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HIDDEN HAZARDS: MICROBIAL FLORA OF THE HUMAN ANATOMY DISSECTION HALL

Dr. Manish Chaturvedi	Associate Professor, Department of Anatomy, Gajraraja Medical College, Gwalior (M.P.)
Dr. Gajendra Singh Parihar	Assistant Professor, Department of Microbiology, Gajraraja Medical College, Gwalior (M.P.)
Dr. Anil Sastya	Associate Professor, Department of Anatomy, ,Gajraraja Medical College, Gwalior (M.P.)
Dr. Sakshi Singh*	PG resident, Department of Microbiology, Gajraraja Medical College, Gwalior (M.P.) *Corresponding Author
Dr. Ram Mehra	PG resident, Department of Microbiology, Gajraraja Medical College, Gwalior (M.P.)

ABSTRACT **Background:** The dissection hall represents a unique occupational environment where medical students, faculty, and paramedical staff are routinely exposed to potential microbial hazards arising from cadavers, contaminated surfaces, instruments, and ambient air. Despite its critical role in medical education, microbiological surveillance of dissection hall environments remains limited, particularly in Indian medical institutions. **Aims & Objectives:** To assess the bacteriological and mycological profile of various sites in the dissection hall of Gajra Raja Medical College, Gwalior, including cadaver swabs, visceral tissue, dissection hall tables, instruments, water sample, and settle plates, and to evaluate the extent of microbial contamination across different sample sources.**Materials & Methods:** A cross-sectional observational microbiological study was conducted in the Dissection Hall of the Department of Anatomy, Department of Microbiology, GRMC, Gwalior. A total of 34 samples were collected from 5 cadavers across multiple sites including DH tables, skin surfaces, viscera, perineal region, thorax, abdomen, nasal and oral cavities, dissection instruments, water tank, and settle plates. All swab samples were inoculated on Blood Agar, MacConkey Agar, and Sabouraud Dextrose Agar and incubated at 37°C for 24–48 hours. Identification was performed by Gram staining, LPCB mount, and standard biochemical tests. Settle plates were exposed for 1 hour during active dissection at two locations. Water samples were cultured on three plates and in MacConkey broth for 48 hours.**Results:** Of the 34 samples processed, 9 samples (26%) yielded positive growth. Bacillus species were the predominant bacterial isolates, recovered from DH table swabs and visceral samples. Coagulase Negative Staphylococci (CoNS) and Streptococcus species were isolated from settle plates, confirming active airborne microbial dissemination during dissection. Fungal isolates included Aspergillus flavus, Aspergillus niger, and Aspergillus terreus from visceral tissue and table surfaces, and Candida species from settle plates. Instrument swabs, skin surface swabs, and water samples showed no microbial growth, indicating satisfactory decontamination of these sources.**Conclusion:** The dissection hall environment harbours a significant diversity of bacterial and fungal organisms, particularly on table surfaces, in visceral tissue, and in ambient air. The isolation of potentially pathogenic Aspergillus species and airborne CoNS highlights serious occupational health risks for dissection hall personnel. The absence of growth from instruments and water samples reflects adequate sterilization practices in these areas. The study strongly recommends regular microbiological surveillance, improved ventilation, antifungal surface decontamination, and strict biosafety compliance in dissection hall settings.

KEYWORDS :

INTRODUCTION

The dissection hall is an essential component of medical education, providing students with hands-on anatomical training. However, it simultaneously poses significant occupational and biosafety risks to students, faculty, and paramedical staff. Despite advances in fixation techniques, cadavers remain vulnerable to microbial contamination, making the dissection hall a potential hub for microbial transmission. [1] Nature

Formalin embalming, though standard practice, does not guarantee complete microbial elimination. Cadavers processed with 10% buffered formalin have been shown to harbor viable organisms on their surfaces. [2] International Journal of Medical Research and Health Sciences Research Gate

The aerial environment of the dissection hall is equally concerning. Airborne microbial loads are significantly higher during active dissection hours compared to unoccupied periods, with coagulase-negative staphylococci, micrococci, and aerobic spore-formers being the most commonly identified organisms. [1] Settle plates, as a passive air sampling method, have been widely used to quantify this airborne burden in enclosed medical environments. [4] Nature

Inanimate surfaces and instruments within the hall serve as persistent fomites. In tropical and humid climates, elevated temperature and humidity further promote microbial persistence on cadaver-contact surfaces, intensifying the risk of contamination. [5] This is particularly relevant to Indian medical institutions, where hot and humid conditions prevail for much of the year. PubMed Despite these recognized risks, comprehensive microbiological surveillance of dissection hall environments-covering cadavers, viscera, instruments, tables, and air-remains limited in literature. The present study therefore aimed to assess the bacteriological profile across all major sample sites of the dissection hall and to provide evidence-based recommendations for infection control and biosafety.

MATERIALAND METHODS-

Study design and setting-

A cross-sectional study was carried in Department of Microbiology, GRMC, Gwalior to determine the profiles, gross tissue, and microbial integrity of cadavers in medical schools Anatomy department, Gajra Raja Medical College, Gwalior.

Study population-

The study population comprised **five human cadavers,** preserved in the dissection hall of GRMC, along with environmental and instrument samples collected from the same setting. A total of **34 sample types** were included from below sites.

Table		Sites
Table 1	1.1	DH table
	1.2	Skin surface
	1.3	Viscera
	1.4	Perineal region
	1.5	Thoracoabdominal region
Table 2	2.1	DH table
	2.2	Skin surface
	2.3	Viscera
	2.4	Perineal region
	2.5	Axilla
	2.6	Thorax
Table 3	3.1	Table
	3.2	Skin surface
	3.3	Viscera

	3.4	Dissection area
	3.5	Axilla
	3.6	Perineal region
	3.7	Thorax
Table 4	4.1	Table
	4.2	Thorax
	4.3	Abdomen
Table 5	5.1	Table
	5.2	Skin surface
	5.3	Viscera
	5.4	Perineal region
	5.5	Thoracoabdominal region
	5.6	Nasal cavity
	5.7	Oral cavity
Instrument box	6.1	Instrument box
	6.2	Forceps
	6.3	Scalpel
Water tank	7	
Settle plate	8.1	Table no 1
	8.2	Table no 3

METHOD:

Inclusion Criteria

- Formalin-preserved cadavers available in the dissection hall at the time of study
- Instruments in routine use during dissection sessions
- Settle plates exposed during active dissection hours

Exclusion Criteria

- Instruments undergoing sterilization at time of sampling
- Settle plates exposed for less than the standard duration

Sampling Technique

A. Cadaver Swabs

- Sterile cotton swabs moistened with normal saline were used
- Swabs taken from standard anatomical sites-axilla, groin, oral cavity, and exposed skin surfaces
- Swabbed area approximately 5×5 cm

B. Dissection Hall Table Swabs

- Pre- and post-dissection swabs collected from dissection table surface
- Sterile swabs moistened with normal saline rubbed over a 10×10 cm marked area

C. Instrument Swabs

- Swabs taken from commonly used instruments — scalpel handles, forceps, scissors, and bone cutters
- Blade edges and handle surfaces swabbed with moistened sterile swabs

D. Settle Plates (Airborne Sampling)

- Blood agar and MacConkey agar plates exposed at 1 meter height above ground level
- Placed at two locations-near the cadaver at 2 tables(Table no1, table no3)
- Exposed for 1-2 hour during active dissection session
- Plates sealed and transported to lab for incubation at 37°C for 24–48 hours

SAMPLE PROCESSING

Inoculation & Culture

All swab samples collected from cadaver surfaces, dissection hall table, instruments, and visceral tissue were inoculated onto the following media:

- Blood Agar (BA)-for fastidious and non-fastidious organisms
- MacConkey Agar (MAC)-for Gram-negative lactose and non-lactose fermenters
- Sabouraud Dextrose Agar (SDA)-for fungal isolation

All plates were incubated at 37°C for 24-48 hours and examined for growth, colony morphology, and pigmentation.

For fungal culture the samples were inoculated on SDA tubes, SDA plates incubated for 5-7 days at 37Ċ and 25Ċ respectively, post that growth was observed , LPCB mount was made to further identify the organism.

Settle Plate Processing

Settle plates containing Blood agar and MacConkey agar were exposed in the dissection hall for 1 hour during active dissection. After incubation at 37°C for 24–48 hours, colonies were examined and subjected to:

- Gram staining — for morphological characterization
- Biochemical tests — for species-level identification

Water Tank Sample Culture

Water samples collected from the dissection hall were processed as follows:

- Inoculated onto 3 culture plates and incubated for 48 hours — No growth observed
- Inoculated into MacConkey broth for enrichment

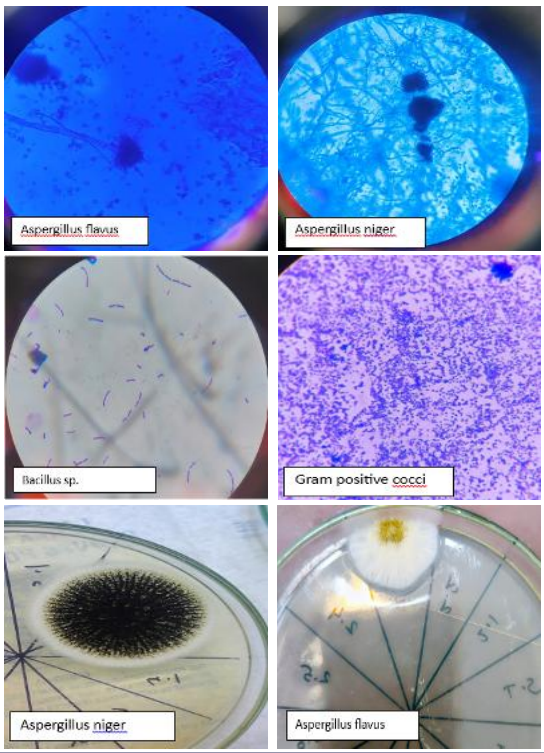
Identification Methods

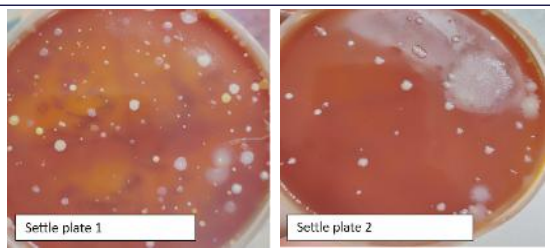
All isolates showing growth were identified by:

Method	Purpose
Gram Staining	Morphology & Gram character
Colony Morphology	Size, shape, pigment, hemolysis
Biochemical Tests	Species-level identification
LPCB Mount	Fungal identification (Lactophenol Cotton Blue)

RESULTS

Sample No.	Cadaver/ Source	Site	Gram Stain	Final Identification
1.1	Table 1	DH Table	Gram Positive Bacilli	Bacillus sp.
1.4	Table 1	Perineal Region	GPB + GPC	Bacillus sp. + CoNS
2.1	Table 2	DH Table	Gram Positive Bacilli	Bacillus sp.
2.3	Table 2	Viscera	Fungal hyphae	Aspergillus flavus
3.3	Table 3	Viscera	Gram Positive Bacilli	Bacillus sp.
4.1	Table 4	DH Table	Gram Positive Bacilli	Bacillus sp.
4.2	Table 4	Thorax	Fungal hyphae	Aspergillus niger
4.3	Table 4	Abdomen	Fungal hyphae	Aspergillus niger
7	Water Tank	Water Sample	No Growth	No coliforms
8.1	Settle Plate	Table No. 1	GPC + GPB + Yeast	CoNS+Streptococcus sp.+Candida sp.
8.2	Settle Plate	Table No. 3	GPC + GPB + Yeast	CoNS+Streptococcus sp.+Candida sp.





CONCLUSION

The present study undertaken in the Dissection Hall of Gajra Raja Medical College provides valuable microbiological evidence of environmental and cadaveric contamination in an anatomical teaching setting.

The findings of this study demonstrate that the dissection hall harbors a diverse array of bacterial and fungal organisms across multiple sites including cadaver surfaces, visceral tissue, dissection hall tables, and ambient air. The isolation of *Bacillus* species from DH tables and visceral samples indicates persistent environmental contamination, likely perpetuated by spore-forming ability and resistance to routine cleaning measures. The recovery of Coagulase Negative *Staphylococci* (CoNS) and *Streptococcus* species from settle plates confirms active **airborne microbial dissemination** during dissection sessions, posing a direct inhalation risk to students and faculty.

Notably, the isolation of ***Aspergillus flavus*****,** ***Aspergillus niger*****,** and ***Aspergillus terreus*** from visceral samples and dissection tables is of significant clinical concern, as these species are well-recognized opportunistic pathogens capable of causing **invasive aspergillosis** in immunocompromised individuals. The presence of ***Candida*** **species** in settle plates further highlights the **fungal burden** of the dissection hall air.

In contrast, the **complete absence of growth** from instrument swabs, skin surfaces, and water samples is reassuring and suggests that certain infection control practices-such as instrument handling and water supply maintenance-are being adequately followed.

The **sterility of instruments** reinforces the effectiveness of current sterilization practices, while the **microbial positivity of tables and air** highlights gaps in surface decontamination and ventilation protocols.

Recommendations:

- Regular microbiological surveillance of dissection hall environment
- Use of HEPA filters or laminar airflow systems to reduce airborne burden
- Antifungal fogging or UV decontamination of surfaces periodically
- Mandatory use of N95 masks, gloves, and gowns during dissection sessions
- Periodic training of students and staff on infection control practices

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