

# Real-Time Measurement Of Psychological Impact Due To E- Learning; Among The Undergraduate Dental Students During Covid-19

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## ABSTRACT

**Objectives:** To assess the psychological factors in undergraduate dental students towards e-learning in clinical skills education compared to traditional teaching methods and their relationship with performance during the COVID-19 pandemic.

**Methods:** In this study, survey conducted among 494 undergraduate dental students of all four sessions from different dental universities within the Pakistan. Total 494 undergraduate dental students responded to a 28-question online survey to identify e-learning is more convenient and practical than traditional learning and to measure it 5- point Likert Scale used. To measure level of psychological impact, Hamilton Anxiety Scale used due to e-learning among undergraduate dental students.

**Results:** The majority of undergraduate dental student's responded e-learning is not convenient and practical than traditional learning system. The majority of undergraduate dental students reported very severe level of psychological impact due to e-learning and closing of institutions during COVID-19 pandemic. Results are statistically significant and analyzed on IBM SPSS version 23. There are 82% students responded having problem with e-learning system and among them 58 % have very severe anxiety and 24% have severe anxiety. So the results shows increased percentage of anxiety due e-learning.

**Conclusion:** Dental students expressed a higher level of comfort and effective learning in a recognizable, conventional classroom circumstance. Teaching with traditional system improves student's critical thinking skills and formulates opinions or arguments by engaging in live discussions. This study reveals that students face challenges in using the e-learning resources because of incompetency in the IT skills, lack of motivation and access to proper internet. The most important issue identified by this study is maintaining an effective interaction with dental students in e-learning system of teaching to fill the gap between the teacher and students. There should be further flexibility workload and learning time to

*students to reduce the level of anxiety among the dental students.*

**Keywords:** *Psychological impact, Undergraduate dental Students, Pandemic, E-learning, COVID-19*

## **1. INTRODUCTION**

Common cold and severe respiratory problems caused by pathogens belonging to Human coronaviruses (HCoVs). In the 21st century, highly pathogenic viruses emerged from animal reservoirs causing global epidemics named severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV). In 2003 and 2012, these pathogenic viruses having high morbidity and mortality rate as compared to other viruses<sup>15</sup>. COVID-19 emerged in China and cases were increased and spread rapidly. COVID-19 cases were reported and registered all over the world in December 2019. On 11<sup>th</sup> March, 2020 COVID-19 was titled as pandemic and a major health problem all over the world. First positive case of COVID-19 appeared in Pakistan on 26<sup>th</sup> February, 2020. When a person belongs to Karachi returned from Iran. From 18<sup>th</sup> March, many cases of COVID-19 appeared in Pakistan. E-learning is the term used for delivering education online through a computer, internet or any other digital resource to improve learning capacity. E-learning can also be termed as “Online education,” “distance education,” “online learning,” “blended learning,” “computer-based learning,” “web-based learning,” “virtual learning,” “tele-education,” “cyber learning,” “Internet-based learning,” “distributed learning,” etc<sup>2</sup>. We used the term e-learning throughout the article as all these terms are synonymous. In all dental universities, concept of e-learning (electronic learning) emerged to cover the course and to eliminate wastage of time during current situation of pandemic. In this situation, there is prerequisite of written online assignment, webinars and computer-based examinations due to ceased traditional way of education. Online classes lag far behind the real ones that students had in classes, which drag their academic performance down. The emergence of such a novel and highly contagious pandemic results in increase of psychological issues due to social distancing, quarantine and disruption of studies. This have a severe psychological impact on undergraduate dental students and already considered psychologically vulnerable groups. Factors contributing to psychological problems; are highly competitive training of dental students, their academic pressure, infected from patients in clinical settings, financial issues and lack of sleep. In addition to that, the decreased co-operation between educator and students due to lack of direct and open communication, also contributing factor in increased level of psychological health<sup>3,4</sup>. After limiting face-to-face communication, Pakistan’s universities efforts for providing e-learning resources like other countries. There are many hurdles in e-learning of dental education during COVID-19, no social interaction and lack of technical skills among the undergraduate dental students. Cost and access to internet is also a barrier in e-learning in dental education. Medical schools need emergency measures to deal with this current pandemic to continue the academic courses in the middle of lock down and social distancing measures leading spread of psychological issues among students. The factors affecting e-learning in health education are poor motivation of undergraduate students due to their personal factors like high levels of stress and anxiety, less attention or involvement, lack of self-discipline, unaware of new techniques and IT skills. When consider the domain of dental clinical skills, online learning becomes the area of challenge. Interaction and discussion between teacher and students is limited than traditional way of teaching. Purpose of the present study was to assess the psychological factors in undergraduate dental students towards e-learning in clinical skills education compared to traditional teaching methods and their relationship with performance. E-learning is significant and easy access to deliver online education. However, focus to

improve the method of teaching and examination process during pandemic. There were many questions raised, is dental students consider e-learning valuable for their learning? There is also needed to find out dental student's psychological and emotional impact of E-learning, IT ability, accessibility, their attitude and response towards e-learning because of recent COVID-19 pandemic. E-learning can never replace practical or demonstrative activities as clinical skills can never be achieved. So traditional face to-face teaching system proved ranked higher than e-learning.

## 2. MATERIAL AND METHODS:

The present cross section descriptive study was conducted in Pakistan during the COVID-19 pandemic (June-September 2020). A total of 494 undergraduate dental students who were enrolled in registered dental institutes of Pakistan were included. A validated research questionnaire explaining the research objective on the front page was distributed to all the participants electronically (whatsapp, facebook and email) and data were collected by the end of September 2020. In addition, the research tool was also circulated by the undergraduate dental students using snowball sampling where acquaintances were able to share the links.

### *Sample Size:*

The sample size was calculated using the following formula:  $n = N * X / (X + N - 1)$  where,  $X = Z_{\alpha/2}^2 * p * (1-p) / MOE^2$ , 'N' is the population size while 'p' and MOE denotes the sample proportion and margin of error, respectively.  $Z_{\alpha/2}$  is the critical value of the normal distribution at  $\alpha/2$  (e.g. for a confidence level of 95%,  $\alpha$  is 0.05 and the critical value is 1.96). The minimum sample size calculated for the present study was 373, however the actual sample size was increased to account for non-response. A total of 494 students were considered by the data provided by the regulatory authority Pakistan Medical and Dental Council (PMDC). In this study, we considered 95% confidence level and 5% margin of error.

### *Data Collection:*

A questionnaire consisting of 24 variables was constructed to collect the data. The questionnaire was comprised of two parts including psychological impact and E-learning. The psychological impact considered dependent variable and E-learning and other factors considered independent variables. For measurement of variables related to E-learning, five-point Likert scale was used, ranging from strongly disagree (0) to strongly agree (5). For anxiety variable/parameters' assessment, Hamilton anxiety scale (0-absent, 1-mild, 2-moderate, 3-severe, 4-very severe) was used.

### *Statistical analysis*

Data analyzed using IBM SPSS Version 23.0. All the participants were asked to complete the research tool (n=494). Incomplete and duplicated forms were excluded from the study (n=11).

## 3. RESULTS

In this study, total of 494 undergraduate (UG) dental students responded to questionnaire and data analyzed from different dental college and universities of Pakistan. Reliability was assessed good for total 24 variables (Cronbach's alpha = 0.76) and better for 17 psychological variables (Cronbach's alpha = 0.868). Psychological impact considered as dependent variable and e-learning as independent variable, to determine strength of association between these two variables Pearson's correlation coefficient (r) used. Pearson's (r) value assessed 1 indicates a perfect positive linear relationship between variables and correlation is significant at the level of 0.01 level (2-tailed). In this study, majority of the UG dental student's (80%) responded e-learning

is not a convenient mode of teaching compared to the traditional system of education (Figure.1, Table.1). However, 88% of the students also responded that the e-learning and closure of institutes due to COVID-19 pandemic causing psychological impact among the UG dental students (Figure.1, Table.1). In terms of convenience of the traditional teaching, 85% of the UG dental students were in favor relating to lack of availability of high-speed internet access. On the other hand, a significant proportion of UG students (40%) were convinced to have enough time for self-study at home but due to minimal interaction with teachers and classmates. Whereas 48% UG students considered spending on e-learning classes as a wastage of time and resources. Many UG dental students (39%) responded to have capability of attending online lectures independently without the help and motivation from others. A very few (2.6%) UG students were in favor of e-learning is convenient (Table 1). Majority of UG dental students responded to have moderate to very severe psychological impacts. UG dental students expressed various concerns such as finishing and submission of online assignments on time online (84%), difficulty in finishing of practical/clinical (91%), interruptions and connectivity issues during online classes (85%), delay in annual examination (71%), difficulties while working on computers (72%), issue with the assessment and lowering of grades (87%) while 68% of UG dental students were motivated face these challenges and working with new skills and technologies. On the other side, almost half of UG dental students (53%) were comfortable with this e-learning online mode of communication including email, chats, discussion boards and social media mainly due to restrictions and availability of no alternatives other than the e-learning method of teaching. Surprisingly, 51% of UG dental students developed new habits during lockdown (such as nail biting, chewing pen, teeth grinding etc.) (table.2). Due to the current COVID-19 pandemic situation and continuously changing scenarios and government policies a vast majority of UG dental students feared (90%) about COVID-19 pandemic would get demotivated and affect their expertise, skill and working efficiency of dental practice. Other concerns reported by the UG students included depressed and anxious (86%), prolonged time for COVID-19 pandemic (81%), emotional and mental instability during lockdown (77%), and anxiety related sickness (67%).

Table 1: Convenience of E-learning

	<b>Strongly disagree %</b>	<b>Disagree %</b>	<b>Neutral %</b>	<b>Agree %</b>	<b>Strongly agree %</b>
<b>Convenience of E-learning than traditional learning</b>	56.5	23.8	11.2	6	2.6
<b>Time for self-study</b>	15.1	17.5	27.9	28.3	11.2
<b>Online classes are wastage of time</b>	11.2	16	26.4	17.2	29.2
<b>Interaction during online lectures</b>	24	23.6	31	18.6	2.8
<b>Convenience of traditional learning</b>	4.4	4	6.6	21.3	63.7
<b>Independently attending online lectures</b>	18.6	16	26.5	25.3	13.6
<b>Access to internet</b>	28	24.5	25	16.3	6.2

Table2: Psychological impact of E-learning

	<b>Absent %</b>	<b>Mild %</b>	<b>Moderate %</b>	<b>Severe %</b>	<b>Very Severe %</b>
<b>Psychological impact of E-Learning and closure of institutions</b>	3.4	9	17.4	26	44.2
<b>Psychological impact of online submission of assignments</b>	4.2	11.8	27.1	25.5	31.3
<b>Psychological impact of finishing practical and clinical work</b>	2.6	6.8	13.6	26.8	50.2
<b>Psychological impact of interruptions during online classes</b>	5.2	9.6	20.4	28.6	36.1
<b>Psychological impact of delay in examination</b>	14.8	14.2	21.6	17.8	31.5
<b>Psychological impact of working on computer</b>	15	12.8	24.6	22	25.6
<b>Psychological impact to accept new technologies</b>	12.2	19.5	32.9	19.3	16.1
<b>Comfortability with online modes of communication</b>	26.3	20.7	29.3	14.7	9
<b>Psychological impact of internal assessment</b>	5	7.9	19.2	22.4	45.6
<b>Fear of effecting dental expertise</b>	3.4	6.3	14.6	23.7	52
<b>Feeling of pressurized and demotivated</b>	3.8	5.9	18.8	23.2	48.3
<b>Developing new bad Habits</b>	34.9	13.9	18.6	13.1	19.4
<b>Psychological impact on health</b>	19.4	14.1	24.4	19.8	22.4
<b>Feeling unstable emotionally and mentally</b>	13.1	9.6	18.1	25.1	34.1
<b>Fear of COVID-19 takes time to end</b>	8.9	9.9	22.7	29.6	29
<b>Depressed about future</b>	6.4	7.2	18.5	28.3	39.6
<b>Depressed about managing time</b>	3.2	6.8	13.2	24.2	52.5

Table 3: Mean and standard deviation of E-learning

Mean ± Std. Deviation	
Convenience of E-learning than traditional learning	0.74 ± 1.0

Time for self-study	2.05 ± 1.2
Online classes are wastage of time	2.37 ± 1.3
Interaction during online lectures	1.53 ± 1.1
Convenience of traditional learning	3.36 ± 1.0
Independently attending online lectures	1.99 ± 1.3
Access to internet	1.48 ± 1.2

Table 4: Means and standard deviation of variables of psychological impact

<b>Mean/ Std. Deviation</b>	
Psychological impact of E-Learning and closure of institutions	2.99 ± 1.1
Psychological impact of online submission of assignments	2.68 ± 1.1
Psychological impact of finishing practical and clinical work	3.16 ± 1.0
Psychological impact of interruptions during online classes	2.81 ± 1.1
Psychological impact of delay in examination	2.38 ± 1.4
Psychological impact of working on computer	2.30 ± 1.3
Psychological impact to accept new technologies	2.08 ± 1.2
Comfortability with online modes of communication	1.60 ± 1.2
Psychological impact of internal assessment	2.96 ± 1.1
Fear of effecting dental expertise	3.15 ± 1.0
Feeling of pressurized and demotivated	3.06 ± 1.1
Developing new bad habits	1.69 ± 1.5
Psychological impact on health	2.12 ± 1.4
Feeling unstable emotionally and mentally	2.58 ± 1.3
Fear of COVID-19 takes time to end	2.61 ± 1.2
Depressed about future	2.88 ± 1.1
Depressed about managing time	3.16 ± 1.0

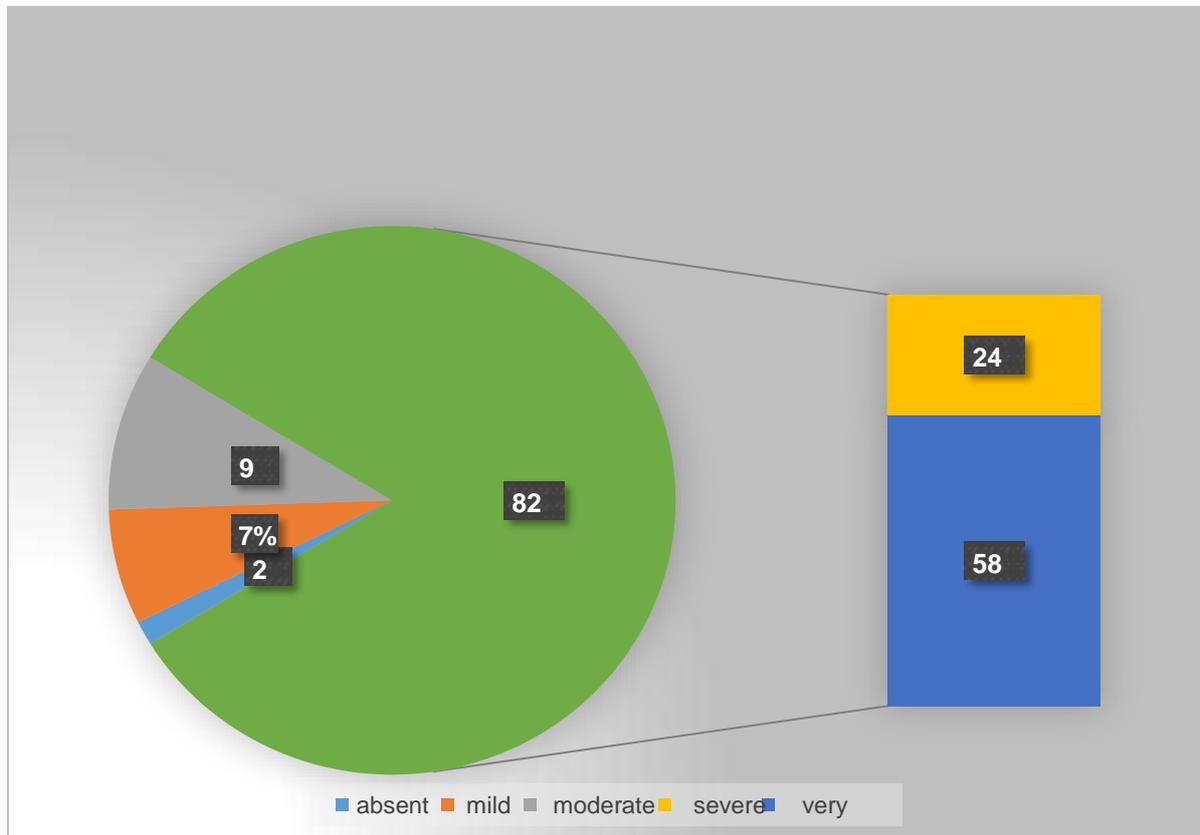


Figure 1: Relationship of Online learning with Stress level.

#### 4. DISCUSSION

The present descriptive study investigated the psychological impact of e-learning among UG dental students enrolled at different dental universities in Pakistan. To assess and judge the dental issues, risk factors and problems, this study was conducted using online google survey forms during the COVID-19 pandemic situation when UG dental students were set up to get education from their home. The outcomes of the present study may guide to assess the problems of UG dental students and potential solutions to resolve their psychological issues due to COVID-19 pandemic and associated distance e-learning. In addition, it may facilitate strategies and planning for current and any future crisis faced by dental students<sup>3</sup>. This study revealed that majority of UG dental students have high (moderate to very severe) level of psychological impact due to e-learning than traditional education system. COVID-19 pandemic had a great influence on the overall global community and considered significant leading to psychological impacts particularly due to lockdown, social distancing, institutions and educational disruptions. The effectiveness of e-learning and psychological impact was measured using the Likert and Hamiliton scales<sup>5</sup>. The world is moving towards computerized and digital objects but surprisingly our survey results were opposite and were not in favor of electronic and digital e-learning. The overall mean level of psychological impact of e-learning was observed severe due to risk factors considered in the study. Furthermore, the response rates were in favor of traditional learning. The present study reported that a majority of the UG dental students were in favor of routine face-to-face learning and disagree on the point of teaching through electronic means because not every student of Pakistan has good access to internet and strong financial support for expensive digital learning appliances. Due to poor internet facilities in the far-flung areas and finances for internet in Pakistan, majority of undergraduate dental students had interruptions

during online classes. Dental Students are not trained to use digital and electronic devices. There is proper training is required for dental students and as well faculty, how they can use electronic gadgets, learn and teach through digital and electronic means. There is also deficiency of expert trainers who can train the faculty to conduct the digital education. Due to lack of financial support, lack of training and knowledge about how to use digital and electronic means and access to internet, majority of undergraduate dental students feel difficulty in online submission of assignments. In addition to that they felt difficulty in accepting new technologies without proper training and facilities. However, in the results of this survey, UG dental students were not satisfied with online modes of teaching and its effecting their mental health and creating anxiety among students. Assessing dental student's performance based on online assignments and test is also a difficult task for dental faculty and management. The following factors mentioned above were considered to assess significance of e-learning than traditional one. However, many UG dental students expressed their concern for not having enough time for self-study at home due to distractions and relax environment. As the dentistry is a clinical and skill-oriented education, e-learning and lack of focus lead to anxiety. They consider online classes are wastage of time because they are not able to interact independently during online lectures with instructors. These are the factor which causes anxiety and effects the dental student's mental health. Because of lockdown in whole country, undergraduate dental students were unable to perform their practical and clinical work, which is important for dental students for future expertise. Practical and clinical work helps in improvement of patients handling and their professional skills<sup>4</sup>. Majority of undergraduate dental students felt anxious about completing their practical and clinical work. Majority of undergraduate dental students were anxious for their future and delay in examination because of closure of universities. survey results also showed that majority of undergraduate dental students were worried about their internal assessment for final examination, which based on their annual performance. There was no clinical and laboratory work feasibility because of institutions and dental clinics closure. In addition to that, current study revealed that dental students were afraid that their dental expertise effect and had feeling of pressurized and demotivated about to get a good job after graduation. By this survey, we also found majority of undergraduate dental students were getting new bad habits of bruxism, nail, cheek and lip biting. Results of this survey showed anxiety effecting undergraduate health and making them sick, students easily get emotional about the minor events and getting mentally weak<sup>16</sup>. COVID-19 pandemic increased feeling of isolation and loneliness among students and increasing patient's ratio and deaths with COVID-19 developing fear in students. This study survey also disclosed that majority of undergraduate dental students responded, they fear about COVID-19 will takes long time to end and they will remain in isolation for longer period. Because of decreasing economy and financial resources due to this pandemic situation in the country, students are worried about employment after graduation. Majority of undergraduate dental students were in favor of the option, that they are depressed about future. Because of fall in health and increasing psychological issues, majority of undergraduate dental students do not properly concentrate on studies and properly manage time for study. Above-mentioned factors were considered to access the level of psychological impact of e-learning.

## 5. CONCLUSION

Dental students expressed a higher level of comfort and effective learning in a recognizable, conventional classroom circumstance. Teaching with traditional system improves student's critical thinking skills and formulates opinions or arguments by engaging in live discussions. Physical interaction between instructors and students is important to change student's behavior toward an educational goal. During this study it is found that students face challenges in using the e-learning resources because of incompetency in the IT skills, lack of motivation and access to proper internet. The most important issue identified is maintaining an effective interaction with

dental students in e-learning system of teaching to fill the gap between the teacher and students. Faculty must encourage dental students and guide them about e-learning. Faculty also organize interactive session during online lecture and discuss student's problems to reduce psychological impact of COVID-19 and e-learning. There should be further flexibility workload and learning time to students to reduce the level of anxiety among the dental students.

## **6. RECOMMENDATIONS:**

Result of this survey shows there is need of focus on dental student's mental health. There is need of proper planning and strategies for reducing anxiety in undergraduate dental students. There should be counselling sessions on regular basis for controlling anxiety in dental students. Guidelines should provide to them, to reduce their fear and to keep their good health. Knowledge of computer handling and digital education guidelines should provide to dental students. Dental faculty of universities need to recognize that e-learning requires expertise and delivery skills for online teaching. Students and dental faculty require extensive training on how to utilize new technologies and adapt new teaching methods for e-learning mode of teaching. Dental universities administration should focus on student's affairs and services during COVID-19. There is the need of shaping, providing services and helping in finding solutions to challenges face by dental students. There is need to provide direction to dental students in COVID-19 situation. Dental faculty should take measures and motivate students to focus on studies and reduce heightened level of psychological distress among students.

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