 3rd ed. Seoul: Komunsa; 2007:101-4.*

Influence of time, toothpaste, and saliva in the retention of Streptococcus mutans and Streptococcus sanguinis on different toothbrushes.

Julia Caroline SCHMIDT, Miriam BUX, Elisabeth FILIPUZZI-JENNY, Eva Maria KULIK, Tuomas WALTIMO, Roland WEIGER, Clemens WALTER.

1- Department of Periodontology, Endodontology and Cariology, School of Dental Medicine, University of Basel, Basel, Switzerland.

2- Clinic of Preventive Dentistry and Oral Microbiology, School of Dental Medicine, University of Basel, Basel, Switzerland.

Submitted: January 8, 2013 - Modification: February 6, 2014 - Accepted: March 3, 2014 www.scielo.br/jaos

The microbial load decreased after a period of dry storage.

This finding implies that the non-humid atmosphere and the absence of nutrients during dry storage prevent the survival of most microorganisms.

In our study, there was a greater reduction in microbial load after 24 hours of dry storage for both species and all toothbrushes.

Efficacy of two mouth rinse sprays in inhibiting *Streptococcus mutans* growth on toothbrush bristles ORIGINAL ARTICLE

Dalia Mamdouh Talaat, Aly Abd El-Aziz Sharaf, Mona Abd El-Moneim Ghoneim, Soraya Ali EL-Shazly, Omar Abd El Sadek El Meligy

- 1) *Faculty of Dentistry, Alexandria University, Egypt*
- 2) *Pediatric Dentistry Department, Moharam Bek Dental Research Center, Alexandria, Egypt*
- 3) *High Institute of Public Health, Alexandria University, Egypt*
- 4) *Faculty of Dentistry, King Abdulaziz University, Saudi Arabia*

(6 April 2018; revised 24 July 2018; accepted 30 July 2018 Available online 4 August 2018)

The results of our study revealed that after one-minute tooth brushing, toothbrushes in immediately processed control group IA loaded high count of *S. mutans*, which decreased by time when toothbrushes were kept in clean ventilated area. This might have been due to the need of humidity for *S. mutans* growth.

The results of our study showed that after one-minute tooth brushing, toothbrushes in immediately processed control group IA loaded high count of *S. mutans*. This count was significantly decreased by time when toothbrushes were kept in clean ventilated area for 24 h (group IB). This might have been due to the need of humidity for *S. mutans* growth. Our finding agreed with Sogi (1) et al. (2002) who found that bacterial count decreased by time when toothbrushes were kept in ventilated area. Also, Borso (2) et al. (2004) concluded that toothbrushes when covered increased humidity and so increase bacterial retention on toothbrushes rather than ventilated uncapped brushes.

References 1

Contamination of toothbrush at different time intervals and effectiveness of various disinfecting solutions in reducing the contamination of toothbrush. Sogi SH1, Subbareddy VV, Kiran SN

Journal of the Indian Society of Pedodontics and Preventive Dentistry, 01 Sep 2002,

The common devices used for oral hygiene measures are toothbrush, dentifrice, and oral rinses. Present study was carried out to know the level of contamination of toothbrush after brushing and at the same time, to know the efficacy of various disinfecting solution in reducing their contamination. Thirty-two children in the age group of 12-14, residing in Government Hostel were selected. They were divided into four groups of 8 each and were supplied with toothbrushes. Toothbrushes were cultured to assess the contamination at different time intervals. Control group had shown the highest percentage of contamination. It was concluded that cleaning of the oral cavity is not the only procedure in maintaining the oral hygiene, the oral hygiene devices should also be kept clean and dry.

Microbiological evaluation of bristles of frequently used toothbrushes

Dental Press J Orthod. 2012 July-Aug;17(4):72-6

Celso André Ferreira¹, Geovana Dagostim Savi², Ana Paula Panatto¹, Jaqueline da Silva Generoso², Tatiana Barichello³

The toothbrushes contamination can play an important role in the development of various diseases. Brushes should be replaced monthly and should not be stored in closed or wet containers, these locations associated with the substrate food scraps facilitate the microorganism's growth.

The presence of organisms can be related to the lack of cleaning in the bristles or the brushes storage in wrong places with high rates of heat and humidity, which facilitates the spread and growth of these microorganisms. Among the survey members we found that 90% store the brushes in the bathrooms and among them 30% placed in lockers and 60% reported that the brushes are stored in a location such as exposed in the bathroom, over the sink, counter, glasses, among others. Regarding the use of protective cover on the brush, 90% of respondents did not use the cover protection on their brushes.

According to Barros, Pernambuco and Tomita, the brush should be kept clean and should be stored where it can dry and without direct contact with other brushes.

Bacterial Contamination of Used Manual Toothbrushes Obtained from Some Students of Nnamdi Azikiwe

Article · January 2015 DOI: 10.13189/ujmr.2015.030404

1Department of Applied Microbiology and Brewing, Nnamdi Azikiwe University, Nigeria

2Department of Zoology, Nnamdi Azikiwe University, Nigeria

The contamination of the used toothbrushes by bacteria may come from the oral cavity, storage containers, storage environments, the water used for rinsing and the users.

Since the organisms are pathogenic and could be a potential health hazard, adequate rinsing and air-drying of the toothbrushes before storage will minimize the incidence of these bacteria and the health risk associated with them.

Different brands of toothbrushes are marketed to the public every year with little information on their contamination by bacteria with use. The use of uncontaminated toothbrushes will assist in the maintenance of sound oral hygiene and reduce the health risk posed by the contaminating bacteria to humans.

All the used toothbrushes examined in this study were contaminated with bacteria which are known to cause serious health problems in humans. Since toothbrushes serve as reservoirs for microorganisms and play a major role in disease transmission and increase in risk of infections, their care should be given adequate attention. They must be adequately rinsed with sterile water and allowed to dry in air before storage in hygienic dry containers.

Evaluation of streptococcus mutans contamination of toothbrushes and their decontamination using various disinfectants - An in vitro study

NanjundaSwamy KV* Anand U Madihalli†M. B. Prashanth‡ *M.D.S,Professor, Department of Pedodontics, †M.D.S, Professor, Department of Prosthodontics,‡M.D.S, Professor, Department of conservative dentistry,Sri Aurobindo

College of Dentistry, Indore, India.

Cleaning of the oral cavity is not the only procedure in maintaining the oral hygiene. The oral hygiene devices should also be kept clean.

In this study toothbrushes were kept in the bathroom environment where it is usually kept after normal brushing. Storage conditions of toothbrushes are an important factor for bacterial survival. Caudry et al7, reported that a wet environment increases bacterial growth and cross contamination. Therefore, as time increases between one tooth brushing and another, more microorganism development can occur in the toothbrushes stored in a wet/moisture environment.