

ORIGINAL ARTICLE

Impact of Covid-19 Pandemic on Medical Education

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ABSTRACT

Background: Pandemic of COVID-19 has affected almost every aspect of human life. Medical Education is profoundly affected globally because of social distancing which has prohibited teacher-medical student and medical student-patient's interaction. During this paradigm shift, students both have faced different challenges. College of Medicine, University of Ha'il is not an exception.

Aim: The aim of present study was to assess students' perspective to list supportive and inhibitory factors that has affected implementation of Medical Education during COVID-19 Pandemic. Study results would be helpful to design a feasible cost effective strategy to minimize the effect of those inhibitory factors so our medical undergraduates of coming academic year attains maximum competencies during this period of pandemic.

Methodology: It was a cross sectional study conducted in College of Medicine, University of Ha'il from November 2020 till February 2021. Our study respondents were undergraduate MBBS male and female students who were attending online sessions since March 2020.

Results: Eighty-two percentage of students learned digital technology, gained confidence and self-efficacy (61%) hence their metacognitive learning ability has increased (71%). As the lectures are being recorded, students found online lecturing more useful (88%) as compared to classroom. Flipped Learning was liked by 70%. Online teaching saves time (89%) its low cost (89%) and there is there is flexibility of location (90%). Main barrier (95%) to online learning is its dependency on Internet availability. Students' could not concentrate properly and they were not satisfied with online assessment (65% & 68% respectively). Even the motivated students answered that Problem Based Learning sessions were not delivered effectively as it was before when it was by physical presence ($p \leq 0.000$). Community and patients' care skills could not be developed by online learning instructions ($p \leq 0.05$).

Conclusion: Students learned digital technology and developed metacognitive ability so become more responsible for their learning tasks as they were before pandemic. As teaching sessions are recorded that helps them in revision. However, online sessions are not suitable to learn soft skills. Student-patients' interaction is a mandatory element in order to learn competency.

Key Words: Medical Education, COVID-19 Pandemic, Impact

INTRODUCTION

World Health Organization has declared COVID-19 Pandemic on March 2020, since then there is a sense of panic and fear all around the globe¹⁻³. Every aspect of human life on planet earth was affected; medical education is not an exception².

Several international and national studies have shown that impact of COVID-19 Pandemic is not only on physical, social, and mental health but it has profoundly affected teaching system globally^{4,5}. Every educational institution, right from primary school to university, has adjusted their way of delivering education²⁻⁴.

Regarding medical education, every aspect of it is affected; right from curriculum designing till training of medical students in clinic^{5,6}.

This discipline is profoundly affected globally because of social distancing which has prohibited teacher-student and student-patient's interaction. Hence current COVID-19

Pandemic has led to unprecedented modifications in medical education⁴⁻⁶.

Mr. Petterson has stated in his book, titled Learning, "if he had predicted the application of long distance learning (LDL) in the future, teachers would be able to communicate with their students through multi-media for distance education classrooms for interactive distance education and training"⁴. It seems that Petterson's prediction of online learning and teaching has come true.

Howlett defines online learning as "the use of electronic technology and media to deliver, support, and enhance both learning and teaching and involves communication between learners and teachers utilizing online content"⁷. The advantages of online learning in medical education include quick accessibility of information, ease of standardizing and updating content, and cost-effectiveness thus students get motivated and become active learners^{8,9}.

During this paradigm shift because of pandemic, medical educators and students both have faced different challenges⁵⁻¹⁰. Previous literature of last year has revealed that several factors influence, positively and negatively on medical education¹⁰⁻¹².

Recent systematic reviews suggested that online learning for undergraduate health professions was equivalent to traditional methods of curriculum delivery due to quick accessibility of information, ease of standardizing and updating content, and cost-effectiveness^{2,6}.

On the contrary, studies conducted in Pakistan¹³, India¹⁴, Nepal¹⁵, Libya¹⁶, and Jordan¹⁷, majority of medical students had a negative perception towards online learning. Disadvantages noted down by students were as; teaching sessions could not be interactive, students did not deliver PBL sessions effectively, soft skills could not be inculcated, and online learning needs a lot of internal motivation¹³⁻¹⁷.

Focusing on risk assessment, College of Medicine, University of Hail has conducted present study to assess impact of COVID-19 Pandemic on Medical Education by assessing perception of medical students.

Aim was to find out the factors that are supportive (positive) and inhibitors (negative) that have affected implementation of Medical Education during the last 12 months of COVID-19 Pandemic.

Results of this study would be a benchmark in sketching recommendation for reshaping medical curriculum according to the challenging environment of COVID-19 Pandemic.

Incorporating evidence-based educational principles into learning of medical professionals will have a positive impact on patients' outcomes.

SUBJECTS & METHODS

This cross sectional study was conducted in College of Medicine, University of Ha'il from November 2020 till February 2021. Our study respondents were undergraduate MBBS male and female students who were attending online sessions since March 2020.

Questionnaire was constructed consisting of different supportive (such as learned digital technology, developed metacognitive ability, saves time, cost, experience with flipped learning technology, etc.) and inhibitory factors (internet dependency, lack of concentration, lack of student-teacher interaction, dissatisfaction with assessment, competencies could not be learned effectively etc.) to the implementation of online learning and teaching during Pandemic. After getting ethical approval from Institutional Review Board (IRB) of the University of Hail, questionnaire was fed on Google (Google Form). Pilot testing was done on 20 medical students in order to test validity of e-questionnaire. Two hundred and fifty five students filled the whole questionnaire on the given time frame. Data was transferred to SPSS (Statistical Package for Social Sciences version 23) for descriptive and inferential analysis. Names and identity of the respondents were kept confidential.

RESULTS

As shown in figure no.1, most of our respondents were male students (65%).

Figure no.2 reveals percentage of response from medical students of different years of graduation. Maximum response was from 4th year medical graduates (29%)

Different advantages, which medical students have experienced while having online academic sessions during Pandemic, are mentioned in table no.1. They have learned digital technology (82%), gained confidence and self-efficacy (61%) hence their metacognitive learning ability has increased (71%). As the lectures are being recorded, students found online lecturing more useful (88%) as compared to classroom. Flipped Learning that is adopted through online sessions helped students to become life long learner i.e., students prepare before their online lecture so they develop self-regulation & motivation which activate higher-order thinking process as answered by 70%. Other advantages that students mentioned were, there is flexibility of location (90%), saves time (89%) low cost (89%), and its beneficial to those students who could not attend college by physical presence due to disability, illness, maternity leaves or any other excuse as answered by 98%. Regarding Self Directed Learning (SDL), 77% of our students did not face any difficulty.

Figure No.1: Gender of Respondents (n= 255)

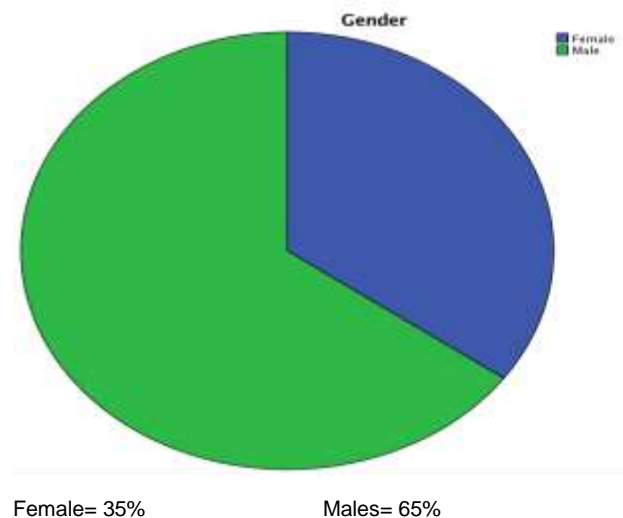
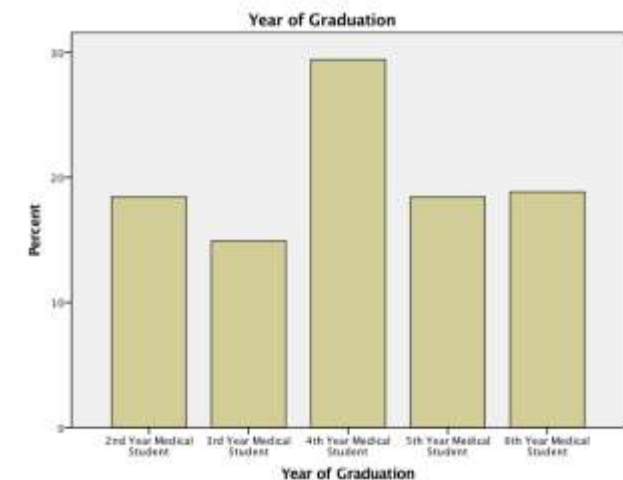


Figure No.2: Year of Graduation of Respondents (n= 255)



2nd Year Medical Graduates= 47(18%)
 3rd Year Medical Graduates= 38(15%)
 4th Year Medical Graduates= 75(29%)
 5th Year Medical Graduates= 47(18%)
 6th Year Medical Graduates= 48(19%)

Table No.1: Advantages of online academic sessions during COVID-19 Pandemic (n=255)

Variable	Response	N (%)
Learned digital technology	1. Yes	209 (82%)
	2. No	46 (18%)
Online learning has increased my confidence and self-efficacy	1. Yes	156 (61%)
	2. No	99 (39%)
Effect on my motivation	1. Increased	156 (61%)
	2. Same as before	30 (12%)
	3. Decreased	69 (27%)
Online learning has increased my awareness of metacognitive learning	1. Yes	181 (71%)
	2. No	74 (29%)
Sessions through Webinar are useful as recorded so lecture revision is possible	1. Yes	224 (88%)
	2. No	31(12%)
Flipped Learning that is adopted helps to become life long learner	1. Yes	179 (70%)
	2. No	76 (30%)
There is flexibility in location while taking online sessions	1. Yes	230 (90%)
	2. No	25 (10%)
Online attendance saves time	1. Yes	228 (89%)
	2. No	27 (11%)
Online learning is low cost	1. Yes	227 (89%)
	2. No	28 (11%)
Beneficial to students who could not attend college by physical presence	1. Yes	242 (98%)
	2. No	13 (2%)
Self Directed Learning (SDL) could be done properly	1. Yes	178(70%)
	2. Not possible	77 (30%)

Table No.2: Disadvantages of online academic sessions during COVID-19 Pandemic (n=255)

Variable	Response	N (%)
Distance learning (online) depends on Internet availability	1. Yes	242(95%)
	2. No	13 (5%)
Concentration through online sessions	1. Affected	163(64%)
	2. Not affected	92 (36%)
Satisfaction with online assessment	1. Not satisfied	173(68%)
	2. Satisfied	82 (32%)
Teacher's Role as Role Model through online sessions	1. Not possible	199(78%)
	2. It is possible	56 (22%)
Online teaching has affected student-teacher interaction	1. Yes	185(72%)
	2. No	70 (28%)
Online learning is not suitable to learn soft skills(community & patients' Care)	1. Yes	196(77%)
	2. No	59 (23%)
Hesitation to ask question in online session	1. I hesitate	130(51%)
	2. I do not hesitate	125(49%)
Development of communication skills	1. Not possible	141(55%)
	2. Possible	114(45%)
Regarding online sessions on Problem Based Learning (PBL)	1. Not learned effectively	141(55%)
	2. Learned effectively	114(45%)
Online learning requires strong self-motivation	1. Yes	199(78%)
	2. No	56 (22%)

Table No.3: Association of different variables related to positive impact with motivation of medical students (Chi-Square Test)

Response of those medical students whose motivation has increased	
Variables of positive impact	p-value
Online learning has increased my confidence and self-efficacy	0.057
Online learning has increased my awareness of metacognitive learning	0.246
Sessions through Webinar are useful (Lectures are recorded so lecture revision is possible)	0.000
Flipped Learning that is adopted through online sessions helps me to become life long learner	0.003

Table No.4: Association of different variables related to negative impact with motivation of medical students (Application of Chi-Square Test keeping level of significance ≤ 0.05)

Response of those medical students whose motivation has increased	
Variables of negative impact	p-value
Online teaching has affected student-teacher interaction	0.002
Not suitable to learn Community and Patients' Care (Soft Skills)	0.002
Concentration through online sessions	0.227
Communication skills could not be properly developed in students	0.369
Problem Based Learning could not be done effectively	0.000

Different disadvantages, which medical students have experienced while having online academic sessions during Pandemic, are mentioned in table no.2. Distance learning (online) depends on Internet availability i.e., there should be no disruption in connectivity, use of cellular data or Wi-Fi as rightly said by 95%. Students' concentration is affected by online sessions (65%) and 68% were not satisfied with online assessment. Teacher's role as Role Model through online sessions is not possible (78%) and student-teacher interaction is not as it was before Pandemic when sessions were by physical presence (72%). Seventy-seven percentage of respondents revealed that online learning is not suitable to learn soft skills like Community and Patients' Care. Almost half of the students answered that they hesitate to ask questions in online sessions and communication skills could not develop hence almost the same proportion of students replied that Problem Based Learning sessions were not delivered effectively as it was before when it was by physical presence (51%, 55% and 55% respectively). Lastly in this table, it is shown that 78% of respondents answered that online learning needs strong self-motivation.

Different variables related to positive impact of online sessions during COVID-19 Pandemic were cross-tabulated with motivation of students. It is shown in table no.3 that motivated students were those who have gained confidence and self-efficacy ($p \leq 0.05$). Secondly those motivated students found online webinars and flipped learning very useful ($p \leq 0.001$). However there is no association of development of metacognitive learning with those students who were motivated, this could be due to the fact that medical students are responsible for their tasks throughout their career right from first year.

Different variables related to negative impact of online sessions during COVID-19 Pandemic were cross-tabulated with motivation of students. It is shown in table no.4, motivated students were those whose communication skills and concentration were not affected by online sessions ($p \geq 0.05$) hence their opinion is that PBL could not be done effectively by online ($p \leq 0.000$). However that group of students was of the opinion that Community and Patients' Care Skills could not be developed by online learning instructions ($p \leq 0.05$). This group of students favored that student-teacher interaction has been affected ($p \leq 0.001$) once learning has shifted to online.

DISCUSSION

In medical education, evidence based education has been implemented extensively during the last few decades⁷. Medical curriculum is now towards students centered approach integrated with competency-based education⁸,

self-directed learning, team-based approaches and personalized learning^{4,5,9,10}.

The era of COVID-19 Pandemic is providing an opportunity to fully practice student-centered strategy with long distance learning^{4,17} in conjunction with digital technology^{13,17,18}. Literature review have revealed that during current pandemic, multiple innovative strategies to optimize educational endeavors have been adopted globally^{13,19,20,21}.

The need for social distancing has significantly reshaped and innovated medical curricula by implementing virtual learning platform¹²⁻¹⁷.

Virtual learning platform through Internet technology has provided medical educator and students an infrastructure that shifts teacher-centered approach towards student-centered approach^{5,6,12-17}.

Many software programs such as Zoom, Microsoft Teams etc., have been introduced to trainers and trainees during current pandemic^{5,6}. Gadgets and IT are always users-friendly and easy to operate^{10,14}.

Virtual learning strategy is applied not only in undergraduate studies but in postgraduate training programs as well^{18,22}. Brigham and Women's Hospital has fellowship program in Cardiovascular Medicine via virtual learning platform using Microsoft Teams (Microsoft Corporation, Redmond, Washington)¹⁸. On the contrary, some recent studies have revealed that the primary challenge of this novel platform of change is faculty's willingness to embrace this technology though students were found more receptive¹³⁻¹⁶.

With any new virtual initiative, technical issues are expected but can be managed as users become more familiar with its usage with the passage of time^{15,17}.

In present study, teachers and students of our college have learned digital technology very quickly and efficiently during 2020. Dean, Vice Dean, IT staff as well as multidisciplinary faculty members and administrative staff, of College of Medicine, have contributed in this task force. This approach helped to empower students and faculty, who served as champions for change.

An innovative instructional technique recommended in many studies, is flipped classroom model (with previously providing online material, online practice questions, procedural & examination videos and assessment in the form of MCQ and scenario-based questionnaires)¹¹⁻¹³. Flipped learning technique is practiced and found successful in many colleges^{13,19,21} during last one year. Our study participants were also benefitted by this technique and it has provided an impetus for students to exponentially develop self-efficacy, self-directed study skills and metacognitive ability (processes used to plan, monitor, and assess one's understanding and performance)^{10,18,21}.

Regarding online SDL sessions, majority of students were satisfied (in SDL sessions, students with guidance of teacher, decide what and how they will learn)¹⁵. It can be done individually or in groups, overall concept is that students take ownership of their learning tasks. Medical students right from day one are supported and helped by their respective academic advisors and course coordinators in SDLs; hence with passage of time they inculcate ownership of their own learning goals. Previous studies have supported our results in this regard^{13,15,16}.

The paradigm shift in medical education has benefitted both the medical educators and students in other aspects as well¹³⁻¹⁷.

Flexibility in location is a great benefit especially for those who are on sick or maternity leave, or out of station. Flexibility is considered as a blessing in LDL⁶⁻¹⁰. It saves time and cost of traveling. It means that the costs for e.g., gasoline, bus/train ticket, meals, is reduced to almost naught¹⁴.

Similar to our study, previous studies have shown that students suggest to take attendance using online method even in conventional teaching after Pandemic is over as it saves a lot of time¹⁰⁻¹².

Certain shortcomings as highlighted in present study were lack of interactive teaching, easy distraction and lack of concentration. Main factor behind all these issues is Internet. To run a session smoothly there should be a steady and uninterrupted Internet connectivity. Due to disruption in connectivity, students could not focus on session effectively hence their concentration is effected¹⁸. This is limitation of IT advancement, even though digital technology can do barely almost everything in our lives, but it cannot replace human touch and humanity¹⁵⁻¹⁸.

Students also pointed out that their assessment could not be done properly online^{13,15,23}. For medical educators, it was a big challenge. Focusing this issue, our college has started taking assessments by physical presence keeping SOPs strictly and vigilantly.

The theme of PBL sessions is to develop group dynamics and communication skills in students. Our study shows that even those students whose motivation was not affected by online learning, were not benefitted by online PBL sessions. Focusing students' response, more time is allotted to PBL sessions so students could interact affectively and find more time to share their views on the given problem.

Results of recent research have shown that disruption of hospital training and community-based health activities have a negative impact on students' sense of community care and development of competencies^{15,16}. According to studies done in United States and in Europe, physical sessions for medical students to learn soft skills are mandatory.

Almost all of our study participants responded that practical and clinical teaching is grossly affected during this era of COVID Pandemic^{11,12,23}. Hence watching related videos and online demonstrations could not develop soft skills^{12,23}. This was another big challenge in training clinical batch of students. To handle this issue, students are split in small groups, under SOPs measures they are trained in college's skills labs where dummy patients are arranged.

Studies have revealed that medical students reported feelings of uncertainty and anxiety⁷ about how the pandemic impacts their graduation timeline, financial liability, and career planning¹⁹⁻²¹.

We acknowledge that medical curricular adaptations should be flexible in terms of delivery and administration during this period of Pandemic. College of Medicine has tried that; governance structure of the curriculum should be maintained to ensure compliance with accreditation standards. Our college has adopted innovative strategies to modify curriculum according to the need of time in the

beginning of this year⁹. Similar to the curricular adaptations, our College has made parallel modifications to the assessment framework, allowing flexibility in the formative and summative components.

Results of this study will be a benchmark in sketching recommendation for reshaping medical curriculum according to the challenging environment of COVID-19 Pandemic.

Hence our study results would be helpful to highlight latest evidence-based principles that can engage medical students in meaningful learning during current COVID-19 Pandemic. Incorporating evidence-based educational principles into learning of medical professionals will have a positive impact on patients' outcomes.

CONCLUSION

Students learned digital technology and developed metacognitive ability so become more responsible for their learning tasks as they were before pandemic. As teaching sessions are recorded that helps them in revision. However, online sessions are not suitable to learn soft skills. Student-patients' interaction is a mandatory element in order to learn competency.

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