Challenges to Online Education in Medical Education during the COVID-19 Pandemic

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Abstract

Background: The sudden outbreak of COVID-19 has affected the world medical education system and has led to changes in conventional teaching methods in most universities. This study aimed to review the challenges of online education in medical education during the COVID-19 pandemic.

Materials and Methods: In this review, a systemic search of online databases (Medline, EMBASE, Scopus, Web of Science, Cochrane Library, CIVILICA, and Google Scholar search engine) based on Mesh keywords in related articles was conducted for related studies from January 2020 to December 2021. The evaluation of eligible studies and selection was done by two reviews.

Results: The findings of this study indicated the challenges of online education in the crisis caused by the COVID-19 in three areas of student and cultural, education and research, and management, administration, and finance. During the COVID-19 pandemic, these challenges can affect the physical, psychological, social, educational and behavioral status of students and professors and educational and research processes, and cause irreparable damage to the administrative, executive, and financial infrastructure of universities. Therefore, ideas and solutions to solve these problems can facilitate high-quality and sustainable education for students.

Conclusion: The COVID-19 pandemic could have a positive effect on some aspects of medical education. However, numerous challenges have arisen, involving issues related to the student and cultural fields, education, and research, and financial issues. In the field of medical education, the development of online medical simulators, the promotion of virtual hospitals and telemedicine (telemedicine), the provision of virtual cases, and the conduct of online examinations can help to promote virtual education.

Key Words: Challenges, COVID-19, Medical education, Online education.

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1- INTRODUCTION

The COVID-19 pandemic is considered a major global health crisis and has led to substantial changes in human behavior on a large scale. With the onset of the COVID-19 pandemic worldwide, health protocols have emphasized social distancing (1-3). In this regard, face-to-face school and university education have stopped to reduce the spread of the coronavirus in many countries. Various alternatives, including online teaching, have been provided to continue student education while implementing social distancing protocols and to continue the curricula according to the pre-defined program (4-7). Governments and public health officials have taken extensive measures to prevent the disease by declaring a state of emergency during the COVID-19 pandemic, but the disease-related stress and its devastating psychosocial effects have posed many problems for society in every field, especially education (8).

In addition to imposing costs, COVID-19 has affected other areas besides the health system, including the education system. It has damaged the system and posed challenges to countries through the closure of schools, universities, and educational centers (9). With the spread of the COVID-19 pandemic, Iranian universities transferred their educational classes to online (social networks) and blended education platforms. Initially, education was provided irregularly, but over time, universities were required to use the NAVID system (special learning software) and platforms such as Adobe Connect, Skyroom, and BigBlue as a centralized educational system, and regular online education was provided in these universities (10-12). Despite the widespread use of online education in universities and its benefits, the main concern relates to universities that cannot hold practical courses and face-to-face

education. For example, medical students need to take internships in clinical settings, and online courses will not be as effective as clinical education (13, 14). Many medical schools have discouraged students from the face-to-face university and clinical environment due to the prevention of the spread of coronavirus disease and the reduction of high workload in hospital wards and encouraged them to online education (15, 16). This shift in teaching platforms has caused challenges for students, officials, and educational administrators of universities (17).

Since achieving a better understanding of challenges and providing solutions during the COVID-19 pandemic is of special importance for educational systems and universities, and it is necessary to carefully study and monitor the changes that have occurred and their possible effects on student education, the present study aimed to review the challenges to online education in medical education during the COVID-19 pandemic around the world to finally provide practical solutions in this field and improve medical sciences education.

2- MATERIALS AND METHODS

This research is an integrated review article that comprehensively synthesizes the published information on the challenges of e-learning at the time of the COVID-19 outbreak. This study employs the Broome approach (Broome, 2000), which includes the following steps:

1. Text Search: In this step, the exact definition of text search strategies is carried out to increase the validity of the review.

2. Data evaluation: In this step, the research team evaluates the accuracy of the obtained data based on its coordination with the aim of review and inclusion criteria.

3. Data analysis: In review research, it is necessary to classify and summarize the data extracted from primary sources in an integrated summary and unit of data order (18).

In this study, the research topic was "the challenges of online education in Pandemic COVID-19". In this regard, credible databases Scopus, Web of Science, Medline (via PubMed), EMBASE, Cochrane Library, CIVILICA, and Google Scholar search engine were used.

The search period ranged from January 30, 2020 (when COVID-19 was declared a pandemic) to December 2021. The combination of terms used in the search based on Mesh and keywords mentioned in related articles were "Online education, Education, E-learning, Virtual education, Medical education, Coronavirus, and COVID-19.

Database search was done for suitable studies. Abstracts of the studies were screened to identify eligible studies, full-text articles were obtained and assessed, and a final list of eligible studies was made. This process was done independently and in duplication by two reviewers, and any disagreement was resolved by a third reviewer. References were organized using EndNote software (version X8). Finally, 250 articles were selected. Articles unrelated to the purpose of the research, letters to the editors, duplicate articles, and those without full-text were excluded.

3- RESULTS

With the onset of the coronavirus pandemic, many countries have closed their schools, universities, and education centers, and many students continued their education remotely through electronic systems. This shift from traditional (face-to-face) to online (remote) educational platforms has created challenges for students, professors, and university officials. In this review study, 43 articles were reviewed, and the findings are presented as challenges related to the three aspects: student and cultural, education and research, and executive and financial management.

1. Student and cultural aspect

Challenges of online education are in part related to students and cultural issues. The spread of coronavirus disease has affected the mood and morale of students and the academic community, which in turn has increased anxiety and stress and worsens the COVID-19-related psychological issues (19). Low motivation due to limited experience (20), poor skills in using computers and educational software, lack of quality teaching aids and acceptable graphic specifications at home, high cost of supply and maintenance of essential equipment such as laptops, modems, and Internet packages (21), low English proficiency of students and professors, and poor communication skills among students for conveying their messages online were among the common problems of students (22). Other challenges include the inability to develop ethics in the academic capacity during the COVID-19 crisis, the spread of Internet addiction among students and university staff, and the decline of support for international student enrollment and scholarships, which in turn have reduced the number of students in different study levels. Delayed graduation, especially in higher education, is another challenge in this critical period (24). On the other hand, there exist resistance to changes and a negative attitude, mistrust, and as a result, disinclination to use new educational technologies among students and professors (25, 26). The existence of cultural lag towards understanding new crises, i.e., the difference between material and spiritual culture, is another problem. The biological threat of COVID-19 has now entered all countries; however,

governments have been slow to act, as can be seen in various attitudes and behavioral dimensions, including not wearing masks and gloves to prevent and reduce disease transmission by students and different segments of society, changes in student culture and its impact on student life, inaccurate knowledge of different ethnicities, races, and religions among students, which causes and exacerbates identity disorders due to cultural differences, are among other notable challenges during this pandemic (27). In addition to these challenges, one positive outcome of the COVID-19 outbreak is that professors have become more inclined to use online education. Before the pandemic, the resistance of professors and some students was one of the main barriers. This resistance, however, has gradually decreased, and online education has been accepted as a reasonable solution during the COVID-19 pandemic.

2. Educational and research aspect

Although online education is not a new teaching method, it is always possible that some less digitally literate faculty members are unable to get accustomed to this method (28). Many universities do not have the infrastructure and resources to facilitate online education. The shift from face-to-face to online education has also had a significant impact on educational evaluation. Since the assessment is designed for face-to-face learning courses, online assessment is challenging for students and faculty members. It is also difficult to monitor students' online usage and ensure that they do not cheat during online exams. Laboratory, practical and functional tests are not possible online. In addition, students who do not have access to the Internet will have a fundamental disadvantage when participating in the assessment process, which will affect their average grades (29). Lack of diverse and flexible student evaluation methods due to test problems and inadequate feedback, as

well as inadequate supervision and feedback of professors and students' confusion in doing homework and its delivery time due to poor communication and interactions are factors affecting students in the education field (30, 31), which in turn increases injustice and strengthens inequality in education (32). Research productivity is another aspect that is profoundly damaged during the pandemic. This can be attributed to the decline in the number of research, field, and laboratory projects, congresses, academic, national, and international conferences, academic articles and non-academic journals, research grants of professors and researchers, and the supply and sale of scientific and research products (33). These issues have reduced students' research capacity due to reduced field research activities, reduced inter-university scientific cooperation due to reduced interactions between faculty members, and even reduced knowledge from different communities due to reduced direct field studies (34). Other challenges include the limited use of laboratory environments for research and the reduced use of data collection tools such as counseling, field research, action research interviews, etc. (35). The slow assessment process of research articles in academic journals, which sometimes leads to delayed graduation and delayed promotion of faculty members, is another problem in this period (21). Also, the lack of up-to-date research priorities has reduced the number of research projects with the cooperation of industry and other service and executive organizations of the society and has limited the scientific capacities of students (36). It is expected that in the future and post-corona period, global knowledge move more comprehensively towards the development of healthcare knowledge (37). New technologies will also have a stronger focus on smart diagnosis, treatment, and maintenance (38). The discourse and approach of new

technologies is a perspective based on responsibility towards the society, people, and the environment in all areas, particularly education. The resulting development in the educational system and technologies will ensure the reduction of environmental degradation, e.g., the contamination of air, water, and the natural living environment (39). Following the spread of COVID-19 and its severity, there will be more sensitivity to health smartization, so that the health warning system will pervade through tools connected to humans, objects, and processes (40). The online education system during the pandemic has acted as a solution to fill the educational gap caused by the closure of schools and universities. In the meantime, the shortcomings of the distance learning system have become known. The blended education and smart education system were born out of these shortcomings and educational needs and have revealed the necessity of strengthening the quality of this education system in all countries (41-44). Regarding medical education, the development of online medical simulators, promotion of online hospitals and telemedicine, providing online cases, and holding online exams can help promote online medical education (30, 45, 46).

3. Management, executive, and funding areas

Challenges to online education during the COVID-19 pandemic caused economic problems for the educational system of universities, which were partly funded through their communication with society and industry (47). Also, universities that relied on tuition fees from international students and other international activities, such as the cross-border sale of knowledge products, were severely underfunded (48). On the other hand, universities that relied on government budgets also suffered delayed or insufficient funding due to government budget deficits (49). Also,

universities that relied on the aid of citizens and charities faced a significant problem (50). Another serious damage to online education during the COVID-19 pandemic has been to the administrative and executive affairs of medical education (51). The administrative-executive affairs of a university, such as position change, promotion of professors, recruitment, employment, and retirement, have been delayed or suspended (52). Besides, inevitable psychological damage to professors and students due to distance from their academic environment is a consequence that must be specifically addressed (53). Other challenges faced by most universities in their management include the suspension of important university councils and meetings at the board level, education, and research, graduate studies, poor planning for educational simulators and online reality spaces for the practical, workshop, and clinical courses in medical education during the COVID-19 crisis, and the university's poor interactions with social, political, and extra-university systems (54). Challenges related to the executive field during the COVID-19 pandemic include the excessive workload of faculty members, ambiguity in evaluating the performance of faculty members during the online training courses, ambiguity in the validity of students' opinions on the professors' performance in the training courses, ergonomic problems of professors during teaching, the unfamiliarity of faculty members and students with information technology and distance education, and non-cooperation of faculty members in conducting coherent training courses, which have in turn increased stress among university staff and faculty members (55, 56). As for funding during the COVID-19 pandemic, it has sharply decreased following the reduction of extra-tuition income of universities due to the suspension of educational processes and skill development, the growing need to

fund separate units to finance emerging technologies, reduced income from extracurricular activities such as joint projects with research centers, organizations, and other universities, lower rental income and selling university services (publishing, book-selling departments, buffets, and sports fields), and has led to further economic problems for the education system (57-59).

4- CONCLUSION

The results of this study showed that the COVID-19 epidemic has had a positive effect on some aspects of medical education. However, several challenges have arisen, often related to the students and cultural fields, education and research, management, administration, and finance. With the outbreak of the coronavirus and the subsequent closure of educational centers, those involved in the educational system had to take measures to reduce the spread of the coronavirus using various software and tools to maintain the health of students and professors and the whole human community through following the training through cyberspace. However, due to the lack of necessary infrastructure and facilities, they initially faced serious challenges in design and implementation. Therefore, it is expected that developing the necessary infrastructure such as the global Internet and increasing its speed, producing interaction-based educational software, and motivating and empowering professors and students to use e-learning and using the experiences gained in this pandemic further virtual education in universities. Even after the end of the corona outbreak, this type of education will continue alongside face-to-face education. In medical education, the development of online simulators in medicine, the promotion of virtual hospitals and telemedicine (telemedicine), and providing virtual cases and online exams can help promote virtual medical education.

5- AUTHORS' CONTRIBUTIONS

Study conception or design: FR, and AH; Data analyzing and draft manuscript preparation: FR; Critical revision of the paper: FR, and AH; Supervision of the research: FR and AH; Final approval of the version to be published: FR, and AH.

6- CONFLICT OF INTEREST: None.

7- REFERENCES

1. Sajed AN., Amgain K. Corona virus disease (COVID-19) outbreak and the strategy for prevention. Europasian Journal of Medical Sciences, 2020; 2(1): 1-3.

2. Demuyakor J. Coronavirus (COVID-19) and online learning in higher institutions of education: A survey of the perceptions of Ghanaian international students in China. Online Journal of Communication and Media Technologies. 2020;10(3):e202018.

3. Ghodsi A, Azarfar A, Ghahremani S. A Review of Coronavirus Disease (COVID-19) in Children. Journal of Pediatric Nephrology. 2020; 8(3):1-6.

4. Jones S ,Chacko S. Quantitative Analysis of the Evolving Student Experience during the Transition to Online Learning: Second-Language STEM Students. Journal of Teaching and Learning with Technology. 2021;10:373-85.

5. Viner RM, Russell SJ, Croker H, Packer J, Ward J, Stansfield C, Mytton O, Bonell C, Booy R. School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. Lancet Child Adolesc Health. 2020 May; 4(5):397-404. doi: 10.1016/S2352-4642(20)30095-X. Epub 2020 Apr 6.

6. Eachempati P and Ramnarayan K. Ten maxims for out of class learning to outclass the academic challenges of COVID-19 . MedEdPublish, 2020; 9: 89. https://doi.org/10.15694/mep.2020.00089.

7. Al-Balas M, Al-Balas HI, Jaber HM, Obeidat K, Al-Balas H, Aborajooh EA, et al. Distance learning in clinical medical education amid COVID-19 pandemic in Jordan :current

situation, challenges, and perspectives. BMC medical education. 2020;20(1):1-7

8. Abolmaali Alhosseini K. Psychological and Instructional consequences of Corona disease (Covid-19) and coping strategies with them. Educational Psychology, 2020;16(55): 157-93. doi:10.22054/jep.2020.52371.2993.

9. Hajizadeh, A., Azizi, G., Keyhan, G. Analyzing the opportunities and challenges of e-learning in the Corona era: An approach to the development of e-learning in the post-Corona. Research in Teaching, 2021; 9(1): 174.

10. Taghizadeh S, Haji J, Mohammadimehr M. A Comparative Study of the Challenges and Opportunities of Higher Education in the Corona Pandemic in Iran and around the World. Nurse and Physician Within War. 2020;8(27):47-57.

11. Viner RM, Russell SJ, Croker H, Packer J, Ward J, Stansfield C, et al. School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. The Lancet Child & Adolescent Health. 2020;4(5):397-404.

12. Mousavi SM., Jafari F. Virtual Education in the Corona Age, Opportunities and Challenges. First National Conference on Applied Research in Education Processes, Minab; 2020.

13. Ilonga A, Ashipala DO, Tomas N. Challenges Experienced by Students Studying through Open and Distance Learning at a Higher Education Institution in Namibia: Implications for Strategic Planning. International Journal of Higher Education. 2020;9(4):116-27.

14. Ashokka B, Ong SY, Tay KH, Loh NHW, Gee CF, Samarasekera DD. Coordinated responses of academic medical centres to pandemics: sustaining medical education during COVID-19. Medical teacher. 2020;42(7):762-71.

15. Sadeghi mahali N, Arsalani N, Rad M, Nematifard T, Khaki S, Fallahi-Khoshkenab M. Comparison of Virtual Education Challenges in Nursing Before and After COVID-19; A Systematic Review. 3. 2021; 2 (1): 81-103

16. Zuzuárregui JRP, Bledsoe IO, Brown EG, Dietiker CG, Galifianakis NB. Medical education in movement disorders during the COVID-19 pandemic. Parkinsonism Relat Disord. 2020 Aug; 77:11-12. doi: 10.1016/j.parkreldis.2020.06.013. Epub 2020 Jun 15. PMID: 32570192.

17. Dewart G, Corcoran L, Thirsk L, Petrovic K. Nursing education in a pandemic: Academic challenges in response to COVID - 19. Nurse Education Today. 2020;92:104471.

18. Broome ME. Integrative literature reviews for the development of concepts. Concept development in nursing: foundations, techniques and applications Philadelphia (USA); WB Saunders Company: 2000:pp.231-50.

19. Lasheras I, Gracia-García P, Lipnicki DM, Bueno-Notivol J, López-Antón R, De La Cámara C, et al. Prevalence of anxiety in medical students during the COVID-19 pandemic: a rapid systematic review with meta-analysis. International journal of environmental research and public health. 2020;17(18):6603.

20. Ilonga A, Ashipala DO, Tomas N. Challenges Experienced by Students Studying through Open and Distance Learning at a Higher Education Institution in Namibia: Implications for Strategic Planning. International Journal of Higher Education. 2020;9(4):116-27.

21. Gaur U, Majumder MAA, Sa B, Sarkar S, Williams A, Singh K. Challenges and Opportunities of Preclinical Medical Education: COVID-19 Crisis and Beyond. SN Compr Clin Med. 2020 Sep 22:1-6. doi: 10.1007/s42399-020-00528-1. Epub ahead of print. PMID: 32984766.

22. Ashokka B, Ong SY, Tay KH, Loh NHW, Gee CF, Samarasekera DD. Coordinated responses of academic medical centres to pandemics: sustaining medical education during COVID-19. Medical teacher. 2020;42(7):762-71.

23. Lin M-P. Prevalence of internet addiction during the COVID-19 outbreak and its risk factors among junior high school students in Taiwan. International journal of

environmental research and public health. 2020;17(22):8547.

24. Aucejo EM, French J, Araya MPU, Zafar B .The impact of COVID-19 on student experiences and expectations: Evidence from a survey. Journal of public economics. 2020;191:104271.

25. Sinacori BC. How nurse educators perceive the transition from the traditional classroom to the online environment: A qualitative inquiry. Nursing education perspectives. 2020;41(1):16-9.

26. Morin KH. Nursing education after COVID-19: Same or different? J Clin Nurs. 2020 Sep;29(17-18):3117-3119. doi: 10.1111/jocn.15322. Epub 2020 Jun 17.

27. Yoosefi Lebni J, Abbas J, Moradi F, Salahshoor MR, Chaboksavar F, Irandoost SF , et al. How the COVID-19 pandemic effected economic, social, political, and cultural factors: A lesson from Iran. International Journal of Social Psychiatry. 2021;67(3):298-300.

28. Onyema EM, Eucheria NC, Obafemi FA, Sen S, Atonye FG, Sharma A, et al. Impact of Coronavirus pandemic on education. Journal of Education and Practice. 2020;11(13):108-21.

29. Chakraborty P, Mittal P, Gupta MS, Yadav S, Arora A. Opinion of students on online education during the COVID-19 pandemic. Human Behavior and Emerging Technologies. 2021;3(3):357-65.

30. Ahmed H, Allaf M, Elghazaly H. COVID-19 and medical education. The Lancet Infectious Diseases. 2020;20(7):777-8.

31. Telford M, Senior E. Healthcare students' experiences when integrating e-learning and flipped classroom instructional approaches. British Journal of Nursing. 2017;26(11):617-22.

32. Lau J, Yang B, Dasgupta R. Will the coronavirus make online education go viral. Times Higher Education. 2020;12.

33. Becker G, Martin T, Sabo A-N, Bertrand F, Hutt A, Ayme-Dietrich E, et al. Impact of the COVID-19 pandemic on clinical research in hospitals: observational study in the first epicenter of the epidemic during the general lockdown in France. European Review for Medical and Pharmacological Sciences. 2021;25(2): 10.

34. Xyrichis A, Williams U. Strengthening health systems response to COVID-19: interprofessional science rising to the challenge. J Interprof Care. 2020 Sep-Oct;34(5):577-579.

35. Ellimoottil C, An L, Moyer M, Sossong S, Hollander JE. Challenges and opportunities faced by large health systems implementing telehealth. Health Affairs. 2018;37(12):1955-59.

36. Sohrabi C, Mathew G, Franchi T, Kerwan A, Griffin M, Soleil C Del Mundo J, Ali SA, Agha M, Agha R. Impact of the coronavirus (COVID-19) pandemic on scientific research and implications for clinical academic training - A review. Int J Surg. 2021 Feb;86:57-63. doi: 10.1016/j.ijsu.2020.12.008.

37. Joshi A., Vinay M. Bhaskar P. "Impact of coronavirus pandemic on the Indian education sector: perspectives of teachers on online teaching and assessments", Interactive Technology and Smart Education, 2021;18(2):205. https://doi.org/10.1108/ITSE-06-2020-0087

38. Abumalloh RA, Asadi S, Nilashi M, Minaei-Bidgoli B, Nayer FK, Samad S, et al. The impact of coronavirus pandemic (COVID-19) on education: The role of virtual and remote laboratories in education. Technology in Society. 2021;67:101728.

39. Williamson B, Eynon R, Potter J. Pandemic politics, pedagogies and practices: digital technologies and distance education during the coronavirus emergency. Taylor & Francis; 2020; 45 (2): 107-14.

40. Hibbi F-Z, Abdoun O, El Khatir H. Coronavirus pandemic in Morocco: measuring the impact of containment and improving the learning process in higher education. International Journal of Information and Education Technology. 2021;11(1):30-4.

41. Rehman AU, Qudratullah M, Khan B. Challenges to Online education in Pakistan during Covid-19 & the Way Forward Aziz Ur Rehman Qudratullah Bakhtiar Khan Abstract Covid-19 has been a nightmare for all strata of the world's social, economic and political

structures. The status quo of the. Social Science Learning Education Journal. 2021;6(07):503-12.

42. Sohil F, Sohail MU, Shabbir J. COVID-19 in Pakistan: Challenges and priorities. Cogent Medicine. 2021;8(1):1966179.

43. Daroedono E., Siagian F., Alfarabi M., Cing J., Arodes E., Sirait R.The impact of COVID-19 on medical education: our students perception on the practice of long distance learning. International Journal Of Community Medicine And Public Health, 2020;7(7): 2790-96.

44. Zeeshan M, Chaudhry AG, Khan SE. Pandemic preparedness and techno stress among faculty of DAIs in Covid-19. sjesr. 2020;3(2):383-96.

45. Mian A, Khan S. Medical education during pandemics: a UK perspective. BMC medicine. 2020;18(1):1-2.

46. Ghafouri Fard M, Hasankhani Hadi2 H. Virtual Hospital : a new approach in education and treatment. J Med Educ Dev. 2015; 8 (17) :47-57.

47. Ameen K. COVID-19 pandemic and role of libraries. Library Management. 2021 Feb 24.

48. Sălceanu C. Higher education challenges during Covid-19 pandemic. A case study. Revista Universitară de Sociologie. 2020;16(1):104-14.

49. Toquero CM. Challenges and opportunities for higher education amid the COVID-19 pandemic: The Philippine context. Pedagogical Research. 2020;5(4): 1-5.

50. Aini Q, Budiarto M, Putra POH, Rahardja U. Exploring E-learning Challenges During the Global COVID-19 Pandemic: A Review. Jurnal Sistem Informasi. 2020;16(2):57-65.

51. Safari Y, Mohtaram M, Razi E. Explaining the Experience of Iranian Student Teachers on the Status of Virtual Education in the Corona Virus Pandemic: A Phenomenological Study. International Journal of Schooling. 2020;2(3):17-32.

52. Dacholfany MI, Noor TR, Diana E, Prayoga D. Identification of higher education administration applications efforts to improve digital-based academic services. Linguistics and Culture Review. 2021;5(S2):1402-14.

53. Akat M, Karataş K. Psychological Effects of COVID-19 Pandemic on Society and Its Reflections on Education. Electronic Turkish Studies. 2020 Aug 1;15(4): 1-13.

54. Sahu P. Closure of universities due to coronavirus disease 2019 (COVID-19): impact on education and mental health of students and academic staff. Cureus. 2020 Apr;12(4): .

55. Zhou Y, Wang W, Sun Y, Qian W, Liu Z, Wang R, et al. The prevalence and risk factors of psychological disturbances of frontline medical staff in china under the COVID-19 epidemic: workload should be concerned. Journal of affective disorders. 2020;277:510-4.

56. Zinchenko YP, Shaigerova LA, Almazova OV, Shilko RS, Vakhantseva OV, Dolgikh AG, et al. The Spread of COVID-19 in Russia: Immediate Impact on Mental Health of University Students. Psychological Studies. 2021;66(3):291-302.

57. Bolatov AK, Seisembekov TZ, Askarova AZ, Baikanova RK, Smailova DS, Fabbro E. Online-learning due to COVID-19 improved mental health among medical students. Medical science educator. 2021;31(1):183-92.

58. Thatcher A, Zhang M, Todoroski H, Chau A, Wang J, Liang G. Predicting the impact of COVID-19 on Australian universities. Journal of risk and financial management. 2020;13(9):188.

59. Friga PN. Under Covid-19 ,university budgets like we've never seen before. The Chronicle of Higher Education. 2020, pp.1-13. Available at: https://f.hubspotusercontent00.net/hubfs/68852 57/.