

MICROORGANISMS DETECTED ON GLOVES CONTAMINATED BY FIRST YEAR MBBS STUDENTS DURING DISSECTION OF FORMALIN-FIXED CADAVERS

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ABSTRACT

Introduction: The study is done with the purpose to detect if any microorganisms are detected on dissection of formalin fixed cadavers which can be a potential of infection for students.

Material and Method: Students were made to do dissection of routinely preserved cadavers using gloves. Samples from the contaminated gloves were collected and sent for culture and sensitivity.

Observation and results: Variety of microorganisms were cultured from the given samples.

Conclusion: The results indicate that cadavers fixed with formalin are potential source of infection for students as well as faculty. This study underscores protocols to decrease cross contamination.

ORIGINAL RESEARCH ARTICLE

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INTRODUCTION

The human cadavers and its dissection is a valuable tool in learning process utilized by anatomist and medical students. Formalin is universally used as fixative for preservation of human cadavers. However, it has been established in some recent studies that formalin does not effectively inactivate all kinds of microbes. Long term preservation with formalin can still yield microbes on the surface of human cadaver that can be a potential source of infection for students, faculty and those who handle the cadavers.^{1,2}

Embalming involve the use of fixative agents, 10% formalin is most common fixative with added glycerol, disinfectants, and water.

Formalin denature proteins by acting on amine groups.

The cadavers used in this research study were embalmed following standard embalming practices. The capacity of a fixative solution to eliminate microorganisms in the cadaver and to avoid the growing of bacteria is very important for the safety of the students and of the faculty while doing dissection.¹

Workers handling cadavers are exposed to a number of infectious agents mostly blood born viruses, enteric pathogens and mycobacterium tuberculosis. A strong aversion to dead may represent a natural instinct to protect oneself against the disease.³

The normal microbial flora is broadly divided into residents and transients. Resident flora comprises a population which cannot be completely removed permanently, they vary from time to time and are temporary. The transients may be potentially pathogenic and non-pathogenic. The human skin is constantly and continuously bombarded by micro-organisms present in environment. Cultures from the skin have frequently demonstrated diptheroids, Staphylococci gram positive aerobic bacilli, and gram negative bacilli. Often the skin of face, neck, hands and buttock carry pathogenic hemolytic streptococci, while as hair frequently harbor *S. aureus*.

Limited and incomplete research has been done to determine efficacy of modern embalming processes in destroying pathogenic agent. The purpose of this study was to determine if any potentially pathogenic bacteria might be present in cadavers used in anatomic dissection and ways how to prevent their spread.

MATERIAL AND METHOD

120 Medical students who were enrolled in the MBBS Ist year course at SKIMS medical college bemina were solicited

to participate in this research prior to beginning the anatomy dissection. All the cadavers used in present research were formalin treated as per universal guidelines. Students were instructed to wear sterile gloves while doing cadaveric dissection. Sample collection: In the mid of the dissection swabs from hand-wearing gloves were collected using a sterile cotton swab and placed in BHI (Brain Heart Infusion broth) and incubated at 37° C overnight. Processing of samples: Each tube incubated with swabs were inoculated on Blood agar and Macconkey agar plates and kept for incubation at 37° C for 24 hours. The culture plates were read for any visible growth. The colony characters were read and Grams staining was performed. Gram positive cocci were confirmed by standard microbiological tests like catalase, clumping factor and tube coagulase. Identification of *Staphylococcus aureus*: *Staphylococcus aureus* was confirmed by tube coagulase, Dnase test and mannitol fermentation test. Identification of Coagulase Negative *Staphylococcus* species was done as per the methodology explained by IORIO *et al.*⁴

OBSERVATION AND RESULTS



Fig 1: Gram positive cocci on blood agar plates

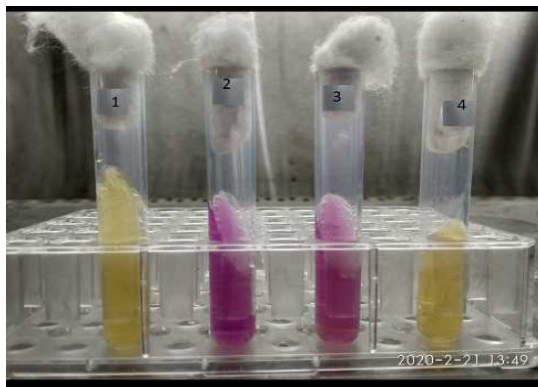


Fig2: Urease test: Tubel 1 &4 show negative reaction while tubes 2&3 show positive reaction

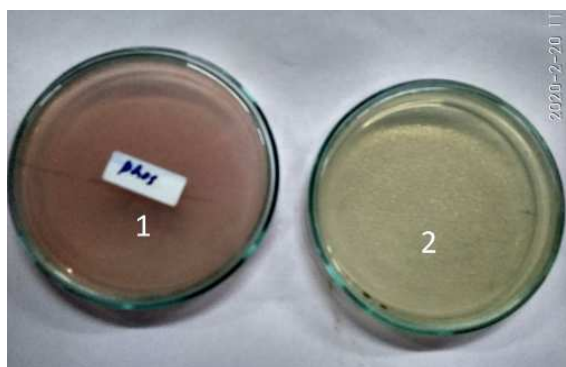


Fig 3: Phosphatase test: plate No 1: positive, plate No 2: Negative

Table 1: Types of the organism and their isolation

Micro-Organism isolated	Number
Staphylococcus aureus	4
Staphylococcus cohni	2
Staphylococcus lugdunensis	3
Staphylococcus saprophyticus	1
Staphylococcus capitis	2
Staphylococcus hominis	2
Staphylococcus warneri	6
Staphylococcus epidermidis	3
Nontypeable	32
Total isolates	55
Total Samples	120

Table 1: demonstrates that 55 types of isolates were obtained in a total of which 32 isolates were non-typeable, while as 4 isolates of staphylococcus aureus were obtained, 2 of staphylococcus cohni, 3 of staphylococcus lugdunensis, 1 of Staphylococcus

saprophyticus, 2 of staphylococcus capitis, 2 of staphylococcus hominis, 6 of staphylococcus warneri and 3 of staphylococcus epidermidis.

DISCUSSION

Embalming is done with the purpose to inhibit the growth of micro-organisms, by which reduces the risk of infection and preventing the decay of the cadaver. The present study was done to determine if bacteria could be recovered from human cadavers used by medical students. It was seen in the present study that despite dissecting formalin-treated bodies variety of micro-organisms were cultured from the samples taken. An inadequate amount of data is available on the antimicrobial abilities of embalming fluids (Demiryurek *et al.* 2002).⁵ However from previous studies it has been seen that several disease-causing agents may remain viable in cadavers, despite the use of Fixative agent (De Craemer, 1994; Bayramoglu *et al.*, 2002; Kaufman, 2005).^{5,6,7} But some Important Pathogens like HIV is killed during Embalming of appropriate duration. (De Craemer, 1994).

Few studies have been done to check the disinfecting efficiency of fluids that are used for embalming (Tabaac *et al.* 2013; Hayashi *et al.* 2014).^{8,9} Some of these studies document the presence of micro-organisms on formalin-embalmed cadavers while some studies reported absence of bacteria or yeast-like fungi from cadavers embalmed with the same technique (Tabaac *et al.* 2013; Hayashi *et al.* 2014). The biological risk of fixed cadaver in manipulation and the dissemination of pathogenic microorganisms during anatomy teaching, research, and dissection procedures is also reported by some studies (Hayashi *et al.*, 2014). Tabaac *et al.* (2013). By sampling the clothes of students who handled the cadavers, Kabadi *et al.* (2013) identified *Staphylococcus aureus*, *Enterococcus faecalis*, and *Streptococcus pyogenes*.¹⁰

SUMMARY

The summary of the present study is that there are viable bacteria recovered from the samples taken from embalmed cadaver. It can be a threat to students, faculty and who

use these human cadavers as learning methodology as well as for anatomists & other handlers worldwide who handle these cadavers. It is concluded that present embalming procedures are inadequate for disinfecting of bodies, hence universal precautions should be practiced to prevent infection and cross contamination. Protocols must be developed for safe use of human cadavers in medical learning.

RECOMMENDATIONS

While handling with cadavers some Precautions may be Recommended like Using double disposable gloves, disposable masks both for face and head, disposable gowns & disposable shoe covers. After doing dissection the hand should be sanitized by using alcohol sanitizers. The used dissecting instruments should be disinfected by using Recommended disinfectants for such instruments at the end of dissection. The Disposable items should be Properly disposed off. The remains of tissue left during dissection should be buried off Properly.

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