

Virtual Learning of Anatomy in the Times of Pandemic: A Questionnaire Based Study

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Abstract

Objective: The present study was aimed to investigate students' perspective on the virtual teaching and learning of human anatomy during COVID-19 pandemic.

Study type, settings & duration: This was a cross-sectional study and was conducted by the Department of Anatomy, Liaquat National Hospital and Medical College, Karachi from August to September 2021.

Methodology: A self-designed questionnaire was prepared and distributed among the students of 1st and 2nd year MBBS, who were exposed to the online teaching methodology during lock down imposed by government. This questionnaire was composed of demographic details of participants, their reflection on virtual learning and problems faced during the online sessions. The data was later translated on excel and SPSS 23 was used to analyze the results.

Results: The findings of the present study revealed majority of the participants (47.8%) were laptop users for seeking the virtual classes. They do not find this learning experience as effective as face-to-face classes and expressed that neither theoretical nor practical aspects of anatomy could be learnt effectively online. They listed technical issues like slow internet speed and connectivity errors as barriers during the course of study. However, the respondents (3.33 ± 0.94 & 3.01 ± 1.07) found that the sessions were well-organized, they saved students time and continued the process of learning despite of the strict COVID-19 restrictions.

Conclusion: Virtual teachings continued the learning process during the pandemic but they cannot be a replacement of real class-room experience. The traditional anatomy teaching remains the most preferred and effective teaching modality among students.

Key words: Anatomy, learning, pandemic, perspective, virtual.

Introduction

The outbreak of COVID-19 started from the Wuhan city of China in the early December 2019. Due to frequent travelling and urbanization the virus spread exponentially not across the country but beyond borders as well. By the beginning of 2020 many countries of the world were affected by the morbidity of the virus and therefore it

was subsequently declared pandemic by WHO.¹

The first case of COVID-19 was reported on February 26th, 2020 in Pakistan and then the number of affected individuals keeps on increasing.² To limit the contagiousness of infection, nationwide lock down was imposed in many parts of the world and similarly was also implemented in Pakistan leading to a complete closure of educational institutions across the country. As a result the learners' were cut-off from their education and other vital benefits, which their educational organizations provide.³

The pandemic caused an unprecedented disruption in the field of medical education.⁴ The in-person presence of learners in the large group sessions, small group discussions, practical-based education and clinical clerkship were interrupted remarkably. To overcome this serious issue, the medical education faculty quickly transitioned from traditional face-to-face teachings to virtual formats trying to cover the entire basic medical science curricula and various online academic activities were introduced.⁵

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Authors Contribution

FR & ZI conceptualized the project. FR did the data collection. ZI did the literature search. LF & SQ performed the statistical analysis. Drafting, revision & writing of manuscript were done by SA.

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Traditionally human anatomy classes have relied on “hands-on” training with cadavers and prosected parts considered “gold standard” for teaching and learning the subject.⁶ A number of different modalities including the face-to-face lectures, laboratory practical and small group sessions in order to provoke the critical thinking are used to teach various different aspects of basic and clinical Anatomy, Histology and Embryology.⁷

With the suspension of the traditional classes, the Anatomy teachings were also switched to virtual learning. These sessions were planned with an intention to complete the given syllabus in due course of time as well as to maintain a continuous contact with the student, so that the student can also develop trust and confidence in their faculty during the times of pandemic.⁸

Literature has revealed that the concept of virtual learning in medical schools is not something new. The virtual platform for teaching the subject of Anatomy is used from past two decades.⁹ Several studies have proved that the level of satisfaction is somewhat decreased among the students especially when it comes to the practical aspects of subject of Anatomy as it is found to be less effective in building skills and knowledge.¹⁰ Various learning strategies are used by students like seeing, touching, 3-dimensional perception of structures and hands-on experience in the on-campus practical sessions of Anatomy but the use of these strategies significantly decreases by using virtual platforms for seeking education.

The present study was therefore aimed to measure the effectiveness of virtual learning of Anatomy during covid-19 and to look upon students' point of view regarding it and the possibility of applying it post-pandemic.

Methodology

It was a descriptive cross-sectional study conducted at the Department of Anatomy at Liaquat National Hospital and Medical College (LNH&MC) from August to September 2021.

The minimum number of sample size which is required for this study was determined based on three factors, 1) Students' population size, 2) Margin of error which was set to be $\pm 5\%$ which is an acceptable value for categorical variables and 3) Confidence level that was set to be 95% for this design experiment.

Based on the above information and using the following Open Epi calculator (Version 3), the minimum number of sample size 182. The students participated in the study were enrolled in 1st and 2nd year MBBS and were exposed to virtual teaching of

Anatomy through online educational networks like Zoom, Moodle and Edmodo.

The participants of the study were informed in detail about the objectives and confidentiality at the beginning of the survey and an informed consent was obtained from each of them. It has been disclosed to all the students that their data shall be kept completely confidential and the results will only be used for research purpose. A self-designed questionnaire was prepared and the questions were established based on the published literature.^{11,12} After preparation of questionnaire it was sent to a panel of 4 experts of Anatomy department to consult their opinion regarding the validity of questions and the changes were incorporated according to their suggestions. The final version of questionnaire was composed up of 24 questions, out of which 4 were related to the demographic details of the participants, 14 regarding the students responses on the online teachings and 6 related to the problems faced during virtual learning of Anatomy. The questions were responded on a Likert scoring scale ranging from strongly disagree to strongly agree. The questionnaire was presented to students when they were called on for small group sessions as the Covid-19 restrictions were relaxed by the government due to a decline in the active cases of infection. Statistical analysis was done by using SPSS v.23. The variables were analyzed by using student T-test and data were expressed as mean $\pm$ S.D. A p-value ≤ 0.05 was used to indicate the statistical significance.

The ethical approval was obtained from the Ethical Review Committee of Liaquat National Hospital and Medical College, Karachi vide letter no. 0632-2021LNH-ERC.

Results

The findings from the analysis of quantitative and qualitative data gathered from the current study are present below:

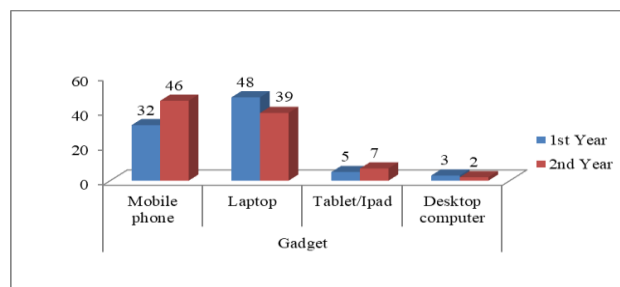


Figure: Choice of gadgets among students of 1st and 2nd year MBBS

Table-1: Demographic details of the participants.

	Total	1st Year	2nd Year	p-value
Age	19.82±0.95	19.34±0.82	20.27±0.83	<0.001*
Gender				
Male	65(35.7)	29(33)	36(38.3)	0.452**
Female	117(64.3)	59(67)	58(61.7)	
Choice of gadget				
Mobile phone	78(42.9)	32(36.4)	46(48.9)	0.271**
Laptop	87(47.8)	48(54.5)	39(41.5)	
Tablet/ iPad	12(6.6)	5(5.7)	7(7.4)	
Desktop computer	5(2.7)	3(3.4)	2(2.1)	

*Significant at p -value <0.05, **Insignificant at p -value >0.05**Table 2: Students reflection on the virtual teachings of anatomy.**

Statements	Responses (Mean±S.D)		p-value
	1st year	2nd year	
1. Virtual sessions improved my overall knowledge of Anatomy	2.55±1.154	2.32±0.986	0.100**
2. The objectives were covered satisfactorily during the online sessions	3.01±1.077	2.87±0.964	0.444**
3. I received sufficient amount of knowledge on a particular topic that I need to learn, through online teachings	2.61±1.044	2.56±1.011	0.884**
4. The sessions of Anatomy were well organized	3.33±0.943	3.01±1.073	0.096**
5. There was ample time for each online session to cover a topic	2.50±1.194	2.20±1.214	0.052**
6. It was easy to understand the gross anatomical structure of the organ through online presentations.	1.77±1.003	1.97±1.062	0.522**
7. It was easy to understand basic embryological and developmental concepts through online teaching.	2.82±1.273	2.50±1.285	0.401**
8. It was easy to understand basic microscopic structure of the organ being taught online.	2.60±1.109	2.37±1.244	0.243**
9. The online sessions helped me to think critically and encouraged to ask more questions	2.60±2.567	2.45±1.113	0.568**
10. The facilitator always answered my questions that helped me to clear my concepts of gross Anatomy, embryology and histology	3.35±1.094	3.54±0.980	0.267**
11. The learning material provide by the facilitators was really helpful (lecture presentations, videos and assignments relevant to the topic)	3.63±1.032	3.31±1.127	0.300**
12. The sessions stimulated my interest in learning and understanding the subject of anatomy.	2.59±1.079	2.47±1.054	0.323**
13. These sessions have saved our time and continued the process of learning the Anatomy	2.69±1.299	2.39±1.193	0.199**
14. The overall experience of virtual teaching was conducive for learning Anatomy	2.56±1.249	2.50±1.065	0.447**

*Significant at p -value <0.05, **Insignificant at p -value >0.05**Table 3: Problems faced by students during virtual sessions of anatomy.**

Statements	Responses (Mean±S.D)		p-value
	1 st year	2 nd year	
1. I believe that teaching resources are limited with respect to the virtual teaching of Anatomy	3.92±1.137	3.48±1.124	0.015*
2. I found problems in learning Anatomy because this teaching style doesn't suits me	3.51±1.184	3.66±1.283	0.224*
3. I feel disruptions in virtual teachings of Anatomy because of connectivity issues	3.30±1.340	4.04±1.269	<0.001
4. I consider that human cadaveric dissection and studying the prosected parts is necessary to achieve course objectives	4.30±1.095	4.18±1.116	0.854**
5. The interaction between students and teacher/facilitator is weak in this modern way of teaching Anatomy	3.97±1.189	3.89±1.282	0.529**
6. I found hands-on teaching of Anatomy is more effective way of learning as compared to web based methods	4.59±0.892	4.36±0.993	0.050*

*Significant at p -value <0.05, **Insignificant at p -value >0.05

In our present study, 88 students of 1st year and 94 students of 2nd year MBBS responded to the questionnaire. The mean age of 1st year students was found to be 19.34 ± 0.82 while it was 20.82 ± 0.83 for 2nd year (Table-1, Figure-1). Among a total of 182 respondents, 65 (35.7%) were males and 117 (64.3%) were females. Majority of the students selected laptops as their choice of gadgets for seeking online education (47.8%), which was then followed by mobile phones (42.9%), tablets (6.6%) and desktop computers (2.7%) (Figure).

The present study sought students' perspective regarding the overall process of online education. Mean and standard deviation were calculated for each of the fourteen statements rated on a Likert scaling system (Table-2). Overall the students did not find virtual learning to be engaging and enjoyable and did not find them as effective as face-to-face sessions quoting problems in upholding focus and engagement. Although some of them were in agreement that the sessions were very well organized with learning objectives were achieved successfully during the sessions (3.33 ± 0.94 and 3.01 ± 1.07 in 1st and 2nd years respectively). They appreciated their teaching faculty in swiftly transitioned to virtual platforms and conveying the educational content even during the challenging conditions of pandemic.

The students were not in favor of online presentations specifically for gross and microscopic Anatomy. The first year students opined that the online sessions for developmental Anatomy were understandable for them (2.82 ± 1.27) but class of second year couldn't find them productive either (2.50 ± 1.28). Hands-on experience, which is an essential part of medical education was altered greatly resulting in an overall deficiency in developing the skills. Majority of the study participants couldn't get their basic concepts of the subject get cleared despite of valuing the facilitator's efforts. This observation was endorsed by both first (3.35 ± 1.09) and 2nd year (3.54 ± 0.98).

A mean average of 3.63 ± 1.03 and 3.31 ± 1.12 class of first and second year respectively also acknowledge that the learning material provided by the faculty members in the form of their lectures, presentations, assignments and video content relevant to the topic helped them a lot in terms of better understanding of the topic.

The main advantages of online teachings were appeared to be that it saved students time and continued the process of learning Anatomy despite of the strict Covid-19 restrictions as agreed by 2.69 ± 1.29 of first year and 2.39 ± 1.19 of class of second year.

Third part of the questionnaire revealed the problems and challenges encountered by participants while seeking the online education as shown in Table-3 and they identify these problems as barriers for the acquisition of knowledge as agreed by a mean score of 3.92 ± 1.13 of first and 3.48 ± 1.12 of second year classes. Adjustment and engagement to a new system was the primary challenge faced by the learners, which can be regarded as a negative aspect from their perspective

A mean average of 3.30 ± 1.34 of first year and 4.04 ± 1.26 of second year students listed many technical issues like slow connectivity of internet, failure of online communication software were faced during various times during the course of study. The students also felt a weak communication between the facilitators and themselves during virtual sessions and they missed the face-to-face discussion with the instructors and their peers as strongly endorsed by both first year (3.97 ± 1.18) and second year (3.89 ± 1.28).

The participants of the present study strongly agreed (Mean score: 4.59 ± 0.89 - first year and 4.36 ± 0.99 - second year) on the fact that hands-on teachings of the Anatomy is the most effective, engaging and active tool for learning Anatomy and plays a pivotal role in the transmission of knowledge among the learners.

Discussion

Under the unprecedented circumstance developed due to pandemic Covid-19, most of the teaching institutes around the globe were caught between two choices, either to close the doors for their students or innovate themselves in order to switch on e-learning technology. Resultantly, many educational organizations belonging to the field of medical education as well opted for adopting a virtual process of learning in order to maximally benefit the students in terms of saving their time and continuing the process of education.¹³

The subject of Anatomy is regarded as an integral component of medical school's curricula and it constitutes a base for their future clinical practices.¹⁴ It has suggested in the study that hands-on sessions are necessary in order to develop the basic understanding regarding the complexity of human body at both macro and microscopic levels which was disrupted due to the pandemic.¹⁵ The main focus of our study was therefore to highlight the perspective of students in getting the online education of Anatomy and the challenges faced by them.

Our medical college was one of the educational institutes across the country, that made prompt and immediate efforts to maintain the continuity of medical teaching. The academics also need to modify themselves and their teaching materials according to the online teaching platforms, but that proved to be challenging in terms of teaching the practical aspects of the subject of Anatomy.¹⁶ There wasn't found to be any substitute in teaching the hands-on part of the subject like the microscopic sections and study of the cadaveric and prosected parts to gain knowledge about histology and gross Anatomy respectively.

The current study has provided relevant insights into the challenges made during the virtual education of anatomy in a time of crisis for the entire healthcare sector. It can be stated that remote teachings cannot replace the traditional Anatomy teaching methodologies. Challenges highlighted in the current study were communication barriers, time management and difficulty in getting basic concepts of the practical aspect of the subject of Anatomy.

The respondents of the present study belong to a post-millennial generation. This population is digital media savvy.¹⁷ This is the fact that explains the avid usage of laptops and mobile phones by the participants of the study as their choice of widget for seeking the Anatomy teachings virtually. However, there was an obvious inclination of the respondents towards on-campus classes rather than the virtual education. A survey conducted on 2,721 medical students across different parts of United Kingdom by Dost et al,¹⁶ also couldn't find the virtual learning interesting. The probable reason explained by the researchers were limited exposure of students with facilitators and fewer chances were available for them to ask questions. This opinion was also endorsed by the current study's participants, where they expressed their concern over a weak communication present between the teacher and the learners during the off-campus classes.

The process of getting online education can be very convenient for many students as it saves time and cost but it cannot be facilitating for every students.¹⁸ Virtual learning is more self-directed, student-centered and self-regulated and that is something many medical students strive with.¹⁹ This observation was also reflected in the current study in which the study participants found difficulties in virtually learning the subject as they stated that this teaching style doesn't suit them.

Rashid et al²⁰ postulated that a strong infrastructure as well as necessary equipment is essential for the successful implantation of an online course. The most notable problems faced by the

current study's participants were connectivity issues, audio troubles and broadcasting delays, that somehow make them difficult to keep the pace with the facilitator. Faculty needs to be trained for updated software used for virtual learning and students also required to be oriented in using online learning tools. Investment in buying premium software packages will also help overcome many problems and is therefore recommended.

The limitations of the study are that it was a single centered cross-sectional study with conclusions drawn from the data over a little period of time. To verify the impact of virtual teachings of anatomy in line with their learning outcomes, it is necessary to follow the students over a prolonged time during their course of studies.

With the relentless spread of COVID-19, the academic activities seems to carry on due to the digital support. Although the paradigm shift in education from traditional to virtual is very challenging. Lack of access to cadavers and physical specimen, influence the students' capability to develop the tangible understanding of human anatomy. The virtual learning of anatomy can never be a replacement of real class room experience and it is challenging in many different aspects for the learners to adjust to the virtual learning system. In conclusion, the observations and results of the present study should be taken into consideration by policy makers to extend the anatomy education beyond traditional methods and incorporating blended methods of learning that are necessary nowadays with revolutionized technology keeping in view the challenges faced by learners.

Conflict of interest: None declared.

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