Infection Control Practices in Cadaveric Dissection - Current Knowledge and Future Perspectives: A Review

Dr. Gayathri Pandurangam[1], Dr. Swathi Gurajala[2]

1. Dr. Gayathri Pandurangam, Assistant Professor, Medical Anatomy, Department of Respiratory care, College of Applied Medical Sciences in Jubail, Imam Abdulrahman bin Faisal University, Saudi Arabia

2.Dr. Swathi Gurajala, Assistant Professor, Medical Microbiology, Department of Respiratory care, College of Applied Medical Sciences in Jubail, Imam Abdulrahman bin Faisal University, Saudi Arabia

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Corresponding Author: Dr. Swathi Gurajala, Assistant Professor, Medical Microbiology, Department of Respiratory care, College of Applied Medical Sciences in Jubail, Imam Abdulrahman bin Faisal University, Saudi Arabia

Abstract:

Anatomy laboratories are essential for medical education, where students learn about the structures and their relations in the human body, through hands-on dissection of human cadavers. The problem of unclaimed bodies without medical records poses a serious threat to public health due to the potential for the spread of infections. Infection control practices are crucial in the handling of cadavers in anatomy laboratories to prevent the spread of infectious diseases. Several studies have revealed the need for increased awareness and compliance with infection control measures among students and staff. To build upon this foundation, future research should focus on the development of standardized infection control guidelines and the use of modern technologies specific to anatomy laboratories. Such guidelines should outline the necessary procedures and protocols that should be followed for effective infection control.

Keywords: anatomy, cadavers, infection control, personal protective equipment, disinfection, sterilization

Introduction:

Cadavers are considered the first teacher for medical students. Anatomy laboratories are essential for medical education, where students learn about the structures and their relations in the human body, through hands-on dissection of human cadavers [1,2].

The history dates to 300 BC for cadaver dissection. Cadaveric dissection has been the only recognized approach for studying complex human body architecture since the 15th century. There are records of medical students dissecting cadavers in the 16th century [3]. Cadaver dissection was the most practical approach for instructing medical students at the beginning of their medical schooling in the 18th century. Presently, cadaver dissection is still the most effective part in the curriculum of medical undergraduates. With advances in current technology, there is a recent trend to use virtual dissection to teach anatomy [4]. However, most medical schools and colleges prefer to continue the use of standard cadaver dissection over the latest virtual dissections, despite the debate which continues over the ethical issues of using cadavers in the medical curriculum [5]. In this review article, we will aim to summarize the current knowledge on risk factors, infections in the handling of cadavers, and various infection control precautions in anatomy laboratories along with future perspectives

Importance of cadaveric dissection:

Medical students can learn more about the structure and functioning of the human body through cadaveric dissection. It aids in the development of abilities needed for correctly diagnosing and treating a range of medical disorders. Medical students can learn about the anatomical features of the human body and how it functions through dissection. Medical students have the chance to practice techniques that are used when carrying out intricate surgical procedures on live patients through dissection [4,6].

Anatomy is a vital subject of research and medical understanding. Beyond textbooks and anatomical models, it is essential to see the anatomical variances present in individual cadavers to fully understand the human body. Medical practitioners can learn more about the human body and any potential medical

implications that may result from these variances by examining them [4].

Cadaver procurement:

The demand for cadavers for dissection has grown dramatically along with the expansion of medical schools around the world [7]. But using human cadavers for training and instruction raises several ethical questions. These include the moral implications of employing corpses as learning tools, the legal consequences of breaking national laws, and the spiritual repercussions of adhering to specific faith organizations' ideals. The issue of informed permission and the requirement for a suitable donation process is also brought up by cadavers for teaching reasons. Thus, medical schools must make sure the ethical issues and consequences of using cadavers are considered.

The International Federation of Associations of Anatomists (IFAA) has long advocated for the exclusive use of donated bodies when it comes to anatomical teaching and research [5,8, 9]. A recent two-year survey conducted on cadaver sources in 71 countries revealed a stark contrast in the sources of cadavers for medical schools across different regions. 32% of cadavers were obtained from donors, while 57% of them were unclaimed bodies [10]. Cadavers obtained through donations are the primary source for cadavers in European and North American medical schools, accounting for 80–100% of the total cadaver sources. However, African medical schools are still heavily reliant on unclaimed bodies, which make up around 90% of their total cadaver sources [11]. This is shown by a survey conducted in Nigeria over a three-year period, which revealed that approximately 86% of cadavers used for teaching and research in Nigerian medical schools were sourced from unclaimed bodies [12]. This shows that most African countries are dependent on unclaimed bodies or felons for anatomical studies, while some Middle Eastern nations import cadavers from other countries for the same purpose. This reliance on unclaimed bodies for anatomical studies has been connected to the necessity for cadavers from other sources owing to these nations' inadequate procedures for a voluntary donation. Even though importing cadavers from other nations can be expensive, it is nevertheless regarded as a practical way to address the cadaver scarcity in some of these nations. [5, 8-12]

Issues with cadaveric Procurement:

Due to the risk of infection spreading, the issue of unclaimed bodies without medical records poses a major risk to public health. This issue has been a problem ever since the anatomical study first began. Gloves were not worn to protect those handling the body before the late 1800s, and little to no care was taken to ensure that cadavers were adequately sterilized before dissection. The Italian anatomist Giovanni Domenico Santorini (1681–1737) died on May 9, 1737, becoming one of the tragic consequences of human dissection's first victims. He died early enough from an infection brought on by the cadaveric dissections he performed [13]. From the height of human dissection in the 1700s until close to the end of the 19th century, this signaled the beginning of a protracted period during which doctors, anatomists, and medical students were often infected and many of them perished. These tragic deaths had an unfathomable effect and left a permanent impression on the development of medical research.

Cadavers used for anatomical study are usually preserved with formalin, a strong disinfectant. Despite the use of this fixative agent, there is still a risk of bacterial and infectious agents being still present in the cadaver [14]. This means that the cadaver, even after being embalmed in 5-10% formalin, could potentially be infectious. The risk of infectious disease transmission through contact with cadavers is a real concern for medical schools. Several diseases, such as tuberculosis, hepatitis B and C, human immunodeficiency virus (HIV), prions, and fungi, can be transmitted in this way [15-17]. The recent outbreak of the novel coronavirus (COVID-19) has posed an additional challenge for medical schools, as they have had to adapt to virtual teaching methods for anatomy [4].

Once a person dies, handling their body as an infectious material is required. To guarantee that it is kept in the safest setting possible, it must be transferred to the university promptly. Depending on the cause of death, some microorganisms can continue to be infectious and active up to a few weeks after the host has passed away. A potentially fatal bacteria known as Mycobacterium tuberculosis can continue to function for up to 36 days after the death of its host. Because of this, it is crucial to use extra caution when working with the deceased. There are numerous reports of Bacillus transmission from cadavers to laboratory workers. It has been proven that cadaver blood

samples, tissue banks, and even donated organs can transmit the hepatitis B and C viruses. Even six days after a patient's death, the human immunodeficiency virus (HIV) was recovered from the patient's bone, spleen, bone marrow, brain, and lymph nodes. A study conducted to identify the spectrum of bacteria and fungi colonizing the surfaces of cadavers and to determine the need to follow infection control protocols during their handling revealed an overall culture positivity rate of 78%, with Escherichia coli and Coagulase negative Staphylococci (CoNS) being the most prevalent at 23.07% each, while Aspergillus species had the highest rate at 37.50% in the fungal group. The study showed that cadaver surfaces can be a reservoir for a wide variety of bacteria and fungi, highlighting the importance of adhering to "standard infection control protocols" to protect students and avoid further risks of contamination [18]. Hand washing is an effective way to avoid many microbes, but it is not enough to protect against all infections. Pathogenic microbes can spread in other ways, such as through student laboratory clothing. A study reported in 2019 showed the potential for pathogenic transmission through student laboratory clothing and advocated for the introduction of universal infection control procedures to protect medical students and their contacts. As part of these procedures, it is recommended that laundry protocols for coats should be implemented in anatomy laboratories. These protocols can help to create a safer environment for everyone [19].

Risk factors with cadaver handling:

- Exposure to Chemicals- The most popular chemical used to preserve cadavers, formalin, has been found to cause a variety of adverse reactions, such as headache, nausea, dizziness, dry eyes and mucous membranes, excessive tears, and burning sensations in the eyes and throat. Skin disorders and cancer could result from prolonged formalin exposure. [20].
- Direct Exposure to Body Fluids- Although cadavers are cleansed by being preserved in embalming fluids, this does not drop the possibility of them harboring illnesses. Dissection involves using sharp tools, which increases the risk of spreading illnesses like HIV, hepatitis B, and tuberculosis through any inadvertent skin injuries or open wounds sustained by trainees or those handling cadavers. [20].
- Unhygienic Practices- Instruments, hands, and filthy clothing (laboratory coats) can act as carriers because multiple infections may adhere to them and enter the body through any route. [21].
- Inadequate Ventilation and Ineffective Laboratory Practices- When conducting dissections in crowded classrooms or hallways with inadequate ventilation, there is a higher risk of spreading airborne illnesses. Major risk factors for the spread of many illnesses in laboratories include poor sanitation, inappropriate preservation methods for the cadavers, and improper disposal of tissues and skin generated in the dissection room. [21].

Microorganisms reported to be associated with cadaveric infections:

A study done from 107 pathology departments covering approximately 192,000 necropsies showed that two doctors and eight technical staff were infected with TB during the examination of specimens Bacteriological examination of post-mortem rooms has shown that tubercle bacilli are present on the surfaces and furniture in these rooms for 24 hours following a necropsy on a case of tuberculosis, and these bacilli have been verified as active through culture and animal inoculation [22].

Two documented cases of embalmers contracting tuberculosis (TB) during the embalming process have been reported. In these cases, direct infection was confirmed through DNA fingerprinting. It is believed that exposure to TB occurred through gurgling at the nose and mouth of the cadaver, which was caused by fluid buildup in the chest cavity and putrefaction of tissue and organs. Aerosols generated during the embalming process may also have been a contributing factor in infections [23].

In a study conducted by Kenneth et al., 138 lung specimens with histological evidence of AFB were tested to detect Mycobacterium tuberculosis. Out of these lungs, 12 cases grew mycobacteria. Surprisingly, the number of days the tissue was exposed to formalin did not influence the viability of mycobacteria in any way. Even after extensive treatment of the lungs, Mycobacterium species were still able to grow and thrive. This is an interesting result that could lead to further research into the effects of formalin on mycobacteria [24].

An extensive epidemiologic investigation was conducted when genotype results for isolates from two previously unlinked TB cases were revealed. Through this investigation, it was uncovered that there was likely TB transmission between a cadaver and an embalmer. The patient and the cadaver were initially clustered by genotype and then further linked based on time, place, and person. This correlation was strong enough for the authors to conclude that the patient likely acquired the Tuberculosis infection from the cadaver during embalming procedures [25].

The Approved List of biological agents provides the approved classification of biological agents into hazard groups [26]. The hazard groups are defined in Table 1; when classifying a biological agent, it should be assigned to one of these four groups according to its level of risk of infection to humans. The list of pathogens reported from cadavers, their mode of transmission, and the disease caused along with recommendations about embalming the infected cadavers is represented in Table 2 [27].

Table 1 - Classification of biological agents into hazard groups

Group	Definition
Group 1	Unlikely to result in human illness
Group 2	It can cause human sickness and pose a risk to workers, but it is unlikely to spread to the community and there are typically adequate preventative measures or treatments available.
Group 3	Can cause serious human disease, pose a risk to workers, and spread to the community, however effective preventative measures or treatments are typically available.
Group 4	Causes a serious illness in humans and poses a substantial risk to workers. It is also likely to spread to the community, and there are typically no effective preventative measures or treatments.

Table 2: Pathogens reported from cadavers along with their mode of transmission and diseases caused

Category of microorganisms	Name of the microorganism	Hazard group	Mode of transmission	Diseases caused	Is Embalming allowed
Bacteria	*Bacillus anthracis*	3	Inhalation of spores	Anthrax/Ragpicker's disease/ Wool Sorter's disease	No
	Mycobacterium tuberculosis	3	Aerosol	Tuberculosis	Yes
	Neisseria meningitidis	2	Droplet	Meningitis and septicemia	Yes
	Corynebacterium diphtheriae	2	Droplet	Diphtheria	Yes
	Streptococcus pyogenes (Group A)	2	droplets, contact	Streptococcal sore throat, impetigo, necrotizing fasciitis	No
	Shigella dysenteriae (type 1)	2	the fecal-oral route, contact	Shigellosis	Yes
	Salmonella typhi/ Para typhi	3	fecal-oral route	Intestinal infection, typhoid fever	Yes
	Brucella melitensis	3	contact with infected tissues, infected aerosols	Brucellosis or undulant fever,	Yes

	Verocytotoxin/ Shiga toxin-producing E. coli (e.g., O157: H7)	3	fecal-oral route	Hemolytic Uremic Syndrome	Yes
Virus	*Hepatitis A*	2	fecal-oral route	Hepatitis and Gastrointestinal infection	Yes
	Hepatitis B, C, D	3	Accidental needle stick injury	Hepatitis	Yes
	Hepatitis E	2	fecal-oral route	Hepatitis and Gastrointestinal infection	Yes
	HIV	3	Accidental needle stick injury	AIDS (Acquired Immune Deficiency Syndrome)	Yes
	Prion	3	Contact with infected embalmed tissues	Creutzfeldt-Jakob disease (CJD)	No
	Lassa fever, Ebola, Marburg, Crimean-Congo hemorrhagic fever viruses	3	contact with infected blood, secretions, and organs	Viral Hemorrhagic Fevers (VHFs)	No
	MERS (Middle East Respiratory Syndrome) coronavirus	3	Droplet	Respiratory illness	Yes
	SARS (Severe Acute Respiratory Syndrome) coronavirus	3	Droplet	Respiratory illness	Yes
	Lyssa virus	3	Contact	Paralysis, delirium, convulsions and death	No
Fungi	*Aspergillus*		Inhalation of spores	Aspergilloma, lung abscess	

In one study, specific regions of the body like the axilla, oral, nasal, and perineal regions of the cadavers were examined to check for the presence of bacteria. The presence of skin folds in these regions makes them potential sites for the growth of bacteria. The authors reported a variety of bacteria in these sites like Aero coccus viridans, Cellulomonas, Gardnerella vaginalis, Gemella hemolysans, Staphylococcus epidermidis, etc. which can cause bacteremia, endocarditis, and other severe infections [22].

Implications:

It is worth taking note that the risk of infection from human cadavers is of lower level than those from persons having an active disease or from the carriers of infectious agents. Infection control practices are essential to prevent the spread of infections in anatomy laboratories. Proper hand hygiene, PPE use, disinfection, waste management, and training and education are key components of infection control in anatomy laboratories. These practices should be implemented consistently and rigorously to ensure the safety of students and staff. In addition, ongoing monitoring and evaluation of infection control practices in anatomy laboratories are necessary to find areas for improvement and ensure continuous quality improvement.

The recommended infection control practices for the handling of cadavers in anatomy laboratories include:

- For accidental exposure to blood and body fluids, Universal precautions should be followed and for pathogens transmitting through fecooralroute, enteric precautions should be followed.

- The staff and students should wear proper attire (laboratory coat) and cover their hair (using cap masks)
- Hand hygiene: Proper hand hygiene is essential to prevent the spread of infections. All individuals handling cadavers in anatomy laboratories should wash their hands with soap and water for at least 20 seconds before and after handling the cadavers. If hands are visibly soiled, hand washing should be performed with an antiseptic hand rub or soap and water.
- Personal protective equipment: Individuals handling cadavers in anatomy laboratories should wear personal protective equipment (PPE) to prevent exposure to infectious agents. PPE includes gloves, gowns, masks, and eye protection. Gloves should be changed after each cadaver is handling, and gowns should be changed daily or when visibly soiled. Masks and eye protection should be worn when there is a risk of splashes or sprays. (11)
- Disinfection: All surfaces that encounter cadavers in anatomy laboratories should be disinfected using a suitable disinfectant. The disinfectant should be effective against a broad range of microorganisms, including bacteria, viruses, and fungi.
- Waste management: All waste generated in anatomy laboratories, including cadaver tissues and contaminated materials, should be disposed of per local regulations. Waste containers should be labeled appropriately and stored in a secure location.
- The severely damaged cadavers can be transported in the Body bags to reduce the infection risk [8,14]. Body bags is recommended if the cadavers are infected with M.tuberculosis, MERS coronavirus and SARS coronavirus [16].
- The precautions for handling cases of CJD, and sterilization measures for instruments and objects in contact with these patients, should be publicized. In the United Kingdom, the current policy requires the destruction of all neurosurgical instruments used in patients with suspected CJD [7]
- All equipment that will be used to embalm or prepare bodies for the funeral should be well-cleansed in detergent and either sterilized in an autoclave, boiled, or soaked in a disinfectant. Blood or other bodily fluid spills should be cleaned up with disinfectants, and single-use gloves should be used to prevent contact between the spill and the hands. After a session, hands should always be cleaned.
- To lower the danger of TB transmission, the Centers for Disease Control and Prevention (CDC) in New York propose environmental control measures for embalming rooms and the use of N95 respirators during embalming processes. Yearly TB testing is conducted for funeral service professionals at a TB risk [10].
- Vaccination against hepatitis B, tuberculosis
- Training and education: All individuals handling cadavers in anatomy laboratories should receive training on infection control practices. This training should include hand hygiene, PPE use, disinfection, and waste management. The embalming staff should be trained in the hazard group pathogens and procedures to be followed when they meet the cadaver with the infectious agent.

Future perspectives:

Infection control practices in anatomy laboratories will continue to evolve and improve in the future. Some of the future perspectives include:

- Standardized guidelines: Currently, guidelines for healthcare settings are general and may not adequately address the special challenges posed by anatomy laboratories. By developing infection control guidelines specific to anatomy laboratories, compliance with infection control measures can be improved. Such guidelines should cover the use of personal protective equipment, maintenance of anatomical specimens, and decontamination of work surfaces. Moreover, guidelines should also address procedures for managing anatomical specimens exposed to potentially infectious agents. Additionally, the guidelines should guide reporting any potential infection control breaches. The guidelines must be based on a through understanding of anatomy laboratory practices and the risks posed by these activities. The development of clear and concise guidelines will help to ensure that best practices are followed consistently across all anatomy laboratories and that students, faculty, and staff are adequately protected from infection transmission.

- Alternative chemical agents for cadaver preservation: Since formalin has serious negative effects, researchers are trying to find alternative embalming methods using a wide range of chemicals. Above all, formalin is still employed in dissection rooms as preservation and disinfection because of its affordability, efficiency, and outcomes. Therefore, it is important to take the necessary precautions to reduce unnecessary exposure to chemicals and germs until a suitable substitute is discovered.
- Use of modern technologies: The use of innovative technologies, such as UV-C irradiation and hydrogen peroxide vapor, may supply effective means of disinfection and could improve infection control practices in anatomy laboratories. It has been proven that UV-C disinfection is effective at lowering the bacterial load on surfaces and in the air [5]. It has been proven that air purifiers are effective at lowering airborne particles and enhancing indoor air quality [6]. These innovations could be employed in anatomical laboratories in addition to hospitals and other healthcare settings.
- Different approaches to teaching anatomy: The requirement for cadaveric dissection may be eliminated by using virtual dissection as an alternative way of anatomy instruction. The lack of cadaver procurement, storage, and disposal means that virtual dissection may also be more economical and efficient.
- Improved PPE: Personal protective equipment (PPE) will continue to be an essential part of infection control practices in anatomy laboratories. There may be improvements in the design and functionality of PPE to improve comfort and ease of use, which could encourage greater compliance with PPE use.
- Increased awareness and education: about infection control practices in anatomy laboratories will be important in the future. This includes educating students, faculty, and staff about the risks of infection transmission and the importance of following best practices. This may also involve greater collaboration between anatomy departments and infection control specialists. To address this issue, there must be an increased focus on education and training about PPE use. This should include clear instructions on how to use PPE and highlighting its importance. Emphasizing fostering an environment where individuals feel at ease asking questions and using proper PPE is also necessary. To ensure employees follow the suggested rules and practices, regular monitoring and evaluation of PPE use in the anatomy lab is also essential. The knowledge and practices of disinfection and sterilization are improved by educational interventions [4].

The limited number of studies found, and the studies' heterogeneity serves as added limitations of this review. Future studies should aim to address these limitations and supply more robust evidence on infection control measures in anatomy laboratories.

Conclusion:

In conclusion, infection control practices are essential for the safe handling of cadavers in anatomy laboratories. Proper hand hygiene, PPE use, disinfection, waste management, and training and education are key components of infection control. However, there is still a need for more standardized guidelines and the use of innovative technologies to improve infection control practices in anatomy laboratories. These practices should be implemented consistently and rigorously to prevent the spread of infections in anatomy laboratories. Ongoing monitoring and evaluation of infection control practices in anatomy laboratories are necessary to ensure continuous quality improvement.

References

1. Chia, Terkuma & Oyeniran, Oluwatosin. (2019). Anatomy Education in Nigeria: Challenges and Prospects. Journal of Contemporary Medical Education. 9. 61. 10.5455/jcme.20190531113058.
2. Chia, Terkuma & Oyeniran, Oluwatosin & Ajagbe, Abayomi & Onigbinde, Oluwanisola & Oraebosi, Michael. (2020). The symptoms and stress experienced by medical students in anatomy dissection halls. Journal of Taibah University Medical Sciences. 15. 10.1016/j.jtumed.2020.01.001.
3. Memon I. Cadaver Dissection Is Obsolete in Medical Training! A Misinterpreted Notion. Med Princ Pract. 2018;27(3):201-210. doi: 10.1159/000488320.
4. Ravi KS. Dead Body Management in Times of Covid-19 and its Potential Impact on the Availability of Cadavers for Medical Education in India. Anat Sci Educ. 2020 May;13(3):316-317. doi: 10.1002/ase.1962.

5. Chia T, Oyeniran OI. Ethical Considerations in the Use of Unclaimed Bodies for Anatomical Dissection: A Call for Action. Ulutas Med J. (2020), [cited March 26, 2023]; 6(1): 5-8. doi:10.5455/umj.20201229101758
6. Dissabandara LO, Nirthanan SN, Khoo TK, Tedman R. Role of cadaveric dissections in modern medical curricula: a study on student perceptions. Anat Cell Biol. 2015 Sep;48(3):205-12. doi: 10.5115/acb.2015.48.3.205.
7. Nurunnabi, A. S. M., Ara, S., Khalil, M., & Khalil, M. (2012). Ethics in dissection of cadaver in teaching and learning of anatomy. Bangladesh Journal of Bioethics, 2(3), 10–15. https://doi.org/10.3329/bioethics.v2i3.10258
8. Habicht JL, Kiessling C, Winkelmann A. Bodies for Anatomy Education in Medical Schools: An Overview of the Sources of Cadavers Worldwide. Acad Med. 2018 Sep;93(9):1293-1300. doi: 10.1097/ACM.0000000000002227.
9. Ghosh SK. Human cadaveric dissection: a historical account from ancient Greece to the modern era. Anat Cell Biol. 2015 Sep;48(3):153-69. doi: 10.5115/acb.2015.48.3.153.
10. Gürses İA, Coşkun O, Öztürk A. Current status of cadaver sources in Turkey and a wake-up call for Turkish anatomists. Anat Sci Educ. 2018 Mar;11(2):155-165. doi: 10.1002/ase.1713.
11. Mwachaka PM, Mandela P, Saidi H. Repeated Exposure to Dissection Does Not Influence Students' Attitudes towards Human Body Donation for Anatomy Teaching. Anat Res Int. 2016;2016:9251049. doi: 10.1155/2016/9251049.
12. Osuagwu, Ferdnand & Imosemi, Innocent & Oladejo, Odunayo. (2010). Sources of cadaver used for dissection at the Ibadan medical school, Nigeria - Analysis of a three-year data. African Journal of Biomedical Research. 7. 10.4314/ajbr.v7i2.54079.
13. Shoja, M.M., Benninger, B., Agutter, P., Loukas, M. and Tubbs, R.S. (2013), A historical perspective: Infection from cadaveric dissection from the 18th to 20th centuries. Clin. Anat., 26: 154-160. https://doi.org/10.1002/ca.22169
14. Gundreddy P, Gaurkar SS. Presence of Contagious Bacterial Flora in Formalin-Fixed Cadavers: A Potential Health Hazard to Medical Professionals. Cureus. 2022 Oct 25;14(10):e30684. doi: 10.7759/cureus.30684.
15. Claudio Molina; Liliana Berrocal; Matías R. Jofré; Carlos Rosas & Ximena Rojas S. Identification of Bacterial and Fungal S pecies in Human Cadavers Used in A natomy Teaching. Int. J. Morphol., 37(2):473-476, 2019
16. Sambasivarao Yaragalla and Amruta Rajput. Identification of Fungal Growth from the Internal Organs of Preserved Human Cadavers. American Journal of Microbiological Research. 2017; 5(1):25-27. doi: 10.12691/ajmr-5-1-4
17. Demiryürek D, Bayramoğlu A, Ustaçelebi S. Infective agents in fixed human cadavers: a brief review and suggested guidelines. Anat Rec. 2002 Aug 15;269(4):194-7. doi: 10.1002/ar.10143.
18. Bhartiya, Vaibhav & Chandra, Prem & Sharma, Himani. (2020). IMPACT OF RELIGIOUS PRACTICES ON HEALTH AND HYGIENE: A CRITICAL OBSERVATIONAL STUDY WITH SPECIAL REFERENCE TO ARTICLE 25 OF THE CONSTITUTION OF INDIA. Journal of Anatomical Sciences. 28. 10.46351/jas.v28i1pp49-56.
19. Kabadi, Chandan & Iii, Carroll & Gomez, Fernando. (2013). Potential pathogen transmission on medical student anatomy laboratory clothing. Medical Student Research Journal. 2. 030-035. 10.15404/msrj.002.002.spring/04.
20. Owolabi JO, Tijani AA, Ihunwo AO. A Need to Protect the Health and Rights of Anatomists Working in Dissection Laboratories. Risk Manag Healthc Policy. 2022 May 4;15:889-893. doi: 10.2147/RMHP.S362305.
21. Jangde, S., Arya, R., Paikra, S., Basan, K., & Kumar, N. (2015). How to provide a safe working condition for medical students and professionals in the anatomy dissection room. Scholars Journal of Applied Medical Sciences | Volume-3 | Issue-05. 1867-1870. DOI: 10.36347/sjams.2015.v03i05.013
22. G. Stewart Smith. Tuberculosis As A Necropsy Room Hazard. J. clin. Pathi. (1953), 6, 132

23. Sterling TR, Pope DS, Bishai WR, Harrington S, Gershon RR, Chaisson RE. Transmission of Mycobacterium tuberculosis from a cadaver to an embalmer. N Engl J Med. 2000 Jan 27;342(4):246-8. doi: 10.1056/NEJM200001273420404.
24. Gerston KF, Blumberg L, Tshabalala VA, Murray J. Viability of mycobacteria in formalin-fixed lungs. Hum Pathol. 2004 May;35(5):571-5. doi: 10.1016/j.humpath.2004.01.009.
25. Anderson JA, Meissner JS, Ahuja SD, Shashkina E, O'Flaherty T, Proops DC. Confirming Mycobacterium tuberculosis transmission from a cadaver to an embalmer using molecular epidemiology. Am J Infect Control. 2015 May 1;43(5):543-5. doi: 10.1016/j.ajic.2015.01.027.
26. www.hse.gov.uk/pubns/misc208.pdf
27. https://www.ecch.org/media/iwtp3eov/care-of-the-cadaver-2023.pdf