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Effect Of Mouthwash On Bacterial Count During Dental Procedures

Research Article

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Abstract

Mouthwashes are solutions used to rinse the mouth, to act as an astringent, to deodorize, to remove or destroy bacteria and to have a therapeutic effect by relieving infection or preventing dental caries. The aim of the study is to determine the effect of mouthwash on bacterial count during a dental procedure. The objective of the study is to assess the level of effectiveness of mouthwash both positively and negatively during dental treatments, to determine the impact of mouthwash on bacterial count during a dental procedure and to assess the bacterial colonies with and without mouth washed during dental procedure. Sample population of 20 healthy individuals divided into 2 groups; Group A (the control group) and Group B (provided with preprocedural mouth-rinse). Microbiologic analysis was done for the assessment of bacterial Colony Forming Units (CFUs). The agar plates were cultured and incubated.The median and range for the bacterial count seen after microbiological analysis from patients who had preprocedural mouth rinse is lower compared to those who had not used the mouth rinse before the procedure. Aerosol and splatter are a concern in dentistry because of their potential effects on the health of patients and of dental personnel. Many routine dental procedures produce aerosol and splatter composed of various combinations of water; organic particles, such as tissue and tooth dust; and organic fluids, such as blood and saliva. Dental health professionals, because of repeated exposures to these microorganisms, are at high risk for developing infectious diseases. The present study will compare the efficacy of mouth rinse in reducing the viable bacteria in dental aerosol following oral prophylaxis and to understand the quality of microorganisms present in the dental aerosol.

Keywords: Mouthwash; Bacteria; Dental; Aerosol; Splatter; Protection; Airborne.

Introduction

Bacteria, a thick layer lying over the teeth, constitutes dental biofilm. The dentist area of work can become a contaminated zone that is the area in which contamination by patient fluids (blood and saliva) may occur by transfer, splashing or splatter of material [21]. It is necessary to prevent the transmission of disease-producing agents such as bacteria and viruses from one patient to another patient or from patients to dental practitioners or other dental staff. There are various methods of contamination; airborne contamination, direct contamination and indirect contamination [10].

The presence of bacteria can be seen in water, surface and in air. The kind of bacterial water contamination occurs in the water of dental units. The most commonly found bacteria in this zone are fecal streptococci, staphylococci, and pseudomonas species. The other kind of contamination occurs by the bacterial interaction on the surface of dental units such as the attached dental tool rack. The most common type of microorganisms seen in this location are fungi, beta-hemolytic streptococci and staphylococci. While the airborne contamination showed presence of microorganisms [1]. The airborne contaminants are aerosols, mists and splatter as classified based on the size of the particles.

The aerosols produced may be contaminated with bacteria and fungi from the oral cavity (from saliva and dental biofilm), as well as viruses from the patient's blood and also from contaminated water of the dental unit [18]. According to the study done by Ben-

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net et al. in 2000, it was found that the highest concentration of bacterial count seen at breathing one was when carrying out the scaling procedure. The most common causes of airborne aerosols are the high speed air rotor handpiece, the ultrasonic scaler and the triplex syringe [14].

It was stated that aerosols may consist of invisible particles ranging from 5mm to 50mm [15]. The type of visible air droplets seen under the exposure of light is mist. They are approximately 50mm in size and will settle down on surfaces after some time. While splatter is particles greater than 50mm in size. They are visible splashes which have the capability of crossing 3 feet distance and contaminating the operator's clothing and body [4].

Thus, diseases can be transmitted via the airborne route such as measles, mumps, tuberculosis and transmission through exposure to infected blood such as HIV or HCV [23]. In this study, the importance of pre-procedural rinsing before dental procedures (scaling by ultrasonic instrument) was assessed.

Materials And Method

The population selected was 20 healthy individuals of age ranging from 18 to 35 years were selected for participation in the study. The important criteria in choosing these patients were that their dentition should have a minimum of five teeth per quadrant. However, for this study patients with fixed or removable prosthesis, other oral lesions or having a history of allergy to components of mouth rinse were excluded from the study. Before the procedure, the objective of the study was explained to all the subjects. The study took place in Saveetha Dental Hospital.

There are 2 groups of patients in this study; Group A (the control group) and Group B (preprocedural mouth-rinse). Group A (consisting of 10 patients) directly underwent the dental procedure whereas Group B (the rest 10 patients) used 20 ml of 0.2% Chlorhexidine as a pre-procedural rinse. During the dental procedure the aerosol splatter produced were collected on blood agar plates. After the procedure, a microbiologic analysis for the assessment of bacterial Colony Forming Units (CFUs) was done. Following which, the agar plates were collected from the site and were kept to culture and incubated.

Results

Raw Data

Table 1 & 2.

Calculated Data

Mean Value for Table 1: 3185
Mean Value for Table 2: 488

The above table 1 and table 2 shows the raw data collected of the bacterial count after the microbiological analysis of bacterial Colony Forming Units (CFUs). The table 2 shows a significant reduction of bacterial count compared to table 1 which showed a higher range of value for bacterial count. The mean values of each table were taken and Table 1 showed the mean value of 3185 and Table 2 has mean value of 488. The mean values of the 2 groups were compared showing the steep variation between them in a graph. (Graph 1). The mean value of bacterial count present is higher when a dental procedure is done before any pre procedural mouth rinse. There is a big difference of 73% (2697) seen in graph 1.

Discussion

For this study scaling was the chosen dental procedure because in 2000, a published report stated that the microbial aerosol peak concentrations were during scaling procedures [13]. As seen in the result obtained, when mouthwash is given to the patients prior to scaling, the bacterial count has shown to be tremendously low compared to when it is not given. The antibacterial mouthwashes generally contain Chlorhexidine and cetylpyridinium chloride [5]. Currently, it is considered the most effective antimicrobial agent as a mouthwash in dentistry.

This effect is a result of Chlorhexidine being a bisbiguanide molecule which binds strongly to hydroxyapatite, the organic pellicle of the tooth, oral mucosa, salivary proteins, and bacteria. Thus, chlorhexidine containing mouth-rinses exhibit high substantively with 30% of drug released after rinsing and slow release for a long time [17]. The limitations in this study were in the interpretations of the results. The colonies that were counted here represent the

Table 1. Shows the Bacterial Count Found without Use of Mouthwash.

DONE WITHOUT MOUTHWASH	
Patient	**Bacterial count**
1	800
2	1200
3	6400
4	8000
5	1850
6	2600
7	1900
8	4700
9	900
10	3500

Table 2. Shows the Bacterial Count Found with Use of Mouthwash.

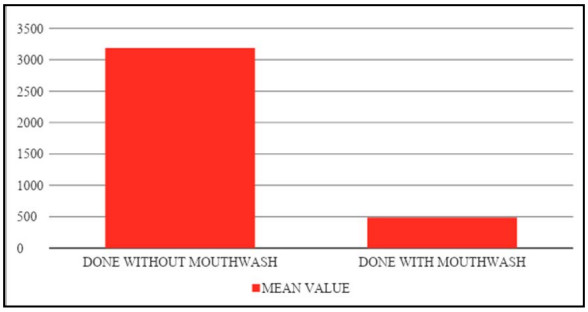
DONE WITH MOUTHWASH	
Patient	**Bacterial count**
1	600
2	860
3	400
4	750
5	250
6	440
7	320
8	210
9	400
10	650

Table 3. Shows the Average Value Comparisons.

	DONE WITHOUT MOUTHWASH	DONE WITH MOUTHWASH
MEAN VALUE	3185	488

Difference of: 3185-488 = 2697 CFU

Graph 1. Shows Comparison between the Bacterial Count with and without Mouthwash.



bacteria that are capable of growing on blood agar plates.

No attempt has been made to identify the bacteria (pathogen or non-pathogen) However, viruses, fungi, and specific bacteria require specialized media that were not cultured in this study. Future studies are needed to investigate the viable pathogenic microorganisms generated during the use of ultrasonic scaling devices. Control of Contamination from Spatter and Aerosol Valid concerns exist regarding contamination from spatter and aerosol created by rotary equipment. Operating this equipment in the mouths of patients spatters oral fluids and microorganisms onto the attending clinical personnel, and aerosols can be inhaled [3].

Aerosolization of mycobacteria that cause pulmonary tuberculosis (M. tuberculosis) has always been a concern, although an infectious patient coughing in the waiting room or operation is much more likely to infect others [20]. The rubber dam and high-volume evacuation are important and helpful methods for reducing exposure to contamination. High-volume evacuation can be 80% effective in reducing aerosol contamination. Complete elimination of airborne contamination, however, is impossible unless some method of continuous air purification can be used [9].

Without the universal use of personal barriers, drapes, or effective cleanup procedures, personnel and patients can be subjected to oral fluid–borne contamination [8]. Protective eyewear may consist of goggles or glasses with solid side-shields. A mask should be worn to protect against aerosols [16]. Face shields are appropriate for protection against heavy spatter, but a mask still is required to protect against aerosols that drift behind the shield. Spatter also can pass under the edge of a short shield and strike the mouth [19].

Anti-fog solution for eyewear can be obtained from opticians or product distributors [12]. The clinician should put on eyewear with clean hands before gloving and remove it with clean hands after the gloves are removed [24]. Eyewear should be grasped by the temple pieces. The clinician should grasp the mask only by the string or band at the sides or back of the head to remove it [22]. The mask should be changed between every patient or whenever it becomes moist or visibly soiled.

When the patient is dismissed after treatment, the mask should be discarded and not worn around the neck, as the contaminated edges can rub against the neck. Touching masks and eyewear during treatments should be avoided to prevent cross-contamination [11]. When eyewear or shields are removed, they should be cleaned and disinfected. To save time, clean replacement eyewear

should be readily available while used eyewear is being disinfected. If preferred, goggles that can be autoclaved are available from dental distributors [6].

Conclusion

Aerosol and splatter are a concern because of their potential effects on the health of patients and of the dental practitioners. These dental health professionals are at high risk of developing the infectious diseases due to repeated exposures to such microorganisms. Thus, it is reasonably significant to know about the infection transmission and to prevent it [2]. Through this study, it can be concluded that pre-procedural rinsing is effective in reducing aerosol contamination which means efficient preventive measures must be taken. Few examples of such measures are pre-procedural patient oral rinses, protective clothing, ventilation and air filtration [7].

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