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Review Article

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Social Media Application in Education During the COVID-19 Pandemic; Pros and Cons: A Systematic Review

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Abstract

Background: In addition to morbidity and mortality, the COVID-19 pandemic affected various fields such as medical and academic education. The purpose of this study was to investigate the types of social media used in medical and academic education and identify their advantages and disadvantages.

Methods: A systematic search of PubMed, Scopus, and Web of Science was conducted to identify published studies related to the effects of social media on medical and academic education during the COVID-19 pandemic. The retrieved records were screened in a two-step process; first by title/abstract and then by full text by two independent researchers and the most relevant studies were selected applying the eligibility criteria.

Results: Facebook, YouTube, Zoom, WhatsApp, Moodle, and Skype were the most used platforms. The main purpose of using these applications was to provide distance education to students in the pandemic era. The advantages of using online platforms outweighed the disadvantages. Advantages include the availability of information at any time and place, maintaining communication between students and classmates and instructors, and the possibility of presenting conferences and assignments. Disadvantages comprised infrastructure and internet problems.

Conclusion: Social media and messengers have a great potential to meet educational purposes in the epidemic era. Although online platforms can serve as an efficient public repository of learning resources, achieving this needs some prerequisite and infrastructural tasks.

Keywords: Coronavirus, COVID-19, Education, Learning, Medical education, Social media

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Introduction

COVID-19 pandemic started to spread in late 2019 and overwhelmed lives around the world (1,2). The pandemic likewise drastically affected the higher education sector by imposing national lockdown in most countries and compulsory closure of universities and schools (3,4). Nevertheless, virtual education played a central role in the new educational assembly where distance education became widespread and much higher education events were picked up through social media applications (5-7). Such transformation from conventional education to e-learning unveiled the need for developing support systems aiding many services which assist learners to achieve pre-defined goals, knowledge, expertise, and skills (8). Social media were the sought-after to support distance learning ventures during the pandemic. Each technology has been confirmed by unique features in studies (9). Social media play a significantly useful role in educating the public about health information in critical situations such as the COVID-19 pandemic (10,11). Rapid data dissemination and easy access by residents and healthcare professionals allows for individual and group learning as well as quick access to information (4,12,13). By contrast, virtual education further suffered from some challenges and concerns (14,15). One challenge was the failure to organize in-person and practical learning sessions in medical sciences universities, where social media platforms and other software encountered many barriers and disruptions in educational courses (16).

Abbasi *et al* reported motivation to improve media literacy skills, identifying talented and creative teachers, and versatility in class schedule as advantages; by contrast, non-universal access to cyberspace particularly in deprived and remote areas, slow Internet speed, nomophobia (Internet and smartphone addiction), and demotivation in some students are some of the disadvantages (17). Isyaku Hassan described some of the challenges that students may encounter using web-based technologies during the pandemic such as the dearth of technical information, failure to load big files, and forgetting passwords (18). The pandemic has promoted the public use of specialized virtual networks in academic associations, while it has contrarily caused the fading of non-verbal communication, failure to substitute clinical activities, and professor-student-patient interactions (19). The use of social media in advancing educational goals during the COVID-19 pandemic had various positive and negative effects. Knowing the strengths and weaknesses of social media in the field of public health education and specialized education can be very useful. However, there is a shortage of a comprehensive report on the strengths and weaknesses of using social media for education. Therefore, the purpose of this study is to investigate the pros and cons of social media platforms' utilization for medical and academic education.

Materials and Methods

A systematic search of Google Scholar, PubMed, Scopus, and Web of Science was conducted on November 30th, 2022, to identify published studies related to the effects of social media on medical and academic education during the COVID-19 pandemic. This review study performed adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement (20).

Data Sources

We carried out a systematic literature search using the following online databases: PubMed, Scopus, and Web of Science. The references of included articles were also searched to identify additional relevant literature.

Search Strategy

The search strategy was defined by the first and corresponding authors combining different keywords as follows:

A: COVID-19 OR SARS-CoV-2 OR "Corona virus" OR COVID OR "Coronavirus disease-2019" OR "Novel coronavirus"

B: "Social Media" OR "Social Medium" OR "virtual network" OR "Social network" OR "Communication Media" OR "virtual communities" OR "Web 2.0" OR Facebook OR Twitter OR Instagram or telegram OR WhatsApp OR podcast

C: train OR teach OR education OR Educate OR "Literacy Program" OR learn OR academic OR instruct OR guide

D: [A] AND [B] AND [C]

Eligibility Criteria

Articles retrieved from databases met the following eligibility criteria:

1. The original studies surveyed social media and virtual networks on education during the COVID-19 pandemic.
2. Published studies from the beginning of the COVID-19 to August 31st, 2021.

We excluded the articles that met one of the following criteria:

1. Non-English language.
2. Non-original articles including reviews and editorials, comments, position papers, case reports, and clinical trial protocol.
3. Articles without obtainable full texts, short communication, abstract papers, and conference abstracts.
4. Any duplicated and suspicious outcomes in databases.

Data Screening and Study Selection

The EndNote software was used to organize the retrieved records. Search results from reviewed databases combined in a single EndNote library and duplicates were removed. Two independent researchers screened the retrieved records by titles against inclusion and exclusion criteria.

Data Extraction

The extraction data included: The first author, type of study, country, population, educational organization, objectives of the study, social media platforms, reported advantage/disadvantage, and other relevant findings. This information was collected by two independent researchers and organized in table 1. To ensure the consistency and reliability of the results, the selected articles were investigated by other researchers once again. Any discrepancies were addressed by a third researcher.

Quality Assessment

We utilized the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist to determine the quality and accuracy of the selected articles and outcomes. Three independent researchers surveyed the quality of the articles and the

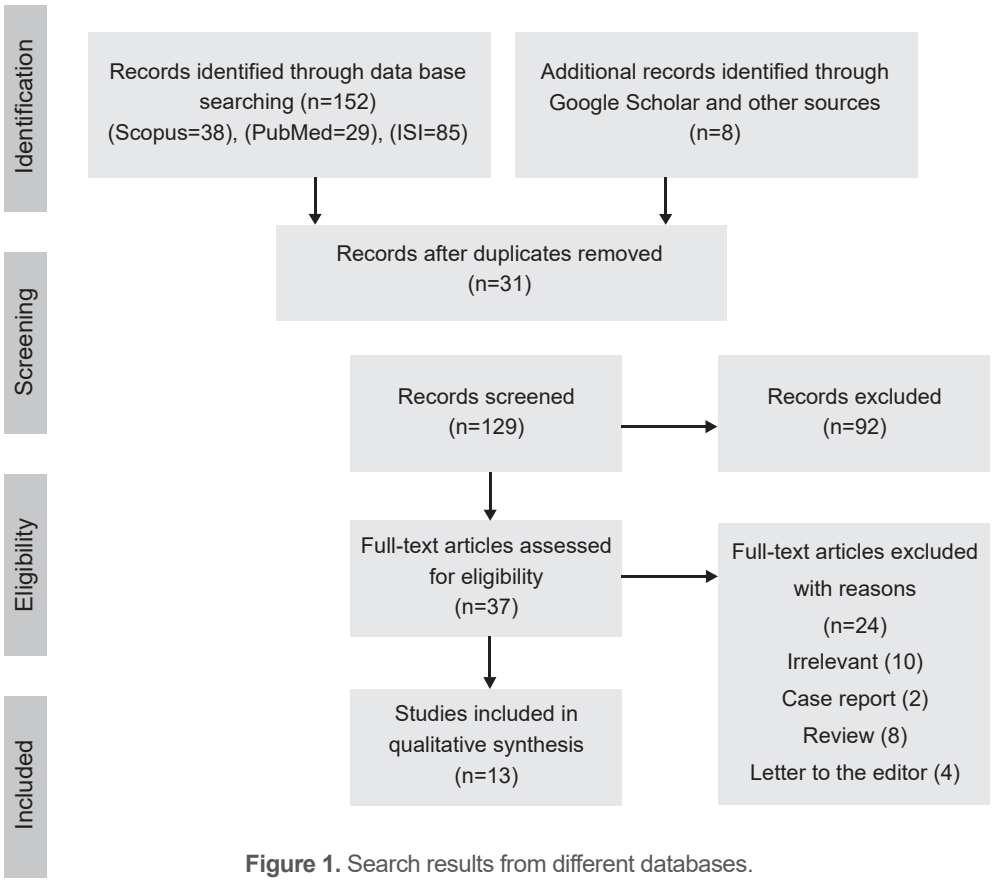

Figure 1. Search results from different databases.

Table 1. Description of the findings reported in eligible studies

ID	First author (reference)	Country	Population	Educational organization	Aim	Social media platforms	Advantages	Disadvantages	Other findings
1	Abdillah, L(5)	Indonesia	College students from 2 faculties, (computer science and engineering)	College	Arabic learning	Zoom (mainly) Dropbox Facebook Google Forms Moodle WhatsApp WordPress YouTube	Does not stop educational activities within the restrictions of the quarantine period	N/A	NA
2	Basal, A(21)	Turkey	Students (pre-service teachers) (N=92)	Schools and universities	Using two different instructional approaches for the same students in two different lecture groups: direct transmission lecture without Web technologies (GDT); lecture with Web technologies (GW)	Lecture with Web 2.0 technologies (GW)	Using Web 2.0 technologies has a high effect on reducing negative emotions and increasing engagement and a moderate effect on increasing positive emotions of the pre-service teachers.	N/A	-Duration of social media use=5 weeks -Significant differences were found between the GW ($\bar{x}$=36.6087) and GDT ($\bar{x}$=29.64). -Participants in the GW lecture group have higher levels of positive affection (t=−5,358; p< 0.01) than in the GDT lecture group. -GW method has a high effect size (r=0.81) on reducing negative emotions and increasing engagement (r=0.58); it has a moderate effect size (r=0.37) on increasing the positive emotions.
3	Chu, WM(22)	Taiwan	The Facebook fan pages of 13 academic medical centers, with a total of 1816 posts	Taiwan's Center for Disease Control (TCDC)	Explore the use of Facebook by academic medical centers during the COVID-19 pandemic	Facebook	-Social media has been a useful tool for communication during the COVID-19 pandemic. -Medical centers from different regions displayed different strategies for using video posts on Facebook.	N/A	-The trends of cumulative COVID-19 posts and reported confirmed cases were significantly related (Pearson correlation coefficient=0.93, P<.001). -Pages from private hospitals had more COVID-19 posts as well as more video posts (19.9% versus, 12.5%, P=.011) compared to public hospitals.
4	Dutta, A(23)	India	Students (N=18)	University, standalone institutes and colleges	To investigate what kind of social media was used to develop learning resources for the students, and also, the effect of it on their educational quality	Zoom and Skype	-Significant assistance was reported for the students' mental health. -Online learning environment was considered to be effective. -The syllabus could be provided and covered during the off-days -Online learning was reported to be unique. -Help people to handle a critical situation from the online classes -The flow of students' study was maintained -Making students entertained in the lockdown duration	-Handicapped on line education system overnight was reported. -The students' adjustment with the new academic approach was considered to be weak. -Poor internet connection and mobile data was critical. -Final semester students demonstrated more stress and anxiety for completing their master's program. -Online learning was not systematically implemented in India. -The number of participants and the methodology of the online learning was very limited.	-Duration of social media use=10 million academic hours

Cont Table 1

ID	First author (reference)	Country	Population	Educational organization	Aim	Social media platforms	Advantages	Disadvantages	Other findings
5	León-Gómez, A(24)	Spain	Students/ 25 years' old (N=524)	Spanish universities	To determine the changes in social media used for education by students before and after the lockdown	WhatsApp (96.7%), Facebook (78.1%), Instagram (76.4%), Twitter (58.2), YouTube (83.8), Pinterest (not mentioned), Sound Cloud (9.5), Tumblr (7.8)	-Good relationship was reported among the students with their friends during the lockdown. -Significant forte was demonstratd for using social media in the terms of virtual and classroom-based courses.	-The number of online students for educational purposes was dramatically decreased. -Lack of usability was reported. -The pattern of course presentation was considered to be passive without students' participation. -The online teaching was generalized as a discredited approach compared with the classroom-based sort.	
6	Iqbal, MZ(25)	Saudi Arabia	Under graduate medical students (N=203)	Medical colleges	To investigate the educational advantages and disadvantages of Telegram for undergraduate medical students during the COVID-19 pandemic	Telegram	-Telegram was reported to be an effective mobile learning platform for medical students. -It provides easy access to educational resources. -Wellbeing and security could be developed. -Unlimited addition of group members and file sharing without any limitations in size and type could be provided using Telegram. -Sending and receiving educational resources could be possible freely. -Telegram was a beneficial App for teachers and students to be communicated with each other. -Searching the journal articles and eBooks could be provided in Telegram.	-Telegram was a source of disturbance and distraction during course education. -Telegram was found to be a complex and difficult tool without user-friendliness. -Overloading information was reported by some students when they used the app.	
7	Lima, DL(26)	South America, North America, Europe, Central America, Asia	Medical students, surgical resident/35-44 years old (N=219)	Universities	To investigate the utilization of social media platforms by medical students, surgical trainees, and practicing surgeons in their surgical education during the Covid-19 pandemic	YouTube (33.3%), Messaging app WhatsApp (21%)	-Social media have been particularly effective to facilitate more access to surgical education around the world.	-The accuracy of surgical videos and contents was limited. -Many videos were failed to demonstrate. -Large misinformation was found using social media.	-900.9% of the respondents reported that they use social media for education in the field of surgery.
8	Makki, A(27)	Iraq	University lecturer and students, high school teachers, students, and their parents	University, high school	To examine the teachers, professors, and students' perception of online learning and education facilities using social media at all levels of education	Facebook (50.2%), Viber (22.3%), Zoom (15.3%), YouTube (20.6%), Telegram (4.4%), Skype(4%), Instagram (4.4%)	-Exchange of information was reported quickly. -More opportunities were reported to learn. -A friendly relationship was found among teachers and students.	-The internet services were very expensive and low quality. -Lack of students and teachers' experience utilizing online learning in educating -Limitation in electricity -Lack of trust in teachers' merit for implementing the online teaching was found -Lack of internet in rural areas was demonstrated.	

Cont Table 1

ID	First author (reference)	Country	Population	Educational organization	Aim	Social media platforms	Advantages	Disadvantages	Other findings
9	Mulenga Eddie, M(28)	Zambia	Mathematics teacher (N=102)	University	To give a quick response to how students engage in mathematics learning activities *via* digital platforms	Facebook, MSN chat, email, text messaging, Tumblr, Twitter, Google documents, Dropbox, Social bookmarking, Reddit, Wiki, YouTube, Skype, Lifesize, Flickr, Discussion forums, Moodle (UoW e-Learning System)	-Enabling teachers to shift into a less known method to teach that is entertaining and interesting rather than the traditional learning approach	-Low skill levels were reported by teachers using mobile technology and social media -Using social media technology was reported to be more challenging. -Inadequate power of electricity, internet costs, and unreliable internet connections -Students explained that they were very unfamiliar with the technological networking platform.	
10	Sobaih, AE(29)	Egypt	Students, faculty members, administrators (N=613)	University	To investigate the extent to which social media sites are accepted by faculty members and students for sustaining formal	Facebook (100%) WhatsApp (69.4%) YouTube (63.1%) Wiki (50.2%) LinkedIn (19.4%)	-Help students to communicate with each other in the courses -Possibility to check the class assignments and course announcements -To create stronger learning communities -To check online lectures (live or recorded) -To check effectiveacademic videos, links, and materials -To facilitate online discussions about the assignments and projects -To assess students' academic accomplishments or achievements -To answer the comments and amendments on academic issues -To provide mentoring for students - Help to integrate students in workgroups	-Lack of clear policy and action plan to support the online education. -Poor infrastructure and absence of professional information technology support. -Limited attention was reported to the student from the faculty members to support and build an online community. -That presentations of some material and voice notes sometimes were not clear enough. -More stress was reported by faculty members.	-Duration of social media use=Daily Weekly.
11	El Firdoussi, S(30)	Morocco	Students, professors (N=3068)	University	To evaluate the online learning in Morocco during the COVID-19 pandemic	Moodle (54.7%) Microsoft Teams (48.8%) Zoom (23.9%) Google Classroom (15.9%) YouTube	-Help to submit courses, practical work, tutorials, corrections, *etc*. -To arrange the video conference courses. -To manage the projects and defenses. -To evaluate students in terms of quizzes, homework, *etc*. -To organize a training program and activities scheduled over time.	-Weak internet quality and connection. -Lack of experience among the students for online education. -Make difficulty for the majority of students to take exams remotely. -The majority of students were satisfied with face-to-face teaching.	
12	Alismaiel, OA(31)	Malaysia	Students (N=491)	University	To discover the important factors that impact university students' online learning and academic performance during the COVID-19 epidemic	Text messaging, online media	-Digital learning can be improved. -Has a direct positive impact on students' interactivity with peers and teachers.	N/A	Both collaborative learning and engagement affected online learning during the COVID-19 pandemic, which improved students' happiness and academic success.

Cont Table 1

ID	First author (reference)	Country	Population	Educational organization	Aim	Social media platforms	Advantages	Disadvantages	Other findings
13	Papademetriou, C(32)	Greece	Students (N=20), faculty members (N=10)	University	To examine the impact of the use of social media in Higher Education	Facebook, YouTube, Forums, Viber, Twitter, WhatsApp	-All learning information is stored and organized in a virtual learning area.	Difficulty to ensure personal privacy	N/A

Table 2. The proportion of using social media platforms for education in COVID-19 pandemic

Social media platform	N	Social media platform	N
Facebook	7	Email	1
YouTube	6	Text messaging	1
Zoom	4	Google Docs	1
WhatsApp	5	Social bookmarking	1
Moodle (UoW e-Learning System)	3	Reddit	1
Skype	3	Lifesize	1
Instagram	2	Flickr	1
Twitter	3	Online Discussion Forum	1
Dropbox	2	LinkedIn	1
Wiki	2	Microsoft Teams	1
Tumblr	2	Google Classroom	1
Telegram	2	Google Forms	1
Messaging app	1	WordPress	1
Viber	2	Lecture with Web 2.0 technologies (GW)	1
MSN chat (MSN Messenger)	1	Pinterest	1
Sound Cloud	1	Forums	1

probable risk of bias. Any disagreement was addressed by a consensus among authors.

Results

We identified 160 related articles by searching keywords in the online databases. After removing the duplicates, 129 articles remained; 92 articles were excluded by screening titles and abstracts, and the full texts of 37 remained articles were assessed for eligibility. Finally, 13 articles were included in this review as figure 1 shows.

One record was an intercontinental study: America, Europe, and Asia; other studies were conducted in Indonesia, Turkey, Taiwan, India, Spain, Saudi Arabia, Iraq, Zambia, Egypt, Malaysia, Greece, and Morocco. Almost all of the studies included university students and only in two of them, school students were assessed. The most frequently used social media applications were Zoom, Facebook, Dropbox, YouTube, WhatsApp, Skype, and Instagram. However, other applications such as Google Forms, Google classrooms, Moodle, WordPress, Telegram, Viber, MSN chat, Tumbler, Twitter, Text messaging, Wikis, Social bookmarking, Lifesize, Forums and LinkedIn were also used in some studies (Table 2). The purpose of using these applications was to provide distance education to students in the pandemic era. They were mainly used for the communication of continuous and updated information in medical students.

The advantages of using each platform in learning are reported in table 3. In education, using online platforms, access to educational materials and resources are not location-dependent and could be freely available worldwide. Online learning could reduce the negative emotions and increase the engagement of teachers in preparing the syllabus, materials, and resources even on their off-days. During the COVID-19 pandemic, the use of applications successfully replaced the face-to-face training and used as an effective measure for continues communication between students and their peers as well as their mentors. Moreover, discussion about the assignments and projects and feedbacks can be easily done through online platforms.

The advantages of using these platforms obviously outweigh the disadvantages; however, there could be some disadvantages to the using online platforms for education as follows: lack of infrastructure and absence of professional information, lack of clear policies and actions to support online education, limited methodology, lack of internet in rural areas, expensive cost of internet and its low quality, weak

Table 3. Advantage of using social media in education in the COVID-19 pandemic

N	Advantage of using social media
1	Significant assistance for the students' mental health
2	Particularly effective to facilitate more access to surgical education around the world
3	Sending and receiving educational resources could be possible freely
4	To evaluate students in terms of quizzes, homework, *etc*.
5	To organize a training program and activities scheduled over time
6	Application of social distancing does not stop educational activities
7	A useful tool for communication during the COVID-19 pandemic
8	Has a high effect on reducing negative emotions and increasing engagement and a moderate effect on increasing positive emotions of the pre-service teachers
9	Medical centers from different regions displayed different strategies for using video posts.
10	The online learning environment was considered to be effective.
11	The syllabus could be provided and covered during the off-days.
12	The uniqueness of online learning
13	Helping people to handle a critical situation from the online classes
14	Maintaining the flow of students' study
15	Making students entertained in the lockdown duration
16	Having good relationships among the students with their friends during lockdown
17	Significant forte was demonstrated for using social media in the terms of virtual and classroom-based courses
18	Being an effective mobile learning platform for medical students
19	Providing easy access to educational resources
20	Developing wellbeing and security
21	The unlimited addition of group members and file sharing without any limitations in size and type
22	Enable teachers and students to be communicated with each other
23	Searching the journal articles and eBooks *via* Telegram
24	Quick Exchange of information
25	More opportunities to learn
26	Having friendly relationships among teachers and students
27	Enabling teachers to shift into a less known method to teach that is entertaining and interesting rather than the traditional learning approach
28	Helping students to communicate with each other in the courses
29	Possibility to check the class assignments and course announcements
30	To create stronger learning communities
31	To check online lectures (live or recorded)
32	To check effective academic videos, links, and materials
33	To facilitate online discussions about the assignments and projects
34	To assess students' academic accomplishments or achievements
35	To answer the comments and amendments on academic issues
36	To provide mentoring for students
37	Helping students to integrate into workgroups
38	Help to submit courses, practical work, tutorials, corrections, *etc*.

Cont table 3

39	To arrange the video conference courses
40	To manage the projects and defenses
41	To store and organize all learning information in a virtual learning area
42	To improve the digital learning skills
43	To impact on students' interactivity with peers and teachers

adjustment of students with this new academic approach, more stress and anxiety experienced by final semester students, passive participation of students, overload of information, and difficulties in using some apps (Table 1).

Discussion

Increasing public interest in social media has speeded up the expansion of maiden forms of social linkage, creating a growingly excellent opportunity for the education process. Social media has created new possibilities to study and teach using the potency and availability of social media (33). However, it is important to emphasize the growing tendency and trust to use social media as a public network for studying and getting information. This offers a great opportunity to make proper use of these platforms and promote the scientific information and the level of health literacy in the community (34). The aim of this study was to investigate the impact of social media in medical and academic education and identify their advantages and disadvantages.

In this study, we found broad advantages of a social media application in education. Most resources noted that social media has a remarkable capability facilitating the communication between students and teachers (22,23,25-27). It allows shaping the education in an individual mood and in the classroom to motivate learners solving educational problems eagerly and be more engaged in the class. It also facilitates the timely communication, which increases the handiness of knowledge and raises the level of feedback in the teacher-student interaction (5,35). Moreover, resources and materials can be efficiently distributed through social media in a short period of time. Accordingly, this medium serves as a repository of learning resources that can be used by all learners. This use reinforces the spread of information and a sense of community. It also functions as an alternative platform for online discussion among learners on educational content and exam preparation, and especially it can be applied by residents and medical students to communicate with directors in their areas of interest. Social media have been particularly effective to facilitate more access to surgical education, academic videos, links, and materials around the world. It also enables searching the journal articles and eBooks (26,36).

Based on the findings of this study, other advantages of social media in education are: helping improve the mental health of students, facilitating the exchange of educational resources, facilitating the evaluation process of students, and reducing the stress caused by the outbreak of the disease. To minimize the risk of virus spread, most educational institutions around the world were shut down during the COVID-19 pandemic. Although most of them were not entirely ready for the transition to e-learning, in both developing and developed countries; more opportunities were created to apply technological development in educational programs for conducting online learning. Social media and messengers were suggested as options for providing educational services. Nonetheless, these means were not fully intended to execute the full-fledged pedagogical actions. In addition, their application in the educational process is associated with some advantages and disadvantages. The advantages could fulfill several necessary educational tasks to meet the objectives of the education system during COVID-19 lockdown (37).

Despite the many advantages of using social media for education in the era of COVID-19, this technology also had disadvantages such as: lack of infrastructure and absence of professional information, lack of clear policies and actions to support online education, limited methodology, and lack of internet in rural areas. A reliable technological infrastructure is the foundation of a successful E-learning. Among all

perquisites of education with social media, inadequate power of electricity, internet costs and unreliable internet connections with the low quality, especially in rural areas are the drawbacks to the use of social media for educational purposes. Besides, professional information technology support to maintain online education is sometimes essential to tackle these concerns (37).

The literature determined some other problems of E-learning such as the flexibility of pedagogical approaches, difficulties with the design of training courses, *etc*. This emphasizes the need for adequate support from teachers. However, some studies indicated that many students were deprived of adequate educational support (25,26,37,38). However, there some shortcomings to the use of E-learning such as information overload on social media, low accuracy of surgical videos and contents, failure to demonstrate videos, and large misinformation (24,29,39). These limitations have resulted from a lack of peer review and content control. It forces the learner to evaluate by whom the information is provided and notice the quality of information. Content accuracy, especially in the educational videos that are shared on some social media is a matter of concern and should be considered with uncertainty. Improvement of social media content to minimize the spread of misinformation should be a priority to improve the educational outcomes (40).

Conclusion

This review provided valuable knowledge on the available social media tools for educational purposes and presented successful cases of using social media for educational goals during the COVID-19 pandemic. Education has been seriously influenced by the COVID-19 pandemic; as a result, the use of social media for education during epidemic appears to be increasing. Overall, the educators' feedback was positive; the advantages of using social media for distance learning outbalanced the disadvantages. These findings suggest that the unique features and availability of social media can be invaluable in learning activities, although additional investigations are needed.

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Conflict of Interest

The authors declare no conflict of interest.

Ethics approval and consent to participate

This study was extracted from the study project with code IR.ESFARAYENUMS.REC.1400.010 entitled " impact of social media on medical and academic education during COVID-19 pandemic: a systematic review" conducted at Esfarayen University of Medical Science. We thank all the participants for taking the time to contribute to the project.

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