

**Letter to the
Editor**

Impact of COVID-19 Pandemic on students learning Anatomy-View Point

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Author's Contribution

¹ Conception of study

¹ Experimentation/Study conduction

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Introduction

In December 2019 the Coronavirus was first identified in Wuhan, China. The outbreak spread rapidly to involve many countries of the world. The World Health Organization realized the sensitivity of the issue and declared it a Pandemic on March 11, 2021. Up to April 18, 2021, the number of reported cases worldwide reached more than 140 million and 3 million deaths in 192 countries.¹

The pandemic's shocks and aftershocks were very painful on the economy, culture, education, and Health sector throughout the world. The burden of immediate home quarantine at the start of the pandemic with the uncertain future created a deep impact on the student's physical and mental performance. In a Canadian study, there was an association found between a longer duration of quarantine and anxiety/depression in people.² Due to the sudden change, people all around the world felt depressed and their lifestyle changed from their routine pattern. The home quarantine for months led to physical and mental health issues.

The reaction to the epidemic was first observed in health care workers who played their role as the first line of defense against the threat. They are not only exposed to active cases but also exhaustive working hours, tiredness, and stress led to psychological upsets

in them.³ In a study in Egypt, more than 75 percent of healthcare staff were found more prone to infection as they were dealing with individuals not following SOPs.⁴

The immediate effect of COVID-19 on the education sector was the collapse of the learning process. Educational institutes were closed. Around 1.6 billion students in 190 countries were affected. Due to the inactivity of teaching institutes around 94% of the world's student population was affected. The positive effect of the pandemic crisis led to the introduction of innovative methods and applications in the learning process. Stakeholders played a significant role in implementing the drastic modifications as needed to promote the new ways of the education system. In universities mode of learning has been shifted from traditional face-to-face learning to online methods by use of pre-recorded lectures and online platforms, while in some universities due to lack of information technology teaching and learning process was postponed until further notice.⁵

Technical educational institutes like sciences and technology institutions, engineering, and medical colleges have suffered the most. Here we will be discussing the effect of COVID-19 on medical education in general and anatomy education in specific medical institutions. The immediate effect on the daily routine of undergraduate medical students was intense. Initially, the Students had difficulty

focusing in online classes. Online classes are not a substitute for in-person classes. In some institutions, interactive sessions and small group discussions are introduced, inviting students to participate actively during didactic sessions. Clinical teaching was also affected. Case presentations, group discussions, in-person history taking and physical examination of patients, clinical rounds under supervision of senior doctors, research activities, workshops, seminars, and conferences are affected. At the start of the outbreak, lectures were conducted online but practical lab sessions and cadaver dissections were kept on hold. The exposed medical students became asymptomatic carriers for transmission of infection to their intimate circle, thereby deteriorating the situation. Statistics from China showed a large number of individuals are asymptomatic carriers, and 86% of COVID-19 diagnosed patients obtained the disease from them.⁶ As the number of suspected cases increases in hospitals, the medical students are more restricted to evaluate them thus clinical education loses its value.^{7,8} During a crisis, the senior registrars and residents focus their attention on managing COVID-19-related issues during their duties so the medical students didn't get their adequate attention during clinical rounds. Anatomy and physiology are the subjects, which are the pillars of medical sciences. The study of human structures and their functions provides an essential tool to learn knowledge of medicine and surgery. Cadaver-based knowledge has survived as the main teaching strategy for hundreds of years. Up to the past two decades delivering anatomical knowledge was considered an art. The experts of the field used to take lectures on blackboards. Colored chalks were commonly used to explain the anatomical structures by drawing simple conceptual diagrams. The medical graduates of the past are the competent clinicians and surgeons of today. The cadaveric dissection provides an essential tool for learning anatomy. It gives a three-dimensional approach to study the relations of structures of the human body. A student of anatomy acquires the knowledge of the structures and their interrelationship by cadaveric dissection, layer by layer dissection, the study of compartments and cavities, tracing the course of blood vessels and nerves, and understanding complexity of structures gives valuable knowledge to a student of anatomy which gives great help in understanding the human body and will be capable to understand further branches of medicine and surgery in their future years of study. As anatomy is not taught in detail nowadays there is a concern that medical students are ill-

prepared in anatomy when entering clinical training and residency programs. However, there are differing opinions on whether full cadaver dissection is still required for modern undergraduate training. During COVID-19 the cadaveric dissection in groups has been affected. In the current situation according to the health ministries, no Covid-19 infected dead body will be embalmed and can be used for dissection purposes. There are clear instructions that the dead bodies of COVID-19 patients should be immediately buried deeply to avoid any spread of infection in the community.⁹

Although in medical colleges the human dissection is replaced by online resources, simulations, and applications. Worldwide the universities are facing this issue as the students engaged themselves to learn the subject without access to course materials based on practice such as 3D, plastic and plastinated models, and group discussions. In the modern era, online resources are a major source for medical students who have grown up all the time surrounded by modern technology to get their relevant information.¹⁰ It has already been mentioned that "Anatomy education has been resistant to change for almost millennium". Now is a sign of a possible historic evolution and we are on the verge of a paradigm shift. In near future, anatomy education will be based on simulated dissection, medical imaging, and multimedia resources and it is going to be cadaver less in a decade.^{11,12}

Although the academic managements are well committed to offer uninterrupted quality education to students and introduce innovative teaching tools in higher education. Zoom, Microsoft teams, and Blackboard Collaborate Ultra platforms are being used by institutions to take anatomy lectures. These are excellent tools to interact with students with real-time feedback. Through Blackboard Collaborate and Microsoft Teams, the lecture slides in PowerPoint can be shared with the students. During lecture delivery, the handmade conceptual figures can be displayed as needed. One of the benefits of these meetings is the attendance of the participants can also be recorded. Quizzes and Objective Structured Practical Examinations are also conducted through online sources. Through Google forms the Multiple-Choice Questions are downloaded and examinations are conducted. During this period the demand for new technologies like human anatomy learning systems using augmented reality is increased. It is a new generation of 3D-visualized technology in which 3D virtual objects are integrated into a 3D real environment in real-time.¹³ Through Augmented

Reality; the anatomical models are visualized in three dimensions. The viewer can have a better perception of the depth of structures and their relations with each other with the intact sense of their environment.¹⁴ The phenomenon is exhibited by a study that showed that the group of students who used AR had significantly higher test scores than the group of students who studied with two-dimensional pictures, graphs, and text material.¹⁵ A.D.A.M is the most comprehensive online interactive anatomy learning resource. This interactive assessment tool contains 11 body systems having 952 anatomical structures. It includes fill-in-the-blank spaces, identification exercises. Students can generate their performance and an email to their instructors. Through KENHUB interactive anatomy students can learn Anatomy more efficiently using the right tools and high-quality anatomy illustrations reviewed by experienced medical professionals. It works on mobile phones, tablets, and desktop computers, so one can practice it anywhere. Social media have gained fame in anatomy education in recent years¹⁶ and anatomists have established Facebook pages to help students study the subject.¹⁷ In a study by Jaffar and Eladl¹⁸ students who performed well on Facebook pages were involved more intensely in discussions than did lower-performing students who contributed with a single "like" or comment. The authors concluded that Facebook could be taken as an appropriate platform for engaging students in an educational perspective rather than a distractor. YouTube videos also have been in use for learning anatomy (Mustafa, Taha, Al Shboul, Al Salem, & Malki.¹⁹

Despite all, we think physical attendance, face-to-face learning, group discussions, demonstrations, study on models are still the most effective ways to learn the subject.

Professional institutions have started formal mentoring programs. In the current situation, mentorship may play a very important role in alleviating academic stress and psychological issues in students. Mentorship is a deliberate process of interaction between two individuals. The structure of the mentorship model has three mentoring influential, i.e. people, environment, and events. People who incorporate in the process, the environment in the workplace, and events are the occurrences to be critical to career development. The process of mentorship is an active process comprised of four organized stages motivating mentees toward positive career development outcomes. The first stage, mentoring characteristics, consists of the mentoring influential

from the structural model. The second stage is mentoring dimension. The dimensions lead to the last stage i.e. mentoring strategies, which facilitate career development consequences.²⁰ A mentor is an experienced and trusted adviser. Mentorship is beneficial in developing a career and enhances the educational and psychological growth of the mentee. In the current situation, personal experiences shared by an educated and experienced mentor would help boost up the morale of the mentee. Thus, it is very effective, protective, and supportive.²¹ In the current scenario although the supportive measures can help out the students it is very difficult to predict the long-lasting impact of the COVID-19 pandemic on medical teaching.

Conclusion

The pandemic has created a new chapter in the history of medical education. Although the stakeholders have succeeded to overcome the challenge and they have managed to much extent by generating new teaching strategies to make sure that education is not interrupted and students perform well during a pandemic. There are several areas in teaching and learning for undergraduates who demand more. Online teaching has now become a viable alternative source these days by the adoption of innovative teaching strategies. Small group discussions, didactic interactive sessions, use of comprehensive online interactive anatomy learning resources can be beneficial for students to learn the subject. These changes will impact the future of anatomy education. After the pandemic aftershocks are over the ideal way to teach anatomy is to adopt an approach taking the help of modern multimedia resources and a conventional approach. To overcome the stress, fear, and anxiety in medical students the effective mentorship meetings could help alleviate the situation.

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