Covid-19 impact on medical students teaching & learning in Saudi Arabia

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KEYWORDS
COVID 19, E-learning, Virtual Education, Pandemic, Communication Gap, Challenges, Medical Education, Saudi Arabia.

ABSTRACT:
Objectives: The main objective of this study is to evaluate the impact of Covid-19 on medical education in Saudi Arabia and identify the challenges faced by them. The study also provides the recommendations on basis of observations and research analyses to make the medical education system better.
Methods: A qualitative study was performed using virtual interview with seven open-ended questions.The study has chosen to collect responses from 10 interview participants that are students of the King Saud University, Ibn Sina National College for Medical Studies, and Alfaisal University College of Medicine.
Results: The findings have shown that COVID 19 has changed the learning environment and medical education and the classes are taken online. Students are not satisfied by virtual education, it can be concluded that the major challenges that medical student's education have faced are a lack of practical education that enhances health practitioner skills, a lack of student-teacher interaction, and network problems that disrupt live sessions. Furthermore, it can be concluded that the mental health of students in Saudi Arabian medical universities has been negatively impacted as a result of this educational environment shift, as stress and anxiety levels among studied participants was high because they are unable to grasp deep medical concepts from online lectures.
Conclusion: The research provides a deep analysis of various challenges faced by medical students in acquiring medical education in Saudi universities during the pandemic. After illustrating the challenges, the study provides quality recommendations to improve the learning environment in the days of COVID to fulfil the research objectives.

Introduction

The virus SARS-CoV-2 was first reported on December 19 in the markets of Wuhan, China which led to its spread and cause the global pandemic COVID-19. Since then pandemic has affected all areas of life, including education. The only way to control its spread is by social distancing and in the worst-case scenario, lockdown implementation. In an alarming situation the Saudi ministry of education has announced to take online classes in educational institutes including colleges, universities, and schools (Tanveer, Bhaumik, Hassan, & Haq, 2020). This method was applied to save the children from this life-threatening infection and it was required that the classes must be suspended (Dyer, Swartzlander, & Gugliucci, 2018). As a result, the institutions started to adopt new ways of teaching online. However, as it is a new way, it is challenging not only for the teachers to adopt new skills for teaching effectively in online classes but also for the students to learn and engage in class online from their homes (SUGARMAN & LAZARÍN, 2020). Particularly targeting the medical science education, it can be described that it is the toughest field and requires proper concentration in the class for physical practice(Atreya & Acharya, 2020; Franchi, 2020). However, a report was published on December 4, 2020, by Ipsos (market research and consulting company) which includes the Saudi student's perception of online education in the upcoming five years. The result indicates that 45% of participants think that in five-year education will be delivered solely online while 30% believed that education will be delivered online as well as physically (Buchholz, 2020). There is no doubt that the current COVID-19 pandemic has acted as a catalyst to shift the focus of education on online classes, but we expect that in the future this shift will be a permanent trend in all teaching including medical education. Therefore, researchers have been reporting the online teaching methods for the medical system for decade. These methods usually included 4-box case analysis, online lectures, seminars, clinical case discussions, and dry labs (online) demonstrations (Bediang et al., 2013; Greenhalgh, 2001). Hence, we conducted this qualitative study to evaluate the efficiency of online teaching techniques and the barriers faced by medical students during

online learning. In this study, interviews have been conducted to highlight the issues faced by the medical students in taking education online in the Covid-19 outbreak, and in this regard, the region of Saudi Arabia is considered because the trend of online education is prospering since the Covid-19 started.

1. Methods

1.1. Participants

The research participants were chosen from the medical universities of Saudi Arabia. The participants for interviews were studying in three different universities of Saudi Arabia. Generally, two set of three students were selected from King Saud University and Ibn Sina National College for Medical Studies, and four from Alfaisal University College of Medicine. Eligible participants in this study were in their final academic year. The reason for selecting this group was because in last academic year they need physical participation but due to Covid-19 the medical institutes in Saudi Arabia have failed to give them chance on contact base medical practice.The detail characteristics of the study respondents is described in **Table 1.**

Table 1: The characteristics of the study respondents.

Characteristics	Information
Participant	10
Age group	>18
Nationality	Saudi
College	• King Saud University • Ibn Sina National College for Medical Studies • Alfaisal University College of Medicine
Student degree	Medical
Academic year	Final year

The study aims to conduct an online interview with the medical students studying from three different medical universities of Saudi Arabia. Based on the aim of the study, the related objectives are to evaluate the impact of Covid-19 on medical education, to identify the challenges faced by the medical students, to recommend the ways to make the medical education system better in Saudi Arabia. Following question were asked during the interviewto fulfil the purpose of this study, **Table 2**.

Table 2: Summary of theme and question ask during interview.

Themes	Related questions
Impact on education	➢ How COVID 19 has changed your educational and learning environment? ➢ How do you perceive the impact of Covid-19 on your medical education?
Challenge encounter	➢ What challenges have you faced during the pandemic for acquiring medical education? ➢ In your opinion, do these challenges are impacting your mental health more or your educational aspects?

Technical challenges	➢ Have you considered virtual or online education as the most suitable option for gaining medical education during Covid-19? In case of yes or no, provide the reason for your choice as well.
Methodology challenge	➢ What measures your university is talking about to deliver medical education to you and are those measures suitable?
Expectations for the future	➢ Can you recommend some way to your university through which the delivery of medical education can become better?

1.2. Plan of work

To determine the challenges associated with medical education in Saudi Arabia, the researcher had aimed to adopt qualitative research. The most common way to collect data includes face-to-face in-depth interviews, participant observation and focus group discussions. In our study primary data for the research was collected with the help of semi structured interviews. The primary source of data collection was chosen because it is more up-to-date and relevant as compared to secondary data (Moser & Korstjens, 2018). Moreover, the qualitative research design had enabled the researcher to conduct an in-depth analysis rather than making the research limited to the numerical data and results. Hence, it can be said that the researcher's choice of adopting primary qualitative methodology is suitable for the nature of the topic and in this regard, interpretive research philosophy and inductive approach are also applied to the research as both prefer the qualitative research design unlike other philosophies (positivism and pragmatism) and deductive approach (Carminati, 2018). However, due to restrictions of time, the interviews with the research participants were conducted online for 30 minutes. Hence it took one and half week for the researcher to conduct all interviews from 3rd January 2022 to 13th January 2022.The interviews were conducted in the English language. Once the data from the interview was collected, then thematic analysis was used to analyse the data (Braun, Clarke, & health, 2021). This has enabled the researcher to formulate the themes in accordance with the research objectives to ensure that the desired outcomes have been generated. The recorded interviews were transcribed and coded to identify the themes or patterns. To ensure the reliability and trustworthiness of the quotes for each theme, the quotes were reviewed by another researcher as well, so that additionally, the probability of the biased outcomes would reduce (Lemon & Hayes, 2020). Ethical considerations were also taken into account to make the research more reliable. The anonymity and confidentiality of each participant were guaranteed in the research by taking the informed consent from each participant and informing them that no data would be included in the research that can personally identify the participant and hence, the dummy names were used instead of actual names of the research participants.

2. Results

This section outlines the responses of students gathered from interviews. We have invited ten participants for the interviews from the three selected universities. The researcher has chosen dummy names for the King Saud University, Ibn Sina National College for Medical Studies, and Alfaisal University College of Medicine as University 1 (U1), University 2 (U2), and University 3 (U3), respectively. The study has chosen to interview three students from U1, three from U2, and four from U3. To keep the name confidential, we have named the students A, B, C, and D along with their respective university codes.

2.1. Changes in the learning environment and medical education

Participants who are getting medical education during the pandemic have highlighted the learning environment undergoes a major change in teaching policies. Students have reported that universities have complete closure due to lockdown policies of the Saudi government. According to the participants, universities are using e-learning platforms to deliver the knowledge to students. Responses have shown that the learning is going to be more theoretical rather than practical due to the closure of research centres and labs, **Table 3**. Similar findings were reported all over the world where COVID-19 has increased the

popularity of digital E-learning platforms and the teachers are using digital technologies to deliver medical concepts to students (Ish, Sakthivel, Gupta, Malhotra, & Rajeshwari, 2020). In essence, the learning environment and medical education are incorporating digital E-learning platforms but the education is getting more toward theoretical concepts rather than practical experiences.

Table 3:Responses of participant onchanges in the medical education learning environment.

Source	Selected Evidence (Quotes)
Student A U1	*"COVID 19 make the learning environment more virtual and students have to adopt digital technologies to continue the studies."*
Student C U2	*"My university has been shut down due to lockdown policies and the education system move towards e-learning which impacts my practical learnings."*
Student D U3	*"The classes have been taken remotely and the lecturers are using the digital platform to transfer the knowledge. I think that medical education is going to be more theoretical rather than practical."*

2.2. Challenges faced during the pandemic

The participants pointed out that they have faces many challenges while taking online classes; this is evident in the following statements, **Table 4**. In general, participants have pointed out that they faced difficulties in accessing the digital platform assigned for taking the online classes and their lack of technology awareness has cause them unease. Moreover, students have highlighted that they have faced network interruption while taking online classes which induce much disturbance in getting the medical concepts and brings anxiety to them. Furthermore, online classes increase the communication gap between students and lecturers which will not be in the case of face-to-face education. Students have also reported that online classes did not clear their conceptswhich shows that this education system requires experimental knowledge. In conclusion these difficulties bring out the importance of physical learning in medical education. **Figure 1,** demonstrate the challenges face by medical student during online classes on basis of their interview.

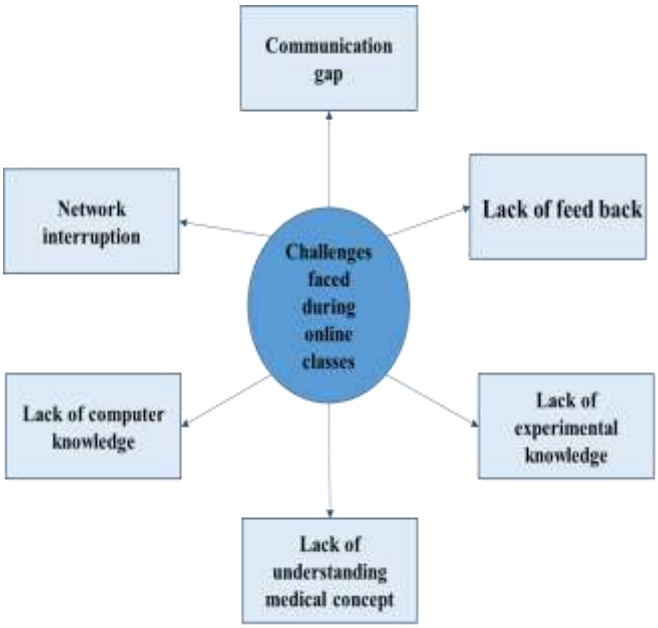

Figure 1: Challenges face by medical student during online classes.

Source	Selected Evidence (Quotes)
Student B U1	*"I have faced difficulties in using the latest technological tools for taking online classes."*
Student A U2	*"Network interruptions have created anxiety and issues in getting the medical concepts. I have faced difficulty in communicating with the lecturer."*
Student C U3	*"I have difficulties in accessing the online learning platform which increases stress and anxiety. The online classes didn't clear my concepts due to communication gaps with the lecturer."*

Table 4: Challenges faced by respondents during the online classes

2.3. Virtual classes and medical education

Responses have shown that the King Saud University, Ibn Sina National College for Medical Studies, and Alfaisal University College of Medicine are using web-based online and virtual platforms of E-learning to deliver medical knowledge. The theme evaluates that whether the students are satisfied with online education or not. The responses have shown that the majority of the student were not satisfied by the online learning environment and they do not consider it as a suitable platform as it reduces the practical knowledge of the medical practitioners. Student have report that their medical concepts are not getting clear due lack of communication gap with the lecturers and network interruptions. However, to some extent students agrees with the benefits of online education as it reduces physical contact and thus reducing the chances of virus spread. But at the same time, students have quoted that medical education requires practical experience to become a skilled medical practitioner, **Table 5**. In essence, physical or face-to-face education is more effective in delivering the medical concept to students and the virtual education system is not delivering adequate practical medical knowledge.

Table 5: Participant response onvirtual or online medical education

Source	Selected Evidence (Quotes)
Student C U1	*"I don't think so because it introduced several interruptions due to poor network and communication gap in getting the medical concepts."*
Student B U2	*"In my view, online education is a suitable option for getting an education as it reduces the chances of getting infected by the virus but at the same time it increases the communication gap."*
Student B U3	*"No, because medical education requires practical experience and online education reduces practical exposure to the concepts and theories."*

2.4. Expectations for the future

The participants have provided unique recommendations on how to improve the learning environment of the medical students, their statements are elaborated in **Table 6**. Students recommended for the evaluation and rebuilding of IT infrastructure of universities so that it can hold all the data of registered students in the medical course. Students also want their universities to provide adequate E-learnings training, because

this will reduce the interruption in getting access to the so many online platforms. Participants also want to know the resources needed to get the education through virtual classes. They also want universities to monitor how students are interacting with the online platform to improve their usage. Participants have also stated that there is a need to use fair learning analytics and learning assessments that provide information on the learning capabilities and achievements of students. Besides this, it has been suggested that there must be an adequate amount of lectures and quality notes on the universities website so that students can get an easy excess to quality education. In summary, **Figure 2** demonstrate the recommendation suggested by the medical students to their universities.

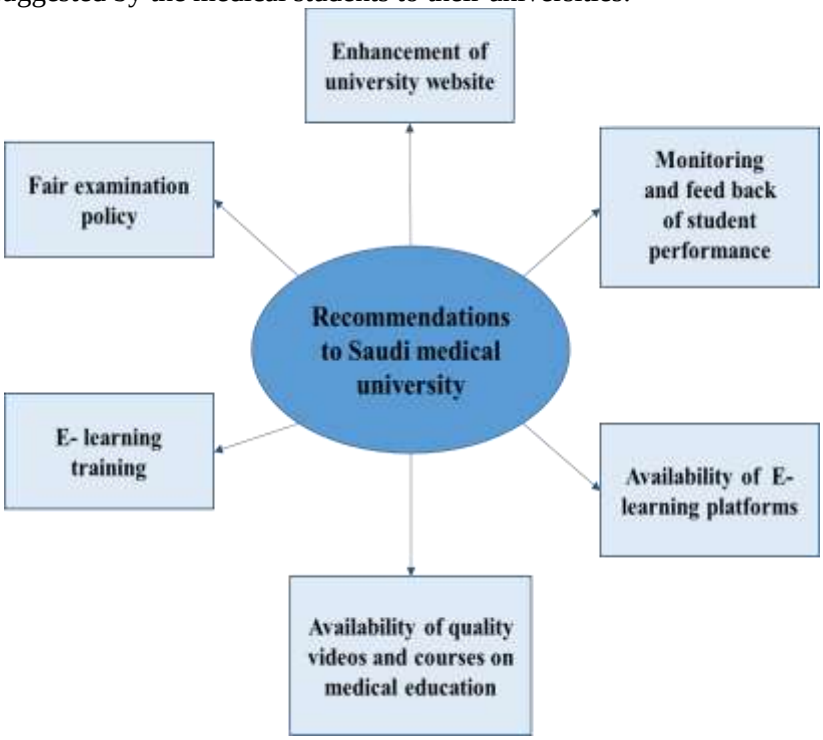

Figure 2: Recommendation suggested by the medical students to their universities to improve online medical education.

Source	Selected Evidence (Quotes)
Student B U1	*"I would recommend to re-build the IT infrastructure to support the increasing need and capacity of students for e-learning."*
Student A U2	*"I think that university should provide support and training on the latest technological tools used for online classes."*
Student D U3	*"My university should use learning analytics and learning assessments to identify different achievements of students along with how they use the online learning platforms. Moreover, there must be an adequate amount of lectures and quality notes."*

Table 6: Recommendations to university by medical students.

2.5. Discussions

Covid-19 has significantly impacted the ways in which people interact with each other, run businesses or acquire education (Ratten & Jones, 2021). Correspondingly, Covid-19 has changed how education is delivered to the students (Torda, 2020). Considering this aspect, the research chose to determine the impact of Covid-19 on medical education in Saudi Arabia; while listening to the medical student's experience from the most prestigious universities in the region. The qualitative or thematic analysis was conducted to analysed the response of medical participants; it was revealed that the educational and learning environment of the medical students has changed from the physical/traditional to electronic means such as web-based or online. During the lockdown tutorials are posted or teacher conduct an online session which limits the interaction between the teachers and students of King Saud University, Ibn Sina National College and Alfaisal University. The result revealed that online education impacted the medical students in Saudi Arabia and they face mental anxiety. A thorough research was conducted which revealed that 48% of the students have faced anxiety and stress during online education (Rajab, Gazal, & Alkattan, 2020). Another study found that during the pandemic, 67.50 percent of college students in China experienced moderate to severe stress at PSS-10 ≥ 14, 43.77 percent of depression at PHQ-9 ≥ 5, and 20.60 percent of anxiety on the SAS standard score ≥ 50 (Zhan et al., 2021).This has proved that during the pandemic students have been suffering from anxiety and stress and their decline in mental health have harm their learning capabilities in understanding the educational concepts. The participant of the medical universities also revealed that their expectations of getting hands-on experience on medical apparatus during the final year have completely shattered. As through online learning only medical-related theories are delivered while experimentation becomes limited, which is considered as the core competency of the medical practitioners. Moreover, Alsoufi, A., et al. evaluate 13 medical schools in Libya and concluded that only 21.1% medical student agreed that E-learning is useful for clinical aspects in comparison to 54.8% of students who disagreed with the given statement. Similarly, 54% of the participants have agreed that E-learning is not suitable for clinical and medical aspects; a research conducted with Saudi medical students. The students have also recommended the adaptation of blended learning strategy via combining online education and face-to-face teaching on campus will subdue the decline on education (Alsoufi et al., 2020; Soliman, Aldhaheri, Neel, & Medicine, 2021). From the analysis and results gathered from the aforementioned studies, it can be said that the flow of medical education in Saudi Arabia has been disturbed greatly and students are finding it challenging to gain medical education during the pandemic as physical learning has become negligible. However, the contradictory view was reported by Rajab and his co-worker where only 27% of the medical student in the research agreed that the shift to online education due to pandemic in Saudi Arabia has negatively impacted them(Rajab et al., 2020). This indicates that the effectiveness of medical education through E-learning platforms is dependent on the digital resources that the universities have and how effectively the staff is trained to deliver medical education through virtual platforms in Saudi Arabia.

Similarly virtual learning, is ineffective and causes plenty of problems for students all over the world (Smith, Hoderi, & Mcdermott, 2019). Muthuprasadet al., research also emphasised that students have faced difficulties due to poor internet connection, data limit, and data speed. The researcher further adds that lack of proper devices and a poor learning environment reduces the chances of success in online education.To further validate the finding author's has conducted an online survey among the agricultural major student's (n = 307). The largest percentage of students (57.52%) respond that they are facing difficulties due to lack of connectivity while constraints of online learning cannot be ignored. The study shows that 55.95% students report the internet data limitation; 55.50% respond to data speed; 53.58% respond to lack of face to face interaction; 46.07% respond to lack of device, 36.04% respond to technophobia and 45.17% respond to poor learning environment when asking about the constraints of online learning. However, 70% of the respondents agreed for online classes to manage this pandemic (Muthuprasad, Aiswarya, Aditya, Jha, & Open, 2021).Another studies conducted recently have also supported our finding and reported that the student assessment (57.5%), communication (59%), online experience (55%), use of technology tools (56.5%), time management (35%), pandemic-related anxiety or

stress (48%), and technophobia (17%) effect the education of medical students (Qazi et al., 2020)**.**Similarly, investigation was conducted with Bangladeshi studentsalso highlighted that poor learning experience is due to communication gap and poor relationship between teacher and students. The authors also stated that proper E-learning environment planning is also neglected. Some of the respondents reported in his investigation that online education reduces the chances of virus spreads but at the same time, they believed that it does not deliver effective knowledge on medical concepts and theories. Since it is essential that future doctors must practice the theoretical concepts so that they have the idea of how to treat the patients in hospitals and health clinics. Results have also emphasized on an adequate amount of notes and lecturers play a vital role in career development. Respondents in given research want to have a sufficient amount of quality notes so that they can easily understand the medical concerns. The research supported these findings by the survey statistics. Their survey result shows that 45% of the respondents have agreed about the significance of the quality of useful course material (Sarker, Al Mahmud, Islam, & Islam, 2019). Furthermore, in another article the university respondent has recommended rebuilding the IT infrastructure so that all student's data can be accommodated easily and effectively. The respondents also pointed out that training sessions on the usage of an online learning platform are necessary to improve the online learning environment (Rana & TECHNOLOGY 2018).

2.6. Recommendations

The medical students of the selected universities also provided recommendations through which the delivery of medical education through E-learning platforms can be improved. However, the following recommendation can also be taken into account to ease the negative impacts associated with the challenges of education during Covid-19 in Saudi Arabia. The recommendations include:

- The medical universities in Saudi Arabia are recommended to provide technological training to the staff so the course material and education can be delivered to the students effectively.
- Universities should develop and integrate performance management tools on the student portal so that the performance of each student can be tracked easily.
- Teachers are recommended to take an interactive approach during online education sessions, for instance, taking a small quiz to make the students attentive.
- University must divide the sessions into 20-25 students instead of conducting the class of 50-70 students at one time.

2.7. Limitation and implication

The conclusions of this study cannot be applied for generalized students because it was conducted with only Saudi Arabian medical students. Despite the fact that our research generated four key themes, the authors believe there are likely to be additional benefits and drawbacks to using this medium for undergraduate medical students. Second, to ensure the success of online learning modules for medical students, the principles of the online learning model and learning outcomes should be systematically and routinely examined. We hope to conduct a more in-depth analysis of this group in the future, comparing it to numerous institutes in various countries. We would like to advise that more exploratory events be held. This could draw attention to the difference (if one exists).

3. Conclusion

The research has taken an in-depth analysis under consideration to determine the challenges that have been faced by the medical students in acquiring medical education in the region of Saudi Arabia at the time of the pandemic. The researcher has ensured that the outcomes achieved are in complete alignment with the research objectives to ensure the credibility and reliability of the research. The research has undertaken the primary qualitative research in which the interviews were conducted from the medical students of King Saud University, Ibn Sina National College and Alfaisal University. It can be concluded that Covid-19 has transformed the traditional medical education system into a digital system, which has had a significant impact on students' educational and mental well-being. While some students see this as a

positive change, others believe that E-learning platforms are unsuitable for delivering medical and clinical education because these require physical interactionStudents are not satisfied by virtual education, it can be concluded that the major challenges that medical student's education have faced are a lack of practical education that enhances health practitioner skills, a lack of student-teacher interaction, communication gaps, and network problems that disrupt live sessions. Furthermore, it can be concluded that the mental health of students in Saudi Arabian medical universities has been negatively impacted as a result of this educational environment shift, as stress and anxiety levels among studied participants was high because they are unable to grasp deep medical concepts from online lectures. From the analysis, it can also be concluded that the King Saud University, Ibn Sina National College and Alfaisal University are trying their best to deliver quality education to the students in these hectic times, and adequate digital learning resources hold the potential to improve the learning experience of the medical students.

ACKNOWLEDGEMENT
We whole-heartedly acknowledge all the participants and their corresponding universities for giving permission and spending their valuable time on giving interview.
FUNDINGS
This research does not receive any form of funding.
CONFLICT OF INTEREST
The author declares no conflict of interest, financial or otherwise.
CONSENT FOR PUBLICATION
Author accepts the final version submitted to the journal.

NOTE: It is difficult to claim that students have issues with use of technology. The new generation has good exposure and expertise with the latest technologies used in teaching. The need for up gradation is definitely for the staff which can be achieved by additional faculty training sessions. The offline platform comes with advantages also where students are less stressed during the theoretical exam session, as they would be in their convenient home environment. It also reduces the stress in assessments like presentations where there is no audience visualization. The question-answer session following the presentations is comfortable with online and peer support. Therefore online teaching also comes with some advantages.

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