

The impact of online classes on the mental and physical health of dental undergraduate students in Mangalore

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ABSTRACT

Introduction: The COVID-19 pandemic has had a significant impact on higher education institutions. Online education has become a new norm that may invoke lifestyle alterations and adversely affect university students' health.

Objective: To assess the impact of physical and mental health on undergraduate dental students during online classes.

Materials and Methods: The Copenhagen Burnout Inventory-Student Survey was employed to evaluate the mental health of the students. Depression levels were assessed using the patient health questionnaire-9 scale, while the patient health questionnaire-15 scale was used to assess common physical health symptoms. Frequency distribution was done using descriptive statistics. The Chi-square test was utilized to assess the association between the variables.

Results: In total 228 students participated in the study. Burnout prevalence was greatest among students aged 23–26 (25.9%) and among females (38.2%). Moderate burnout (44.3%) and depression (29.8%) increased once online classes extended beyond 3 months. Severe physical symptoms were more prevalent in females (29.8%) and associated with prolonged online participation (38.2%).

Conclusion: To address the situation, management should put forward various solutions to tackle such physical and mental barriers and resolve the dilemma of students with academic and personal burdens.

Keywords: Online classes, mental health, physical health, depression, dental students

Introduction

Technology influences the daily lives of college students which inadvertently influences both their education and health. College students encounter several health concerns associated with the utilization of computers and the internet, which may hinder with their degree completion.^[1] The pandemic significantly affected global mental and physical health, with symptoms including post-traumatic stress disorder, depression, stress, and anxiety which was observed among the population worldwide.^[2] Social and physical separation, along with self-isolation and lockdowns, have considerably restricted in-person social interactions.^[3] The online education model adversely impacts medical and dental students, as both disciplines require clinical exposure that cannot be delivered through virtual instruction.^[4]

Access to e-learning, the abrupt transition from traditional to online instructions, and factors related to social and psychological well-being, particularly student demographics specific to the epidemic, significantly impacted the efficacy of the online teaching and learning process.^[5] Online learning has facilitated the process for educators and learners by offering tools for content creation, storage, and delivery, thereby alleviating the temporal and spatial limitations typically associated with conventional classrooms.^[6] Technological advancements have led to delayed bedtimes, increased sleep onset latency, and delinquent waking times.^[7]

Increased computer usage poses significant risks to both physical and mental health, contributing to a decline in active leisure activities and recreational sports, while steering them toward sedentary activities, such

as television, video games, and computers.^[8] Physical inactivity or sedentary behavior is the second leading risk factor for numerous diseases and overall health depletion.^[9]

Burnout is a prolonged response to persistent emotional and interpersonal pressures in the workplace, characterized by three dimensions: Exhaustion, cynicism, and inefficacy. It is a word that denotes a clinical syndrome characterized by intense stress, discontent, and a sense of being overburdened.^[10] Depressive symptoms can produce adverse, immediate, and delayed effects on the academic, familial, and personal spheres of university students, encompassing diminished academic performance, school absenteeism, interpersonal and physical health issues, and a reduction in quality of life.^[11] Physical health is an essential aspect of general well-being, especially for dental students who encounter rigorous academic and clinical demands. The change to online learning has presented additional obstacles, perhaps increasing physical health issues due to longer screen time, diminished physical exercise, and ergonomic considerations.^[12]

The rapid shift to online education, notably during the pandemic, has substantially transformed the learning environment for undergraduate dental students. This shift presents unique challenges due to the practical demands of dental education, which impacts not only academic achievement but also the mental and physical health of students. Comprehending the magnitude of burnout, depression, and physical health complications linked to extend online learning is essential for recognizing at-risk students and formulating targeted solutions. The study aimed to assess and compare the physical and mental health among students who attended online classes.

Materials and Methods

This was a prospective, cross-sectional research. Ethical approval was acquired from the Yenepoya Ethics Committee, Yenepoya (Deemed to be University) [No YEC2/1154]. The study sample included undergraduate dental students at constituent colleges of the universities in Mangalore, Karnataka, India. Overall, 228 participants from 2020 and 2021 dental students who attended online classes from all constituent colleges of the universities were included in the study. Participants who did not provide consent to participate in the study were excluded. All dental students who consented to participate were provided with information sheets

detailing the study's objectives and were invited to participate voluntarily.

The principal findings of this study were the impact of mental and physical health on dental students who attended online classes. Demographic characteristics were considered predictors (independent variables) which included gender, age, year of study, online class attended, and duration of online class attended.

In the present study, a structured questionnaire was employed to assess both physical and mental health. A pilot study involving 10 undergraduate dental students was performed to assess the clarity, relevance, and reliability of the structured questionnaire before its comprehensive implementation. In response to participants' input, slight modifications were implemented to enhance the simplicity and clarity of specific questions. Once validated, the questionnaire was distributed through email to all students of the constituent colleges, and responses were collected through a Google Form.

The required sample size was estimated using the Raosoft sample size calculator.^[13] Based on an estimated population size of 3,000, a response rate of 80%, a margin of error of 5%, and a 95% confidence interval, the calculated sample size for this study was 228.

The first domain assessed demographic data, such as gender, age groups (20–22 years, 23–26 years), college name, year of study (3rd year, 4th year, and internship students), if the online class was attended (yes, no, no response), and duration of online class attended (<3 months, >3 months, not attended).

The second domain evaluated the mental health of dental students. The Copenhagen Burnout Inventory-Student Survey (CBI-SS)^[7] was utilized to evaluate mental health. This domain encompasses personal burnout (including feelings of fatigue, physical exhaustion, mental fatigue, frequent thoughts of “I can't take it anymore,” feelings of being worn out, and susceptibility to illness), academic burnout (such as feeling depleted at the end of the workday, dreading the morning due to the prospect of another workday, experiencing fatigue during every working hour, and finding studies emotionally taxing and frustrating), colleague-related burnout (including difficulties in collaborating with colleagues, frustration in teamwork, fatigue from working with colleagues, and energy

depletion due to colleague interactions), and teacher-related burnout (such as challenges in working with teachers, energy depletion from teacher interactions, frustration in collaborating with teachers, and fatigue from working with teachers). Choices for each item included “Never,” “Rarely,” “Sometimes,” “Frequently,” and “Always.” The CBI for students employs a five-point Likert scale, with response options assigned the following scores: “Always” (100%), “Often” (75%), “Sometimes” (50%), “Seldom” (25%), and “Never/almost never” (0%). Total scores are interpreted to indicate different burnout levels: scores below 50 suggest low or no burnout, scores between 50 and 74 indicate moderate burnout, 75–99 reflect high burnout, and a score of 100 signifies severe burnout.

The third domain evaluated depression levels among dental students using the patient health questionnaire-9 (PHQ-9)^[8] scale, which assessed various symptoms of depression. These included reduced interest or enjoyment in activities, feelings of depression or hopelessness, difficulty initiating or maintaining sleep or excessive sleeping, and experiencing fatigue or diminished energy levels. Other symptoms evaluated were reduced appetite or excessive eating, feelings of inadequacy or perceiving oneself as a failure, or believing one has disappointed oneself or one’s family. The questionnaire also included issues like trouble in concentrating at tasks, such as reading the newspaper or watching television, moving or speaking at a noticeably slower pace that could be observed by others, or, conversely, being excessively fidgety or restless with increased movement beyond the norm. In addition, it assessed thoughts of self-harm or a belief that death would be preferable. The PHQ-9 evaluates the severity of depression with a four-point scale: “Not at all” (0), “Several days” (1), “More than half the days” (2), and “Nearly every day” (3). The total score, ranging from 0 to 27, is interpreted as follows: 1–4 indicates minimal depression, 5–9 suggests mild depression, 10–14 reflects moderate depression, 15–19 denotes moderately severe depression, and 20–27 indicates severe depression.

The fourth domain evaluated the physical health of dental students using the patient health questionnaire-15 (PHQ-15)^[9] scale. An instrument assessed common physical health symptoms, including stomach pain, back pain, pain in the arms, legs, or joints (e.g., knees, hips), menstrual cramps (for female participants), headaches, dizziness, fainting spells, constipation, diarrhea, or loose stools, and nausea, gas, or indigestion. The PHQ-15 is rated on a three-point scale: “Not bothered at all” (0),

“Bothered a little” (1), and “Bothered a lot” (2). The total score ranges from 0 to 30, with higher scores indicating greater severity of somatic symptoms. Symptom severity is categorized as follows: 0–4 (minimal), 5–9 (low), 10–14 (medium), and 15–30 (high).

Data analysis was performed using IBM SPSS Statistics version 27.0 (Armonk, NY, USA). Descriptive statistics were utilized to summarize the data, with qualitative variables presented as percentages and proportions. The Chi-square test was employed to assess associations between the variables.

Results

The demographic data included age, gender, year of study, online class attended, and duration of online class attended (<3 months, more than 3 months, and not attended) [Table 1]. A total of 289 online questionnaires were distributed, and 228 students completed and submitted their responses, yielding a response rate of 79%.

Association of burnout among students in the health profession

The distribution of participants’ burnout symptoms based on age, gender, year of study, and duration of online courses attended is shown in Table 2. The majority of participants in the age group of 20–22 years had moderate burnout (23.2%) while 25.9% of those aged 23–26 years also reported moderate burnout. And there was a significant difference in the age ($P = 0.001$). Female and male participants experienced

Table 1: Socio-demographic characteristics of the participants (n=228)

Variables	n (%)
Age	
20–22 years	105 (46.1)
23–26 years	123 (53.9)
Gender	
Female	178 (78.1)
Male	50 (21.9)
Year of study	
3 rd year	1 (0.4)
4 th year	80 (35.1)
Internship	147 (64.5)
Online class attended	
Yes	225 (98.7)
No	2 (0.9)
No response	1 (0.4)
Duration of online class attended	
<3 months	15 (6.6)
>3 months	211 (92.5)
Not attended	2 (0.9)

moderate burnout with response rates of 38.2% and 11%, respectively. The participants who attended online classes for <3 months had moderate burnout (4.8%) and those who attended online classes for more than 3 months also reported moderate burnout (44.3%).

Association of mental health among students in the health profession

The participant’s responses are categorized according to age, gender, academic year, and length of online course [Table 3]. The participants in the age range of 20–22 years showed mild depression at a rate of 21.1% and the 23–26 years of age group showed moderate depression at a rate of 15.8%. There was a significant difference in mental health between these age groups ($P = 0.001$). The female and male participants had mild depression at rates of 23.7% and 8.8%, respectively.

Participants of the internship had moderate depression and moderate-severe depression, each with a response

rate of 16.7%. Participants in 4th year had mild depression of 16.2%. There was a significant difference in mental health concerning the year of study ($P = 0.001$). The participants who attended online classes for <3 months had mild depression at a response rate of 2.6% and those who attended online classes for more than 3 months had mild depression at a response rate of 29.8%.

Association of physical health among students in the health profession

Among the study participants, an aching pain in the stomach bothered nearly 55.7% of applicants. Around 68.3% of participants felt bothered by back pain. Orthopedic conditions, such as joint pain involving knees and hips, along with leg and arm pain, caused discomfort to about 60.9% of the students. Menstrual cramps or other period-related issues plagued 56.4% of the participating women, contributing to their troubled menstrual health. Headaches bothered close to 72.2% of participants. Chest pain symptoms troubled roughly 43.9% of the entrants. Physical issues, such as dizziness

Table 2: Association of burnout among students in the health profession (n=228)

Variables	Mild	Moderate	High	Severe	Total	χ^2	P-value
Age (years)							
20–22 years	10 (4.4)	53 (23.2)	39 (17.1)	3 (1.3)	105 (46.1)	17.895	0.001*
23–26 years	2 (0.9)	59 (25.9)	41 (18.0)	21 (9.2)	123 (53.9)		
Gender							
Female	8 (3.5)	87 (38.2)	65 (28.5)	18 (7.9)	178 (78.1)	1.526	0.676
Male	4 (1.8)	25 (11.0)	15 (6.6)	6 (2.6)	50 (21.9)		
Year of study							
3 rd year	0 (0)	1 (0.4)	0 (0)	0 (0)	1 (0.4)	13.926	0.30
4 th year	7 (3.1)	46 (20.2)	25 (11.0)	2 (0.9)	80 (35.1)		
Internship	5 (2.2)	65 (28.5)	55 (24.1)	22 (9.6)	147 (64.5)		
Duration of online class							
<3 months	1 (0.4)	11 (4.8)	3 (1.3)	0 (0)	15 (6.6)	16.973	0.009*
>3 months	10 (4.4)	101 (44.3)	77 (33.8)	23 (10.1)	211 (92.5)		
Not attended	1 (0.4)	0 (0)	0 (0)	1 (0.4)	2 (0.9)		

$P < 0.05$ * statistically significant

Table 3: Association of mental health among students in the health profession (n=228)

Variables	Minimal depression (%)	Mild depression (%)	Moderate depression (%)	Moderate severe (%)	Severe depression (%)	χ^2	P-value
Age (years)							
20–22	15 (6.6)	48 (21.1)	28 (12.3)	11 (4.8)	3 (1.3)	25.74	0.001*
23–26	13 (5.7)	26 (11.4)	36 (15.8%)	31 (13.6%)	17 (7.5%)		
Gender							
Female	21 (9.2%)	54 (23.7%)	51 (22.4%)	33 (14.5%)	19 (8.3%)	4.729	0.316
Male	7 (3.15%)	20 (8.8%)	13 (5.7%)	9 (3.9%)	1 (0.4%)		
Year of study							
3 rd year	0	1 (0.4%)	0	0	0	26.30	0.001*
4 th year	10 (4.4%)	37 (16.2)	26 (11.4)	4 (1.8)	3 (1.3)		
Internship	18 (7.9)	36 (15.8)	38 (16.7)	38 (16.7)	17 (7.5)		
Duration of study							
<3 months	1 (0.4)	6 (2.6)	5 (2.2)	3 (1.3)	0	7.062	0.530
>3 months	26 (11.4)	68 (29.8)	59 (25.9)	38 (16.7)	20 (8.8)		
Not attended	1 (0.4)	0	0	1 (0.4)	0		

$P < 0.05$ * statistically significant

bothered about 60% of the participants. Approximately 55.2% of the entrants encountered respiratory health issues, particularly shortness of breath. Nearly 68.7% of the applicants reported experiencing a depletion of energy, indicating tiredness and fatigue. Troubled sleep bothered around 62.6% of the entrants.

In the age group of 20–22 years and 23–26 years, the majority of participants 16.2% and 24.6% showed mild physical symptoms, respectively. 29.8% of the female participants had reported severe physical symptoms whereas only 5.3% of the male had severe physical symptoms. A significant difference in the physical symptoms between the male and female participants was recorded ($P \leq 0.001$). 27.6% of interns and 12.7% of 4th-year students have reported mild physical symptoms. Only 2.2% of participants who had attended online classes for <3 months reported mild symptoms in the current study, compared to 38.2% (87) of those who had attended online courses for more than 3 months [Table 4].

Discussion

The study was conducted among 228 participants and responses were constructed under various variables such as age, gender, year of study, online class attended and duration of online class attended.

Burnout is a significant factor in students' mental health, according to a review of the literature, and it can have an impact on learning and have further professional repercussions. The CBI's division of burnout into four parts is one of its features. To improve the organization of the educational process, burnout can now be better understood by identifying its predictors and categorizing it into distinct dimensions: personal, study-related,

colleague-related, and teacher-related burnout. In the current study, the majority of participants (49.1%) in the 20–26 age group reported experiencing moderate burnout. A study by Almalki S. A. and colleagues at King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) in Riyadh, Saudi Arabia, found a higher prevalence of burnout, with 67% of students reporting being affected. Furthermore, students who experience greater burnouts related to their studies are more likely to perceive a lack of support from their significant others.^[14]

Among the study participants, females experienced more burnout compared to males (78.1%). When burnout is examined from the viewpoints of students, gender is a crucial factor. Students have shown, according to Fiorilli *et al.*, that girls feel more worn out than their male classmates across all educational levels. In contrast to their male colleagues, female students are more likely to feel worn out and inadequate.^[15] A recent latent profile analysis by Asikainen *et al.* revealed that female university students were disproportionately overrepresented in the high tiredness and inadequacy profile.^[16] Among the study participants 4th year and interns had 35% and 64.5% of burnout levels, respectively. However, professional activities such as internships and residencies may now be more demanding, leading to greater professional emotional weariness.^[17]

Overall, the CBI revealed that emotional exhaustion was most prevalent in study-related burnout (88.1%) and personal burnout (76.3%). In contrast, teacher-related burnout was the lowest among all dimensions, at 41%. These findings are lined with Kyaw *et al.* they observed that 546 responded emotional tiredness was most prevalent in burnout from personal and study-related

Table 4: Association of physical health among students in Health Profession (n=228)

Variables	Mild (%)	Moderate (%)	Severe (%)	χ^2	P-value
Age (years)					
20–22 years	37 (16.2)	34 (14.9)	34 (14.9)	7.379	0.025
23–26 years	56 (24.6)	21 (9.2)	46 (20.2)		
Gender				14.605	0.001*
Female	61 (26.8)	49 (21.5)	68 (29.8)		
Male	32 (14.0)	6 (2.6)	12 (5.3)		
Year of study				9.438	0.051
3 rd year	1 (0.4)	0	0		
4 th year	29 (12.7)	28 (12.3)	23 (10.1)		
Internship	63 (27.6)	27 (11.8)	57 (25)		
Duration of study				1.624	0.804
<3 months	5 (2.2)	3 (1.3)	7 (3.1)		
>3 months	87 (38.2)	52 (22.8)	72 (31.6)		
Not attended	1 (0.4)	0	2 (0.9)		

$P < 0.05$ * statistically significant

factors, with percentages of 18.1 and 15, respectively. Comparatively, burnout connected to teachers was the lowest of all elements, whereas burnout related to studies was the worst of all aspects.^[18]

The prevalence of depression in our study, as measured by the PHQ-9, was 55%, which was higher than the rate reported in a study conducted by Yoon *et al.* on medical students.^[19] The Dental syllabus is more skill and theory-based and has a hectic schedule. Furthermore, the skills need to be developed for the various conditions that can create this kind of environment. Screening for depression using a self-report scale like the PHQ-9 can be valuable in planning interventions aimed at alleviating distress among students. The study has reported a higher prevalence when compared to the reported prevalence among Brazil (8%) and Germany (9.2%).

Participants aged 20–22 had mild depression while those aged 23–26 exhibited moderate depression. Contrast research by Sayeed *et al.* in Bangladesh revealed that students aged 22 years or less experienced a more pronounced psychological impact than those older than 22 years.^[20] This finding shows a higher psychological impact for younger age. The female and male students had mild depression at rates of 23.7% and 8.8%, respectively. In females, higher stress levels, anxiety symptoms, and depressive symptoms were noted, aligning with prior research conducted on Bangladeshi students.^[21] The recommended explanation for females exhibiting a greater psychological impact is their susceptibility to negative influences. This suggests online studies have caused depression symptoms to worsen. This also may be due to the fear and also being stuck in one place and the uncertainty faced by the student community. In addition, since this study is cross-sectional, it is not possible to directly establish correlation or causality. Therefore, screening for depression using the PHQ-9, coupled with timely management of symptoms, should be prioritized to achieve better outcomes.

The PHQ-15 is a valid and moderately reliable tool for identifying patients at risk for somatoform disorders. In a study conducted by Hinz *et al.*^[22] PHQ-15 mean scores increased with age which is also in line with our present study where 16.2% and 24.6% of the participants in the age group of 20–22 and 23–24 years old had mild physical symptoms, respectively. The study found that 29.8% of females and 5.3% of males reported experiencing severe physical symptoms, which

is consistent with the findings of the study conducted by Hinz *et al.* Men reported significantly fewer physical symptoms than women ($P < 0.001$). The students frequently experience physical symptoms in their colleges, and these pains impact both students and their parents. In our study 27.6% and 12.7% of the interns and 4th year students have reported mild physical symptoms, respectively. However, there are very few studies in the relevant literature that cover the years of the study.

Online teaching and learning offer numerous advantages, particularly as it became the sole option during the pandemic. The results of the present study indicate that, despite its advantages, online or e-learning cannot replace traditional learning methods unless a specialized curriculum is developed and structured for dentistry.

The limitations of this study include the absence of longitudinal data, the dependence on self-reported data, and the use of convenience sampling within a single institute, all of which can introduce potential biases. In addition, a skewed sample distribution shapes the study's conclusions. The majority of participants were female (78%), and interns constituted a significant portion (64.5%) of the sample, potentially limiting the generalizability across genders and academic years. In addition, most participants (92.5%) attended online classes for over 3 months, which may not reflect the experiences of students with shorter online exposure. Future research should aim for a more balanced sample to enhance generalizability.

Conclusion

The COVID-19 pandemic has been recognized as having affected undergraduate dental students in various aspects, including their academic performance, as well as their social, mental, and physical well-being. The study concludes that undergraduate dental students successfully adapted to online learning; however, they expressed concerns regarding their physical and mental health. The current findings emphasize the necessity for institutions to refine their transition to online learning by considering student feedback. It is essential to adjust the curriculum in light of the reduction in clinical sessions, ensuring the safety of patients, students, and staff, while also addressing the mental and physical well-being of students who are separated from their families and experiencing diminished social interactions due to social distancing measures.

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Data Availability Statement

Not applicable.

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Conflicts of Interest

The authors have no conflicts of interest to declare

Ethical Approval

Study approval was acquired from the Yenepoya Ethics Committee, Yenepoya (Deemed to be University) [No IEC2/1154].

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