



Unveiling challenges in cadaveric dissection for medical education – a study of student perspectives

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ABSTRACT

Introduction and aim. Cadaveric dissection is the mainstay of learning anatomy by medical students. Even though newer teaching learning methodologies have been implemented to facilitate learning anatomy, cadaveric dissection remains the most preferred method by students. The objective of this study was to analyze the student perspective of different aspects of learning anatomy with their positive and negative experiences and to get a better understanding of their opinions and their experience.

Material and methods. In this cross-sectional study, a pretested and validated questionnaire was used to collect information from the students after approval from the Institutional Ethics Committee. Informed consent was obtained from every student prior to their participation in the study.

Results. Three hundred seventy-seven students took part in this study and the response rate obtained was 63.5%. The majority of the students stated that cadaveric dissection has helped them in learning basic anatomy and had deepened their understanding of complexity of human body and has helped in better performance in clinical applications. The smell of formaldehyde and eye irritation was cited as the major reasons for finding dissection sessions challenging. Most of the students agreed that counselling before dissection sessions will help to alleviate the emotional reactions to cadavers.

Conclusion. The students unanimously agreed that cadaveric dissection sessions are the best way to learn basic anatomy complemented with newer teaching tools like prosection and computer-based approaches. However, the problems encountered by the students like smell and irritation of formaldehyde need to be addressed with usage of alternative techniques.

Keywords. anatomy, cadaveric dissection, medical curriculum, medical education

Introduction

Anatomy is considered the cornerstone and fundamental basis of clinical medicine.¹ The practice of dissecting cadavers (CD) traces its origins back to 300 BC, and by the 15th century, it had evolved into a vital method for exploring the intricate structures of the human body.^{1,2} The inclusion of cadaver dissection in the traditional undergraduate medical curriculum is of great significance, and as a result, it has continued to be a pivotal

component of anatomical education for the past four centuries.³

Anatomy has traditionally been taught through a range of methods, including lectures, practical sessions using models, prosected materials, and cadaveric dissection. In recent times, newer approaches such as computer-assisted learning models, interactive computer-based software, and radiological images have been introduced. Many universities worldwide have adopted modern

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integrated curricula that incorporate problem-based learning (PBL), case-based learning (CBL), team-based learning (TBL), and other computer-assisted teaching methods in their undergraduate anatomy courses.⁴⁻⁸

Nevertheless, cadaver dissection remains the most superior method for learning human anatomy. This is because it enables students to grasp the surface anatomy of various structures, gain a tactile understanding of tissues and organs, and appreciate the prevalence of anatomical variations.⁹

Over the years, the majority of students have shown enthusiasm for participating in dissection activities. However, some students have found the experience of dissection to be quite distressing and have chosen to avoid it. In response to this behavior, it is essential for faculty to recognize, acknowledge, and validate the emotional distress experienced by these students. This recognition is crucial because such distress can potentially hinder the acquisition of the necessary competencies and skills.¹⁰⁻¹²

Aim

The objective of this study was to investigate the perceptions and attitudes of medical students at a tertiary care teaching institute in South India, drawn from diverse cultural backgrounds. The study focused on their views and attitudes regarding cadaveric dissection and other contemporary advancements in anatomical learning methods

Material and methods

A cross-sectional study design was used. The main objective of this study was to probe medical student perspectives on cadaveric dissection learning sessions. The study was conducted among medical undergraduate students of a tertiary care teaching centre in Tamilnadu, India. This is one of India's largest private universities in the field of science and technology, and students from various social and cultural backgrounds are trained here. All the medical students of the university from the second year to the final year were included in the study. The students in this university get the opportunity to perform dissection under the guidance of faculties. There are weekly 12 hours of dissection for the students, with two hours each day. The data was collected during the period from January to March 2021. All medical students who had direct contact with the use of cadavers for learning during their first year of medical school training and who signed the informed consent form to participate in the study were enrolled. Approval was granted by the Ethics Committee of SRM Medical College Hospital & Research Centre, SRM Institute of Science and Technology No. 2179/IEC/2020.

The study tool consisted of a questionnaire consisting of 17 questions which were pretested and validated

with the experts of the department of Anatomy and among five students. The questions were developed by reviewing different related literature articles. The questionnaire consisted of 5 questions about the agreement or disagreement regarding positive experience relating to dissection sessions and application of dissection related in their clinical training and other aspects of their attitude. There were five questions about negative experience regarding dissection like fear of infection, mutilating bodies or eye irritation. Rest of the questions were about scope for improvement of the learning sessions.

A total of 377 medical students from second year to internship were included in the study. After obtaining formal permission from the Institutional Ethics Committee and consent from the participants, they were told about the objectives and relevance of the study before they filled out the questionnaires containing 17 items which was circulated through Google form link.

The actual sample size was calculated using the single population proportion formula with the following assumptions: $p=0.5$ (prevalence), 95% confidence interval, and 5% margin of error. The total number of students was 594, and a 10% non-response rate was applied, yielding a final sample size of 259. The convenience sampling method was used to select the samples.

Data was downloaded from Microsoft Excel (Microsoft, Redmond, Washington, USA). The principal investigator reviewed all the collected data for consistency and completeness. Using SPSS v21.0 (IBM, Armonk, NY, USA), suitable percentage and proportions were calculated in interpretation of the results obtained.

Results

The questionnaire was sent to 594 students and 377 (63.5 %) completed the questionnaire. The mean age of the students was 21 ± 1.6 years. Table 1 shows the demographic features of the study participants.

Table 1. Demographic features of the study participants

Variables	n (%)	
Age (in years)	Less than 18	0
	18-24	299 (79.3)
	> 24	78 (20.7)
Sex	Male	204 (54.1)
	female	173 (45.9)
Attendance in dissection	Regular	315 (83.6)
	Irregular	62 (16.4)
Year of study	Phase II	138 (36.6)
	Phase III	160 (42.4)
	Internship	79 (20.9)

All of the participants ($n=377$, 100%) strongly agreed that cadaver-based learning of gross anatomy had helped them to develop and enhance empathy and compassion which helped during training in clinical settings. A majority of the participants ($n=371$, 98.4 %)

strongly agreed that cadaver dissection had deepened their understanding of anatomy with respect to complexity and variability of the human body and provided an effective learning experience that reinforced lecture and textbook material. Also, 98% (n=370) of the participants strongly agreed that the anatomical knowledge gained through dissection could be applied in training in clinical skills/examination of patients. The participants endorsed that CD has also improved their power of critical thinking and professionalism. As a result, it is reasonable to state that performing on cadavers generate positive experiences for the further medical education. Table 2 depicts the positive experiences of cadaveric dissection.

Table 2. Positive experiences of cadaveric dissection

Attitude area	Agree; n (%)	Disagree; n (%)
Help to develop and enhance empathy and compassion which is helpful during clinical posting	377 (100)	0
Deepen the understanding of anatomy with respect to complexity and variability of the human body	371 (98.4)	6 (1.6)
Provide an effective learning experience that reinforced lecture and textbook material.	371 (98.4)	6 (1.6)
Anatomical knowledge gained through dissection could be applied in training in clinical skills/examination of patients	370 (98)	7 (2.0)
Improved critical thinking power and professionalism	377 (100)	0

Upon analyzing the reasons for finding the dissection challenging, multiple factors were rooted out as depicted in Figure 1. A majority of the participants agreed that the odor of formaldehyde is a major limiting factor (n= 348; 92.3%). More than half of the participants complained of eye irritation as well (n=226; 60%). Other factors which were accounted for were fear of infections (n=190; 50.3 %), fear of mutilating bodies (n=115; 30.5%) and a dislike of touching cadavers (n=42; 11.1 %).

Upon further analysis of factors that were related to the conduct of the cadaver-based learning of anatomy, 73.7% (n=278) of the participants revealed that long durations of dissections were a disadvantage. Being uncomfortable with the peer groups was also put forth as a reason by a small fraction of participants (n=58; 15.4 %). A few participants also expressed that the anxiety and stress related to dissection negatively impact learning (n=15; 4%). All of the participants agreed that they were contented with the current teaching methodologies followed for learning anatomy (n=377, 100%).

The solutions for the above-mentioned challenges were also proposed. Counselling before entering the dissection room concerning the possible emotional reactions to cadaver was considered as critical by all of the participants (n=377; 100%). They also insisted that need of proper use of safety equipment (gloves and masks) should be emphasized throughout the period (n = 348; 92.3%).

A majority of the participants (n=342; 90.2%) agreed that suitable measures should be adopted to overcome the unpleasant odor (e.g. face masks). The participants also emphasized the requirement for proper management of molds/fungus on cadavers (n=190; 50.4%) and maintaining general cleanliness of the dissection hall (n=148; 39.3%). Figure 1 depicts the major negative experiences/challenges during the dissection sessions.

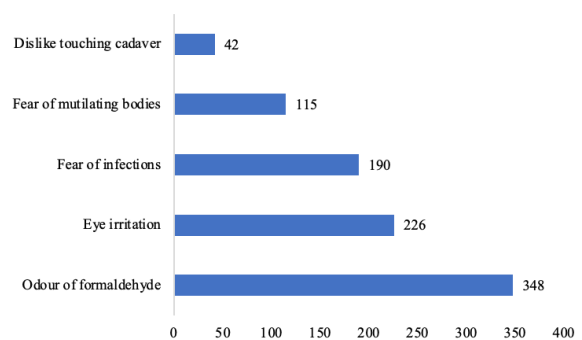


Fig 1. Negative experiences/challenges during cadaveric dissection

Regarding teaching-learning methodology, all of the participants agreed that small group teaching prior to discussion can be considered for better understanding of structures (n=377; 100%). They also facilitated the usage of newer teaching tools and technologies along with CD for making learning anatomy enlightening. However, 100% of the students strongly agreed that cadavers could not be replaced fully with any other advances in learning anatomy.

Discussion

The purpose of this study was to examine medical student perceptions and attitudes towards cadaveric dissection and other latest advances in methodologies for learning anatomy. Anatomy knowledge is extremely important in the practice of medicine. Hence cadaveric dissection is considered to be an indispensable part in medical education since centuries.

In this study, the majority of students had favorable attitudes toward the utility of cadaveric dissections in the teaching process of anatomy. Cadaveric dissection, according to the students, deepens their understanding of anatomy, improves their clinical examination skills, increases their respect for the human body, and delivers a better perception of patient examination skills while also making learning interesting. This perspective conveyed by the participants in this study is similar to that expressed in an Australian study by Dissabandara et al.¹³ Furthermore, Abass Alhassan et al. stated that approximately 87.9% of the participants in their study regarded cadaveric dissection as essential and integral in the science of human anatomy.¹⁴

Previous research has shown that, while the versatility of cadaveric dissection in the modern medical education system is being challenged, those who actively participated in cadaveric dissection performed quite well in written and oral examinations.^{13,15} According to the findings of several studies, dissections promote deeper learning by providing students with a significant chance to study the exact complexity of human body tissue and their clinical significance.^{16,17}

In this study, the major perceived downsides of cadaveric dissection were the smell of formalin, eye irritation, and fear of infection. Furthermore, the students expressed apprehension about mutilating bodies. The majority of students, however, universally agreed that cadaveric dissection was the most crucial tool for learning for anatomy in the first year.^{18,19} This finding is in line with the observations of previous studies. Several studies found that most students reported experiencing anxiety and stress, which had a negative impact on their learning.^{20,21}

The problem in recognizing structures is typical with students who are being introduced to dissection for the very first time. However, this challenge is believed to foster critical thinking among students, which is an essential element of the Problem Based Learning which is quite often followed in the latest competency based medical curriculum. According to studies, sufficient pre-dissection preparedness using lectures, model-based sessions, and appropriate tutor assistance during the dissection session usually alleviates such problems. The students also recommended that counselling before entering dissection room for the first time about the potential emotional reactions to cadaver is essential. They also insisted that need of proper use of safety equipment (gloves and masks) should be emphasized throughout the period as the same is not provided free of cost to the students. Majority of the participants also agreed that suitable measures should be adopted to overcome the unpleasant odor. The participants also emphasized the requirement for proper management of molds/fungus on cadaver due to inadvertent climatic conditions of high humidity and maintaining general cleanliness of the dissection hall. Even though students consider dissection as an integral part in learning medicine, long hours of dissection per week may have been physically challenging in their initial medical school years.

The hallmark finding from this study was the student's inclination towards cadaveric dissection based learning and a qualitative insight into this perspective was brought into light like, the traditional belief of necessity of exposure to cadaver in the first year of medical school and feeling of 'being a doctor' upon contact with cadaver. These findings lead us a dilemma for implementation of latest technologies in learning anatomy of human body. Hence the ideal technique will be CD coupled with latest technologies which will make anatomy education enlightening.

Conclusion

Cadaveric dissection is indispensable in teaching and learning anatomy. Better facilitatory sessions and newer teaching methodologies like flipped classroom sessions will help in improving the student's attitude towards dissection which in turn will help the students to perceive an effective learning experience, perform well in examinations and as well as to apply this knowledge in clinical training.

Declarations

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Author contributions

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Conflicts of interest

The authors have no conflicts of interest to declare.

Data availability

Available, subject to request to authors.

Ethics approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of SRM Medical College Hospital & Research Centre, SRM Institute of Science and Technology No. 2179/IEC/2020.

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