ORIGINAL ARTICLE

Effect of online Teaching on Academic Performance of 4thYear MBBS Students During Covid-19 Lock-Down

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ABSTRACT

Objective: To determine the frequency of academic performance of fourth year MBBS students and to evaluate the perceptions of students regarding online teaching methods

Study Design: Cross sectional.

Place and Duration of Study: Study was conducted at department of Ophthalmology, HBS medical and Dental College, Islamabad from January 2020 to April 2020.

Materials and Methods: 125 student's 4th year MBBS were selected through nonprobability consecutive sampling. We used structured questionnaire with three main sections: 1) demographics characteristics, 2) perceived stress and academic performance using Likert scale , 3) perceptions of students regarding online learning. Data was analyzed using SPSS version 24. Chi-square test was applied. P value ≤ 0.05 was considered significant.

Results: There were 59(47.2%) male and 66(52.8%) female students. Mean age of students was 21.3±4.3SD years. Academic performance was improved in 71(56.8%) students. Perceived stress was mild in 53(42.4%), moderate in 47(37.6%) and severe in 25(20%). Common perceptions affecting academic performance were future learning preferences, low impact, satisfactory quality of online learning, high level of isolation and better than traditional method (p<0.05).

Conclusion: Online learning is an effective teaching modality resulting in moderately high academic performance of HBS medical students. Low perceived stress leads to better academic results. We suggest faculty training and students' orientation regarding online learning tools. This will help in improving online learning outcomes.

Key Words: *Coronavirus Disease, Online learning, Perceptions, Teaching Methods.*

Introduction

COVID-19 (Novel Coronavirus disease) is declared a global public health challenge. It is caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus-2).[1] 1st cases of COVID-19 were reported in Wuhan, China (December 2019), later on the disease rapidly disseminate around the world and World Health Organization (WHO) declared it as pandemic on 11th March 2020. An estimated 223 countries are affected with COVID-19 with 138 million cases and 2.9 million mortalities reported globally.[2] In United Stated, COVID-19 is 3rd leading cause of mortality following cardiovascular disease and cancer. However, WHO reported global case

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fatality rate 2.2% for COVID-19 as current estimate.[3] WHO reported 873,220 confirmed cases of COVID-19 and 19,384 confirmed deaths in Pakistan on 10th May, 2021.[4]

COVID-19 affected all areas of life including medical education. The global lockdown leads to worsen the medical education level. In this stressful condition, several countries initiated as E- learning system to continue the education process in safe and secure manner. A sudden transition of education system from traditional learning to online learning changed the institutional educational methods of delivering courses. Medical students were exposed to online modules, textbooks, video lectures and computer-based programs. The process resulted in Flipped classroom model for learning in several countries of world.[5]

Literature divided online learning into two main classifications: 1) synchronous and asynchronous. Synchronous technology is associated with live interaction (between student and teacher) using

web chats, audio-conferencing and videoconferencing etc. Asynchronous technology is associated with a significant delay in time for interaction between receipt and instructor using E-mail, Discussion forum, earlier video recording etc.[6] Online learning system had several reasons for acceptability including ease of use, better control over the environment and flexibility of method. However, it had some limitations including social isolation, connectivity issues and lack of teacher student interaction. Desi et al. reported psychological impact of E-learning on medical students. They reported that delay in online lectures (58.9%) is statistically correlated with depressive symptoms of students. Loss of confidence to be competent doctor among students due to E-learning system is also mentioned specially in male gender (p=0.001).[7]

So, it is very important to understand Effect of online learning on medical student to monitor their academic and moral progress. Our study was conducted to determine frequency of academic performance and perceived stress of fourth year medical students and to evaluate the perceptions of students regarding online teaching methods.

Materials and Methods

We conducted a cross sectional study at department of Ophthalmology, Hazarat Bari Imam Sarakar (HBS) medical and Dental College, Islamabad. Our study duration was 4 months (January 2020-April 2020). We took ethical approval from internal review board (Appl# EC, 03/01/02/2021). All participating students signed written consent before participation into study. Sample size of 125 students was calculated using 20% students using online software for classes[8], 95% confidence interval, 5% absolute precision. Students were selected through nonprobability consecutive sampling. Inclusion criteria was based upon age >18 years, both gender and students enrolled in 4th year of M.B.B.S. Exclusion criteria was based upon special students (students with any disability), students other than 4th years, students on long leave, female students who are married and pregnant. We used structured questionnaire with three main sections; 1) demographics characteristics, 2) perceived stress and academic performance using likert scale, 3) perceptions of students regarding online learning

using Abbasi et al. guidelines[9]. Perceived stress was categorized as mild, moderate, and severe. Academic performance was categorized as improved and not improved. Students were interviewed using questioner. Data analysis was done with the help of SPSS version 24. We reported percentages and frequencies for numerical and categorical data while Mean and standard deviations were reported for quantitative data. Universal confounder's age and gender were controlled by stratification. Post stratification Pearson's chi-square test was applied. P value ≤0.05 was reported as significant finding.

Results

Total 125 students were included in study. There were 59(47.2%) male and 66(52.8%) female. Mean age of students was 21.3±4.3SD years. Out of all, 51(40.8%) were using mobiles, 22(17.6%) computer, 47(37.6%) laptops and 5(4.0%) were using other gadgets. Annual academicGrades were ≤50% in 33(26.4%) and >50% in 92(73.6%) students. Academic performance was improved in 71(56.8%) and not improved in 54(43.2%). Perceived stress was mild in 53(42.4%), moderate in 47(37.6%) and severe in 25(20%). Overall perceptions regarding online learning response was positive 67(53.6%) and negative 58(46.4%).

Students with mild stress showed improved academic performance as compared to moderate and severe perceived stress (p=0.000). Among all the students with overall positive perceptions response showed improved academic performance as compared to students with negative perceptions response as shown in table I.

Majority of students who agreed with "Online learning is helpful in understanding basic sciences" showed better academic performance as compared to others (p=0.000). Among all those students who were strongly agreed with "online learning is not suitable for clinical skills 31(24.8%) showed not improved academic performance while 11(11.2%) showed improved academic performance (p=0.001). Academic performance was significantly associated with quick time management (p=0.001), online learning as serious communication gap (p=0.000) and low connectivity and internet issues (p=0.000) as shown in table II.

Perceived stress questions including social isolation, lack of self-discipline, lack of interaction with

patients for learning and lack of interaction with students and other class members showed significant impact on academic performance (p=0.000, p= 0.000, p=0.01 and p=0.000 respectively) as shown in table III.

Majority of students with positive perceptions regarding "future learning preference of online learning system" showed improved academic performance as compared to those with negative response (48% vs 8.8%, p=0.000). Majority of students with positive response regarding "satisfactory quality of online learning" showed improved academic performance as compared to those with negative response (38.4% vs 18.4%, p=0.001). Perceptions such as low impact of online learning, increased isolation positive response showed significant association with improved academic performance (p=0.03) as shown in table

Table I: Association Between Academic Performance, Perceived Stress, and Overall Perceptions Response

Perceived stress	Academic performance		Total	P value
	Not improved	Improved		
Mild	10(8%)	50(35%)	53(43%)	0.000
Moderate	36(28.8%)	14(13.2%)	47(42%)	
Severe	8(6.4%)	7(8.8%)	25(15%)	
Total	54(43.2%)	71(56.8%)	125(100%)	
Overall Perceptions Response				
Negative	39(31.2%)	19(15.2%)	58(46.4%)	0.000
Positive	15(12%)	52(41.6%)	67(53.6%)	
Total	54(43.2%)	71(56.8%)	125(100%)	

Table II: Academic Performance with Respect to Performance Questions

	Performance Questions		Academic Performance		P value
			Not improved	Improved	
1	Online learning helped me in understanding better basic sciences	Agree	3(2.4%)	28(22.4%)	0.000
		Strongly agree	38(2.4%)	12(9.6%)	
		Neutral	11(8.8%)	10(8%)	
		Strongly disagree	0(0%)	15(12%)	
		Disagree	2(1.6%)	6(4.8%)	

2	Online learning is not suitable for clinical skills learning	Agree	10(8%)	15(12%)	0.001
		Strongly agree	31(24.8%)	11(11.2%)	
		Neutral	13(10.4%)	9(7.2%)	
		Strongly disagree	14(11.2%)	3(2.4%)	
		Disagree	3(2.4%)	13(10.4%)	
3	Time is easily managed in studies through online system	Agree	21(16.8%)	20(16%)	0.001
		Strongly agree	26(20.8%)	36(28.8%)	
		Neutral	7(5.6%)	1(0.8%)	
		Strongly disagree	0(0%)	9(7.2%)	
		Disagree	0(0%)	5(4%)	
4	A serious communication gap was found between student and instructor	Agree	13(10.4%)	17(13.6%)	0.000
		Strongly agree	7(5.6%)	33(26.4%)	
		Neutral	17(13.6%)	18(14.4%)	
		Strongly disagree	11(8.8%)	3(2.4%)	
		Disagree	6(4.8%)	0(0%)	
5	Internet and low connectivity affect understanding of lectures	Agree	16(12.8%)	6(4.8%)	0.000
		Strongly agree	24(19.2%)	38(30.4%)	
		Neutral	1(0.8%)	16(12.8%)	
		Strongly disagree	5(4%)	8(6.4%)	
		Disagree	8(6.4%)	3(2.4%)	

Table III: Association Between Perceived Stress Questions and Academic Performance of Students

	Perceived Stress Questions		Academic Performance		P Value
			Not improved	Improved	
1	Students had a feeling of social isolation in online learning system	Agree	0(0%)	19(15.2%)	0.000
		Strongly agree	15(12%)	23(18.4%)	
		Neutral	21(16.8%)	4(3.2%)	
		Strongly disagree	0(0%)	24(19.2%)	
		Disagree	18(14.4%)	1(0.8%)	
2	Students are more likely to have lack of self-discipline with online system	Agree	9(7.2%)	37(29.6%)	0.000
		Strongly agree	0(0%)	20(16%)	
		Neutral	3(2.4%)	7(5.6%)	
		Strongly disagree	10(8%)	0(0%)	
		Disagree	3(2.4%)	13(10.4%)	

3	Students lack interaction with patients in online learning system	Agree	15(12%)	28(22.4%)	0.01
		Strongly agree	20(16%)	24(19.2%)	
		Neutral	7(5.6%)	6(4.8%)	
		Strongly disagree	12(9.6%)	5(4%)	
		Disagree	0(0%)	8(6.4%)	
4	Reduced interaction and class discussion with other class members	Agree	1(0.8%)	35(28%)	0.000
		Strongly agree	26(20.8%)	14(11.2%)	
		Neutral	8(6.4%)	11(8.8%)	
		Strongly disagree	15(12%)	7(5.6%)	
		Disagree	4(3.2%)	4(3.2%)	

Table IV: Association Between Perceptions Response and Academic Performance

	Perceptions	Response	Academic performance		P value
			Not improved	Improved	
1	Future learning preference	Negative	45(36%)	11(8.8%)	0.000
		Positive	9(7.2%)	60(48%)	
2	Quality of online learning is satisfactory	Negative	35(28%)	23(18.4%)	0.001
		Positive	19(15.2%)	48(38.4%)	
3	Low impact of online learning	Negative	36(28.8%)	23(18.4%)	0.000
		Positive	18(14.4%)	48(38.4%)	
4	Student teacher interaction isolation has increased	Negative	32(25.6%)	39(31.2%)	0.03
		Positive	22(17.6%)	32(25.6%)	
5	Online learning is better than traditional learning	Negative	25(20%)	58(46.4%)	0.000
		Positive	29(23.2%)	13(10.4%)	
		Total	1(0.8%)	16(12.8%)	

Discussion

Online learning is an active medical education tool that offers effective alternative for traditional educational system. it also helps to solve health care providers and educators' shortage issue.[10] Literature reported that online learning is as effective in enhancing knowledge and information as traditional lecture-based learning. Some studies labeled it as cost effective strategy in health education system.[11]

Pandemic COVID-19 has forced medical schools to suspend their on-ground lectures and shift it to online system for safety of students and teachers.[12]

In present study, online learning Help in basic sciences, unsuitability for clinical skills understanding, quick time management, serious communication gap and low internet activity were important factors effecting academic performance (p<0.001). Hugenholtz et al. reported that online learning is an effective learning system as compared to traditional methods. However, secure internet capacity, staff experience performing online lectures, poor access to communication technologies and poor infrastructure are common problems faced in online learning system.[13] Kogan et al. reported that lack of computer and technical skills are significant barriers towards delivery of online learning system.[14] Keshverziet al. reported that good quality internet and affordable bandwidth are too expensive to afford by students. Similarly, these barriers contribute to slow downloading speed and low visual quality outputs.[15] Another similar study reported that in remote areas telecommunication signal contribute to poor connectivity issue in low-income countries.[16] Agrawal et al. reported that online learning sessions were stopped due to 80% unavailability of presenter and 20% technical reasons.[17]

In present study, common perceptions regarding online learning include future learning, satisfaction, low impact, isolation and better than traditional learning system. Rose reported that online learning reported that common perceptions of students are flexibility, better platform for sharing information, improve access to medical information, learner convenience and repeatability.[18] Jawaid et al. reported that common perception regarding online learning system is that it required digitalization of medical education using innovative technology.[19] Iqbal et al. from Pakistan reported that 86% of students felt online learning had little impact on their learning while 77.4% students showed negative perceptions.[20]

Limitations

Study was conducted in medical college so its findings cannot be generalized on all learning schools.

Conclusion

Online learning is an effective teaching modality

resulting in moderately high academic performance of HBS medical students. Low perceived stress leads to better academic results. Future learning preference and low impact of online learning are most common students' perceptions associated with lack of improvement in academic performance. We suggest faculty training and students' orientation regarding online learning tools. This will help in improving online learning outcomes.

REFERENCES

1. Rabi F.A., Al Zoubi M.S., Kasasbeh G.A., Salameh D.M., Al-Nasser A.D. SARS-CoV-2 and coronavirus disease 2019: what we know so far. *Pathogens.* 2020;9:E231.
2. Cui J., Li F., Shi Z.L. Origin, and evolution of pathogenic coronaviruses. *Nat Rev Microbiol.* 2019;17:181–192.
3. Xie M., Chen Q. Insight into 2019 novel coronavirus - an updated interim review and lessons from SARS-CoV and MERS-CoV. *Int J Infect Dis.* 2020;94:119–124
4. Akhtar H, Afridi M, Akhtar S, Ahmad H, Ali S, Khalid S et al. Pakistan's Response to COVID-19: Overcoming National and International Hypes to Fight the Pandemic. JMIR Public Health Surveill. 2021 May 19;7(5):e28517.doi: 10.2196/28517.
5. Kumar SC. Awareness, benefits, and challenges of e-learning among the students of Kurukshetra University Kurukshetra: A study. *Int J Inf Dissemination Tech.* 2019;8(4):227–230. doi:10.5958/2249-5576.2018.00048.1
6. O'Doherty, D., Dromey, M., Lougheed, J. *et al.* Barriers and solutions to online learning in medical education – an integrative review. *BMC Med Educ* 18, 130 (2018). https://doi.org/10.1186/s12909-018-1240-0
7. Desai D, Sen S, Desai S, Desai R, Dash S. Assessment of online teaching as an adjunct to medical education in the backdrop of COVID-19 lockdown in a developing country - An online survey. *Indian J Ophthalmol.* 2020;68(11):2399-2403. doi:10.4103/ijo.IJO_2049_20
8. Wynter L., Burgess A., Kalman E., Heron J.E., Bleasel J. Medical students: what educational resources are they using? *BMC Med Educ.* 2019;19(1):36
9. Abbasi S., Ayoob T., Malik A., Memon S.I. Perceptions of students regarding E-learning during Covid-19 at a private medical college. *Pak J Med Sci.* 2020;36 (COVID19-S4).
10. Kim KJ, Jang HW. Changes in medical students 'motivation and self-regulated learning:a preliminary study. *Int J Med Educ.* 2015;6:213. doi:10.5116/ijme.565e.0f87
11. Bradbury NA. Attention span during lectures:8 seconds, 10 minutes, or more? *Adv Physiol Educ.* 2016;40:509–513. doi:10.1152/advan.00109.2016.
12. Kim K.J., Kang Y., Kim G. The gap between medical faculty's perceptions and use of e-learning resources. *Med Educ Online.* 2017;22(1):1338504
13. Hugenholtz NI, de Croon EM, Smits PB, van Dijk FJ, Nieuwenhuijsen K. Effectiveness of e-learning in continuing medical education for occupational physicians. Occup Med. 2008;58(5):370–2
14. Kogan M., Klein S.E., Hannon C.P., Nolte M.T. Orthopedic education during the COVID-19 pandemic. *J Am AcadOrthop Surg.* 2020;28(11):e456–e464
15. Keshavarzi M.H., SoltaniArabshahi S.K., Gharrahee B., Sohrabi Z., Mardani-Hamooleh M. Exploration of faculty members' perceptions about virtual education challenges in medical sciences: a qualitative study. *J Adv Med Educ Prof.* 2019;7(1):27–34
16. Ayittey FK, Ayittey MK, Chiwero NB, Kamasah JS, Dzuvor C. Economic impacts of Wuhan 2019-nCoV in China and the world. J Med Virol. 2020;92(5):473–5
17. Agrawal S, Maurya AK, Shrivastava K, Kumar S, Pant M, Mishra SK. Training the trainees in radiation oncology with telemedicine as a tool in a developing country: a two-year audit. Int J Telemed Appl. 2011;2011:23–8.
18. Rose S. Medical Student Education in the Time of COVID-19. JAMA. 2020;323(21):2131–2.
19. Jawaid M, Ashraf J. Initial experience of eLearning research module in undergraduate medical curriculum of Dow University of Health Sciences: Development and students' perceptions. *Pak J Med Sci.* 2012;28(4):591–596.
20. Iqbal S, Shafiq A, Iqbal N. Perceptions of undergraduate dental students towards e-Learning in Lahore Medical and Dental College. *Pak J Med Heal Sci.* 2016;10(4):1191–1193.

DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

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