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Assessment of Bacteriological contamination in Tooth brushes

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ABSTRACT

With the dawn of the new century, dentistry has seen a new face in the fields of diagnosis, treatment and prevention. A peer-reviewed laboratory scale research was conducted to evaluate the cumulative state of knowledge related to toothbrush contamination and its possible role in disease transmission. Individuals were each supplied with a new toothbrush. After a period of one month i-e; four weeks, during which subjects were asked to follow their usual oral hygiene practices, the toothbrushes were collected and assayed for microbial contamination using a few selective growth media. Colonies of the most suspected micro-organisms like *Enterococci*, *Staphylococci*, *Salmonella*, *Shigella* and *Pseudomonas* spp were observed on the media plates. Quantitatively dominating genera were Staphylococci and Enterococci whose colonies were observed on MacConkey's agar. However, no fungal colony was detected on any of the plates of Sabouraud's Dextrose Agar.

Keywords: Toothbrushes, oral hygiene, microbial contamination.

INTRODUCTION

The human mouth contains hundreds of different types of microbes commonly called germ, in which few are convey to the tooth brush during its use and some are come from the environment where the toothbrushes are stored (Long et al 2000).Hence, The toothbrush can have a number of microorganisms including bacteria, fungi and viruses (Contreras et al 2002, Falck et al 1998, Glass et al 1994), depending upon storage criteria. Therefore, toothbrush acts as a reservoir of many potential pathogens, such as mutans streptococci (Svanberg 1978).

There are many different method which are used for killing the microbes in tooth brushes includes, Soaking the toothbrush in alcohol (Cobb 1920) or disinfecting solution (Caudry et al 1995, Lara et al 2001, Nelson et al 2000, Sanches et al 2001) spreading of antimicrobial solutions (Meier et al 1996, Nelson et al 2003) ,exploit ultraviolet light (Fratto et al 1986, Glass et al 1994).The purpose of the study was to assessment the microbial contamination of toothbrushes which may also the cause of many disease or dental carriers.

MATERIALS AND METHODS

Tooth brushes were distributed among 10 people. They were requested to follow their normal oral hygiene practices for a four-week period at the end of which each toothbrush was collected in a sterile paper bag and processed within 18 hours of its last use. The head of each tooth brush was transferred to a tube containing 10ml of sterile phosphate-buffered saline (PBS). The contents were then subjected to vigorous vortex mixing for 60 seconds, ultra sonication for 30 seconds, followed by further vortex mixing for 15 seconds. Five-folds dilutions in PBS were prepared and 0.1ml of appropriate dilutions of 10-3 and 10-5 were spread onto the plates of following media; MacConkey's agar; for Enterobacteria, Cetrimide agar; for pseudomonas,Sabouraud's dextrose agar (SDA); for yeasts and moulds.

Incubation period:

These plates were then incubated aerobically for 24-48 hours and the plates of SDA were further incubated for 48 hours to culture fungus. Predominant colonies were identified in each plate and their morphological characteristics were studied in detail so as to determine which type of colony belongs to which genera.

RESULTS & DISCUSSION

From table 1 it can be observed that a variety of micro-organisms can be found in the micro-biota of contaminated toothbrushes. No toothbrush was found bacteria-free in this study. However, there are a few exceptions which might be due to the information regarding the variables such as toothbrush rinsing practices, post-brushing storage methods, pre-brushing mouthwashes, etc. All these factors can increase the microbial load as well as decrease it depending upon the situation. Apart from that, growth occurred on all MacConkey's and Cetrimide agar plates. However, no growth of any fungal colony was observed on SDA. The study suspects the presence of staphylococci and Enterococci as a part of normal mouth flora. Presence of Salmonella and Shigella is also indicated but not that numerically dominant as Staphylococci.Cetrimide agar was used as pseudomonas selective medium for the growth of pseudomonas species.

In Pakistan, no such records of a similar study could be found. However, oral hygiene practices are of great importance. The principal author of this study hopes that this pilot study will help in opening new doors to this kind of research in Pakistan.

The ubiquity of this group of organisms on the tested toothbrushes may well be related to the fact that most of the subjects used their fingers during post-brushing rinsing of their toothbrushes. The origin of pseudomonas and coliforms would be environmental; pseudomonas from tap water. A toothbrush does not naturally contain nutrients to support bacterial growth. However, after brushing, food particles often cling to the bristles of the toothbrush. From being rinsed with water and coming into contact with the moist environment of the mouth, the toothbrush becomes moist. All together, these aspects help make the toothbrush a more favorable environment for microbial growth. Bacteria in mouths can transfer to toothbrushes, so active brushing will cause bacteria to always be present on the toothbrush. Bacteria living on one toothbrush can thus be transferred to another nearby toothbrush through contact. The toilet also harbors a community of bacteria that can be partially transferred onto the toothbrush (Scott 1982).

Table 1: Types of microorganisms isolated on various media from used toothbrushes

Type of microorganism	Subject (brush)									
	1	2	3	4	5	6	7	8	9	10
Salmonella & Shigella	+	+	-	+	-	-	+	-	-	+
Enterococci	+	+	+	+	+	+	+	+	+	+
Staphlococci spp	+	+	+	+	+	+	+	+	+	+
Pseudomonas spp	+	+	+	+	+	+	+	+	+	+
Escherichia coli	-	+	+	-	+	-	-	-	+	+
Fungus	-	-	-	-	-	-	-	-	-	-
Yeast	-	-	-	-	-	-	-	-	-	-

+ Growth; - No growth

Table 1: Types of microorganisms isolated on various media from used toothbrushes

CONCLUSION

This study concludes that most of the toothbrushes were extensively contaminated with a variety of micro-organisms. Therefore, it makes sense that individuals should store their toothbrushes in separate holders or locations, preferably away from the toilet as well. The exception is storing a toothbrush in a closed container or cabinet. According to the American Dental Association, dark and moist environments are more favorable towards the growth of microorganisms than open air.

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