Journal Homepage: - www.journalijar.com
INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)
Article DOI: 10.21474/IJAR01/4816
DOI URL: http://dx.doi.org/10.21474/IJAR01/4816
ISSN NO. 2320-5407

RESEARCH ARTICLE

A RANDOMIZED, DOUBLE BLIND, CONTROLLED EVALUATION OF EFFECTIVENESS OF DIFFERENT TECHNIQUES FOR PRE-STERILIZATION OF DRILL BITS USED IN A HOSPITAL-BASED ORAL AND MAXILLOFACIAL SURGERY DEPARTMENT.

Dr. Heena Agarwal[1], Dr. Mohit Mangla[1], Dr. Lily Rajput[1], Dr. Madan Mohan Niranjan[2], Dr. Pankaj Kukreja[3] and Dr. Sanjeev Kumar[1].

1. Post Graduate Student, Department of Oral & Maxillofacial Surgery, ITS-CDSR, Muradnagar, Ghaziabad, U.P.
2. Post Graduate Student, Department of Paedodontics and Preventive Dentistry, Subharti Dental College, Meerut, U.P.
3. Professor, Department of Oral & Maxillofacial Surgery, ITS-CDSR, Muradnagar, Ghaziabad, U.P.
4. Professor and Head, Department of Oral & Maxillofacial Surgery, ITS-CDSR, Muradnagar, Ghaziabad, U.P.

Manuscript Info

Manuscript History

Received: 11 May 2017
Final Accepted: 13 June 2017
Published: July 2017

Key words:-
Glutaraldehyde, Phenol, Autoclave, Drill bits, Mean bacterial colony count.

Abstract

Introduction: Infection control is a major issue in medicine and dentistry because of concern over communicable diseases transmitted in health care settings. Both dental personnel and patients are always at risk of communicating diseases during treatment. The use of effective infection control procedures in the dental office will prevent cross contamination that may extend to dentist, dental staff, dental technician and patients. The current study evaluated the effectiveness of different techniques for Pre-sterilization of burs used in a Hospital-based Oral and Maxillofacial Surgery department. **In material and method,** four groups A, B, C, and D were made and sterilization of drill bits was done by mechanical scrubbing in group A, 2% glutaraldehyde in group B, 5 % phenol in group C and autoclaving in group D. After which microbiological evaluation of the drill bits are done in Blood Agar media and the microbial colony were counted in each group. **Result:** The result showed that for Group A the mean bacterial colony count is 62.10 ± 4.17, 72.80 ± 4.61 and 81.30 ± 5.35 at 24, 48 and 72 hours respectively. For group B the mean bacterial colony count was 4.50 ± 0.52, 5.70 ± 0.48 and 6.20 ± 0.91 at 24, 48 and 72 hours respectively. For group C the mean bacterial colony count was 2.80 ±0.78, 3.50 ± 0.52 and 3.80 ± 0.63 at 24, 48 and 72 hours respectively. For group D mean bacterial colony count was zero at all three intervals. **Conclusion:** Autoclave was highly effective in sterilization of drill bits followed by 5% phenol and 2% glutaraldehyde and manual scrubbing was not an effective method for sterilization of drill bits.

Introduction:-

Patients reserve the right to be treated in a surgery environment that is clean and sterile.[1] Effective infection control in the dental clinic is a priority as many diseases can be transmitted in dental environs, including streptococcal and staphylococcal infections, tuberculosis, the common cold, influenza, mumps, herpes simplex, Hepatitis B virus

Corresponding Author:- Dr. Heena Agarwal.
Address:- Post Graduate Student, Department of Oral & Maxillofacial Surgery, ITS-CDSR, Muradnagar, Ghaziabad, U.P.

(HBV), syphilis, and human immunodeficiency virus (HIV).[2] In 1987, the Centers for Disease Control and Prevention (CDC) developed universal precautions to help protect both health care workers (HCWs) and patients from infection with blood-borne pathogens in health care settings. The recommendations stress that blood is the most important source of HIV, HBV and other blood-borne pathogens, and that infection control efforts should be focused on the prevention of exposures to blood as well as the receipt of HBV immunizations.[3]

In 1996, however, the CDC's Hospital Infection Control Practices Advisory Committee (HICPAC) introduced the concept of standard precautions, which states that a single set of precautions be used for the care of all patients in hospitals regardless of their presumed infection status.[4]

Drill bits are used in Oral and Maxillofacial Surgery for various drilling of bone during fixation of fracture. During this procedures drill bits may become heavily contaminated with necrotic tissue, saliva, blood and potential pathogens and identified as potential vehicle for cross infection. The most commonly used methods of sterilization includes soaking of drill bits in commercially available disinfectors followed by manual cleaning , using ultrasonic bath or by autoclaving.

Drill bits are unique by virtue of their complex architecture which makes pre-cleaning and subsequent sterilization difficult to achieve. Inadequate sterilization causes cross infection among the patient and transmission of disease between the patient and dental personnel. The current study evaluated the effectiveness of different techniques for Pre-sterilization of drill bits used in a Hospital-based Oral and Maxillofacial Surgery department.

Methodology:-

This study is a randomized, double blind, controlled evaluation of effectiveness of different techniques for Pre-sterilization of drill bits and was carried out in the Department of Oral and Maxillofacial surgery, I.T.S Dental College and Hospital Ghaziabad, India.

A total of forty drill bits were selected for the study. After that these burs were randomly assigned into four groups and in each group a total of 10 bur/drill bit was allocated. Various method of sterilization were done in different group:

A. Group - 1 = Mechanical scrubbing

Mechanical scrubbing was done by bur brush. These were subjected to 40 strokes of bur brush by holding the bits with a sterile tweezer and brushing from the shank to the working end.

B. Group – 2 = 2% Glutaraldehyde

Drill bits was placed in 2% glutaraldehyde for 24 hours.

C. Group - 3 = 5% Phenol

Drill bits was placed in 5% Phenol for 24 hours.

D. Group – 4 = Standard Autoclave

Drill bits was placed in autoclave for 15 minutes at 121^{o}C under 15 psi.

After sterilization, all drill bits were placed in 1ml solution aseptically to blood agar into an incubator (figure 1) maintained at 37°C to mimic body temperature. The microbiological evaluation of drill bits was after 24hours, 48 hours and 72hours to check for evidence of bacterial growth using colony counter in blood agar medium (figure 2). One way ANOVA test was applied to evaluate the difference of mean colony growth in different groups. Statistical analysis of the data was done by using SPSS IBM Statistics version 20.

Result:-

The result of this prospective randomized, double blind study showed that for Group A the mean colony count is 62.10 ± 4.17, 72.80 ± 4.61 and 81.30 ± 5.35 at 24, 48 and 72 hours respectively. For group B the mean colony count was 4.50 ± 0.52, 5.70 ± 0.48 and 6.20 ± 0.91 at 24, 48 and 72 hours respectively. For group C the mean colony count was 2.80 ±0.78, 3.50 ± 0.52 and 3.80 ± 0.63 at 24, 48 and 72 hours respectively. For group D mean colony count was zero at all three intervals. Statistically result showed highly significant variation between all the groups ($P < 0.005$).

Figure 1:- showed the incubator in which the sample were kept at 37°C.

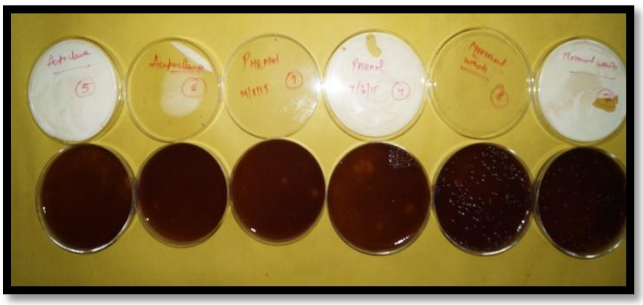
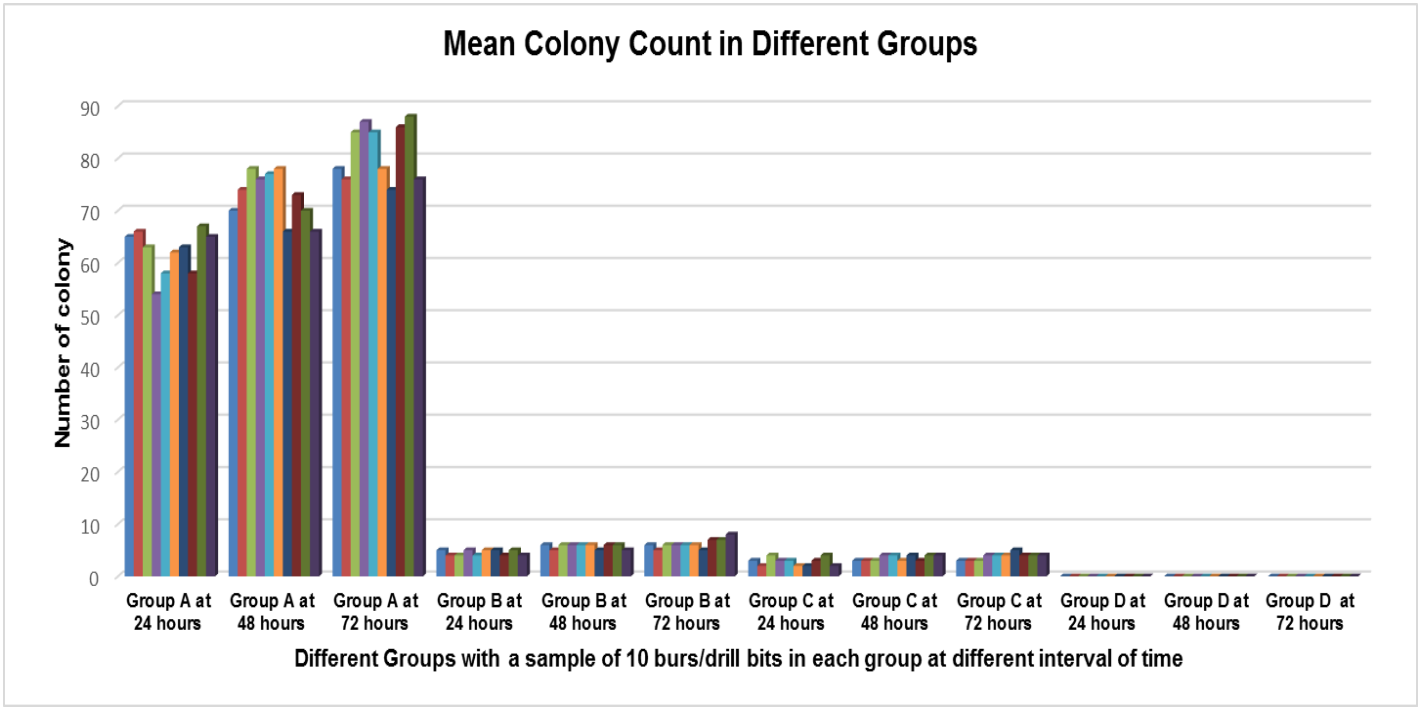


Figure 2:- showed the blood agar medium in which bacterial colony developed.



Graph 1:- showing mean colony count of different groups at different time intervals.

Discussion:-

Currently, numerous articles address the transmission of blood and tissue borne pathogens from one patient to another via contaminated devices. Many studies look at the bacterial and viral contamination of dental and medical instrumentation and the safety of sterilizing and reusing these instruments. There have also been concerns over the possible transmission of prions by contaminated surgical instruments.

Our Study revealed that the manual scrubbing used as decontamination method was not an effective method of sterilization as the mean bacterial colony count was highest among all the groups followed by 2% glutaraldehyde which also showed high number of mean bacterial colony count. Whereas the decontamination or sterilization done via 5% phenol was effective as the mean bacteria colony count is low but it should be use judiciously because it contains highly acidic acid. But autoclave used as sterilization of drill bits is highly effective as the mean bacterial colony count was zero. Sajjanshetty S also did a study in which result showed that the autoclave was highly effective method of sterilization.[5]

Drill bits are identified as potential vehicle for cross infection in dental orifice due to their contact with saliva, blood, teeth and bone. While most of the dental instruments are effectively cleaned after use, the drill bits is often neglected and only brushed or immersed in a mild disinfectant prior to reuse.

Manual scrubbing of drill bits is simple and cheap but it may not be effective, it also takes time for instruments to be cleaned properly and it may not be possible in busy practice and also aerosols of pathogenic microorganisms may be produced by hand cleaning with contamination of the sink .

Under proper conditions steam under pressure (Autoclave) can destroy all microorganisms including bacterial spores and it is found to be relatively the best method to decontaminate dental burs, yet it has some limitations like it increases the fracture susceptibility, decreases the cutting efficiency and life span of burs, which all should be weighed against its benefits.

Sterilization is the process of destroying all microorganisms, including bacterial endospores. Sterilization should be used for instruments and other items that come in direct contact with sterile tissue or the bloodstream. For sterilization to be effective, instruments must be thoroughly cleaned and rinsed beforehand, regardless of the method.

The sterilization procedure also requires time, contact, temperature and—with steam sterilization, high pressure—to be effective. All surfaces of a surgical instrument must be exposed for sterilization to be successful. The effectiveness of any sterilization method depends on the number and type of microorganisms, the amount and type of organic matter that protects them, and the number of cracks and crevices on an instrument that might harbor microorganisms.

It is incumbent on the end user to follow manufacturer guidelines at all times. Policies and procedures for the office and/or the ambulatory surgery center must adhere to these guidelines. Manufacturers must provide end users with written instructions for proper cleaning and sterilization. This information is developed based upon their testing and validated cleaning and sterilization methods.[7]

Conclusion:-

Infection control within healthcare is the subject of continued debate.[6] Autoclave was highly effective in sterilization of drill bits followed by 5% phenol and 2% glutaraldehyde and manual scrubbing was not an effective method for sterilization of drill bits.

Biblography:-

1. The Department of Health (2009) Health Technical Memorandum 01-05: Decontamination in primary dental care practice. Available at : http : // www .dh.gov.uk/ en/ Publications and statistics/Lettersandcirculars/Firecode/DH_097330 (Accessed 10th September 2001).
2. Omolara G, Sonny O, Eyitope O and Gbemisola A. Infection control knowledge and practices related to HIV among Nigerian dentists. J Infect Dev Ctries 2009; 3(8):604-610.
3. Centres for Disease Control (1987) Recommendations for prevention of HIV transmission in health care settings MMWR 36: 1s-18s.
4. Garner JS (1996) Hospital infection control practices advisory committee guidelines for isolation precautions in hospitals. Infect Contr Hosp Epidemiolo 17: 53-80.
5. Sajjanshetty S, Hugar D, Hugar S, Ranjan S and Kadani M. Decontamination methods used for dental burs - a comparative study. J Clin Diagn Res 2014;8(6): 39-41.
6. British Dental Association (2003) Infection Control in Dentistry- Advice sheet A12. Available at: http://universitydental.co.uk/resources/bda-cross-infection.pdf (Accessed 10th September 2011).
7. Association for the Advancement of Medical Instrumentation. ANSI/AAMI/ISO 2001: 10993-7.