|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||
International Journal of Medical and Biomedical Studies
Available Online at www.ijmbs.info
NLM (National Library of Medicine ID: 101738825)
Index Copernicus Value 2020: 79.44
Original Research Article
Volume 5, Issue 12; December: 2021; Page No. 174-177

ANATOMY WITHOUT CADAVERS IN COVID-19 TIMES AND ITS POTENTIAL REPERCUSSIONS.

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Article Info: Received 09 October 2021; Accepted 23 December 2021
DOI: https://doi.org/10.32553/ijmbs.v5i12.2641
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Conflict of interest: No conflict of interest.

Abstract
The journey of every medical student begins with cadaveric dissection in the dissection hall of Anatomy department. It not only helps to learn anatomy of human body but also helps in developing surgical skills. The COVID-19 pandemic has profoundly affected education worldwide due to lockdown. The purpose of this study was to understand the problems faced by the medical students to study anatomy without cadaveric dissection in COVID-19 times and its potential repercussions. The present study was conducted on 1st year medical and dental students of 2019-20 batch who were willing to participate in the study. A multiple choice questionnaire was designed and feedback was taken from students. The results revealed that 90.8% students thought that anatomy teaching with cadaveric dissection was easier to grasp, 76.4% reported that unavailability of gadgets and internet connectivity issues prevailed in online teaching classes, 92.7 % students found that only virtual teaching is not sufficient, 72.5% agreed that competency will be hindered in surgical proceduring, 73.3% students missed every aspect of anatomy education and 85.3% thought that virtual teaching will have negative impact on future surgery and anatomy professionals. Anatomy teaching with cadaver is a better teaching modality as compared to virtual teaching. Moreover, cadaveric dissection can help students to develop skills which help them to opt for surgical branches as future profession.
Keywords: Anatomy, COVID-19, Cadaveric dissection.

Introduction

ANATOMY; comprising of sub - branches viz. gross (macroscopic) anatomy, embryology (developmental anatomy), histology (microscopic anatomy) and radio anatomy; is the backbone of medical education. The knowledge of anatomy remains the bedrock for all medical and related medical sciences programs(1). Thus, Anatomical education provides the solid foundation upon which all other clinical branches and practice will build up (2).

"*The battle of Waterloo was won on the playing fields of Eton"*- a proverb; likewise the learning of how to fight and win the battle to save someone's life on operation table starts way back in cadaveric dissection hall. So, one has to study the dead first to save the living. Cadavers can be compared to the complex roads without any traffic where students can reach the destination of learning surgery without having any accidents or hurting anyone. Anatomical dissection is a time tested method of medical education. Cadaver is the first teacher of every medical student who reveals the secrets of the human body by allowing itself to be laid open by the dissecting knife. It is always better for medical students to learn anatomy using cadavers than virtual methods because:-

1. Dissection provides hands-on experience with three dimensionally complex anatomical structures and relations.
2. Dissection confronts students with variations and diversity.
3. Dissection develops compassion and empathy.
4. No imaging technique can teach a medical student the complex relations of anatomical structures.
5. Dissection provides the opportunity to have the feel of the structures and viscera of human body.
6. Dissection also equips students with the skills of maneuvering essential surgical instruments such as the scalpel, scissors of various types, and different kind of forceps (3).

During year 2019, the whole world experienced a serious pandemic COVID-19 and with no time, it became the public health emergency of international concern. Apart from hitting the health scenarios drastically, it also had detrimental effects on medical education along with anatomy dissection. During the COVID-19 pandemic, students had no access to cadavers, which has been the principal way of learning anatomy since the 17th century; it becomes necessary to find out its impact on undergraduate medical students, anatomy postgraduate students and its implications on future careers. According to the Center for disease control and prevention (CDC), the COVID-19 outbreak could be of long duration which no one can yet estimate (4).

Anatomy teaching has been resistant to any change since a millennium; with cadaveric dissection, models, museum specimens, bones, microscopic slides and others as various modes of learning and teaching anatomy in many medical colleges. Cadaveric dissection is impossible in the times of COVID-19. Social distancing to limit COVID-19 pandemic has caused suspension of class room teaching, dissection and histology practical in all medical institutions (5). Almost all of the medical schools have adapted to online classes for various undergraduate courses. Theory classes of several subjects can easily be conducted by various soft ware's like Zoom, Google classroom, Google meet and Google hangout to name a few. However, in spite of alternative modes like virtual dissection, medical imaging, living anatomy and multimedia resources, still anatomy dissection classes remain challenging to be conducted online (6). Learning anatomy dissection virtually is unrealistic as tactile element and real world complexities of the human body cannot yet be simulated satisfactorily. Medical education and indeed medicine as a profession was never designed to be fully online. Three primary things are required for dissection to happen in COVID-19 times safely:-

1. Non - infectious Cadavers.
2. Way out to meet the demand of social distancing and COVID appropriate behavior (CAB).
3. Institutional commitment to continue training health professionals using the best possible methods.

For the next academic session, more likely there will be a mix of online and offline or hybrid teaching methods.

The impact of the pandemic on the assessment of students is also worrisome concern. Among the various modalities used to assess anatomy are the specimen viva, written spotter examination and osteology oral viva. However, these methods can obviously not be used in current situation.

Cadaveric dissection is an invaluable opportunity for the development of fine motor skills in a stress free environment and we cannot assess what implications this might have on the future of students who want to opt surgery as profession. Indeed, this worry extends further to the future of surgery in a much wider sense. Lack of dissection in first year MBBS may often be cited by students as a reason for not considering a surgical career. Although, the current situation of anatomy teaching is not intentional, it is possible that the lack of dissection can prove detrimental to the competency of future surgeons. A further compounding factor on this issue is the fact that many students discover their love or natural talent for surgery as an anatomy student. Gross anatomy may also be an unrecognized stepping stone in the path of choosing a medical specialty. Perhaps, through this disappeared dissection, we are losing the opportunity to discover the next top surgeons and orthopedicians.

For those students who wish to become future anatomy teachers, the lack of exposure to variety of teaching and learning techniques may impact on the styles and methods they will later employ as teachers. In view of above background, it is advertant that the change in teaching pattern has impacted the anatomy academic modules. Hence, the current study was planned to assess the attitude of students towards cadaver less teaching and its potential outcomes.

METHODS:

The study was held in Government Medical College Jammu, after seeking ethical clearance from institutional ethical committee of Govt. Medical College, Jammu with ref. no.: IEC/GMC/Cat C/2022/744. This was a simple survey based on cross sectional study design using electronic questionnaire. The present study was conducted on 1st year medical and dental students of 2019-20 batch who were willing to participate in the study. A multiple choice questionnaire was designed and feedback was taken from students. Questionnaire was made on GOOGLE FORMS, then carefully being evaluated for its validity and reliability until considered fix. The e-questionnaire sent via WHATSAPP to all students of FIRST PROF MBBS students 2019-20. All the data collected put together in MICROSOFT EXCEL spread sheet, then further analyzed. Each student was explained the objectives of the study. The student feedback was taken after more than 6 months of digital anatomy education without cadaveric dissection.

OBSERVATIONS:

The present study included 109 participants who were from MBBS and BDS courses among whom 61.5% were 18-20 years old, 34.9% were 21-23 years old and 3.6% were from 24 and above age group and almost all the participants were aware of COVID-19 pandemic. These students had studied superior and inferior extremities and neuro-anatomy with cadaveric dissection and brain specimen and after lockdown the thorax and abdomen sections of anatomy were taught without cadaveric dissection. Majority (90.8%) of the students thought that teaching with cadaveric dissection was easier to grasp whereas only 3.7% thought that anatomy was easier to grasp without dissection and rest were not able to make out any difference. Further, when

asked about the best methodology to learn anatomy, 82.6% students agreed that dissection is the best methodology to learn anatomy, 1.8% felt that virtual dissection was a better method for learning anatomy whereas 15.6% participants felt that hybrid method (both cadaveric dissection as well as virtual dissection) was the best method of learning anatomy. However, 76.4% students felt that the lack of proper gadgets was an obstacle in the learning process during lockdown and 89.9% of students felt that during COVID times, internet connectivity challenge has hampered the study of Anatomy in virtual mode. As lockdown was unforeseen 45.7% students were not able to arrange books and study material at their home whereas only 43.8% students managed to get all the study material at their homes.

Additionally, 73.3% students missed every aspect of anatomy education i.e., cadaveric dissection, histology slides, real time lectures, discussions with the peers while 24.8% missed only cadaveric dissection / histology lab and 1.9% missed only discussion with their classmates.

Regarding virtual mode of teaching, 92.7% students agreed that only virtual mode of study was not sufficient for anatomy curriculum as doctors have to deal with real patients and not the virtual ones whereas rest thought that virtual teaching is a better option in COVID scenario. Cadavers as a source of infection during COVID pandemic was considered on a positive nod by 34.9% medicos, 35.8% thought on a negative nod whereas 29.4% were not able to comment.

Furthermore, 36.7% students agreed that the pandemics like COVID-19 will force them to shift their interest area from medical to some other field, while 35.8% disagreed to this and the rest of the students did not comment on this. 55.5% students felt that the reduction in dissection experience during COVID times can be cited a reason for not considering a surgical career, only 24.8% disagreed to this and 20.2% were not able to say anything.

The detrimental impact of Cadaver less anatomy in COVID era on competency of future generation of surgeons was positively agreed by 72.5% students whereas 20.2% students felt that it will be impact less. As far as the impact of Cadaver less teaching on style and methodology of future anatomy teachers was concerned, 85.3% of students felt that it will have a negative impact, 9.2 % disagreed to this and 5.5% students did not comment. Also, 42.2% students agreed that COVID 19 might bring permanent change in the curriculum of Anatomy. 21.1% disagreed and 36.7% students were not able to say anything in this context.

DISCUSSION:

Anatomy teaching with cadavers has been a boon for medical students since ages as it helps the students to better understand the complex anatomical relations, have the original hand on feel of organs, get familiarize with the instruments and so on and so forth. With the onset of COVID-19 Pandemic the scenarios changed globally and the medical education was also hit badly. The present study was organized to assess the potential repercussions of the virtual mode of teaching as compared to the teaching with cadavers.

The results of current study revealed that 90.8% students thought that anatomy teaching with cadaveric dissection was easier to grasp which was positively supported by Singh *et al.*, 2020 (7) but it was in discordance by other authors who concluded that virtual dissection was a better mode of teaching (6, 8-11). However, conclusions of these authors that online teaching platform was better as compared to offline teaching was supported by the facts that students got more time for self directed learning and recorded lectures can be seen repeatedly.

Approximately 76.4% students documented arranging of gadgets as a major hurdle in case of virtual teaching schedules which was supported by the evidence derived from the various authors but the percentage of students who agreed to this difficulty was very less (3, 6, 11).

Internet connectivity issues were endorsed by 89.9% students as cause of non preference of online teaching platform as mode of anatomy teaching curriculum which has been substantiated by various authors who also have documented internet connectivity issues (11, 12, 13).

Further, about 73.3% of students missed every aspect of anatomy education and were not satisfied with virtual mode of teaching as learning anatomy without cadaveric dissection has not given a chance to have hands on experience of various anatomical structures, have face to face interaction with teachers and various other aspects of teaching. This fact was further supported positively by conclusions derived from the study of Daroedono *et al.*, 2020 and also few authors documented that interaction with teachers and faculty members was poor in virtual class rooms than physical class rooms (3, 14).

Additionally, 72.5% students accepted that cadaver-less teaching hinders surgical skills and maneuvering as the hands on experience in dissection was lacking and this fact was further accepted by various authors (3, 7, 15, 16) and 36.7% students thought that such kind of hindrance in surgical procedure competency will not allow students to consider surgical career.

The fact that cadaver as a source of infection has been proposed by various authors in earlier as well as in current scenario (1, 17, 18). However, in present study regarding considering cadavers as source of infection, about 34.9% students replied in favor and 35.8% students were not in favor of accepting that cadavers can be a source of infection for the students. Thus, negating the hypothesis provided by above mentioned authors.

CONCLUSIONS:

Since COVID-19 pandemic disrupted the age old trend of physical class rooms and forced the medical schools

worldwide to shift to virtual class rooms. The virtual class rooms though were able to cope up with the study needs of the medical students but it came up with certain limitations. Thus, the current study was planned to look out for the potential repercussions associated with the online teaching methods and it was concluded that despite increased use of technology enhanced learning modalities, face to face teaching with cadaveric dissection should be considered as the best teaching modality and cadaver-less anatomy teaching will not allow students to opt for surgical as well as anatomical branches as future professions.

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