

Learning Anatomy via Cadaver Dissection at a New Medical Faculty in Sri Lanka: Students' Perspectives

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Abstract

Introduction: Cadaveric dissection has long been a fundamental component of anatomy education, providing students with a hands-on, three-dimensional understanding of the human body. However, the integration of alternative teaching methods, such as dissected specimens, anatomical models, and digital tools, has raised questions about the relevance of traditional dissection. This study explored the perspectives regarding the role of cadaveric dissection and the learning experience of medical students in a newly established medical faculty in Sri Lanka.

Methods: A cross-sectional survey was conducted among preclinical and clinical students who had previously engaged in cadaveric dissection. Responses were collected via an online questionnaire assessing their views on its benefits, challenges, and comparison with modern educational resources.

Results: Among 427 participants, the majority agreed that dissection reinforced theoretical knowledge, improved retention, and enhanced their spatial understanding of anatomical structures. Many students also felt that it prepared them for surgical training and increased their respect for the human body. While some acknowledged the advantages of alternative learning tools, most opposed replacing dissection entirely.

Conclusion: The study highlighted the continued importance of cadaveric dissection in medical education, despite logistical challenges. A hybrid approach, integrating traditional dissection with emerging technologies, may offer an effective learning experience. Strengthening infrastructure and faculty support for dissection-based teaching will be crucial to maintaining its relevance in the evolving medical curriculum.

Keywords: Anatomy, Dissections, Students' Perspectives, Sri Lanka, Medical Education

Introduction

The "dissection" of the human body has long been an important component of Anatomy teaching and learning.

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The topmost mode for studying Anatomy has been the use of cadavers for many generations. This method involves meticulously dissecting cadavers to explore the intricate structure and relationships between the body organs, tissues, nerves, and blood vessels.

Dissections have various benefits for preclinical students. They gain a comprehension of the gross structure of human body organs by observing a three-



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dimensional view of human Anatomy through cadaver dissection, which is not achievable from two-dimensional images or textbooks (McLachlan et al., 2004). Through dissection, students can connect anatomical structures to their practical applications, enhancing their comprehension of the roles and interactions between various bodily components in both health and illness to achieve clinical correlations (Mc Garvey et al., 2001; Moxham and Plaisant, 2007). The dissections enhance the development of surgical skills as well. It is essential to the development of surgical techniques and abilities because it gives students practical experience with handling tissues, recognizing anatomical landmarks, and performing surgical procedures (Sarkis et al., 2014). Dissection also reveals the anatomical variations. This includes identifying individual anatomical variations and interpreting anatomical variations to normal structural functions of the human body (Nzenwa et al., 2023).

Due to the availability of donor cadavers and being an effective mode of teaching and learning three-dimensional Anatomy, cadaveric dissection is presently the most popular method of teaching and learning Anatomy in the majority of medical faculties in Sri Lanka. However, the students are now exposed to the alternatives such as using pre-dissected/ prosected specimens or cadavers for their study due to variables including lack of time for dissection, unpleasant laboratory environment, and ethical issues for the use of cadavers for the dissection (Bergman et al., 2011). The use of cutting-edge materials like YouTube videos, audiovisual aids, anatomical models, simulations, and virtual and augmented reality (VR/AR) tools decreases students' interest in Anatomy dissection (Bergman, 2015; Burgess and Ramsey-Stewart, 2015; Aziz et al., 2002).

Despite the low-interest among students, cadaveric dissection continues to be the cornerstone of Anatomy education. All Anatomy departments in medical faculties and national Anatomical societies unequivocally state that cadaveric dissection is a fundamental component of medical students'

Anatomy education. Their exposure to cadavers greatly aids the ritual transformation of students from laypersons to medical professionals (Moxham and Moxham, 2007; Ashdown et al., 2013).

The majority of medical schools devote more than half of their Anatomy curricular time to the dissection laboratory (Lempp, 2005). However, several medical schools have either removed the practical hands-on aspect of dissection or are seriously considering such a measure. (Ashdown et al., 2013). Teaching Anatomy in Sri Lankan medical faculties has been under continuous review in the past few years, ranging from discipline-based approaches to full integration organ-system modules. In line with the recommendations of stakeholders, students' feedback and perceptions constituted an important elements for consideration in such curricular reviews.

A substantial appreciation of human Anatomy is still a necessary part of exploring the three-dimensional view of the human body to understand Applied Anatomy. Considering these changes, cadaveric dissection can still be considered as a valuable learning tool for exploring human Anatomy in addition to the other options/methods that students can undertake to develop their anatomical knowledge.

This study aimed to determine students' perceptions of the usefulness of cadaver dissection to understand the intricacies of human Anatomy in the modern teaching-learning environment in a newly established medical faculty in Sri Lanka.

Methods

The present study was carried out targeting medical students presently studying in para-clinical and clinical phases who were involved in cadaveric dissection during their preclinical phase in Faculty of Medicine, Wayamba University of Sri Lanka. All students who had completed the dissection component in the faculty so far were recruited for the study. Approval for the study was taken from the Ethics Review Committee of the Faculty of

Medicine, Wayamba University of Sri Lanka before collecting the data (Ref. No. PW/2024/09/01). A previously reported validated questionnaire was used to acquire the students' feedback online on the benefits and pitfalls of learning Anatomy by using cadaveric dissections and other novel strategies (Kalthur *et al.*, 2022). All para-clinical and clinical students were engaged in academic work at a hospital setup remote from the faculty. The students involved in the study had access to augmented teaching aids, including 3D anatomy software and instructional videos, both prior to and during their dissection sessions. These resources were integrated into their learning process as part of the standard teaching curriculum, enabling the students to form comparative opinions based on both traditional cadaveric dissection and digital anatomical tools.

Data collection was done using a Google form. While the research question was thoughtfully crafted by the lecturers, the data collection process was conducted independently by technical officers who are not involved in teaching or academic evaluations within the faculty. This approach ensured the integrity of the data and minimizes any potential for lecturer-influence bias in the study. The Google form which included a questionnaire, and consent form along with the study description was emailed to all students in the medical faculty who are presently engaging in para-clinical and clinical studies. The questionnaire included three broad themes based on student responses and perspectives to assess the advantages and disadvantages of the dissection, and ideas about the dissection classes versus other modern educational aids in the modern teaching-learning era.

Each of the three themes included a set of questions with choices to which the students had to respond. Other than the above three themes, common questions were also asked about the dissection. Google form responses and consent forms signed by the responding students were collected for the analysis. A 5-point Likert scale was used to score the responses ranging from 'strongly disagree' to

'strongly agree' in every section. The results were expressed in frequency (N) and percentages (%). The data were recorded and analyzed using SPSS version 16 (SPSS Inc., Chicago, IL).

Results

A total of 427 preclinical and para-clinical students were recruited to the study, including 312 (73.1%) female and 115 (26.9%) male students. This included 27 students (6.3%) from the first batch, 30 students (7.0%) from the second batch, 116 students (27.2%) from the third batch, 106 students (24.8%) from the fourth batch, and 148 students (34.7%) from the fifth batch. The overall student response rate for the study was 72.9%.

Broad theme I – Perspectives on the advantages of learning gross Anatomy by dissection (Figure 1) was assessed by using four sets of questions. The majority of students responded positively (50.1% strongly agreed and 42.6% agreed) that dissections help them to recall what was already learnt by the lectures by deepening their knowledge about structures three-dimensionally. Percentage 45.7 of students strongly agreed and 43.6% of students agreed that dissections make learning Anatomy more interesting. Percentage 34.4 of students strongly agreed and 49.6% of students agreed that dissections prepare them for surgery while 10.8% of students had a neutral idea for this. Many students opined (55.5% strongly agreed and 36.3% agreed) that dissections enhance their respect towards human beings.

Broad theme II – Perspectives on the disadvantages of learning gross Anatomy by dissection (Figure 2) was assessed by using six sets of questions. Most of the students (54.8%) disagreed and (14.8%) strongly disagreed that dissections are stressful while 25.1% of students had neutral ideas on this. Percentage 41.9 disagreed with the statement that dissection demands much physical work while 30.7% of students were neutral on this. Percentage 39.1 of the students disagreed while 18% of the students agreed on the fact that dissections are time-consuming.

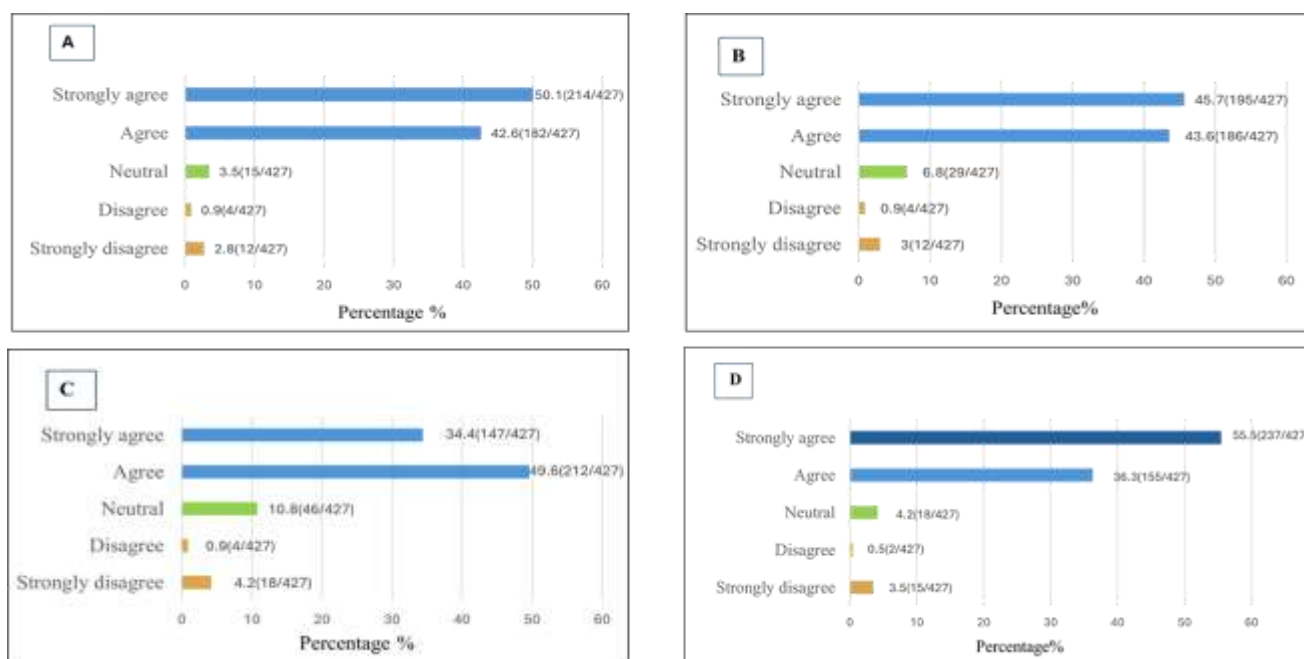


Figure 1: Broad theme I - Medical students' perspectives on the advantages of learning gross Anatomy by dissection

(A) It helps me recall what I have learnt and deepens my knowledge

(B) It makes learning more interesting

(C) It prepares me for surgery by getting used to the idea of cutting into a human body

(D) It enhances my respect towards human body

The majority of students, 39.6% neither agreed nor disagreed on the fact that the smell is unpleasant 23.9% disagreed and 26% agreed with this statement. 30% agreed, 26% disagreed and 34.2 were neutral on the fact that it was difficult to identify structures by self-dissection. 32.8% of students agreed and 19.7% disagreed on the fact that prosected specimens are better and time-saving than dissection while 31.1% were neutral on this fact.

Broad theme III - Perspectives on dissection classes versus other educational resources used in learning Anatomy (Figure 3) were assessed by using six sets of questions. Percentage 24.4 of students agreed and 16.6% of students disagreed on the fact that time allocation for dissections should be expanded while 51.8% of the students were neutral which indicated they agreed that already allotted time is enough in the curriculum. The Majority of students agreed (61.4% agreed and 11.5% strongly agreed) that dissections complement their learning of

Anatomy. Use of prosected specimens was not viewed favourably, with 43.8% of students disagreeing and 10.5% strongly disagreeing when asked if dissections should be replaced by prosected specimens. Similarly, 42.6% disagreed and 23.9% strongly disagreed with replacing dissections with videos of the prosected specimens. Replacement with YouTube videos, video recordings, and audio recordings was met with disagreement of 41.5% and strong disagreement of 28.1%. Percentage 39.3 disagreed and 21.3% strongly disagreed with replacing dissections with didactic lectures.

According to the results of students' overall views on dissections (Figure 4), only 29% of students responded that they prefer dissections over any other classes while 44.5% were very neutral. Percentage 55.7 of students agreed and 23.7% strongly agreed that attending dissection classes is advantageous. The majority of students disagreed (41.7% strongly disagreed and 34.2% disagreed) on eliminating dissections

from the curriculum. Nearly all (63.2% agreed and 21.8% strongly agreed) agreed that

dissections should be supported by educational tools.

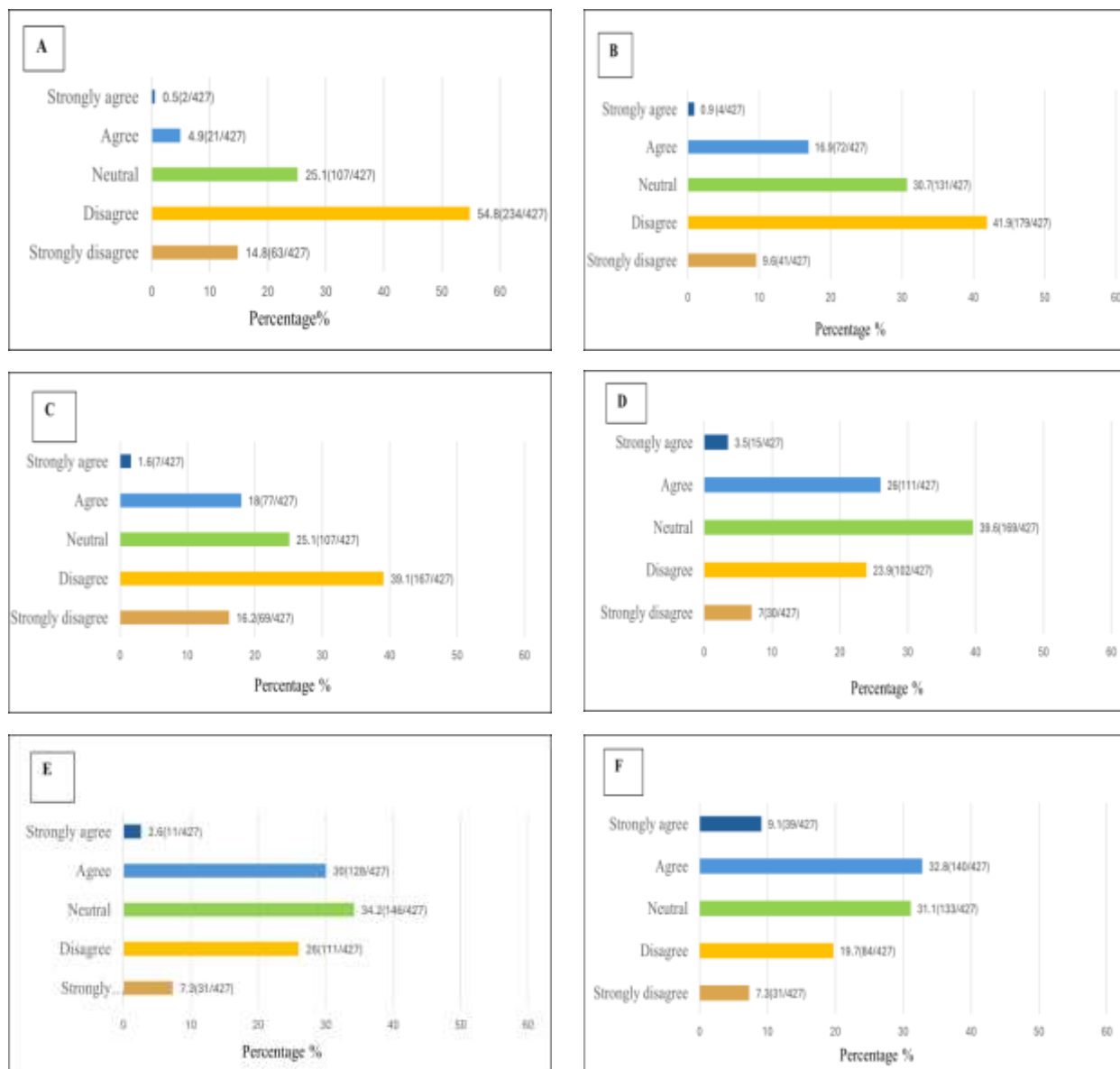


Figure 2: Broad theme II – Medical students' perspectives on the disadvantages of learning gross Anatomy by dissection

(A) The act of dissection is stressful

(B) Dissection demands a lot of physical work

(C) It is time consuming

(D) The smell is unpleasant while dissecting

(E) It is difficult to identify structures by self-dissection

(F) Prosection (Pre-dissected specimens) helped me to get to the important information quicker without spending extra time on dissection

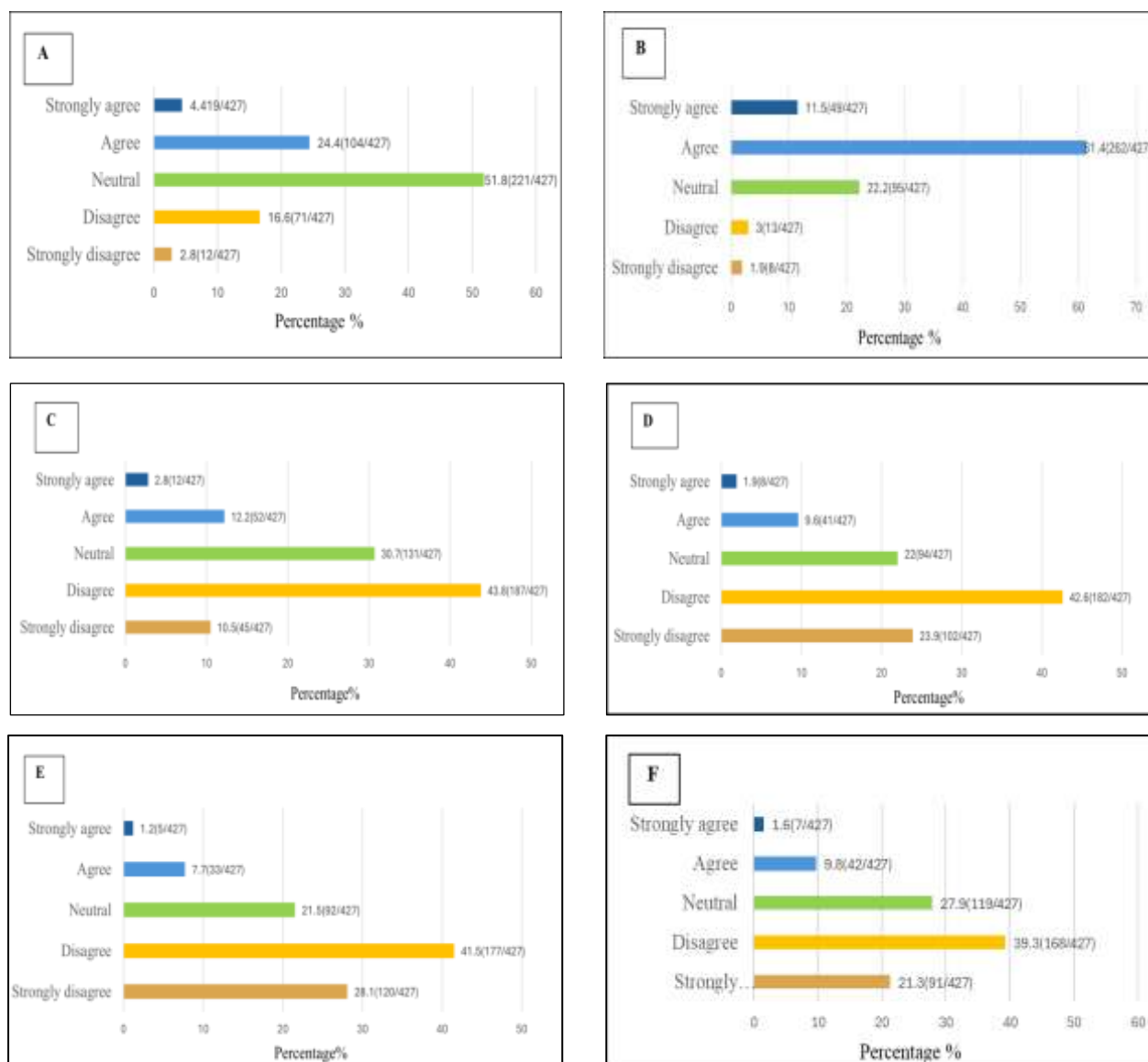


Figure 3: Broad theme III - Medical students' perspectives on dissection classes versus other educational resources used in learning Anatomy

(A) Time allocated for dissection should be more

(B) Dissection classes complement my learning of anatomy

(C) Dissection should be replaced by pre-dissected specimens

(D) Dissection should be replaced by videos of pre-dissected specimens

(E) Dissection should be replaced by YouTube videos, VR/AR

(F) Dissection should be replaced by didactic lecturers

Discussion

Anatomy is regarded as a rather challenging subject in the preclinical medical curriculum when compared to other preclinical subjects. It is essential that students commencing their medical journey obtain a solid understanding of gross Anatomy in an easy way. As a result,

most medical schools worldwide offer dissection as the core mode of teaching Anatomy, which helps beginners gain a better knowledge of the three-dimensional organization of human body organs in a relatively simple way. However, most medical schools have recently proceeded to using prosected specimens in teaching and learning

gross Anatomy in addition to Anatomy dissections (Hiavac *et al.*, 2018). The paucity of time for dissection, the shortage of cadavers available for the dissection, and the stringent

ethical restrictions on cadaver acquisition could all have contributed to this.

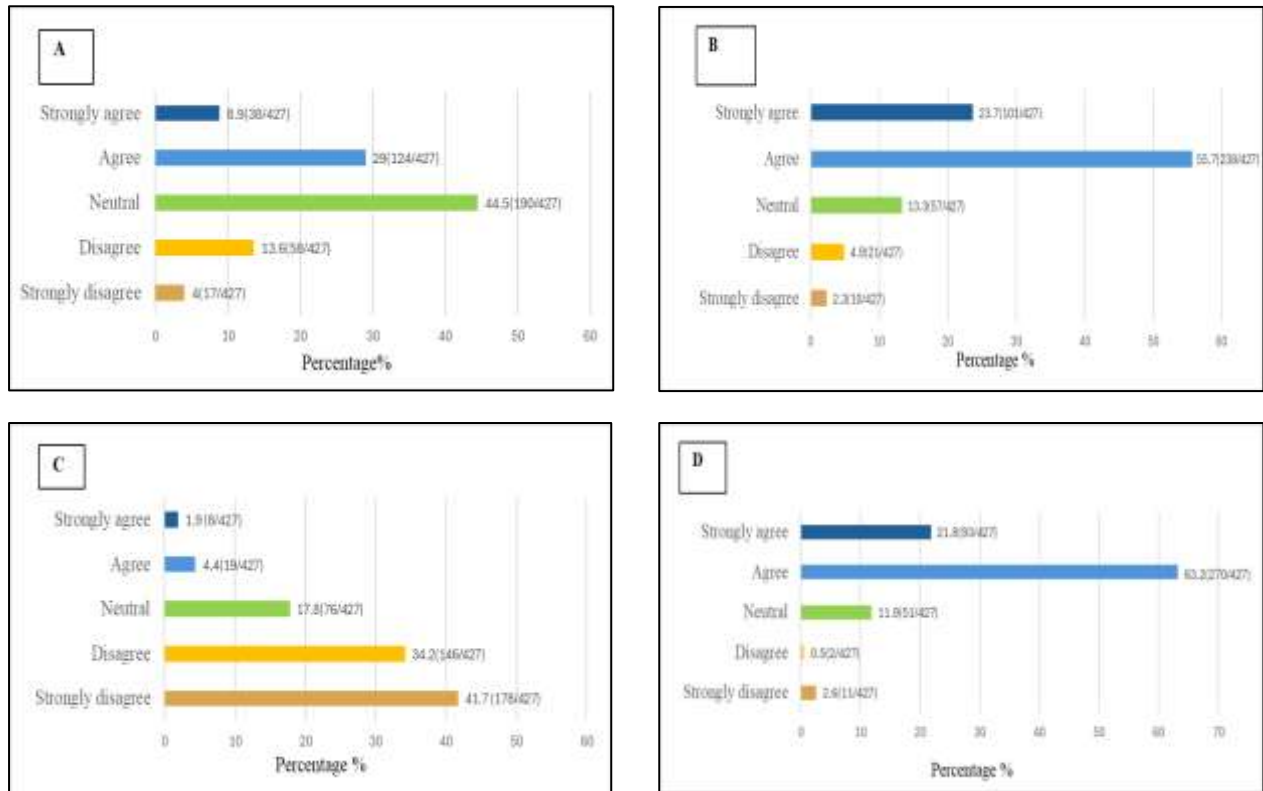


Figure 4: Medical students' overall perspective views on Anatomical dissections

(A) I prefer dissection classes over any other approach

(B) It would be advantageous if I attend dissection classes

(C) Dissections should be eliminated from the curriculum

(D) Dissections should be supported by other educational tools

As the new generation of students is highly proficient in technology, they are familiar with all contemporary learning resources and favor the most recent learning trends. Thus, as part of technology-assisted learning, use of anatomical models, artificial organs, AV assistance, and VR/AR tools is also in practice. As a result, students are denied the opportunity to dissect a human body to learn Anatomy (Bergman, 2015; Burgess and Ramsey-Stewart, 2015; Aziz *et al.*, 2002).

Dissection reduces the complexity of the human body and gives a better understanding three-dimensional view of the human body integrated into structure and function (Gregory *et al.*, 2009; Pandey *et al.*, 2020). This

understanding can be easily correlated to living in the future clinical phase studies too (Coulehan *et al.*, 1995). Several medical schools worldwide have reported that dissection has many benefits and few drawbacks while studying Anatomy (Kalthur *et al.*, 2022; Quince *et al.*, 2011). This study carried out at a newly established medical school in Sri Lanka, Faculty of Medicine, Wayamba University of Sri Lanka, reveals the perspectives of the students on the advantages and disadvantages of dissections as well as a comparison between dissections and other Anatomy study tools.

In the current study, the majority of students agreed that dissections help them to recall

what was already learnt by lectures, make learning Anatomy more interesting, prepare them for surgery, and enhance their respect towards human beings. Similar findings were seen in a study done at Griffith University in 2018. In that study, the majority of students responded that dissections consolidated what they learnt in lectures, made learning Anatomy more interesting, deepened their understanding of clinical Anatomy, helped in developing surgical skills, and also allowed them to exercise components of professionalism and made them emotionally comfortable when handling the human body (Jeyakumar *et al.*, 2020). In a study done in the same university in the year 2015 with a different group of students, similar findings were obtained and almost all students agreed that dissections are the best way to get an idea of the three-dimensional perspective of the structures in the human body (Dissabandara *et al.*, 2015). In a similar study conducted at the University of Melbourne majority of students responded that dissections deepen their understanding of Anatomy, provide a three-dimensional perspective of structures, and make learning more interesting (Azer and Eizenberg, 2007).

In the current study, many students disagreed with the statement that dissections are stressful, demand a lot of physical work, and are time-consuming. The majority had a neutral response to the unpleasant smell and difficulty in identifying structures by themselves. This is in contrast to findings in other studies, where many students agreed that dissections are time-consuming, and more than half agreed on the fact that dissections should be offered to only those who are interested (Jeyakumar *et al.*, 2020). In another study, nearly half of the students agreed that dissections were time-consuming, and that it was difficult to identify structures in their locations. In the same study, the majority disagreed that dissections are stressful which is comparable with the findings of the current study (Dissabandara *et al.*, 2015).

In the current study, majority of students agreed that prosected specimens were better than dissections, but the majority disagreed

when they were asked if dissections should be replaced by prosected specimens. Similarly, the majority have disagreed that dissections should be replaced with videos, VR/AR, or didactic lectures. Most disagreed when they were asked whether dissections should be eliminated from the curriculum and almost all agreed on the fact that dissections should be supported with other educational tools. In a study conducted in North India on students' perspectives of Anatomy teaching methods, the majority (72.3%) of students responded that dissections are the best method for learning Anatomy (Baidwan *et al.*, 2018). In another study, most students disagreed that dissections should be replaced by virtual/augmented reality applications or other computer aid methods which is compatible with the current study. In that study, almost all students strongly agreed that cadaveric materials were essential in Anatomy learning, in obtaining knowledge for clinical examinations and also for understanding diseases (Jeyakumar *et al.*, 2020). In a similar study on students' perspectives on dissections, the majority of students strongly disagreed that dissections should be eliminated from the curriculum. In the same study, the students responded that they did not prefer substituting dissections with lectures, computer programs, or pre-dissected materials (prosected specimens) either (Dissabandara *et al.*, 2015).

In 2004, Older reported that the lack of cadaveric dissection lessons in the curriculum may make it more difficult for students to use the scientific approach when making diagnoses (Older, 2004). This is also supported by the current study, which highlights student perceptions that dissection shouldn't be removed from the curriculum, and is due to Anatomy education being enhanced by dissection sessions. The student community in the present study has strongly accepted this practice too. The study conducted by Weerasuriya and colleagues from Sri Lanka in 2014, 85% stated the preference to use dissection over pre-dissected material (Weerasuriya *et al.*, 2014). A study conducted in USA in 2020 reported that 94.3% of the participants stated that they

would like to engage with cadaver dissection even if it was an optional facility (Deming *et al.*, 2021). Another study conducted in India by Chakrabarti *et al.* (2020) also reports 75.3% of the participant preference for cadaver dissection over other teaching tools. This would suggest that Anatomy dissection should be included in the Anatomy curriculum and every possible arrangement should be made to conduct Anatomy dissections in newly established Medical Faculties in Sri Lanka by encouraging relevant authorities to increase the infrastructure and human resources and cadaver availabilities for the dissections.

Conclusion

Dissections are student-centered learning methods which are aligned with the base of the learning pyramid (practice by doing) and an average retention rate of 75%. If need to reduce the time taken for dissections, augmented cost effective methods such as 3D software, dissection videos and etc. can be incorporated in to the curriculum. Over time, even with the introduction of new technological advancements to the Anatomy curriculum, it is interesting to observe that the requirement for dissection in Anatomy curriculum has not been changed much worldwide.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability

The analyzed data of this study are available to on request from the Corresponding Author.

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Ethical Considerations

Approval for the study was obtained from the Ethics Review Committee of the Faculty of

Medicine, Wayamba University of Sri Lanka (Ref. No. PW/2024/09/01).

Consent to Participate

Informed written consent was obtained from all participants.

Consent for Publication

No individually identifiable data is published in this paper.

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