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Original research article

A study on dissection hall for the purpose of study centre or health hazards for 1 MBBS students

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Abstract
Cadaveric dissection is the best method to teach and learn the gross anatomy for that purpose the human cadavers or remains which are stored in tank room or containers in formalin solution, pose a constant hazard of infection to the handlers. Many organisms have been isolated and handlers will be unaware of contamination status of cadaver. Further our I MBBS students who are exposed to such an environment, may be for the first time have chances of acquiring infection. Hence considering the potential health hazard by the cadavers and cadaveric pool in dissection room, we have undertaken a study to know the different types of organisms and their pathogenicity.
Keywords: Dissection Hall, Fungi, Bacteria, Virus, Health Hazard

Introduction
Cadaveric dissection is the best method to teach and learn the gross anatomy for that purpose the human cadavers or remains which are stored in tank room or containers in formalin solution, pose a constant hazard of infection to the handlers.

After the death of the individual the multiplication of normal flora gets unchecked and becomes pathogenic or whether the deceased was suffering from any of the infectious diseases that may act as constant source of infection. Many organisms have been isolated like tubercle bacilli, hepatitis b and c, cl.tetani, HIV, fungus etc. Routinely handlers will be unaware of contamination status of cadaver hence chances of acquiring the infection either at the time of embalming or during routine dissection will be more. Further our I MBBS students who are exposed to such an environment, may be for the first time have chances of acquiring infection.

The infections can vary from simple minor illness to the severe forms depending on the immunity status of an individual. There are sporadic incidence of infections observed among the staff and students.

Even though stringent measures have been taken up in maintaining cadavers after fixation in good condition but it often fails to check the growth of the organisms.
Hence considering the potential health hazard by the cadavers and cadaveric pool in dissection room, we have undertaken a study to know the different types of organisms and their pathogenicity.

Aims and Objectives
To know the contamination status in cadaveric pool and dissection hall.

Materials and Methods

The dissection hall in the Department of Anatomy of Dr.PMRIMS,Chevella is spacious with appropriately cross ventilated and lit by natural sunlight measures about ?30X60 sqft and accommodates 150 – 200 students with an adjoining room containing cadaveric tanks which is also very well ventilated. Cadavers are stored in the tank rooms and remains of which are stored in separate containers. In order to know the status of infection, the culture plates were kept open in the dissection hall and adjoining tank room for half an hour and sent to microbiology dept. for incubation and further analysis. Such procedure is repeated for three times with adequate time interval. Each sample was collected at two instances, one before the start of dissection by students and the other, during the dissection.

The tank room fluid about 10 ml is collected in the sterile bottle and sent to the microbiology department for the same.

The samples were taken from the dissection tables, cadaveric tissues and cadavers using sterile swabs. Air culture of dissection hall and adjoining tank room was taken on petri dishes, out of which 7 plates was of blood agar, which was incubated at 37o c. other 7 plates of SDA was incubated at 22oc in BOD. The cadaveric tank room solution was cultured using sheep blood agar, SDA, RCM and BHI for aerobic, fungal and anerobic culture.

The plates were kept open in the Dissection hall and Tank room for half an hour for 2 times, once before start of dissection and other during dissection.

Both procedures were repeated for 3 times. Then culture plates and the swabs were sent to Dept of Microbiology, M R Medical College for further processing.

Results:

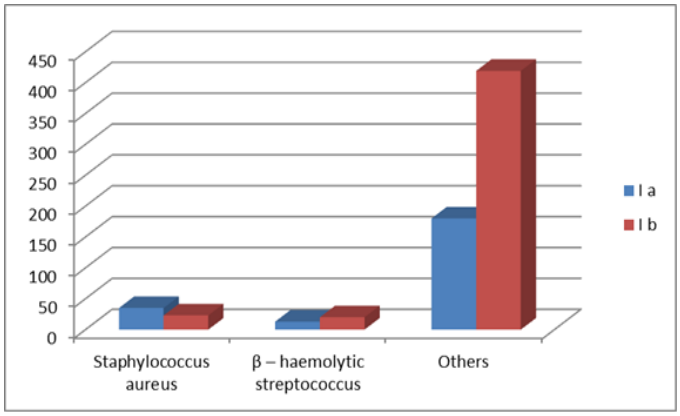
The three samples were taken on different days with a wide gap. The first sample showed 228 bacteria/span of which 35 were staphylococcus aureus, 13 were β – haemolytic streptococcus and 180 others (table Ia) and 462 bacteria/span of which 23 were staphylococcus aureus, 20 were β – haemolytic streptococcus and 419 others. (tableIb).

The second sample also reported with heavy growth of various bacteria with 938 bacteria/span of which 23were staphylococcus aureus, 18 were β – haemolytic streptococcus and 897 others(table IIa) and 228 bacteria/span of which 10 were staphylococcus aureus, 06were β – haemolytic streptococcus and 212 others were reported(table IIb).

Similarly the third sample also showed heavy growth of various bacteria but consistent with that of the first sample with 206 bacteria/span of which 28 were staphylococcus aureus, 10 were β – haemolytic streptococcus and 168 others(table IIIa) and 452 bacteria/span of which 25 were staphylococcus aureus, 22 were β – haemolytic streptococcus and 405 others(table IIIb).

Sample I – table Ia

AIR CULTURE	NUMBER PER SPAN
Staphylococcus aureus	35
β – haemolytic streptococcus	13
Others	180
Total	228



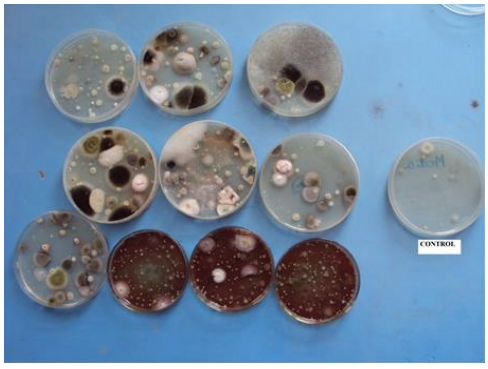
Graph 1: showing the various infections

Sample I – tableIb

Air culture	**Number per span**
Staphylococcus aureus	23
β – haemolytic streptococcus	20
Others	419
Total	462

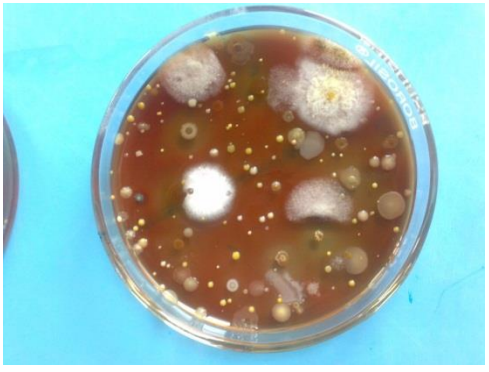
Fungal culture showed a heavy growth of Saprophytic fungus, penicillium, aspergillusflavus and Niger, mucor, rhizopus and candida were identified.

MEDIA SHOWING HEAVY GROWTH OF ORGANISMS OF ALL THE THREE (3) SAMPLES



PHOTOGRAPH -1

PHOTOGRAPH-2

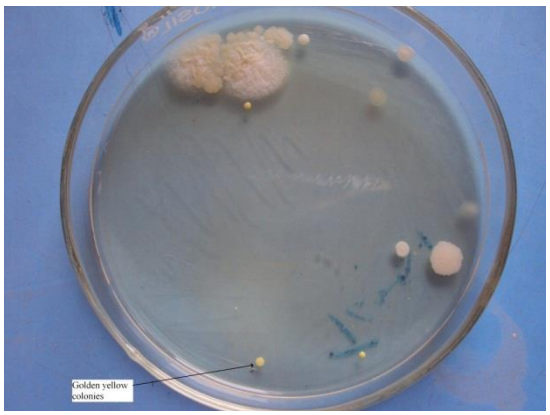


PHOTOGRAPH-3

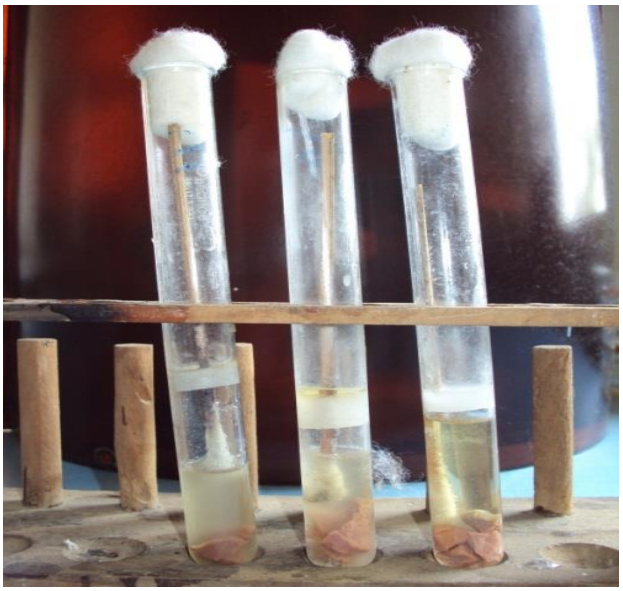
Tank room solutions:

1. Dead body tank containing fluid was collected and inoculated in sheep blood agar, SDA and RCM media which showed growth of Staphylococcus aureus about 300 per ml, candida species 700 per ml. Whereas gas producing gram positive bacilli with terminal spores resembling Clostridium tetani were observed in anaerobic culture. Aspergillus and Candida were seen in fungal culture.
2. In the second sampling of tank room solution there was heavy growth about 9,62,000 per ml was in aerobic culture, gas producing organisms like gram positive bacilli with terminal spherical spores morphologically resembling Clostridium tetani and common mycological organisms like AspergillusFlavus and Candida were observed.

Tank room aerobic culture-1



Tank room solution-2



Tank room anaerobic culture-3

Sample II –(table IIa)

Air Culture	Number per span
Staphylococcus aureus	23
β – haemolytic streptococcus	18
Others	897
Total	938

Sample II – (sample IIb)

Air culture	Number per span
Staphylococcus aureus	10
β – haemolytic streptococcus	06
Others	212
Total	228

Sample III –(table IIIa)

Air culture	Number per span
Staphylococcus aureus	28
β – haemolytic streptococcus	10
Others	168
Total	206

Sample III– (table IIIb)

Air culture	Number per span
Staphylococcus aureus	25
β – haemolytic streptococcus	22
Others	405
Total	452

Discussion

In 1847, Dr. Ignaz Semmelweis1 a Hungarian Doctor teaching medicine in Vienna observed in 2 hospitals wherein one hospital had high rate of mortality from puerperal fever because students moved between dissection room and delivery room without washing their hands and in another obstetric hospital with a low rate of mortality wherein cadaveric dissection was not carried out, even though run by mid wives, who washed their hands. Thus he concluded some unknown "cadaveric material" caused child bed fever. Later Semmelweis advised physicians to wash their hands in a chlorine solution after cadaver dissection thereby mortality was promptly dropped to a very low rate.

Later in 1865 Joseph Lister used carbolic acid solution spray to kill the germs during surgery. Researchers led by Timothy Sterling2 reported that the first known case of tuberculosis transmitted from a cadaver to an embalmer. Further he noticed that aerosols generated during embalming procedure or from the frothing of fluids through cadaver's nose and mouth or the release of trapped air bubbles through these orifices or might be during cadaveric spasm, could affect the handler.

Further Sarslimaz3 et al studied the contamination status of 17 cadavers and 4 cadaveric pools in a Military Medical Academy isolated many pathogenic bacteria and saprophytic fungi at different concentrations of formalin and phenol. They suggested formalin 5% and 4% phenol as ideal solutions for preservation of cadavers. Sarslimaz et al studied 17 cadavers and 4 cadaveric pools and suggested 4% formalin concentration as an ideal way for long term preservation. In our setting even though the tank room solutions are prepared at 5% formalin concentration, many pathogenic bacteria eg: staphylococcus and cl. Tetani along with saprophytic fungi were isolated.

Tolhurst DE4 et al suggested glutaraldehyde for short term preservation of cadavers and could retain a life like texture ideal for short surgical procedures.
Ichizawa Suehiro5 et al surveyed actual condition of bacterial contamination and suggested basic cleaning and disinfection methods for dissection room.

Viroj Wiwantkit6 et al observed about 2.4% anti HIV seropositive cases among donated cadavers in Thailand. Thereby they suggested HIV screening in donated cadavers.
Navin Paul7 et al reported an outbreak of chickenpox (varicella Zoster), in which the source was a cadaver and spread occurred during autopsy.
The formalin though effective against vegetative bacteria, fungi and many viruses but only slowly effective against bacterial spores (like tetanus) and acid fast bacteria8.

Summary and conclusion

The present study shows a growth of various bacteria and fungi in all the culture media in spite of the standard dissection protocol followed for preservation of cadavers.We observed heavy growths of organisms in all the three samples especially gas forming bacilli like cl.tetani. These bacilli are pathogenic to all and becomes more significant in the immunocompromised individuals.

As the Clostridium tetani is one of the significant organism isolated, the staff, students and the attenders are at risk while handling or in cases of finger cut injuries which may go unnoticed. Hence vaccination against the tetanus be made mandatory to all the students, staff and attenders as per vaccine protocol standards. Even the air culture media also showed heavy growth of various other organisms. Hence the individuals entering into the tank room should wear mask and aprons apart from using hand gloves.

In future the dissection hall and attached tank room must be subjected for regular microbiological sampling to know the contamination status and any change in microbiological trend to initiate appropriate counter measures.

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