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In Vitro Assessment of Microbial Contamination and the Disinfecting Adequacy of Alcohol Solution on Orthodontic Pliers

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ABSTRACT

Background: The oral cavity contains several types of microorganisms that frame a complex environment and a different and regularly pathogenic microbiota. Subsequently, uncommon consideration ought to be paid to contamination control and biosafety in dentistry.

Objectives: The point of the show think about was to assess the microbial defilement of orthodontic pliers and disinfection efficacy of ethanol alcohol.

Materials and Methods: Ten sterilized pliers were enrolled in this study. A sterile cotton swab was rolled over the internal surfaces of the pliers' beaks after clinical use and after disinfecting with ethanol alcohol solution. Then the samples were transported immediately for culture and identification of microorganisms.

Results: Microbial contamination was detected on all pliers after used. Streptococcus spp. was found to have the highest percentage, while Escherichia coli and Bacillus spp. scored the lowest percentage of the isolated microbial strains. Upon disinfection with 70% ethanol alcohol solution revealed reduction in number of colonies of different microorganisms.

Conclusion: These finding suggested that like any other dental tools orthodontic pliers were contaminated after use in clinical cases, so they must be sterilized after each use in patients. In addition, this study indicated that the disinfection with 70% ethanol alcohol is the not efficient method.

Key words: Orthodontic pliers, Disinfection, Microorganisms.

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INTRODUCTION

The oral cavity includes many distinct microbial natural homes that serve as stores for few pathogenic organisms cause systemic infection and increase the hazard of cross-contamination [1,2]. Orthodontic treatment, through the utilize of fixed or removable appliances, leads particular changes within the oral cavity, as pH lessening, raise accumulation of dental biofilm, and expanded levels of microorganisms in saliva and biofilm [3,4]. As a result, illnesses can be transmitted by lineal contact with sullied tools or materials, either when utilized straight from the manufacturer's bundling or when utilized in more than one patient without appropriate sanitization or sterilization [5]. So these items got to be sanitizing with each utilize, as a way to maintain a strategic distance from the hazard of cross-contamination by microorganisms.

Heat sterilization and cleansing are the successful strategies to kill microorganisms causing defilement. In any case, writing has detailed chemical cleansing to be more efficient in diminishing contamination when compared to heat sterilization. Glutaraldehyde, hydrogen peroxide, alcohol, and chlorhexidine are the disinfectants usually utilized within the chemical sterilization handle [6,7]. Within the healthcare setting, "alcohol" alludes to two water-soluble chemical compounds—ethyl alcohol and isopropyl alcohol—that have for the most part underrated germicidal characteristics [8]. FDA has not cleared any liquid chemical sterility or high-level disinfectant with alcohol as the most active component. These alcohols are quickly bactericidal instead of bacteriostatic against vegetative forms of bacteria; they too are tuberculocidal, fungicidal and veridical but do not demolish bacterial spores [9]. Subsequently the purpose of this work was to assess the microbial contamination of orthodontic pliers and sanitization efficacy of ethanol alcohol.

PARTICIPANTS AND METHODS

Ten sterilized pliers were utilized in this study to adjust the orthodontic apparatus in patients in a private clinic by dentist. A sterile cotton swab was rolled over the internal surfaces of the pliers before and after disinfection with 70% ethanol alcohol solution by immersion completely for 5 minutes. A swab was incorporated into a container including two ml of normal saline. Then two dilutions

were prepared in 0.9% normal saline (1:100 and1:1000), and 0.1 ml from each solution was spread on blood agar, McConkey agar and Sabouraud dextrose agar by sterile microbiological spreader. Some blood agar plates have been incubated anaerobically for 48 hrs. at 37 ◦ C in an anaerobic jar and other plates were incubated aerobically for 24 hrs. at 37 ◦ C, while MacConkey's as well Sabouraud dextrose agars were incubated aerobically for 24 hrs. at 37 ◦ C. After then microorganisms were identified according to colony properties, Gram staining and biochemical tests, as well colony forming units (CFU) were numbered and compared before and after disinfection.

RESULTS

According to the evaluation of bacterial growth, it was found that all orthodontic pliers were contaminated after used in clinic. The most predominant microorganisms isolated from pliers were presented in (Table 1), Streptococcus spp. was found to have the highest percentage, while Escherichia coli and Bacillus spp. scored the lowest percentage of the isolated microbial strains. Furthermore the current study showed that after disinfection of orthodontic pliers with 70% ethanol alcohol solution the count of different microorganisms was decreased (Table 2).

Table 1: Prevalence and percentage of the isolated microorganisms from orthodontic pliers.

Microorganisms	Prevalence	Percentage (%)
Streptococcus spp.	08/10	80%
Staphylococcus spp.	06/10	60%
Moraxella spp.	04/10	40%
Candida albicans	04/10	40%
Micrococcus spp.	02/10	20%
Escherichia coli	01/10	10%
Bacillus spp.	01/10	10%

Table 2: Number of colonies of microorganisms before and after disinfection.

Microorganisms	Number of colonies before disinfection	Number of colonies after disinfection
Streptococcus spp.	123	33
Staphylococcus spp.	97	20
Moraxella spp.	85	25
Candida albicans	41	0
Micrococcus spp.	21	8
Escherichia coli	15	0
Bacillus spp.	14	0

DISCUSSION AND CONCLUSION

Clinical orthodontics, a strength that as a rule has more patients than other dental specialties, requests arranging and organization of sterilization and sanitization methods to guarantee more noteworthy assurance to both patients and dental healthcare staff [10]. Sanitization does not supplant sterilization and, thus, all fabric that can experience sterilization ought to never be as it were cleaned. In any case, a common blunder among orthodontists is to see cleansing as an elective to sterilization [11].

In this research the most predominant microorganisms isolated from pliers after used in clinic were Streptococcus spp., Staphylococcus spp., Moraxella spp., Candida albicans, Micrococcus spp., Escherichia coli and Bacillus spp. The current result revealed that microbial colonization was confirmed in all the orthodontic pliers after used in clinic, while after disinfection of orthodontic pliers with 70% ethanol alcohol solution the count of some microorganisms were completely decreased, this result is agreement with other result [12] reported that utilized ethyl alcohol did not obtain a complete disinfection of orthodontic pliers. This finding may be clarified by the truth that liquor has fast dissipation, not permitting lessening within the number of colonies.

Notably, Larson and Morton reported that According to the sort of microorganism, ethanol as a drying operator causes cell layer harm, quick denaturalization of proteins

with consequent metabolism obstructions, and cell lysis [13].

However; our result is at disagreement with the results of Almeida [14] who showed that Streptococcus were fully removed while Staphylococcus were observed in considerable quantities post-disinfection treatment with 70% ethyl alcohol, which indicates the inefficiency of this process as a medium-grade antiseptic. On the other hand, Carvalho et al, [15] showed that when using 70% ethyl alcohol a complete disinfection of rubber toys was achieved. Interestingly, Guimarães et al. [16] stated that ethanol is not recommended by the ADA as a surface sterilizer or immersion. As well the author goes further by saying that its employ is not suitable for purify surgical tools on account of their low sporicidal activity and its disability to infiltrate materials which rich with protein, though it is microbicidal, it excludes the hydrophilic, like hepatitis viruses. In conclusion these finding suggested that like any other dental tools orthodontic pliers were contaminated after use in clinical cases, so they must be sterilized after each use in patients. In addition, this study indicated that the disinfection with 70% ethanol alcohol is the not efficient method [17].

REFERENCES

1. Saad HS, Nidhal GH. Evaluation of microbial contamination of different orthodontic as received arch wires from manufacturers. Int J Med Res Health Sci 2017; 6:13–18.
2. Dewhirst FE, Chen T, Izard J, et al. The human oral microbiome. J Bacteriol 2010; 192:5002–5017.
3. Kharod N, Hemanth M, Kabbur K, et al. Assessing microbial contamination of as received orthodontic brackets and wires-an in vitro study. Int J Adv Res 2017; 6:1572–1575.
4. Purmal K, Chin S, Pinto J, et al. Microbial contamination of orthodontic buccal tubes from manufacturers. Int J Mol Sci 2010; 11:3349–3356.
5. Morrison A, Conrod S. Dental burs and endodontic files: are routine sterilization procedures effective? J Can Dent Assoc 2009; 75:39.
6. Ganavadiya R, Shekar BC, Saxena V, et al. Disinfecting efficacy of three chemical disinfectants on contaminated diagnostic instruments: A randomized trial. J Basic Clin Pharm 2014; 5:98.
7. Abreu AC, Tavares RR, Borges A, et al. Current and emergent strategies for disinfection of hospital environments. J Antimicrob Chemother 2013; 68:2718–2732.
8. Spaulding EH. Alcohol as a surgical disinfectant. AORN J 1964; 2:67-71.
9. Morton HE. The relationship of concentration and germicidal efficiency of ethyl alcohol. Ann NY Acad Sci 1950; 53:191-196.
10. Woo J, Anderson R, Maguire B, et al. Compliance with infection control procedures among California orthodontists. Am J Orthod Dentofacial Orthop 1992; 102:68-75
11. Gandini Júnior LG, Souza RS, Martins JC, et al. Control of cross-infection in orthodontics: Part 1- Hepatitis B, disinfection and personal apparatus. Rev Dent Orthodontic Press Ortop Jaw 1997; 77-82.
12. Navarro CA, Miguel JA, Hirata R, et al. Evaluation of the effectiveness of infection control methods in orthodontic pliers. J Bras Orthodon Ortop Facial 1999; 516-525.
13. Larson EL, Morton HE. Disinfection, sterilization and preservation. Philadelphia 1991; 91.
14. Almeida CMF, Carvalho AS, Duarte DA. Evaluation of disinfection methods of orthodontic pliers. Dental Press J Orthod 2012; 17:105-109.
15. Carvalho AS. Evaluation of toy disinfection methods used in dental offices. 2000.
16. Guimaräes J. Biosafety and cross-infection control in dental offices. In Biosafety and cross-infection control in dental offices. 2001; 536-536.
17. Silva CR, Jorge AO. Evaluation of surface disinfectants used in Dentistry. Braz Dent Res 2002; 16:107-114.