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# The Impact of SARS-CoV-2 Pandemic on Medical Students: Knowledge, Attitudes, and Practices towards E-Learning: An Online Cross-Sectional Study in the Kurdistan Region, Iraq

Ahmed A. Mosa[1] (iD), Shah Vahel Ibrahim[1], Ibrahim A. Naqid[2*] (iD), Dawan Jamal Hawezy[3], Sirwan M.A. Al-Jaf[4], Nawfal R. Hussein[2] (iD)

**Abstract**

**Background.** After COVID-19 emergence, medical education witnessed a shift from face-to-face education to digital education, which inevitably affected medical students. Globally, due to the closure of schools and universities, medical education was shifted to electronic learning (E-learning).

This paper **aimed** to assess the effects of the COVID-19 pandemic on medical education and determine medical students' knowledge, attitude, and practices towards E-learning in the Kurdistan Region of Iraq.

**Materials and Methods.** An online cross-sectional study was conducted among 500 undergraduate students of seven medical colleges in the Kurdistan Region, Iraq, in November 2021, to assess their state during the COVID-19 pandemic and how this affected their education.

**Results.** There were 50.6% of males and 49.4% of females. The mean age was 20.6 ( ± 1.5 SD) years. Approximately 17% of participants mentioned having financial issues, while 19.2% of students experienced health-related problems. As many as 67% of participants reported that the Internet quality was good or very good, whereas 46.8% of students disagreed that E-learning was a possible substitute for traditional learning. About two-thirds of participants agreed or were neutral that downloadable content was better than live content; however, only 19.2% of students agreed that E-learning could be used in the clinical aspect. A total of 52.2% of participants disagreed that E-testing could replace traditional learning methods. Surprisingly, 86.4% of students stated that they regularly used the Internet in their study.

**Conclusions.** E-learning was the main adjustment made in the educational system, including medical education. The study concluded with insights into how different circumstances could have different consequences on the efficacy of medical education. E-learning showed effective results in continuing learning until the educational system switched to a blended system. Training programs for medical education personnel are vital in effective E-learning opportunities.

**Keywords**

Covid-19; Medical Education; Medical Students; Pandemic; E-Learning

[1] College of Medicine, University of Zakho, Kurdistan Region, Iraq
[2] Department of Biomedical Sciences, College of Medicine, University of Zakho, Kurdistan Region, Iraq
[3] Department of Surgery, College of Medicine, University of Koya, Kurdistan Region, Iraq
[4] College of Medicine, University of Garmian, Kalar, Kurdistan Region, Iraq
*Corresponding author: ibrahim.naqid@uoz.edu.krd

## Introduction

In December 2019, an infectious disease with symptoms resembling those of pneumonia, such as cough, fever, and breathing difficulty spread exponentially in Wuhan, Hubei Province, China [1]. After thorough investigations, the pathogen causing coronavirus disease (COVID-19) was identified and named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). At that time, the pandemic was the foremost global health issue [2].

After confirming the discovery of the first COVID-19 case in Iraq, the Kurdistan Regional Government took careful measures to control the spread of infection. These measures included the cancellation of religious gatherings and rituals, suspension of public transportation and flights,

closed borders, and most essentially, the isolation of patients infected with SARS-Cov-2 until their complete recovery [3]. The Iraqi Kurdistan authorities locked down the region, obligating civilians to stay at home since March 15, 2020 [4]. Then, due to financial troubles, the authorities gradually reopened the region, and the period of self-responsibility began. Civilians were permitted to work again and leave their homes, as well as interact in the community, which led to low protective precautions, followed by a sharp increase in the number of cases in the region [5, 6]. The pandemic affected all sectors in the region, from finance and investment to health and education. Schools and universities were terminated to minimise the spread of the virus, encouraging physical distancing [7, 8].

The COVID-19 pandemic has put people at high risk of developing life-threatening conditions, making it challenging to continue face-to-face lectures, thus affecting the medical education process, which is lecture-based and patient-based [9, 10]. Therefore, to obtain knowledge and continue learning in the Kurdistan Region of Iraq, electronic-based learning (E-learning) was implemented. Students and educators faced many challenges in engaging in this new technology due to a lack of technical skills. Some lecturers revealed negative attitudes towards engaging in this new technology. Notably, poor Internet quality in the region resulted in an unwillingness to engage in this process as well. Medical school lecturers have already been under pressure to find the time to teach during the COVID-19 pandemic [11, 12]. COVID-19 had noticeable adverse effects on medical education such as minimised experience in clinical sessions and suspension of assignments testing their comprehension during clinical sessions. Thus, final-year medical students were the most affected, as they were expected to achieve specific skills before their careers [13].

Limited studies regarding the impact of the COVID-19 pandemic on medical education in terms of electronic teaching and learning, including both pre-clerkship and clerkship students, have been conducted in the Kurdistan Region, Iraq. Therefore, in this paper, **we aimed** to illustrate the impacts of the pandemic on medical students' circumstances and determine their level of knowledge, attitudes, and practices towards digital medical education during the pandemic, particularly in the Kurdistan Region, Iraq.

## Materials and Methods

### Study Design
An online cross-sectional study was conducted among medical students in the Kurdistan Region of Iraq in November 2021. A total of 500 undergraduate medical students were recruited for the study (Fig. 1). The survey was designed using the Google Form platform and included several questions posed via social media groups and medical school representatives to seven medical schools across the region. The highest possible response rate was maintained by sending a kind reminder. The participants responded to the survey subjectively, without the interference of any author or person.
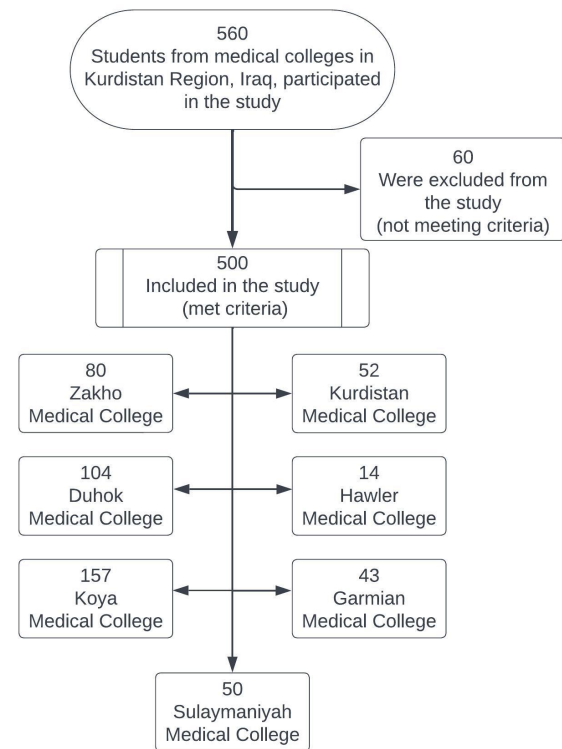


**Figure 1.** Medical students' recruitment.

### Study Tool
The study questionnaire "The Impact of COVID-19 on E-Learning" was pre-designed by Alsoufi A *et al.* [14], with some modifications to fit participants from the region. The study involved 38 questions categorised into various sections. The first section included the basic participants' demographic data such as age and gender, as well as questions about medical school, stage of medical education, financial status, and a history of any health problems, including mental illness. The following section of the questionnaire evaluated the experience of medical students in using electronic devices, including questions regarding their level of proficiency, the type and quality of the Internet, and the ownership of the electronic device. Furthermore, the study examined the state of participants' medical education during the COVID-19 period, such as their working conditions; several variables were provided to evaluate their attitudes towards E-learning during the pandemic and how it impacted their career plans and future interests.

The final part of the study questionnaire included several questions about the participants' knowledge, attitude, and practices towards E-learning, playing a crucial role in continuing medical education, as well as how knowledge was obtained during the COVID-19 pandemic. This part of the survey was organised into three sections: four questions to assess participants' knowledge of E-learning, ten questions to assess participants' attitudes towards E-learning and the applicability of E-learning in the medical field, and the last six questions assessed participants' practice of E-learning.

### Inclusion/Exclusion Criteria

Only undergraduate medical students registered in Iraqi Kurdistan medical schools were included. Non-medical students, as well as first-year medical students were excluded since COVID-19 had no influence on the educational system of first-year medical students, and E-learning was not practiced (Fig. 1).

### Statistical Analysis

GraphPad Prism version 9.3.1 software was used for statistical analysis. Descriptive statistics with frequencies and percentages were used to study the characteristics of respondents and their responses. The t-test, Chi-Square, or Fisher's exact test were used to study the association between variables based on gender category or clinical and pre-clinical stages. A p-value of 0.05 or less was considered statistically significant.

## Results

### Basic Demographic Characteristics

A total of 500 responses from medical students of seven medical colleges in the Kurdistan Region of Iraq were collected. The ratio between male and female respondents was about the same. The sample included 253 (50.6%) males and 247 (49.4%) females. The mean age was 20.6 ($\pm$ 1.5 SD) years, with a significant mean difference between males and females (Table 1A). The Koya University had the highest response rate with 157 (31.4%) participants, followed by the University of Duhok with 104 (20.8%) participants (Fig. 1).

Second-year medical students (39.6%) comprised the highest number of participants, followed by third-year students (28.2%). Only 88 (17.6%) respondents reported that they experienced financial difficulties during the pandemic, while 96 (19.2%) students experienced health-related issues, including mental illness. We observed a significant difference in the sources of COVID-19 knowledge between pre-clinical (II and III) and clinical (IV, V, and VI) students, as shown in Table 1B. Official sources such as the World Health Organization (WHO), the Centers for Disease Control and Prevention (CDC), and the Food and Drug Administration (FDA) were the common sources of COVID-19 knowledge for most clinical students.

### Evaluating the Availability and Usability of Technology Among Participants

Approximately two-fifths of participants (38.8%) reported being proficient or very good at using different electronic devices. More than half of them (64.4%) reported they had the Fourth Generation (4G) Internet service access. However, most students (67%) reported that they had a very

**Table 1.** (A) Basic sociodemographic characteristics of the study population. (B) Basic sociodemographic characteristics based on a comparison between pre-clinical and clinical students.

**(A)**

| Variables | Male (%) n = 253 | Female (%) n = 247 | Total (%) n = 500 | P-value |
|---|---|---|---|---|
| **Age, mean (SD)** | 20.8 (1.6) | 20.4 (1.4) | 20.6 (1.5) | 0.0034 |
| **Education level in medical school** | | | | 0.6 |
| Second stage | 100 (39.5) | 98 (39.7) | 198 (39.6) | |
| Third stage | 71 (28.1) | 70 (28.3) | 141 (28.2) | |
| Fourth stage | 48 (19) | 44 (17.8) | 92 (18.4) | |
| Fifth stage | 12 (4.7) | 19 (7.7) | 31 (6.2) | |
| Sixth stage | 22 (8.7) | 16 (6.5) | 38 (7.6) | |
| **Having financial issues** | 59 (23.4) | 29 (11.8) | 88 (17.6) | 0.0006 |
| **Health-related issues (including mental illness)** | 25 (9.9) | 71 (28.4) | 96 (19.2) | <0.0001 |
| **Sources of COVID-19 knowledge** | | | | |
| Official sources such as the WHO, CDC, and FDA | 164 (64.8) | 143 (57.9) | 307 (61.4) | 0.12 |
| Local and international sources | 143 (56.5) | 110 (44.5) | 253 (50.6) | 0.009 |
| Social media | 132 (52.2) | 153 (61.9) | 285 (57.0) | 0.03 |
| Friends, neighbours, and relatives | 87 (34.4) | 83 (33.6) | 170 (34.0) | 0.93 |

**(B)**

| Variables | Pre-clinical (%) n= 339 | Clinical (%) n= 161 | Total (%) n= 500 | |
|---|---|---|---|---|
| **Age, mean (SD)** | 19.9 (1.13) | 22 (1.2) | 20.6 (1.5) | <0.0001 |
| **Gender** | | | | 0.95 |
| Male | 171 (50.4) | 82 (50.9) | 253 (50.6) | |
| Female | 168 (49.6) | 79 (49.1) | 247 (49.4) | |
| Having financial issues | 53 (15.6) | 35 (21.7) | 88 (17.6) | 0.09 |
| Health-related issues (including mental illness) | 62 (18.3) | 34 (21.1) | 96 (19.2) | 0.45 |
| **Sources of COVID-19 knowledge (multiple answers are possible)** | | | | |
| Official sources such as the WHO, CDC, and FDA | 187 (55.2) | 120 (74.5) | 307 61.4) | <0.0001 |
| Local and international sources | 170 (50.1) | 83 (51.6) | 253 (50.6) | 0.77 |
| Social media | 201 (59.3) | 84 (52.2) | 285 (57.0) | 0.15 |
| Friends, neighbours, and relatives | 123 (36.3) | 47 (29.2) | 170 (34.0) | 0.13 |

good or good Internet connection compared to approximately one-third of respondents who had an acceptable or weak Internet connection. As many as 83.8% of respondents reported having a smartphone, while only 47.2% of respondents had access to a personal computer. A more significant number of students (88%) said that their learning depended on the lectures provided by the university. In addition, 357 (71.4%) and 321 (64.2%) students reported using the Internet for medical education and social media purposes, respectively. Table 2 presents the data on the state of technology tools among medical students during the pandemic.

**Table 2.** Status of education technology tools during the COVID-19 pandemic.

| Variables | Total | % |
|---|---|---|
| **Level of proficiency in using various electronic devices** | | |
| Proficient | 62 | 12.4 |
| Very good | 132 | 26.4 |
| Good | 203 | 40.6 |
| Acceptable | 82 | 16.4 |
| Poor | 21 | 4.2 |
| **Type of Internet service available (multiple answers are possible)** | | |
| Asymmetric digital subscriber line (ADSL) | 212 | 42.4 |
| 3rd Generation (3G) | 72 | 14.4 |
| 4th Generation (4G) | 322 | 64.4 |
| **Quality of Internet service** | | |
| Very good | 74 | 14.8 |
| Good | 261 | 52.2 |
| Acceptable | 131 | 26.2 |
| Bad | 34 | 6.8 |
| **Which of the following items do you personally own and use in your medical education?** | | |
| Personal computer | 236 | 47.2 |
| Smart phone | 419 | 83.8 |
| Tablet | 184 | 36.8 |
| **Your lecture depends upon** | | |
| lectures provided by the university | 440 | 88.0 |
| courses provided by private education centers/courses | 27 | 5.4 |
| self-study with various educational sources | 317 | 63.4 |
| **The main purpose of using the Internet during the COVID-19 pandemic** | | |
| Medical education and E-learning | 357 | 71.4 |
| Social media and E-mail | 321 | 64.2 |
| Communication | 276 | 55.2 |

ple responses, the most selected answers were resting and relaxing (59%), spending more time with family (52.2%), and continuing medical education through online platforms (41%). Table 3 presents the complete list of choices. More than half of participants (53.2%) stated that COVID-19 did not impact their career plans or future interests.

**Table 3.** Impact of the COVID-19 virus on the processing of medical education.

| Variables | Total | % |
|---|---|---|
| **Did your faculty/college suspend or postpone the educational program in response to the COVID-19 pandemic?** | | |
| Yes | 315 | 63.0 |
| No | 185 | 37.0 |
| **Did your faculty/college suspend or postpone your clerkship program due to the COVID-19 pandemic?** | | |
| Yes | 333 | 66.6 |
| No | 167 | 33.4 |
| **Are you currently working/volunteering at a hospital?** | | |
| I am a student at the preclinical education stage, I neither work nor study at the hospital | 99 | 19.8 |
| Yes, as part of my educational program/ as a student in clinical education/ as a volunteer | 149 | 29.8 |
| No, I do not currently work at a hospital | 252 | 50.4 |
| **How did you spend your time during the COVID-19 pandemic?** | | |
| Volunteering activities | 84 | 16.8 |
| Continuing medical education through online platform | 205 | 41.0 |
| My medical education program at the university was not disrupted | 168 | 33.6 |
| Spending more time with family | 261 | 52.2 |
| Exercising and improving physical fitness | 121 | 24.2 |
| Playing video games | 148 | 29.6 |
| Self-learning through a program not provided by faculty/college | 139 | 27.8 |
| Watching TV | 149 | 29.8 |
| Reading non-medical books | 174 | 34.8 |
| Resting and relaxing | 295 | 59.0 |
| **Did the COVID-19 pandemic impact your career plan and future interest?** | | |
| It has impacted career plan or future interest | 141 | 28.2 |
| I became interested in public health/ infectious diseases | 93 | 18.6 |
| It has not impacted career plan or future interest | 266 | 53.2 |

### Evaluating the Impact of the COVID-19 Virus on the Processing of Medical Education

A total of 63% and 66.6% of participants noted that their faculty/college postponed the educational program and clerkship training, respectively. Half of participants (50.4%) did not work at a hospital when questioned if they worked or volunteered at a hospital. However, some participants (29.8%) worked at a hospital as a part of their educational program or volunteered. The remaining (19.8%) participants were not involved in the hospital environment. When participants were asked how they were spending their time during the pandemic, with a possibility of selecting multi-

### Evaluating Medical Students' Knowledge of E-Learning

In this section, participants responded with 'True', 'False', or 'I Don't Know' to evaluate their knowledge of E-learning. More than half of participants (59.4%) agreed that E-learning depended on a digital electronic environment displaying the educational curriculum through electronic networks. A few percent of participants (6.4%) disagreed with that statement. Approximately two-thirds of participants (66.4%) agreed that E-learning was an interactive system providing an opportunity for learning through information and telecommunication technology. On the contrary, 34.4% of participants disagreed when asked whether E-learning in the medical field was considered less expensive than

**Table 4.** Medical students' knowledge of E-learning.

| Variables | True, n (%) | False, n (%) | I don't know, n (%) |
|---|---|---|---|
| E-learning depends on a digital electronic environment displaying the educational curriculum through electronic networks | 297 (59.4) | 32 (6.4) | 171 (34.2) |
| E-learning is an interactive system that provides an opportunity for learning through information and telecommunication technology (distance communication) | 332 (66.4) | 59 (11.8) | 109 (21.8) |
| E-learning in the medical field is not considered less expensive than traditional learning | 166 (33.2) | 172 (34.4) | 162 (32.4) |
| E-learning provides digital multimedia content (written text, audio, video, and images) | 354 (70.8) | 49 (9.8) | 97 (19.4) |

traditional learning. Table 4 concluded the findings of evaluating medical students' knowledge of E-learning.

### Evaluating Medical Students' Attitude Towards E-Learning

Students' attitudes were evaluated through several questions that mainly focused on the feasibility and usability of E-learning in Kurdistan medical colleges. Students' responses were scored using a scale ('Agree', 'Neutral', 'Disagree'). Almost half of respondents were neutral regarding the applicability of E-learning in the Kurdistan Region, while 46.8% of respondents disagreed that E-learning was a possible alternative to traditional learning. Only 37.8% of respondents agreed that downloadable educational content was better than live content. Most interestingly, 19.2% of students agreed that E-learning could be used in clinical aspects of medical sciences, while 29.2% and 51.6% were neutral and disagreed with this statement, respectively.

Moreover, 52.2% of students disagreed that electronic tests could replace traditional testing methods in medical schools, while only 18.8% of respondents agreed with this statement. Finally, more than half of students agreed and were neutral that Kurdistan universities would successfully create E-learning programs for medical students. Table 5 summarised the attitude of students towards E-learning.

### Evaluating Medical Students' Practice of E-Learning

Table 6 describes students' practice of E-learning. Almost half of students (52.2%) participated in the online medical education program during the COVID-19 pandemic, and only 37% of them received a certificate for their course participants. Approximately two-thirds of students (62.4%) mentioned that they used the Internet to study with friends, while in contrast, one-third (37.6%) of students did not use the Internet to study with friends. The overwhelming majority of students (86.4%) reported using the Internet regularly during their studies. Nearly one-half of participants (51.2%) had purchased an electronic device to access E-learning opportunities.

**Table 5.** Medical students' knowledge of E-learning.

| Attitude | Agree | Neutral | Disagree |
|---|---|---|---|
| E-learning is applicable in the Kurdistan region, Iraq | 116 (23.2) | 245 (49.0) | 139 (27.8) |
| E-learning is a possible substitute for traditional medical education | 119 (23.8) | 147 (29.4) | 234 (46.8) |
| E-learning content should be sufficient to satisfy educational requirements | 255 (51.0) | 133 (26.6) | 112 (22.4) |
| Downloadable E-learning content is better than live content | 189 (37.8) | 149 (29.8) | 162 (32.4) |
| Students' adherence to E-learning schedules should be the same as for direct learning | 252 (50.4) | 141 (28.2) | 107 (21.4) |
| E-learning can be used for clinical aspects of medical sciences | 96 (19.2) | 146 (29.2) | 258 (51.6) |
| E-learning is more convenient and flexible than traditional learning | 119 (23.8) | 137 (27.4) | 244 (48.8) |
| E-testing can replace the current traditional testing methods in medical schools | 94 (18.8) | 145 (29.0) | 261 (52.2) |
| Interaction between students and lecturers is possible through E-learning | 140 (28.0) | 208 (41.6) | 152 (30.4) |
| Kurdistan universities are adapting to change and will succeed in establishing E-learning programs for medical students | 97 (19.4) | 190 (38.0) | 213 (42.6) |

**Table 6.** Medical students' practice of E-learning.

| Variables | Yes, n (%) | No, n (%) |
|---|---|---|
| Were you awarded certificates through online training courses related to the medical field? | 185 (37.0) | 315 (63.0) |
| Did you participate in any online medical education program during this period? | 261 (52.2) | 239 (47.8) |
| Did you use the Internet to study with a friend or a group of friends through online meetings? | 312 (62.4) | 188 (37.6) |
| Do you use the Internet regularly in your studies? | 432 (86.4) | 68 (13.6) |
| Have you downloaded electronic content instead of purchasing the paper form of study materials to save money? | 350 (70.0) | 150 (30.0) |
| Did you purchase an electronic device to have access to E-learning opportunities? | 256 (51.2) | 244 (48.8) |

## Discussion

This study aimed to evaluate medical students' state during the COVID-19 pandemic and assess their knowledge, attitudes, and practices toward E-learning, the leading way to deliver knowledge during the pandemic outbreak in the Kurdistan Region of Iraq. Another study in the region demonstrated medical students' knowledge, attitudes, and practices towards the COVID-19 virus [15]. In this study, students from seven regional medical schools were recruited, and the sample included 500 medical students from all stages. Most students revealed an acceptable level of knowledge, attitude, and practice towards E-learning, which evidenced the applicability of E-learning in Kurdistan during the pandemic.

Medical schools were moving away from offering regular classes towards E-learning, which was convenient for students and teachers [16]. Kurdistan medical colleges faced several barriers in implementing E-learning: about one-fifth (17.6%) of students reported having financial issues and 19.2% of students mentioned having health-related issues, including mental illnesses. These economic and social barriers raise significant concerns regarding the effective implementation of E-learning [17]; therefore, the Kurdistan Region Government should establish a special funding program to support students experiencing financial hardship to mitigate these effects and provide appropriate support for medical students to overcome these barriers.

In addition, participants reported high levels of usability of technological devices: about 79.4% of students reported that they had proficient, very good, and good skill levels. Most participants said they had access to 4G Internet services, with half of them agreeing that the Internet service was good. These results could help conclude the probability of E-learning application in the region. Furthermore, about 83.8% of students had a smartphone, while only 47.2% of them owned a personal computer, which are necessary tools to engage in E-learning. In this study, approximately half of students purchased electronic devices to access E-learning opportunities. Since medical education in Kurdistan universities is free, affording technological tools and services may be a burden for medical students. To solve these issues, Internet companies should support medical students by providing a stable and reliable Internet connection and lowering prices for students. Several studies reported that affording E-learning equipment, Internet subscription costs, and weak Internet service were major obstacles [18–20]. To avoid Internet-related issues, colleges and faculties must support live and downloadable lectures and easily accessed resources [21]. Colleges should provide information technology support for students to use E-learning platforms easily.

Most students (88%) reported that their education relied on lectures provided by the university, while 63.4% of them reported they were self-studiers and used different educational sources. Students' reliance on the lessons offered by the university reveals that medical colleges in the Kurdistan region are in a revolutionary era moving away from traditional education towards technology-based education, and that lecturers are working hard to deliver lectures expertly. Compared to a study conducted in Libya, it has been reported that most students are self-reliant using different educational resources [14].

Despite all these challenges experienced by students during the pandemic, most medical students were able to continue their learning process, especially those with downloadable options, where students could play lectures offline. Therefore, developing a curriculum to improve the E-learning process during the pandemic period is crucial [22]. Due to medical school closure and quarantine, students were engaged in different activities. However, only several students continued learning through self-learning, while 34.8% of respondents read non-medical books and 59% of students chose to relax and rest. In such circumstances, medical students play an essential role in community education. Our study observed that only 16.8% of medical students participated in volunteering activities.

Medical students preferred on-campus learning to accomplish specific knowledge and skills before graduation and maintain student-student interaction and student-doctor interaction, which was disturbed during E-learning. Study data are consistent with previous studies [23, 24]. The usability of E-learning in clinical aspects was the central concern of educators and students, with 51.6% of participants disagreeing with the usability of E-learning in the clinical part. In contrast, only 19.2% of medical students agreed with this statement. Our results agree with a study conducted in Saudi Arabia [25]. Implementing blended learning, a combination of digital and face-to-face learning is better in such cases. By contrast, a study conducted before the COVID-19 pandemic revealed that medical students valued E-learning in clinical skill teaching [26]. After COVID-19 pandemic emergence, E-testing was implemented to avoid postponement or further delay in medical students' graduation. More than half of study participants disagreed that E-testing could replace traditional testing methods. These findings agree with a previous study conducted among undergraduate medical students [27]. The Kurdistan Region of Iraq should start adopting and establishing E-learning programs to minimise adverse effects on education in upcoming emergencies and pandemics by developing academic training programs essential to help students and educators engage more in this new technology [28].

## Limitations

There are various limitations to the study: firstly, the study design was cross-sectional, therefore, actual performance and skills could not be measured; secondly, this study was limited to medical students, so it does not represent the knowledge, attitude, and practice of other college students; thirdly, prior to the Covid-19 pandemic, there were no trustworthy studies in the region to examine medical students' knowledge, attitudes and practices regarding E-learning; finally, our study was distributed online through social media groups, so participants' bias may have been contributed, and students who do not utilize social media platforms may have been uninformed of the study.

## Conclusions & Recommendations

Adaptation to E-learning has become the main impact of the COVID-19 pandemic on education, including medical education. This study emphasised the broad effects that COVID-19 had on medical education and students in the Kurdistan Region of Iraq. This study provides insight into various circumstances or lack of necessities that could lead to a comparable variation between the impacts of the COVID-19 pandemic. The Internet speed varied among participants due to the lack of Internet and electrical availability in the region.

Most of the medical programs were postponed for some time until an E-learning system was implemented throughout the region. The E-learning system was successful, and most participants agreed that it was an adequate opportunity to electronically based learning. E-learning has been an obstacle in clerkship programs, and further studies should be made to determine how to improve E-learning in clerkship programs for future uses. In the region, a blended system, an effective learning system by harmonising e-learning with on-campus classes, was implemented. In a developing country, obstacles are more usual. Academic training for medical education personnel is imperative, and equitable Internet access is vital. The pandemic is leading us to the critical realization that more research is needed for the effective implementation and improvement of distance learning to be better equipped with strategies to deal with impending crises. This study concluded that there were different circumstances that might be the reason why people handled COVID-19 differently. The consequences of the impacts of the COVID-19 pandemic were adverse, and at some levels, the impacts were harsher on some than others.

## Ethical Statement

Ethical approval was obtained from the Scientific and Ethics Committee of the College of Medicine, University of Zakho.

## Informed Consent

Informed consent was taken from all participants; no participants' personal information or data were collected.

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## Data Availability

The data sets used in this study are available from the corresponding author upon request.

## Conflict of Interest

The authors declared no conflict of interest regarding study content.

## Financial Disclosure

The study did not receive any financial support.

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