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Social determinants of online teaching in medical students during the COVID-19 pandemic

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Abstract

This survey aimed to evaluate the social determinants and medical student perceptions of online teaching during the COVID-19 lockdown restrictions. This was an analytical cross-sectional study that took place via an online questionnaire open for 2 weeks (1st Nov to 14th Nov) throughout Pakistan. Our sample included 3,952 respondents from various medical schools and medical years. Our survey found that 48% of the students did not like online teaching, 61% did not find online teaching stimulating, 51% did not engage in the sessions, and 59% responded their preparation was not up to the mark with online teaching. Medical school year 5 (OR(95%CI): 0.54 (0.23 – 0.84); P-value = 0.023), male gender (OR(95%CI): 0.71 (0.55 – 0.91); P-value = 0.038), lack of devices (OR(95%CI): 0.63 (0.40 – 0.83); P-value = 0.031), and unstable internet connection (OR(95%CI): 0.85 (0.74 – 0.98); P-value = 0.025) were independent determinants of negative perception to online teaching. We conclude that majority of medical students in Pakistan had a negative perception of exclusive online learning. We recommend that the challenges of online learning in our limited-resource setting should be systematically evaluated and that effective strategies should be developed to overcome their inhibitory effects.

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Introduction

The World Health Organization declared the COVID-19 outbreak an emergency in March 2020, and the resultant restrictions on social distancing and lockdowns to control the spread of the virus impacted all aspects of life [1]. Inevitably, medical education was also affected due to social distancing measures. All the clinical placements, lessons, and clinical exams were stopped, resulting in a shift toward online teaching. Online teaching has been in use in medical education for quite some time, demonstrating many benefits in student progress [2]. A systematic review demonstrated that face-to-face teaching and online teaching is equivalent in terms of exam outcomes [3].

The lockdown measures in COVID-19 have caused a sudden shift toward exclusive online teaching, making it the primary source of learning remotely. Teaching sessions covered on platforms like Microsoft Teams have shown a high level of student engagement, as this allows students to remain at home and have an access to teaching regardless of the location [4]. However, concerns were raised about the quality of doctors being produced during the pandemic years, many students and doctors think exclusive online teaching can impact their ability to develop clinical competence [5]. Many studies have investigated the role of social distancing measures and their impact on the general public workflow; however, to date, the perception of medical students on their education during the COVID-19 pandemic has not been studied in Pakistan [1]. Therefore, we analyzed their perceptions regarding online teaching and find out the determinants of online learning difficulties during the pandemic.

Methods

This cross-sectional study was conducted in various national medical schools in Pakistan through an online survey questionnaire. The questionnaire was designed after a literature search on contemporary curricular methods and the effect of medical education in Pakistan [6]. Dundee Ready Education Environment Measure (DREEM) sections I to IV were used for online teaching experiences [7]. DREEM is a validated questionnaire designed to measure the educational environment of medical schools and healthcare professionals. All the questions were 5-point Likert-type questions, ranging from strongly agree to strongly disagree. The remainder of the questionnaire included a mixture of question styles, including conditional questions, and open-ended text responses. After a discussion with a group of medical students, the final questions were drafted after a careful review and editing process. The following 3 themes were explored in the final draft: (1) Baseline student-level demographics, (2) the use and experience of online teaching during the COVID-19 pandemic, and (3) perceived benefits and barriers of online teaching.

The survey was created on google scholar, and distributed by medical students via emails and a snowball sampling technique to maximize the outreach to all registered medical schools in Pakistan. The survey was accessed via an anonymous link for 2 weeks (1 Nov 2022 to 14 Nov 2022). Abbas Institute of Medical Sciences gave the ethical clearance to undergo this survey according to the the Declaration of Helsinki (Study ID # AIMS/22/074).

All undergraduate medical students across the years (1st-year MBBS to 5th-year MBBS) from registered medical schools were eligible to participate in this survey. As the investigation focused on the views of medical students, patients or the general public were not included in the study design or data collection. However, pilot mini-surveys were carried out on graduate medical health professionals to test the applicability of this questionnaire. All participation was voluntary, and informed consent was signed before starting the survey that all the data were anonymous and non-identifiable, only to be used for research purposes. For that, a mandatory check box consenting to participation was included at the beginning of the survey, ensuring a 100% consent rate and avoiding multiple responses.

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 26 (IBM Corp., Armonk, NY, USA.). Categorical data were presented as frequency (n) and percentages (%) and analyzed using the Chi-square test. Continuous data were tabulated as mean and standard deviation (SD) and analyzed using Student's t-test. Multivariate logistic regression was used for social determinants of online learning for medical students. A two-tailed $p < 0.05$ was considered significant.

Results

Of the 3,952 responses collected, 1,843 (46.63%) were women, and 2,109 (53.36%) were men. Responses were collected from all major ethnic groups in Pakistan and the majority of reactions collected were from Punjabi (36%) and Sindhi (24.11%). Pashtun constituted 21.2% and Balochi included 9.69% of responses. The survey response rate could not be ascertained due to the inability to track survey distribution. However, snowball sampling by a variety of students ensured a minimal non-response bias. More than half of the student respondents studied in a private medical college (56.8%) and spent an average of 12 ± 2 hours/week on online teaching before COVID-19. The type of medium for online classes was equal among men and women with the majority using a tablet for an online class (34.53%). Student-level demographics are shown in **Table 1**.

Table 1. Demographics

Variable n=3,952	Males	Females	P-value
	2,109 (53.36%)	**1,843 (46.63%)**	**0.031**
Age	23 ± 4	22 ± 3	0.165
Ethnicity			
Punjabi	765 (36.27%)	658 (35.7%)	0.158
Sindhi	639 (30.29%)	314 (17.03%)	<0.001
Pashtun	466 (22.09%)	372 (20.18)	0.103
Balochi	108 (5.12%)	275 (14.92%)	0.005
Other	131 (6.21%)	224 (12.15%)	0.007
Medical school year			
1st	328 (15.55%)	319 (17.3%)	0.086
2nd	543 (25.74%)	470 (25.5%)	0.817
3rd	312 (14.79%)	500 (27.12%)	0.004
4th	476 (22.56%)	328 (17.79%)	0.065
5th	450 (21.33%)	226 (12.26%)	0.003
Type of institute			
Private	1,143 (54.19%)	1,102 (59.79%)	0.089
Government	966 (45.8%)	741 (40.2%)	0.052
Type of medium for online learning			
Mobile phone	565 (26.78%)	530 (28.75%)	0.143
Tablet	728 (34.51%)	637 (34.56%)	0.974
Laptop	644 (30.53%)	606 (32.88%)	0.165
Desktop	172 (8.15%)	70 (3.79%)	0.032
Pre-COVID-19 online learning hours/week	10 ± 3	15 ± 5	0.037

Figure 1 shows the online resources students were using before the COVID-19 lockdown. Students used a combination of pre-recorded lectures (75.58%), live lectures by their college (24.11%), others (67.15%), and online question banks (79.02%). Flashcards and video sites like Youtube were used by 31.55% and 42.2%, respectively. However, 19.3% did not use any online material before COVID-19. Following multivariate analysis (**Table 2**), medical school year 5 (OR(95%CI): 0.54 (0.23 – 0.84); P-value = 0.023), male gender (OR(95%CI): 0.71 (0.55 – 0.91); P-value = 0.038), lack of devices (OR(95%CI): 0.63 (0.40 – 0.83); P-value = 0.031), and unstable internet connection (OR(95%CI): 0.85 (0.74 – 0.98); P-value = 0.025) were independent determinants of negative perception to online teaching.

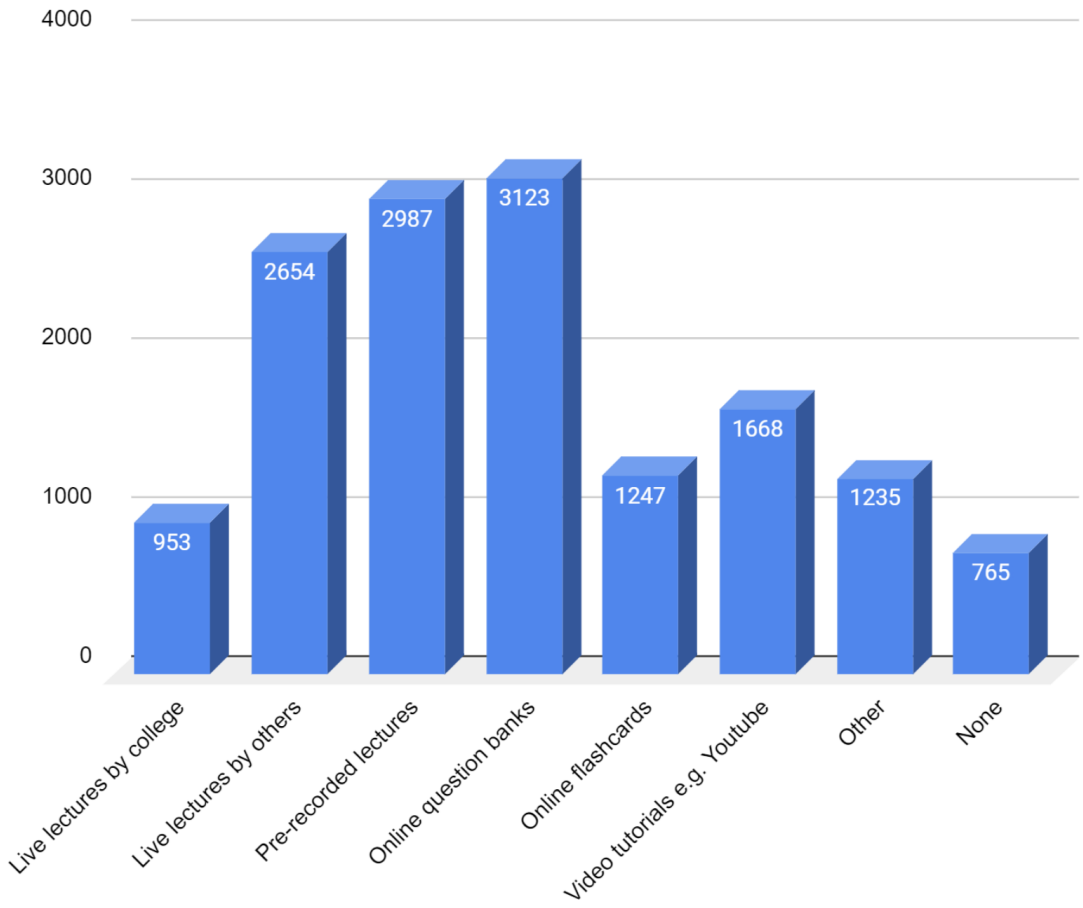

Figure 1. Online teaching platforms used by students before the COVID-19 pandemic

Table 2. Social determinants of negative perception to online teaching

Determinants	OR (95%CI)	P-value
Medical school year 5	0.54 (0.23 – 0.84)	0.023
Male gender	0.71 (0.55 – 0.91)	0.038
Lack of devices	0.63 (0.40 – 0.83)	0.031
Unstable internet connection	0.85 (0.74 – 0.98)	0.025

Students ranked their experience of online teaching using a Likert scale with 1 being strongly disagreed and 5 strongly agreed (**Figure 2**). Overall, 48% of the students did not like online teaching (strongly disagree = 23%, disagree = 25%). Furthermore, 61% did not find online teaching stimulating, 51% did not engage in the sessions, and 59% responded their preparation was not up to the mark with online teaching. Only 31% preferred online classes and 82% would rather have a face-to-face teaching session than online classes.

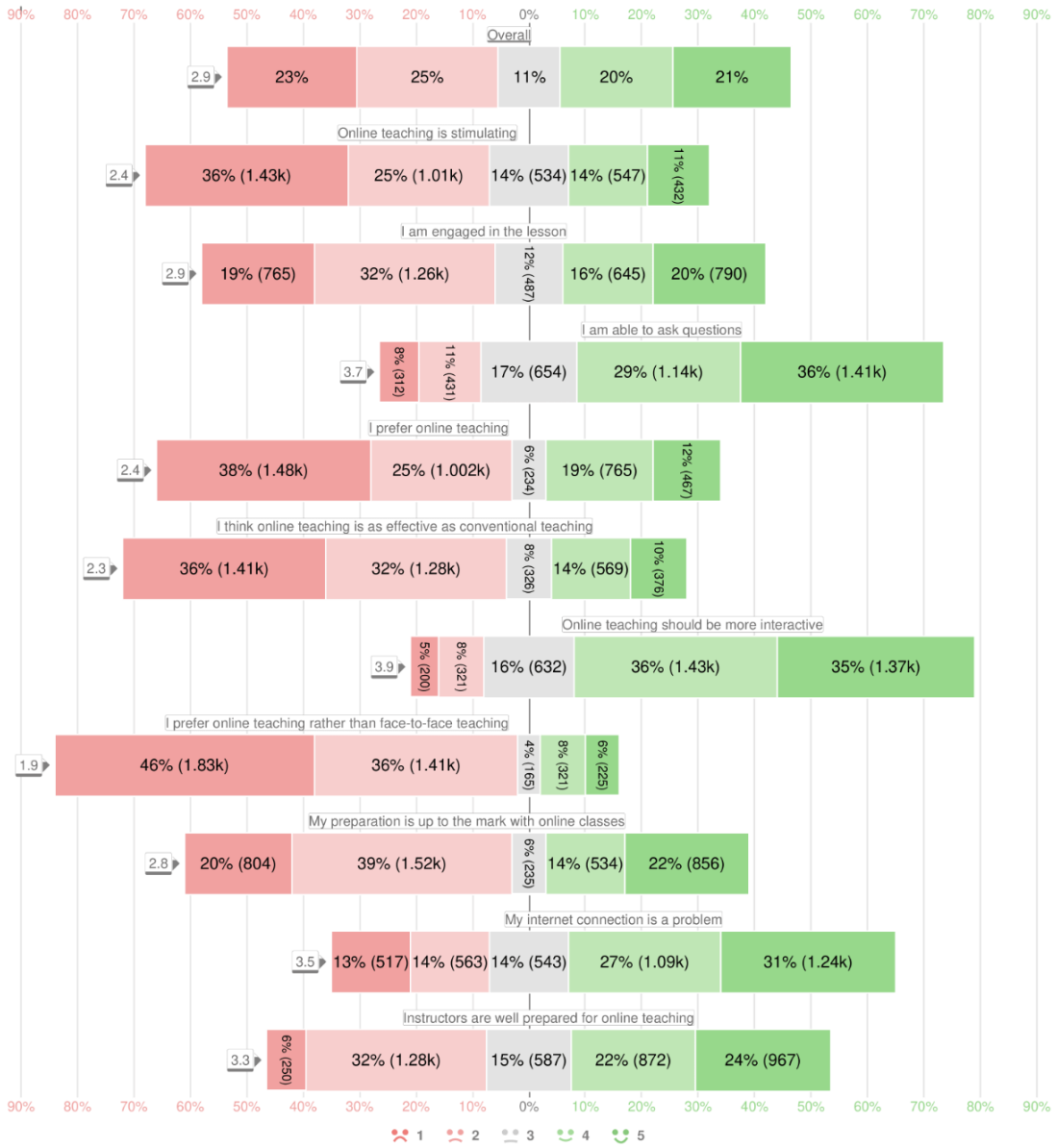

Figure 2. Likert chart for responses regarding student perceptions

The main advantages of online teaching appeared to be decreased cost (82.61%), less traveling (63.25%), flexible timings (67.15%), and the ability to learn at own pace (33.5%) (**Figure 3**). On the other hand, students stated that inconsistent timings (21.6%), internet connection issues (54.22%), other distractions (21.05%), lack of devices (32.36%), and social distancing anxiety (81.35%) were barriers to online learning sessions (**Figure 4**).

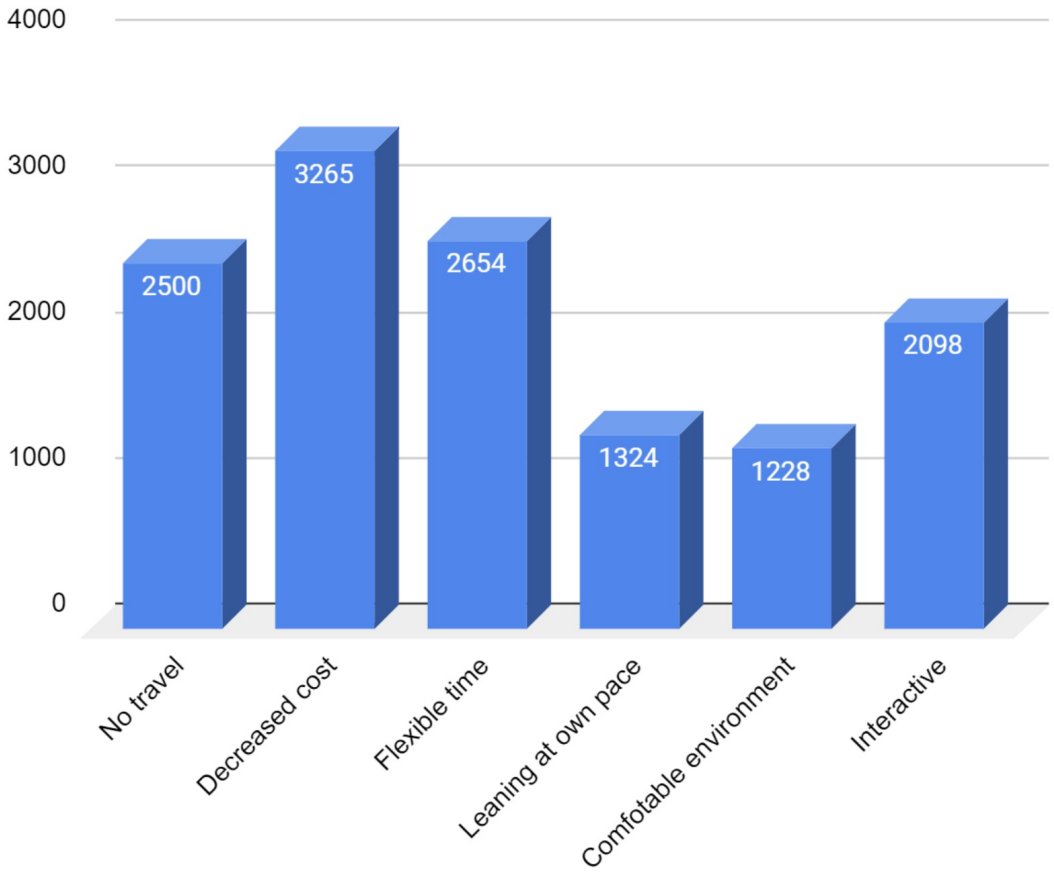

Figure 3. Advantages of online teaching

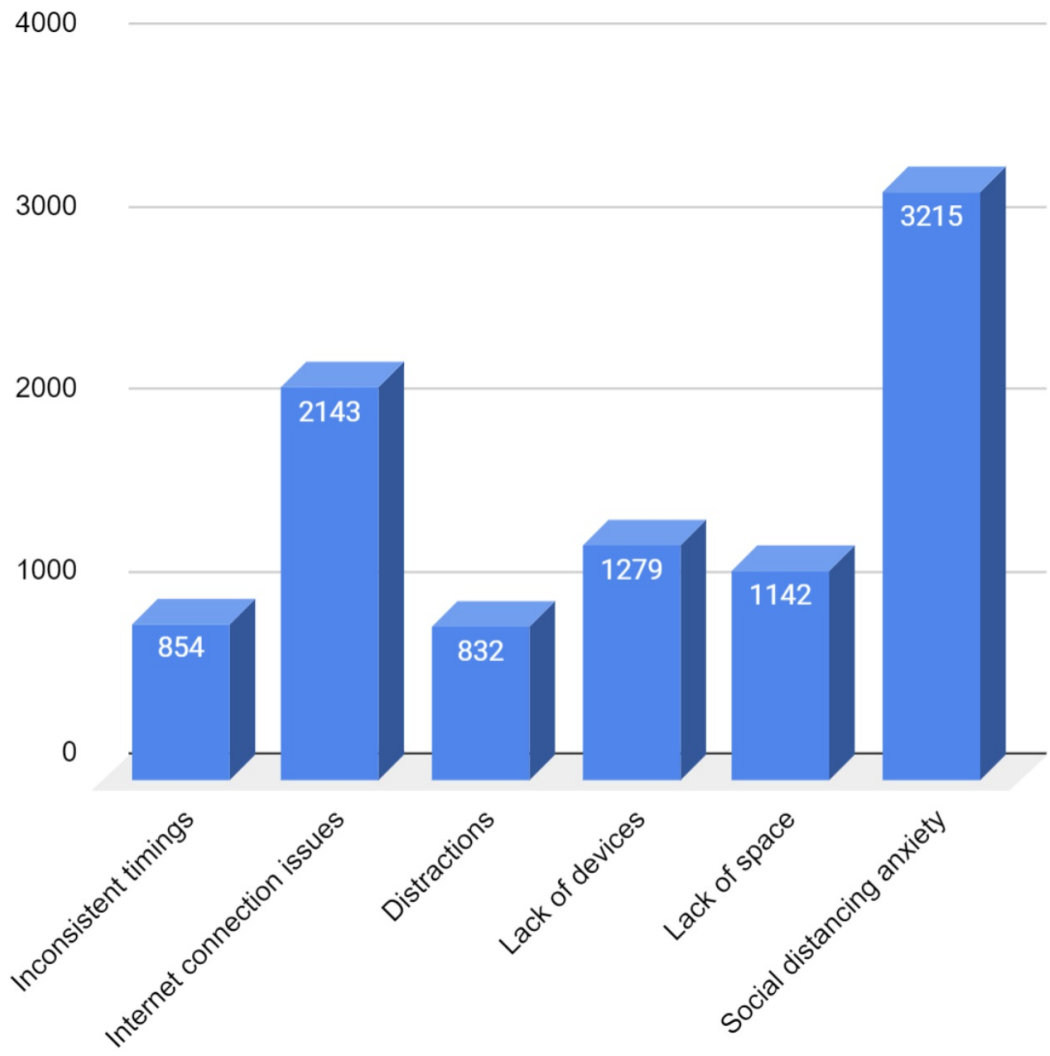

Figure 4. Barriers to online teaching

Discussion

Our study found a significant disparity among students regarding online learning during the COVID-19 pandemic. A majority of the students did not want online learning (48%), and 59% reported a decrease in exam preparation due to online teaching. Students score face-to-face teaching more engaging (82%) when compared with online teaching (31%). Previous studies have shown higher average scores for educational environments [8]. This discrepancy can be due to students comparing their online experience with a face-to-face experience.

The development of contemporary educational projects was initiated for remote medical education. Commercial resources and teaching programs like BiteMedicine, Osmosis, and SMILE have allowed many students to learn from the comfort of their homes [9]. Therefore, students can now learn from a vast medical community of professionals. However, the vast flow of resources can cause the proliferation of choice which may increase student burnout rates [10]. Many diverse medical education platforms were being used by students before the pandemic to pass USMLE and other international

exams from Pakistan, which should lead us to believe that students want this flexible curriculum. However, our survey negates this hypothesis as the majority of the respondents dislike exclusive online teaching.

Digitalization of medical education can play a significant role in the future of medical schools and traditional hands-on training can be abandoned in the foreseeable age of artificial intelligence and robotics. However, at this stage, clinical placements are needed for young doctors to gain experience in patient interaction and to understand the mechanism of disease. Having discussed the advantages and barriers of online learning, we suggest a mixture of online and in-person teaching experiences for medical students moving forward. This can be incorporated into team-based learning or problem-based learning which has been shown to improve learning outcomes. This makes students learn at their leisure, while still holding them accountable for their learning.

This is the first study to look at the impact of COVID-19 on online learning across Pakistan, with responses from all major medical colleges. One of the strengths of this survey is the robust sample size, consisting of medical students across all ethnicities and medical school years. Furthermore, the recruitment of medical students to distribute the questionnaire for minimizing the non-response bias. However, this study has the inherent limitations of a cross-sectional study. Some medical schools may have been disproportionately represented with a larger number of responses. Additionally, some parts of this survey depend on the student's memory of the COVID-19 lockdown era; hence, introducing a recall bias. This study did not evaluate different online teaching methods individually; therefore, we cannot elucidate the functionality and use of different kinds of online teaching provided. To truly measure the impact of online teaching during the COVID-19 pandemic, a more in-depth and quantitative analysis should be conducted to gather more accurate results, such as the effects on exam outcomes.

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Conflict of interests

Authors declare no competing interests

Ethics approval statement

Abbas Institute of Medical Sciences gave the ethical clearance to undergo this survey according to the the Declaration of Helsinki (Study ID # AIMS/22/074). All students gave consent for the survey.

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