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ORIGINAL RESEARCH

Perceptions and Challenges Faced by Undergraduate Medical Students in Studying Anatomy: A Case Study at Kampala International University – Western Campus, Uganda

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Background: Proficiency in anatomy is of great importance for healthcare professionals and medical students alike, as it facilitates a comprehensive understanding of the structure and function of the human body. Despite the obvious significance, medical students have often felt challenged in studying anatomy.

Purpose: The studyassessed the perceptions and challenges faced by undergraduate medical students in studying anatomy at Kampala International University – Western Campus (KIU-WC) in Uganda.

Materials and Methods: Employing a quantitative cross-sectional descriptive design, the study involved the administration of a standardized questionnaire to a cohort of 525 first- and second-year medical students. The questionnaire encompassed sections on student perceptions and challenges faced in studying anatomy.

Results: The findings revealed that the majority of respondents 473/525 (90%) held positive perceptions of anatomy recognizing its importance in diagnosis, understanding the human body, medical terminology acquisition, and clinical preparation. While age (OR = 1.03, 95% CI: 0.54 − 1.97, p=0.93) and gender (OR = 0.51, 95% CI: 0.32 − 0.87, p=0.93) did not significantly impact student perceptions, positive perceptions were observed across different religious affiliations and nationalities, suggesting the universal recognition of anatomy's importance. The commonest challenges were a limited time for revision before their mid-semester and end-of-semester examination 383/525 (73.0%), information overload 374/525 (71.2%) and a lack of suitable equipment and poor internet connection for assessing online resources 352/525 (67.1%).

Conclusion: In conclusion, respondents with positive perceptions dominated with higher percentages among all ages, genders, nationalities, and religions; the commonest challenges included a limited time for revisions before their mid-semester and end-of-semester examinations, information overload, a lack of suitable equipment and poor internet connection for assessing online resources.

Keywords: anatomy study, student perception, study challenges

Introduction

Anatomy is a fundamental subject in health sciences, and its mastery is essential for healthcare professionals and students to understand the human body's structure and function.[1,2] Despite the obvious significance, undergraduate medical students have often felt challenged when undertaking the course due to a vast amount of reasons such as complexity of the topics, information overload and lack of self-directed learning skills among medical students as pointed out in literatures.[1,3,4]

The perceptions of medical students on anatomy are diverse and complex since anatomy is most time considered a difficult subject to study and because each student has a different preferred method of learning.[5] General perception

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mold attitude and behavior of a given population, consequently influencing interest and overall student performance course of study. Hence the need to look into student perception about studying anatomy.

Some challenges in learning anatomy have been pointed out in some studies that have been carried out.[1,3,4] A better understanding of the challenges medical students face in studying anatomy will enable stake holders and medical schools come up with viable solution that could help student achieve better understanding of anatomy as a course.

Most medical schools in East Africa are constantly been faced with resource limitations, therefore affecting the ability of the schools to provide technologically advanced tool for improving learning outcome. The paucity of information on student perception and challenges faced by medical students in studying anatomy among medical students from East African medical institutions also necessitated the conduct of the present study. Hence, the present study aim to assess perceptions and challenges medical students face in studying anatomy, with possible solution and the way forward.

Materials and Methods

The study was conducted at Kampala International University, Western Campus (KIU-WC) situated in Ishaka-Bushenyi, Western Uganda. A quantitative cross-sectional descriptive design was used targeting first- and second-year medical students who were currently taking anatomy course as part of their biomedical studies. The determination of the sample size, consisting of 525 students, was accomplished using Raosoft software (http://www.raosoft.com/samplesize.html) for sample size calculation. To ensure unbiased representation, simple random sampling techniques were utilized, granting an equal opportunity for every member of the population to be selected.

Data collection was executed through the utilization of a standardized questionnaire, which was divided into four distinct sections: socio-demographic, student perception, challenges, and possible solutions. The questionnaire encompassed close-ended questions that were evaluated using a 5-point Likert scale within the perception and challenges sections, while an open-ended question was included to allow participants to provide potential solutions. The development of the questionnaire was rooted in the study objectives and underwent a thorough pre-testing phase, led by senior members of the Anatomy department, to establish its validity and reliability. The questionnaire was pretested among 20 students, where the cronbach's alpha was 93.2%. The research team, comprising the principal investigator and research assistants, conducted the data collection process using consecutive random sampling. Eligible respondents were duly informed about the study, and those who provided consent were enrolled as participants. Subsequently, the questionnaires were distributed, and the responses were collected.

The study was conducted following approval from KIU-WC Faculty of Biomedical Science Research Review Committee and registered as KBRC/2020/01/00901. The study diligently adhered to ethical considerations by ensuring informed consent was obtained from all participants and by adhering to the predefined inclusion and exclusion criteria. To guarantee an adequate number of responses, a sufficient quantity of questionnaires was meticulously printed for distribution.

The collected data was subjected to quantitative data analysis using an updated version of Microsoft Excel and SPSS version 20. Frequencies and percentages pertaining to both the challenges faced and the perceptions held by the students were presented using tables and pie charts.

Results

Socio-Demographics of the Study Respondent

The majority of the respondents were males 333/525 (63.4%) and below the age of 25 years 424/525 (80.8%). The majority of our respondents were Ugandans 476/525 (90.7%) and doing BMS course 497/525 (94.7%). Christians accounted for 438/525 (83.4%) of our respondents (Table 1).

Student Perception of Anatomy

Most of our respondents had a positive perception of 90% about the study of anatomy (Figure 1). Majority 330/525 (62.9%) of the respondents disagreed or strongly disagreed that anatomy is boring. Anatomy was viewed as being very important for diagnosis 454/525 (86.5%), useful for understanding the human body 464/525 (88.3%), helping in the acquisition of basic medical terminology 450/525 (85.8%) and helping medical students to prepare for clinical rotation

Table 1 Socio-Demographics Characteristics of the Study Population

Item	Category	Frequency (%)
Age	Below 25	424(80.8)
	Above 25	99(18.9)
Sex	Male	333(63.4)
	Female	189(36)
Religion	Christianity	438(83.4)
	Moslem	68(13.0)
	Others	17(3.2)
Nationality	Ugandan	476(90.7)
	Foreigners	47(9.0)
Course of study	BCM	25(4.8)
	BMS	497(94.7)

399/525 (76%) by majority of respondents who agreed or strongly agreed on each perception respectively. Most 289/525 (55%) of the respondents agreed or strongly agreed on the perception that anatomy was entertaining due to dissection. Majority of the respondents 475/525 (90.4%) agreed or strongly agreed with the perception that cadaver dissection is very important in learning anatomy (Table 2).

Most of the respondents below the age of 25 years 380/424 (89.6%) had positive perceptions towards anatomy while only 89/99 (89.9%) of those at 25 years and above had positive perceptions of anatomy study (OR = 1.03, 95% CI: 0.54 −1.97 p=0.93). The majority of male respondents and female respondents with percentage scores of 307/333 (92.2%) and 161/189 (85.2%) had positive perceptions of anatomy (OR = 0.51, 95% CI: 0.32 −0.87 p=0.93). Most of the Christian respondents 394/438 (90.0%) had positive perceptions of anatomy. The same was seen in the majority of Muslim respondents and those from other religions with percentage scores of 60/68 (88.2%) and 15/17 (88.2%), respectively, who had positive perceptions. The majority of the

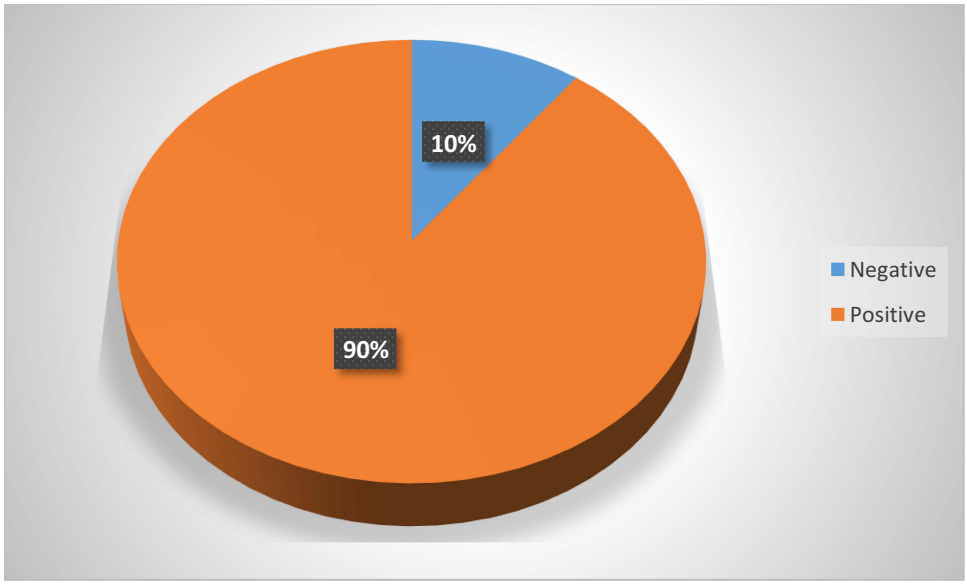

Figure 1 Perception of medical students about anatomy.

Table 2 Perception of Medical Students About Anatomy

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Boring	202(38.5)	128(24.4)	112(21.3)	35(6.7)	46(8.8)
Distressing	88(16.8)	109(20.8)	138(26.4)	87(16.6)	100(19.1)
Fearsome	94(17.9)	103(19.6)	157(29.9)	99(18.9)	68(13)
Very important for the diagnosis	21(4)	12(2.3)	35(6.7)	126(24)	328(62.5)
Useful for understanding the human body	22(4.2)	5(1)	29(5.5)	101(19.2)	363(69.1)
Helps in the acquisition of basic medical terminology	21(4)	15(2.9)	36(6.9)	152(29)	298(56.8)
Prepares for clinical rotation and clerkship	28(5.3)	20(3.8)	75(14.3)	139(26.5)	260(49.5)
Not satisfied with the current methods of teaching anatomy	56(10.7)	86(16.4)	139(26.5)	120(22.9)	120(22.9)
Entertaining due to dissection	48(9.1)	61(11.6)	124(23.6)	145(27.6)	144(27.4)
The time allocated for anatomy lectures is enough	143(27.2)	142(27)	82(15.6)	95(18.1)	60(11.4)
Cadaver dissection is very important	13(2.5)	10(1.9)	25(4.8)	122(23.2)	353(67.2)

respondents who were Ugandans in nationality 426/476 (89.5%) and foreign students 43/47 (91.5%) had positive perceptions about anatomy (OR = 1.23, 95% CI: 0.47–3.27 p=0.81). The majority of the respondents doing BMS course and those doing BCM course 444/497 (89.3%) and 24/25 (96.0%), respectively, had positive perceptions (OR = 0.38, 95% CI: 0.05–2.60 p=0.50) (Table 3).

Student Challenges in the Study of Anatomy

The respondents had mixed views on the challenges with most of them agreeing or strongly agreeing on the challenges they face. Most 345/525 (65.8%) of the respondents agreed or strongly agreed that difficulties in identifying structures

Table 3 Relationship Between Student Perceptions and Socio-Demographic Data

		Perception		Total	OR	95% CI	P-value
		Negative	Positive				
Age	**Below 25**	44(10.4%)	380(89.6%)	424(100.0%)	1.03	0.54 −1.97	0.93
	25 and above	10(10.1%)	89(89.9%)	99(100.0%)			
Gender	**Male**	26(7.8%)	307(92.2%)	333(100.0%)	0.51	0.32–0.87	0.013
	Female	28(14.8%)	161(85.2%)	189(100.0%)			
Religion	**Christianity**	44(10.0%)	394(90.0%)	438(100.0%)			
	Moslem	8(11.8%)	60(88.2%)	68(100.0%)	1.19		0.96
	Others	2(11.8%)	15(88.2%)	17(100.0%)	1.19		0.99
Nationality	**Ugandan**	50(10.5%)	426(89.5%)	476(100.0%)	1.23	0.47–3.27	0.81
	Foreign student	4(8.5%)	43(91.5%)	47(100.0%)			
Course of study	**BCM**	1(4.0%)	24(96.0%)	25(100.0%)	0.38	0.05 −2.60	0.50
	BMS	53(96.0%)	444(89.3%)	497(100.0%)			

Table 4 Student Challenges in the Study of Anatomy

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Difficulties in identifying structures	30(5.7)	49(9.3)	89(17)	194(37)	151(28.8)
Information overload	17(3.2)	49(9.3)	82(15.6)	158(30.1)	216(41.1)
Abstractness of information	37(7)	70(13.3)	174(33.1)	131(25)	109(20.8)
Limited clinical integration	27(5.1)	60(11.4)	125(23.8)	172(32.8)	138(26.3)
Limited time for revision before their mid semester and end of semester examination	27(5.1)	32(6.1)	78(14.9)	150(28.6)	233(44.4)
Reduced cadaveric dissection	49(9.3)	81(15.4)	100(19)	125(23.8)	166(31.6)
Difficulty in relating anatomical knowledge to clinical practice	57(10.9)	101(19.2)	127(24.2)	112(21.3)	126(24)
Lack of suitable equipment and poor internet connection for assessing online resources	34(6.5)	58(11)	78(14.9)	98(18.7)	254(48.4)
Decreasing time allocated to anatomy education	120(22.9)	88(16.8)	105(20)	99(18.9)	111(21.1)
Emotional stress of dissection	102(19.4)	118(22.5)	141(26.9)	73(13.9)	89(17)

was a challenge. The majority 374/525 (71.2%) of the study respondents strongly agreed or agreed that information overload was a challenge. A greater proportion 310/525 (59.1%) of the respondents agreed or strongly agree that limited clinical integration was a challenge in properly understanding anatomy. The majority 383/525 (73.0%) of our respondents agree or strongly agreed that a limited time for revision before their mid semester and end of semester examination was a challenge. The majority of our respondents agreed or strongly agreed that reduced cadaveric dissection 291/525 (55.4%) and lack of suitable equipment and poor internet connection for assessing online resources 352/525 (67.1%) were challenges to the study of anatomy (Table 4).

Discussion

The findings from the present study shed light on the students' perceptions towards anatomy and the difficulties they encounter during their study.

The majority of the respondents had a positive perception of anatomy, with 90% expressing a positive perception towards the study of anatomy. This positive perception is reflected in the respondents' agreement that anatomy is essential for diagnosis, understanding the human body, acquiring medical terminology, and preparing for clinical rotations. These results align with previous study highlighting the importance of anatomy in medical education.[6,7]

An interesting finding is that a significant proportion of the respondents (55%) found anatomy to be entertaining, particularly due to dissection. This perception of entertainment could be attributed to the hands-on nature of anatomical dissection, which can enhance students' engagement and facilitate their learning process.[7] It is worth noting that cadaver dissection was considered very important for learning anatomy by 90.4% of the respondents, emphasizing the value of practical experiences in anatomy education.[5]

Age and gender were observed as potential factors influencing students' perceptions of anatomy. Although the results did not reveal significant differences, it is notable that respondents below the age of 25 and male respondents demonstrated slightly higher positive perceptions of anatomy. These findings are consistent with previous studies that have reported variations in attitudes towards anatomy based on age and gender.[2,8] However, further research is needed to explore these associations in greater detail.

Religious affiliation and nationality were also considered in the analysis. Interestingly, positive perceptions of anatomy were consistently observed across different religious groups and nationalities. These findings suggest that the

importance of anatomy is recognized universally among medical students, transcending cultural and religious boundaries. This aligns with previous study indicating the universal significance of anatomy in medical education.[9]

The study identified several challenges faced by medical students in the study of anatomy. The respondents expressed agreement on various difficulties, including problems with identifying anatomical structures, information overload, limited clinical integration, a limited time for revision before their mid semester and end of semester examination, reduced cadaveric dissection, and lack of suitable equipment and poor internet connection for assessing online resources. These challenges reflect the multifaceted nature of anatomy education and highlight areas that require attention and improvement. These findings are consistent with previous studies which have reported on the challenges of anatomy education.[1,3,10]

Difficulties in identifying structures and information overload were the most prevalent challenges reported by the respondents. These challenges are consistent with previous study, which has emphasized the complex and detailed nature of anatomical knowledge.[1] Efforts should be made to develop innovative teaching methods and resources that facilitate the understanding and retention of anatomical information, such as interactive digital tools and spaced repetition techniques.[11,12]

Limited clinical integration and reduced cadaveric dissection were also recognized as challenges by a considerable proportion of the respondents. These findings highlight the need to enhance the clinical relevance of anatomy education and provide ample opportunities for practical experiences, including cadaveric dissection. Integrating anatomy into clinical scenarios and utilizing technology-driven solutions, such as virtual reality and augmented reality, could address these challenges and bridge the gap between anatomical knowledge and clinical practice.[1,13]

To mitigate the challenges identified, this discussion proposes several possible solutions. This includes innovative teaching methods and resources, such as interactive digital tools and 3D models to enhance students' understanding of anatomical structures.[5] Spaced repetition techniques, involving the use of digital flashcards or specialized software, can aid in retaining complex anatomical knowledge.[12] Integrating anatomy into clinical scenarios and case studies can bridge the gap between anatomical knowledge and clinical practice. Providing practical experiences, particularly through cadaveric dissection, can deepen students' understanding.[14,15] Technology-driven solutions, including virtual reality (VR) and augmented reality (AR), can supplement traditional teaching methods.[16] Lastly, improving infrastructure and equipment, such as high-quality anatomical models and reliable internet connections, is essential for effective anatomy education.[17] By adopting this multi-faceted approach, medical students can overcome the identified challenges and enhance the understanding and retention of anatomical knowledge.

Limitations

Firstly, the generalizability of the findings is limited as the study was conducted at a single university in Western Uganda, potentially influenced by specific cultural, educational, and institutional factors. Secondly, the sample size, although substantial, may not fully represent the entire population of medical students, suggesting the need for a larger and more diverse sample. Thirdly, the focus on a single institution restricts the exploration of variations in perceptions and challenges across different medical schools. Fourthly, the lack of qualitative data limits the depth of understanding, highlighting the importance of incorporating qualitative methods in future studies. Lastly, the temporal limitation of the study implies that the reported perceptions and challenges may be influenced by contextual factors subject to change. Despite these limitations, the study provides valuable insights, and further research is needed to enhance generalizability and depth of understanding in this field. However, we recommend an expanded study covering more institutions for a wholistic evaluation of student perception and challenges the face in studying anatomy to help policy makers provide necessary facilities to improve anatomy education in East Africa.

Conclusion

The study findings indicate that medical students generally hold a positive perception of anatomy, recognizing its importance in various aspects of their education. They view anatomy as crucial for diagnosis, understanding the human body, acquiring medical terminology, and preparing for clinical rotations. Additionally, a significant proportion of students find anatomy to be entertaining, particularly through the hands-on experience of dissection. The majority of respondents also emphasize the significance of cadaveric dissection for learning anatomy.

However, the study also reveals several challenges faced by medical students in the study of anatomy. Difficulties in identifying structures, information overload, and limited time for revision before their mid semester and end of semester examination, limited clinical integration, reduced cadaveric dissection and inadequate equipment were recognized as obstacles to effective anatomy education.

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Disclosure

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