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EVALUATION OF BACTERIAL LOAD ON THE ELECTRONIC DEVICE WITH AND WITHOUT THE USE OF TWO DIFFERENT DISINFECTANTS

Endodontic

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ABSTRACT

Aim: The aim of the study is to compare the bacterial load on the electronic device using two different disinfectants Material and methods
Material and methods: 40 electronic devices were selected from the dental hospital. The devices were randomly divided into three groups. Group A- disinfected with isopropyl alcohol, Group B- disinfected with 2% glutaraldehyde solution. The first sample was collected from the devices after disinfection. The samples were left in the dental operatory. After 7 hours, the second sample was collected from each device. The bacterial load was evaluated under microscope.
Results: The results showed that bacterial colonies were evident in group A. It was also found that compared to conventional alcohol based disinfecting agent, 2% glutaraldehyde was found to be an effective disinfecting agent as there were minimal or no bacterial colonies.
Conclusion: The study concluded that contamination of the bacteria were evident on the electronic devices used inside the operatory. Hence proper aseptic protocol should be followed in dental operatory.

KEYWORDS

Bacteria, Electronic Device, Glutaraldehyde Solution, Moist Swab, Colony Forming Units

Introduction

Dental professionals are exposed to many microorganisms present in blood and saliva. Their cellular phones are seldom cleaned and often touched during or after the examination of patients without hand washing.[1] Mobile phones come into close contact with strongly contaminated human body areas with hands to hands, and hands to other areas like mouth, nose and ears, hence they act as perfect habitat for microbes to breed, especially in high temperature and humid conditions, these mobile phones may serve as reservoirs of microorganisms that could be easily transmitted from one patient to another in the dental care environment. [2]

The phones contain more skin bacteria than any other object; this could be due to the fact that certain types of bacteria at high temperatures multiply rapidly and breeding of the germs are evident, as they are kept warm in brief cases, handbags and pocket. These bacteria are toxic to humans, and can cause infections if they get an opportunity to enter the body. Hence apparently acts as a potentially vehicle for nosocomial transmission of pathogens [3]

Enteric pathogens are the most frequent cause of diarrhoea and account for an annual mortality rate of about five million people worldwide. In Turkey the first study of bacterial contamination of mobile phones was conducted. In a study conducted in New York, One-fifth of the cellular telephones was examined and was found to harbor pathogenic microorganisms [4]

This study aims to evaluate the bacterial contamination on electronic device in dental operatory. There are many researches done on evaluating the micro organisms in medical fields. This is the first article in dentistry which reports the total bacterial load of contamination per day on the electronic device. This clearly indicates that dental professionals are prone to nosocomial infection and strict aseptic protocol need to be followed while working in dental operatory

Materials and methods

This study was carried out in hospital attached institution in Chennai city, Tamilnadu. A total of 40 samples were taken in this study. It was divided into two groups group A and group B. Group A was disinfected with 70% isopropyl alcohol and group B was disinfected with 2% glutaraldehyde

Swab collection

Moist swab were taken from the surface of the sample immediately after disinfection. The samples were left in the dental operatory and the operators were asked to carry out their routine treatment procedures without any specific instructions. After seven hours the second swab were taken from the surface of the sample without disinfection.
Microbiological analysis

The swabs were transported immediately as delayed in transportation leads contamination of the samples. The swab was plated on the growth media made with brain heart infusion agar. The samples were incubated at temperature of 37^{0}C for 24 hours. The culture results were obtained as mean colony forming units.

Statistical analysis

The resultant data was tabulated and statistical analysis was made. The analysis was made with SPSS software system version 23.0. To analyze the bivariate paired group Wilcoxon Signed Rank test and for independent groups Mann Whitney U test was test. The probability value of 0.05 was kept significant.

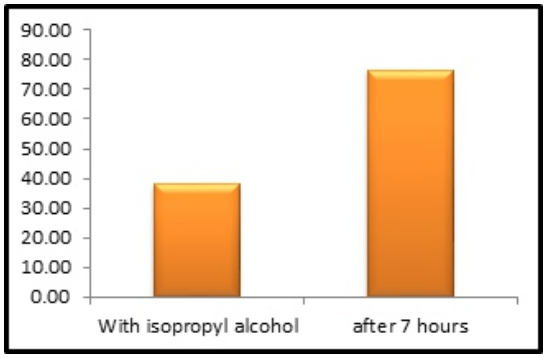
Results

It was found that after 7 hours the number bacterial colonies formed was increased compared to sample with disinfection (Tab. 1& Fig 1). With respect to 2% glutaraldehyde the samples showed increased bacterial colonies after 7 hours compared to samples with (Tab 2 & Fig 2). When 70% isopropyl alcohol and 2% glutaraldehyde, the latter showed reduced bacterial colonies with and without disinfection, which proved to be statistically significant (Tab. 3& Fig 3)

Tab.1

Group	Mean	N	Std dev	Std error
With isopropyl alcohol	38.0	20	18.8	4.2
After 7 hours	76.5	20	104.6	23.4

Fig 1



Tab 2

Group	Mean	N	Std dev	Std error
With Cidex	2.20	20	1.64	0.36
After 7 hours	35.65	20	7.82	1.74

Fig 2

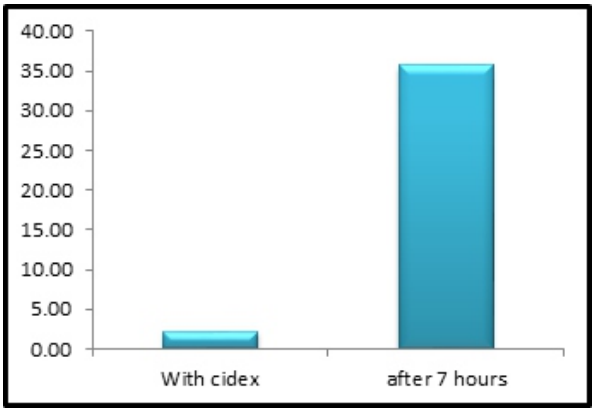
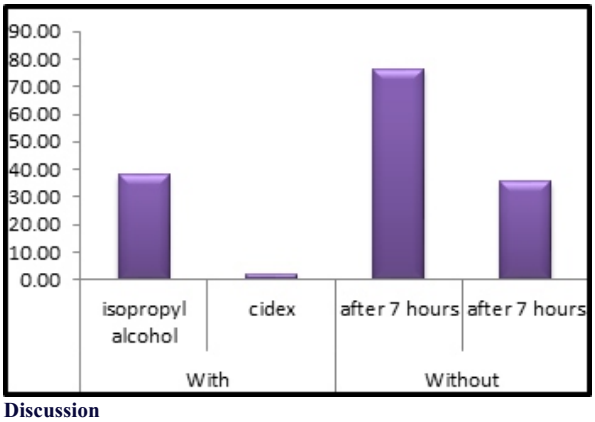


Fig 3



Discussion

Contamination of electronic devices poses a major risk to the operator. Micro organism present in the blood and saliva spread through aerosol contamination adhere to any surface and multiply rapidly in the operating area. It was reported that mobile phones are more contaminated than toilets and sole of the shoes. Mobile phones were touched by the operator at the end of the procedure without washing the hands or in the middle of the procedure with gloved hand. [5, 6, 7] Colonization of micro organism on personal work tools like stethoscope, pens etc which are not routinely disinfected act as a reservoir of bacteria "Trojan horses" causing hospital acquired infection [3, 8].

Dutta et al [9] conducted a study using mobile phones of sample size 144, infected by bacteria. Out of which 36% were contaminated with S.Aureus. This clearly states that electronic gadgets are associated with nosocomial infection.

Brady et al [6] stated that less than 4.76% of isolated bacteria were gram negative. Khivsara et al [10] reported that mobile phones of health care workers were contaminated up to 40%

According to a study done by Trivedi et al [11] 46.6% of mobile phones of the staff working in hospitals were contaminated with bacteria. It was seen that the most predominant of which are staphylococcus epidermis. The study result by Sepehri et al [12] also concluded that 40% of health care worker staff's hands and 32% of their mobile phones were contaminated with bacteria.

In the study done by Hosseini et al [13] concluded that mobile phones from dental and engineering schools had 94% of bacterial contamination. Mohammadi et al [14] reported that S. Aureus were evident on contaminated mobile phones.

46% mobile phones of medical staff and students reported positive cultures. Out of which 15% were found to be gram negative pathogen as reported by Ramesh et al [15]. Ulger et al [16] concluded that 94.5% of phones showed gram negative bacterial contamination among health care workers.

According to Elkholy and Ewees [17], it was reported that 96.55 of mobile phones were contaminated. It was found that the organism found on the mobile phones and on the hands were found to be the same.

Jeskey et al [2] concluded that hands of the health care worker were contaminated with bacteria about 95% and contaminations in their mobile phones were 90%. Tambekar et al [18] concluded that 95% mobile phones showed bacterial contamination, predominant were S.Aureus. Similarly Ali et al [2] stated that 46% of mobile phones of health care workers carried infective micro organisms

40% mobile phones of 266 of medical staff and students in Queen Elizabeth hospitals in Barbados, West Indies showed positive culture [15]. Akinyemi et al [19] stated that 42% of mobile phones were contaminated with Coagulase negative Staphylococcus. This result was found to corroborate with the study result of Karabay et al which concluded that Coagulase Negative Staphylococcus to be isolated in 68.4% of mobile phones. [20]

A similar study were conducted in turkey and found that only 9% of mobile phones were contaminated with bacteria associated with nosocomial infections.

Conclusion

The present study concludes that bacterial contaminations were evident on the electronic device. Since electronic device generate heat, hence this surface of the device favors the colonization of bacteria. Treatment procedures in dental operatory cause aerosol contamination as it as reported that around 300 species of microorganisms were evident in the oral cavity. Hence proper aseptic protocol should be followed in dental operatory.

Recommendation.

- Periodic usage of antibacterial spray, disinfecting solution, UV chambers, Alcohol- Chlorhexidine wipes can be used.
- Hand washing should be done according to aseptic protocol instructions before and after
- the treatment procedures.
- Gloves should be worn and should be changed between patients.
- CDE program should be conducted to create awareness among the dental professionals and students about the harmful effects on fomities in transmission of bacterial contamination.
- This study concludes that the usage of CIDEX (2% Glutaraldehyde) solution had significant decrease in bacterial load.

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