

Impact of COVID-19 on Student's Dental Education and Life

S.H. Al Rawahi^{1,2,3*}, N.S Al Harthy⁴, G. Singh^{5,6}, and M.I. Al Isamili⁷

¹Behavioural Change Sciences, Department of Oral Health, Oman College of Health Sciences, Muscat, Oman

²Social & Behavioural Sciences Unit, Department of Population and Patient Health, Faculty of Dentistry, Oral and Craniofacial Sciences, King's College London, London, UK

³Behavioural Sciences, Dental Public Health, Oman Dental College, Muscat, Oman

⁴Adult Restorative Dentistry, Oman Dental College, Oman Dental College, Muscat, Oman

⁵Adult Restorative Dentistry, Oman Dental College, Muscat, Oman

⁶International Dental Ambassador for the Royal College of Surgeons Edinburgh, Middle East

⁷Head of Oral Diseases, Oman Dental College, Muscat, Oman

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*Corresponding author: said.dsa.ihs@gmail.com, salrawahi@staff.omandentalcollege.org

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Abstract

Objectives: To identify the impact of the pandemic on the Oman Dental College (ODC) students' management of their educational and student life.

Methods: Ethical approval was obtained to conduct a quantitative cross-sectional online survey study using Survey Monkey®. During the 2019-2020 academic year, a total of 383 ODC students, across six levels of education at ODC were invited to participate in the survey. Descriptive statistics were applied on the students' demographic profile and other characteristics of the participants' data were analysed. Cronbach's alpha was calculated for internal consistency. Furthermore, a univariate analysis was carried out to identify differences between genders among BDS students in relation to the questionnaire themes. Also the test was carried out to assess the differences between the BDS levels in relation to the questionnaire themes. A Pearson's correlation test evaluated the association between students' perception of their risks due to the pandemic and the other relevant themes.

Results: A 51% response rate revealed that, five of the themes showed internal reliability ranging from excellent to acceptable namely: performance of exercise; effect of the pandemic on their families; use of a facemask; college's online services; and students' mental health (0.51; 0.59; 0.70; 0.78; and 0.90 respectively). More than half of the participants felt they were encouraged to engage in self-directed learning using online resources. They felt some level of nervousness, worry, anxiety or tension as well as stress during the pandemic. Statistical differences between levels of education were noted in the following themes: ODC's-online teaching services($p < 0.00$) and students' mental health ($p < 0.03$); but there was no difference between female and male students. ODC's online services theme positively related to the students' mental health theme ($r = 0.22$, $P < .00$).

Conclusions: ODC's students experienced some levels of mental health issues during the pandemic including anxiety, stress and sleeping issues, however majority of them were healthy. Most students were satisfied with the online teaching provided by ODC. It was also evident that faculty were connected with the students at all times. A positive relationship was noted between the management of online lectures and students' mental health.

Keywords: Mental Health; Students' perceptions; Academic performance; COVID-19; Pandemic.

Introduction

On March, 11th 2020, the World Health Organization declared a COVID-19 pandemic¹. Although not the worst pandemic known to mankind, the COVID-19 pandemic which started in the Hubei Province in the Republic of China² and later spread around the World, has had a significant impact on every industry. On 24th February 2020, the Sultanate of Oman registered two COVID-19 cases for the first time following a return of travellers from the Islamic Republic of Iran^{3,4}. The total registered cases on the 12th of April, 2021 were 196,900 cases with 2053 deaths and 179,175 recovered cases^{5,6}. The highest reported COVID-19 cases in one day in Oman were 3544 cases which was on the 11th of April 2021⁵. Due to the sharp increase of COVID-19 cases globally, the authorities had imposed restrictions to prevent the spread of the disease. As evident in other countries, the Sultanate of Oman also enforced lock downs, requirement of maintaining social distance of at least 2 meters between individuals in all public and work areas and the compulsory wearing of a mask⁷⁻¹⁰. Furthermore, the ongoing pandemic impacted the educational institutions in many countries, including the Sultanate of Oman, where schools, colleges, and universities either ended the academic year prematurely or evolved to remote learning measures as a means of prioritizing the needs to protect students and staff¹¹⁻¹³. The rapidly evolving changes resulted in multi-fold challenges in delivering academic knowledge and practical clinical skills to dental and medical students^{14,15}. Particularly, clinical placements and clinical exposures that are required for students to progress in healthcare, was hindered by the abrupt halt in clinical contact hours required by the examination board and local and international authorities¹⁶. Other contributing factors that negatively impacted clinical teaching were the lack of knowledge on best practices to control the spread of the virus, limited availability of personal protective equipment (PPE), the complexity in infection control measures related to clinical supervision in large scale student dental clinical areas, and risks associated with aerosol generation of numerous dental procedures¹⁶. An early study in the US, at Roseman University of Health Sciences (RUHS) College of Dental Medicine (CODM), evaluated students' experience and perspectives of their academic institutions' response to COVID-19¹². More than half of the participants reported to accept the overall response of the college to COVID-19 including effective online teaching, however, many students were dissatisfied with regards to the impact that the pandemic had on their clinical training¹².

The pandemic has had academic, physiological and psychological implications among students¹⁷. Hung and his team¹² reported the challenges that students faced in being able to focus on their studies and maintaining motivation to study. Furthermore, students reported having restless sleep, stress, anxiety related to the uncertainty pertaining to the pandemic and anger due to feeling out of control. Similar findings were reported by the dental students at the University of Jordan¹⁸. Where it was found that most of the students missed their clinical training sessions and were less motivated to learn online. However, the students reported that online sessions promoted groups discussions amongst themselves, and they were satisfied with the level of preparedness of faculty at their university.

In the Sultanate of Oman, there is a paucity on studies that have assessed the impact of COVID-19 on healthcare academic institutions as the demands on the students are very different from other "non-patient based" professions. Some studies focused on the management of learning during the pandemic including E-learning¹⁹⁻²¹. However, a recent study reported the prevalence of depression, anxiety, and stress among young students aged between 15 and 24 years in six Middle Eastern countries including Oman²². The study found that the prevalence of depression, anxiety, and stress among the participants were 56.2%, 39.4%, and 31% respectively. Unlike pre-COVID-19, the prevalence of depression and anxiety was 17%²³. The finding indicated that COVID-19 pandemic had a negative impact on the mental health of young participants. In addition, the prolonged lockdowns and restrictions have further contributed to this impact²². However, none of the studies assessed the relationship of COVID-19 and students' management of their healthcare "dental education", in addition to the impact of the pandemic to their lifestyle. The authors decided to use a survey to undertake this investigation to better help ODC prepare and allocate adequate resources and better equip the college to meet its students' specific demands as the timeline for the end of the pandemic remains uncertain. As the Oman Dental College (ODC) is a single standing dental college, the first and only dental school in the Sultanate, it is safe to state that this kind of investigation is the first in Oman.

Methods

Design

A quantitative cross-sectional online survey study was designed aimed at identifying ODC students' management of their dental education during the COVID 19 pandemic and to recognize the impact of the pandemic on student life.

Survey Tool

A Survey Monkey online tool³⁹ was used to conduct the cross-sectional survey. The survey consisted of 11 general themes based on students' opinions during the pandemic: (1) demographics, (2) associated risks of the COVID-19 pandemic, (3) sources of COVID-19 news, (4) the effect of COVID-19 pandemic on their families, (5) application of hand hygiene measures, (6) the use of a facemask, (7) performance of exercise, (8) the college's online services, (9) assignments (10) faculty support, and (11) students' mental health. Each theme had a number of items which were developed and subsequently independently reviewed by four interdisciplinary academic experts with backgrounds covering behavioural changes, adult restorative dentistry, and oral diseases. The survey questions/items were reviewed and refined by the researchers multiple times to enhance validity of content and clarity from a student's perspective; furthermore, to reconfirm the face validity of the survey. There were some conflicts between the researchers however it was managed through the scientific criteria in designing of the survey including no leading and less biased questions, and 5 point options or similar to Likert scales³⁷. The team looked if whether each of the measuring items matches the given conceptual domain of the concept in the study. Few questions/items did not meet the purpose of the survey were deleted and finally the expert consensus on final version of the survey. Further, the students were exposed only to the items being questioned without the main themes to minimise any impact of selection bias. The survey has not been published in any scientific journal.

Predictive criterion validity: Predictive criterion validity was applied using correlation coefficient. Construct Convergent validity was performed by the team through comparing the findings of the questionnaire with their observation of students' actions and attitude. The outcome from this comparison helped in making the necessary changes in the questionnaire. Content validity: The four academic researchers reviewed all the questionnaire items for readability, clarity and comprehensiveness and came to some level of agreement as to include items which match their criteria in the final questionnaire. Also, the experts reviewed the number of scales for each item. The process of construct and content validity were done multiple times until the experts reached a consensus.

Sampling and Sample

A sample frame is the source where the samples or list of samples are selected and recruited for the purpose of a study²⁴. The sample frame for this study was conducted at ODC across all groups within one campus which is located in Al Wattayah area, Muscat. ODC has a one- year Foundation Programme (pre-dental) and the Bachelor of Dental Surgery (BDS) at ODC is a five-year programme. The target sample population consisted of all the registered undergraduate dental students at ODC in the academic year 2019-2020. The total number of target students were as follows: Foundation year (FY) – 61 students; first year (BDSI)= 65; second year dental students (BDSII)= 70; third year dental students (BDSIII)= 68; fourth year dental students (BDSIV)= 64; and final year dental students (BDSV)= 55. Due to limitations and constraints due to the pandemic, the sampling method was conducted by e-mailing the survey to all registered students; no particular group was selected. No power analysis was done because there was no sample size needed due to the limited population size³⁸.

Recruitment process and ethical approval

Ethical approval was obtained from the ODC Research and Ethics Committee (ODC Research 2020_2). An online written informed consent was obtained from each student following perusal of an explanation of the research details. The survey link was circulated to all the registered students at ODC, students voluntarily opted to participate in the survey during a window of four weeks (email reminders were sent at the end of each week to gain more participation). On circulation of the link to the survey, a brief description of the

survey was provided along with the confirmation that student participation was voluntary and anonymous. In addition, it was confirmed that any student opting not to participate in the survey, would not be negatively impacted in terms of his/her academic performance. Students were not offered any incentives to complete the survey.

Data analysis

The collected data was converted from the online Survey Monkey to an excel spreadsheet and then exported to SPSS version 26 for analysis. Descriptive statistics was applied on demographic and other characteristics of the participants data. Cronbach’s alpha was calculated to measure internal consistency of the items relating to the eight themes of the online questionnaire which are: (1) associated risks of the COVID-19 pandemic (2) the effect of COVID-19 pandemic on their families, (3) the use of a facemask, (4) performance of exercise, (5) the college’s online services, (6) assignments, (7) faculty support, and (8) students’ mental health. The overall mental health status of the students was calculated through computing with existing variables related to mental health. The normality tests were performed before any tests were done. An univariate analysis which included nonparametric tests (not normal distributed data) and parametric tests (normal distributed data) was applied to identify the significant difference between genders, levels of study years sample characteristics in relation to the eight themes of the questionnaire. The details of the tests are mentioned in the below tables please refer to pages 26-27 of the manuscript: Parametric Test (Independent T test); Non-Parametric Test (Mann Whitney test); Parametric Test (ANOVA); Non-Parametric Test (Kruskal Wall’s one-way ANOVA). Pearson's correlation coefficient ‘r’ was used to evaluate the association between students’ perception of their risks of COVID-19 pandemic and the other seven themes.

Findings

Demographic data

Students of all study levels contributed to the survey; however, the response rate was 51% from the total number of registered students at ODC. Among the 195 student who contributed to the study 81% (n=177) were female and 7.4% (n=16) were male and majority of them were not married. Many of the respondents lived within Oman; a limited number of them were international students. The majority of students were living with their families. Table 1 illustrates the details of the demographic data and the response rates.

Table 1: Demographic characteristics of the participants:

Demographic Data		n (%)	Response rate
Academic Year of Study	FY	13 (6.7)	21
	BDSI	26 (13.3)	40
	BDSII	34 (17.4)	49
	BDS III	51(26.2)	75
	BDSIV	35 (17.9)	55
	BDSV	36 (18.5)	65
	Total	195 (100)	51
Gender	Male	16 (8.3)	
	Female	177 (91.7)	
	Other		0
Marital Status	Prefer not to mention		0
	Single	188 (96.4)	
	Married	7 (3.6)	
	Separated		0

Do you have any children?	Divorced		0
	Widow		0
	Widower		0
	No	189 (97.4)	
	Yes, only one	3 (1.5)	
	Yes, two	2 (1)	
	Yes, three		0
	Yes, four or more		0

Do you live? Where do you live?	Within the Muscat Governorate	91 (46.7)
	Outside the Muscat Governorate	99 (50.8)
	Outside of Oman	5 (2.6)
	Alone	3 (1.5)
	With family	189 (96.9)
	With friends	2 (1)
Other	1 (0.5)	

Type of accommodation during the academic year?	Single room occupancy in a student accommodation	12 (6.2)
	Shared room occupancy in a student accommodation	54 (27.7)
	Single occupancy private residence	6 (3.1)
	Shared private residence	15 (7.7)
	Family residence	108 (55.4)

Internal consistency of questionnaire

Five of the themes showed internal reliability ranging from excellent to acceptable:

1. Performance of exercise (0.51)
2. The effect of COVID-19 pandemic on their families (0.59)

3. The use of a facemask (0.70)
4. The college's online services (0.78)
5. Students' mental health (0.90)

Risks of COVID-19 pandemic; assignments; and faculty support were found to be below the level of acceptance (0.15; 0.24; and 0.35 respectively). Therefore, these three themes were excluded from the comparison or correlation analyses. Table 2 presents more details of Cronbach's alpha for each Theme.

Table 2: Cronbach's alpha for each theme related to the students' perceptions during COVID-19 pandemic:

Themes composited from the items related the COVID-19	No of Items	Cronbach's Alpha score	Mean (SD)
Risks of COVID-19 pandemic	6	0.15	25.7(3.6)
The effect of COVID-19 pandemic on their families	2	0.59	8.7(1.1)
The use of a facemask	2	0.70	8.5(1.4)
Performance of exercise	2	0.51	6.7(3.8)
The college's online services	9	0.78	40(5.8)
Assignments	3	0.24	8.2(1.7)
Faculty support	3	0.35	8.7(2.1)
Students' mental health	18	0.90	59.2(12.6)

Some of the items were kept away from the above themes, either due to them not matching other items or they were extracted from a theme to rise the Cronbach's Alpha score. Cronbach Alpha score meaning: Excellent reliability: $\alpha \geq 0.9$; high reliability: $0.7 \leq \alpha < 0.9$; moderate reliability: $0.5 \leq \alpha < 0.7$; Low reliability: $\alpha < 0.5$ (Hinton et al , 2004; Hinton, McMurray, Brownlow, 2014)

College's Online Services

More than half of the participants felt that they were encouraged by the college to engage in self-directed learning based on the available online resources. A high percentage of the students 80.4% (n=156) attended online classes. The outcomes of the college's online services were as follows:

1. Students believed the classes were valuable 45% (n=87) and the main reason for attending online classes was to keep up to date with the academic timetable 68% (n=131) of students.
2. In general, those students that attended the online classes felt that the quality and content of the online classes at ODC was good 51% (n=99) and 41% (n=80) respectively. However, 46% (n=89) of students felt that their remote teaching sessions experience was worse than onsite lectures.
3. A large number of students 72% (n=141) felt that they missed out on critical education which could impact their academic progression.

Overall, BDS students were satisfied with the college' online services, as indicated in Figure 1. Table 3 details the responses of each item related to the college's online services theme.

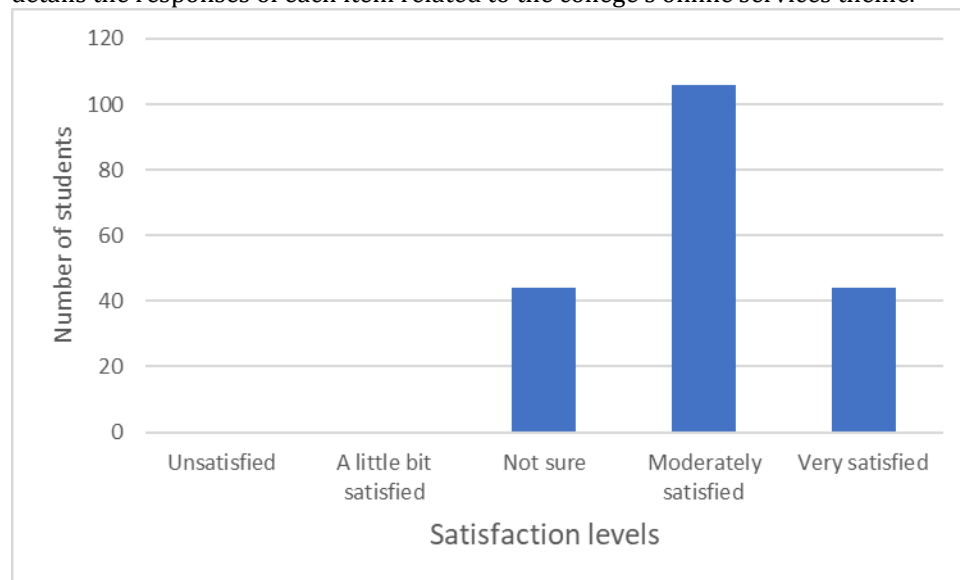


Figure 1: Overall Satisfaction Level of Online College Services

Table 3: Students Responses
The College's Online Services

Concept related items	Options *	(%) n	Total numbers of participants
College is encouraging students to engage in self-directed learning based on the available online resources	Encourage	(51.6) 100	194
Attendance of the online classes	Attending	(80.4) 156	194
Reason for attending the online lectures	Keeping in touch with the academic timetable	(68)131	193
Helpfulness of online teaching to keep up with students' timetabled academic schedule.	Helpful	(59.5) 116	195

Valuable of the online teaching at ODC**	Valuable	(44.6) 87	195
Quality of the online classes content at ODC	Good	(51) 99	194
Satisfaction with the content of the online lectures.	Satisfied	(41)80	195
Missing out critical education which affect students' academic progression because of online learning.	Yes	(72.3) 141	195
Comparison between the remote online teaching content to the campus teaching.	Somewhat worse the physical lectures	(45.9) 89	194
Assignments			
Preference of open book assignments over other types of assessments	Preferred	(69.8) 136	195
Difficulties with respect to open book assignments.	Difficult	(62.1) 121	195
The college planned well for future examinations	Neutral	(45.9) 89	194
Faculty Support			
Ease for students to reach out to the academic faculty for help	Neutral	(55.4) 108	195
Connected with the college in terms of learning.	Connected	(48.7)95	194
Effect of college suspension on clinical education	Affected	(62.7) 121	195
Mental Health			
Frequency of concept related item	The most selected Options *	(%) n	Total numbers of participants
In the past 14 days of onsite suspension	Fearful, anxious or worrisome emotions.	Always	(53.3) 104
	Stress.	Always	(55.9) 109
	Focusing on anything other than anxiety, nervousness or tension.	Always	(48.5)94
Sleeping pattern.	Sleep more	(55.9) 109	195
Feeling more irritated, grouchy, or angry than usual**	Never	(35.1) 68	194
Feeling irritable or have angry outbursts**	Not at all	(53.84) 105	195
Feeling nervous or worried.	Sometimes nervous and worried	(36.4) 71	195
Feeling frightened.	Never frightened	(42.57) 83	195
Having difficulty concentration.	Sometimes	(39.5) 77	195
Interest in doing things.	Interest	(56.4) 110	195
Feeling down, depressed, or hopeless.	Always	(42.1) 82	195

Having unexplained body aches and pains	1-2 days a week	(77)39.5	195
Repeated, disturbing memories, thoughts, or images of a stressful experience.	Not at all	(40.5)79	195
Feeling upset when a stressful experience is reminded**	Not at all	(38.5)75	195
	Sometimes	(38.5)75	
Pandemic effects on relationships	Not affected	(58.5)114	195
Feeling distant, lonely or cut off from other people.	Not at all	(40.5)79	195
Having thoughts of actually hurting oneself.	Not at All	(86.6) 168	
Having to take painkillers, stimulants, sedatives or tranquilizers without a doctor's prescription.	Not at all	(70.1)136	194

**The options mentioned in the table are the most selected response among the participants.*

*** The item has two equal rating.*

Assignments

Around 70% (n=136) of the students preferred open book assignments (OBAs) over other types of assessments. However, 62% (n=121) of participants expressed they experienced difficulty with OBAs and found it to be challenging, although 46% (n=89) of students were indifferent to the OBA's they undertook in ODC versus the standard mode of assessment/examination. Table 3 represents the responses of each item related to the assignments theme.

Faculty support

Almost half of the students 49% (n=95) felt connected with the college in terms of their learning experience and 55% (n=108) confirmed that it was not easy nor difficult to reach out to the faculty for academic help and support. However, 63% (n=121) of the students felt that the college's suspension of clinical education (imposed by the local authorities) affected them negatively. Table 3 presents the responses of each item related to the faculty support theme.

The effect of COVID-19 pandemic on their families

More than 90% (n=182) of the students reported that none of their family members had suffered from COVID-19.

The use of a facemask

Around 71% (n=138) of the students wore facemasks when they were outside their homes before it became compulsory in the Sultanate of Oman, and 62% (n=121) of the students confirmed that they strongly believed in the importance of wearing a mask.

Performance of exercise

Only a limited number of students performed exercise before and during the pandemic, 4.6% (n=9) and 10.8% (n=21) respectively. The majority of the students did not perform any exercise and there was not much difference in their exercise activity either before or during the COVID-19 pandemic (39.2% (n=76) and 34% (n=66) respectively).

Students' mental health

More than half of the students felt nervous, worried, anxious, or tensed and stressed within the first 14 days of college lockdown due to COVID-19. Fortunately, despite these negative feelings, 49% (n=94) of students were able to focus on other things rather than the negative feelings and 56% (n=110) were able to do interesting things. Although 35% (n=68) of students did not feel more irritated, grouchy, or angry than usual, around 42% (n=82) of them felt down, depressed, or hopeless and about 36% (n=71) of students were sometimes nervous and worried.

Moreover, around 56% (n=109) of them were sleeping more than usual and up to 77% (n=39) of the participants had unexplained body aches and pains 1-2 days a week. In relation to feeling upset due to stressful experience, around 38.5% (n=75) of the students felt upset and while 38.5% (n=75) of the students did not feel upset. Moreover, around 40% (n=77) of the participants expressed difficulty in concentration at times.

Nevertheless, about 43% (n=83) of them never felt frightened and about 41% (n=79) did not have repeated disturbing memories, thoughts, or images of a stressful experience nor felt distant, lonely or cut off from other people. More than 50% (n=105) of the participants did not feel irritable or have angry outbursts. Around 87% (n=168) of the participants did not have thoughts of hurting themselves and about 70% (n=136) of the students did not require the use of painkillers, stimulants, sedatives or tranquilizers without a doctor's prescription. Finally, more than 50% (n=114) of the participants felt that their relationship with other people was not affected by the pandemic. Table 3 presents the responses of students to each item related to the mental health theme.

The indicators of the ODC students' mental health status is presented in Table 3. It is evident that in the first two weeks of suspended onsite activities, many students experienced some fear/anxiety 53% (n=104) and stress 56% (n=109) which impacted their ability to focus on other matters in life 49% (n=94). Following the first two weeks of suspension of onsite activities within ODC, it was evident that students slept more than usual (56%), interestingly enough, although 40% of students found it hard to concentrate, 56% of students did not lose interest in doing things. However, the overall students' mental health experience during the last academic year was healthy as indicated in the Figure 2.



Figure 2: The general mental health status among the BDS students.

Differences between the academic year of study in the themes

There were statistical differences between levels of study in the following two themes:

1. College's online services ($p < 0.00$)

2. Students' mental health ($p < 0.03$).

BDSIV scored the highest in the college's online services satisfaction (mean= 34.37, SD=5.35), when compared with the other BDS levels. Also, they scored the highest in students' mental health (mean=63.54, SD=12.62) which indicates that they were the most healthy group among all BDS levels. BDSII scored the lowest in the college's online services satisfaction (mean= 27.15, SD=4.96) BDSI scored the lowest in students' mental health (mean=52.85, SD=10.40) which indicates that they were the least healthy group among all BDS levels.. There was no statistical difference in the performance of exercise, the effect of COVID-19 pandemic on their families, and the use of face mask themes among the BSD levels of study themes. Table 4 presents details of the differences between academic year of study in relation to the themes.

Table 4: The differences between academic year of study in relation to the themes:

ODC COVID 19 Themes	Groups	N	Mean	SD	P. Value
Performance of exercise *	FY	13	7	3.70	0.97
	BDSI	25	6.52	3.24	
	BDSII	34	6.97	4.44	
	BDS III	51	6.35	3.74	
	BDSIV	35	6.57	3.48	
The college's online services *	BDSV	36	6.89	3.97	0.00
	FY	13	33.38	4.57	
	BDSI	26	28.12	6.44	
	BDSII	34	27.15	4.96	
	BDS III	51	30.92	5.86	
Students' mental health *	BDSIV	35	34.37	5.35	0.03
	BDSV	36	32.08	4.55	
	FY	13	60.08	10.38	
	BDSI	26	52.85	10.40	
	BDSII	34	56.82	12.03	
The effect of COVID-19 pandemic on their families**	BDS III	51	60.37	12.36	0.35
	BDSIV	35	63.54	12.62	
	BDS V	36	59.47	14.08	
	Total	195	8.4	1.84	
	Total	195	8.4	1.45	
The use of facemask **	Total	195	8.4	1.45	0.10

*Parametric Test ANOVA

**Non-Parametric Test Kruskal Wall's one-way ANOVA

Differences between males and females in the themes

There were no statistical differences between females and males in the five themes. Table 5 presents details of the difference between gender differences in the themes.

Table 5: The differences between genders in relation to the themes:

COVID 19 Themes	Groups	N	Mean	SD	P. Value
The college's online services*	Male	16	30.75	7.40	0.91
	Female	177	30.92	5.67	
Students' mental health*	Male	16	60.63	14.04	0.67
	Female	177	59.24	12.31	
The effect of COVID-19 pandemic on their families**	Total	195	8.4	1.86	0.78
	Total	195	8.4	1.86	0.27
The use of facemask **	Total	195	8.4	1.45	0.88
	Total	194	6.7	3.77	

*Parametric Test independent test

**Non-Parametric Test Mann Whitney test

Correlation between students' mental health during the pandemic and other themes

The college's online services satisfaction during the pandemic theme was positively related to the students' mental health during the pandemic ($r = 0.22$, $P < .00$); this is illustrated in Figure 3. The more students are satisfied with the online college service, the more mental health will be positive. The other themes were not significantly related to the students' mental health during the pandemic. The detailed results of the correlation between students' mental health during the pandemic and other themes are shown in Table 6.

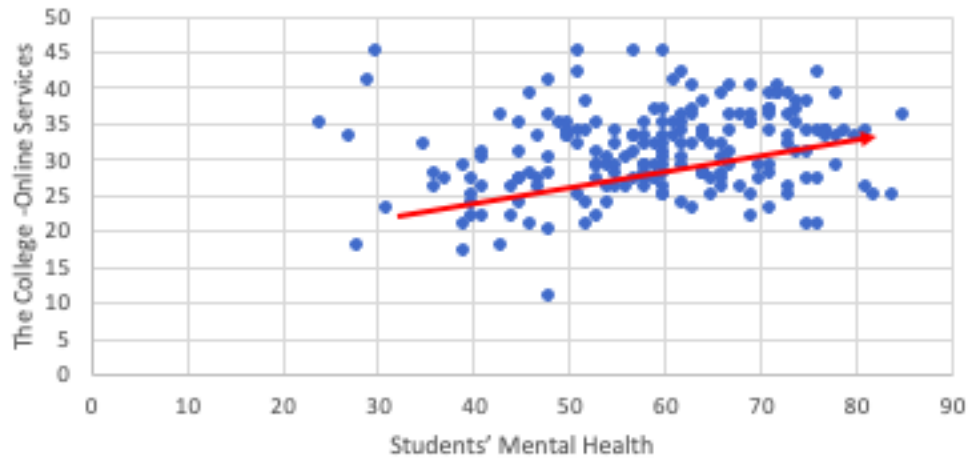


Figure 3: The Significant positive weak relation between ODC-Online service and student’s mental health.

Table 6: The Correlation between students’ mental health and other themes

COVID-19 Themes	Mean	SD	<i>r (P-Value)</i>	Effect size	Correlation
Students’ mental health	59.13	12.589		0.0081	weak/small
The effect of COVID-19 pandemic on their families	8.38	1.861	0.09 (0.23)		
Students’ mental health	59.13	12.589		0.0049	weak/small
The use of facemask	8.44	1.447	0.07 (0.33)		
Students’ mental health	59.13	12.589		0.0144	weak/small
Performance of exercise	6.66	3.767	0.12 (0.11)		
Students’ mental health	59.13	12.589		0.0484	weak/small
The college’s online services	30.89	5.897	0.22(0.00)		

Discussion

This online cross-sectional study aimed to explore the perceptions of ODC students on ODC’s management of their dental education during the COVID-19 pandemic. Also, it recognized the impact of the current pandemic on the students’ life. The COVID-19 pandemic caused many schools and universities to temporarily suspend on site activities and adopt different strategies to ensure the continuity of the learning process¹².

In this survey, most of the BDS students contributed, however the Foundation year students contributed the least amongst the BDS students. Being new in the College and limited activities due to COVID-19 could be attributed to the reduced participation in the survey. Many students were positive about the online services provided by ODC; they described them as being valuable, the faculty members were supportive and encouraging, in addition the teaching was also described as being of good quality. Although, ODC students expressed satisfaction about online teaching, they raised a concern about missing critical components of their education. Many students expressed that online teaching was slightly inferior to on site teaching experiences. Similar findings were reported by Hung and his team¹²; many dental students at the RUHS College of Dental Medicine reported effective and positive experiences with the online services and their academic professors. However, over one third of the RUHS students raised a concern over the quality of online teaching. ODC students felt they were connected to faculty in terms of learning and a limited number of them expressed some difficulties in getting in touch with faculty. These difficulties may be related to the technicalities of the internet network services in their geographical location or perhaps due to the negative impact of the pandemic on their physical and emotional well-being.

In relation to the clinical aspects of education, many ODC students raised concerns about the college suspension of on-site clinical activities and its impact on their training and clinical experience. Clearly, the suspension of clinical activity was a crucial protective measure for all the ODC stakeholders. The ODC findings were similar to those reported in RUHS¹². These negative outcomes in the two studies indicate helplessness of students in the decisions being made by the authorities. Furthermore, the lack of involvement in understanding the thought process behind the decisions being made may have exacerbated the negative feelings expressed by the students. Involving students in the decision making gives them ownership and a sense of control. In addition, students' input in clinical education options such as utilizing online demonstration and exploring simulation can further create a positive impact on their clinical training and perhaps result in less negative survey outcomes.

With regards to assessments, more than half of the ODC students preferred the introduction of open book assignments, however, many of them expressed difficulty in completing the assignments. This perhaps is a point for ODC's assessment team to consider inviting students to express their challenges for consideration by the assessment team to review and consider potential solutions. It is worth noting, however, that the Foundation year students and those that entered BDSI would not be able to compare the OBA experience in a meaningful manner.

The majority of ODC students reported that none of their families contracted COVID-19 at the time the survey was undertaken (15th June 2020); similar findings were reported by Al Omari et al²² across six different Arab countries including Oman. In relation to wearing a face mask, more than 60% of the ODC students supported the wearing of face masks in public places and two thirds of them were wearing face masks before it became mandatory. This reflects students' awareness of the importance of wearing face masks in minimizing the spread of infectious diseases in the community. The RUHS students reported the importance of wearing face masks during the pandemic in public places¹².

Sadly, majority of the ODC students did not exercise every day. This may have contributed to some levels of mental health issues amongst the students. Cumulative evidence indicated that exercise helps to improve the quality of sleep and mental health including reducing the risk of depressive illness²⁵⁻²⁹. Therefore, raising awareness of the importance of exercise on mental health among the students would help to increase their physical activity³⁰.

The pandemic negatively affected many college students leading them to experience a certain degree of anxiety, stress, depression and sleeping pattern^{12,17,22}. Within the 14 days of lockdown, many ODC students were fearful, anxious, worried, stressed, feeling down, depressed, hopeless, and many slept more than usual. This has negatively impacted their sleeping pattern, in which majority had disturbed sleeping patterns ranging from less to high hours of sleeping. However, after the 14 days, the level of nervousness, worry, and stress dropped to having difficulty in concentration; this could be attributed to the adaptation and application of different coping strategies as has been advocated by the WHO³¹. Although the students experienced some mental health issues within the first 14 days, they were able to focus on other matters after that. In addition, they did not experience irritation, getting grouchy, or being angry to an extent that was more than usual. Neither did they get frightened, or experience disturbing memories, thoughts, or images of a stressful experience(s). Fortunately, none of them had thoughts of hurting themselves or had the need to take painkillers, stimulants, sedatives or tranquilizers without a doctor's prescription. It is

worth noting that many of the students never experienced loneliness and the pandemic did not impact their relationships. However, it is worth highlighting that although the numbers of cases in Oman had started to increase, the magnitude of this rise was not as large as it was in other geographical locations. For instance, during June 2020, the number of recorded COVID-19 cases in Saudi Arabia and Iran, exceeded 100000 cases unlike the number of cases recorded in Oman which were below 30000 cases³². The study of Al Omari et al²² found that the prevalence of depression, anxiety, and stress among the participants in Oman was 56.2%, 39.4%, and 31% respectively which is similar to the findings of the current study. The RUHS students, on the other hand did report loneliness due to low social connection and high stress levels which were associated with worsen their health behaviour¹². Perhaps the difference between RUHS and ODC students is indirectly impacted by their cultural and environmental backgrounds. This means, that students across different backgrounds experienced mental issues of different magnitudes during COVID-19.

Difference in BDS study levels and gender in Themes

For decision making at ODC, it was important to identify if there were any differences between the BDS levels of study, to establish the proper interventions for each group. This study identified statistical differences between BDS levels of study in the college's online teaching services during the pandemic and the ODC students' mental health issues. In other words, at each level, BDS students interacted differently with the online services and resulted in different mental health status. For example, BDS level four (BDSIV) students were the most satisfied group in utilizing of the college's online services (mean= 34.37), and they were the group with the least mental health issues (Mean=63.54). However, BDS level two (BDSII) students were the least satisfied group while utilizing of the college's online services (mean= 27.15), and they had more mental health issues (Mean=56.82) than the BDS level four (BDSIV) students. The differences in the college's online teaching services and mental health issues among BDS levels of study may be explained by different experiences of each group of students within the college environment. For instance, the Foundation Year students were more satisfied with the online service when compared with the BDSI students. This difference could be because Foundation Year students were in their first-time experience in the college environment and possibly felt that the college managed the COVID-19 crisis effectively resulting in a healthy mental status; unlike with BDSI students. Another possible explanation could be the implementation of COVID-19 management system by the college without meeting the needs of each BDS academic level or consulting the students in curriculum management. Therefore, the findings suggest that it is important

to consider students' opinion or meet their needs when managing any crisis related to dental education. This was emphasised by Geraghty et al³³ and AlHamdan et al³⁴ that involving students' feedback in the designing of curriculum (e.g. delivery of sessions) would increase students involvement in the learning process. This ultimately would increase their satisfaction and healthy mental status. Our study is the first study to report the differences between the BDS levels of study. This study assessed the difference between male and female in all five themes including mental health issues. The findings of this study are similar to the findings of Cao and his team¹⁷ in China, where no difference was found between males and females in all five themes including mental health issues.

Relationship

The ODC online services during the pandemic theme is positively related to the students' mental health during that time. This means that the online lectures had a significant impact on the students' mental health issues. One of the possible explanations of this finding is the online strategy used by the college helped in reducing mental health issues among the BDS level four (BDSIV) students. This echoes the finding of Hilliard et al³⁵ that many students felt a reduction in levels of anxiety during online learning. Furthermore, the college made the shift from physical learning to online learning gradually which helped reduce the anxiety and stress levels in the students who used the services. Fawaz and Samaha³⁶ emphasized that the sudden shift to the online learning could lead to anxiety and depression among the students. This is the first study to report this association and it emphasises the positive association between satisfaction of online services during the pandemic and students' mental health status.

Limitations

This study is limited to a small number of dental students from ODC and it is based on the convenience sampling method. In addition, the majority of the participants were female dental students (81.9%) which does not represent the targeted population in the college. Some of the themes in the questionnaire had poor internal consistency score resulting in their exclusion from the comparison or correlation analysis. Moreover, the findings from this study could be outdated since the management of the pandemic continues to evolve. Nonetheless, the results can be a fair representation of the experience of dental students from all levels of study. Future studies may be undertaken to compare different dental schools at the regional level and with good Cronbach alfa score to themes relating to Students' attitude/perception about ODC's assignments during the COVID-19 pandemic; and the students' attitude/perception about the support offered by ODC faculty during the pandemic.

Conclusions

- COVID-19 affected many college students internationally and locally including ODC students.
- The findings from the current study indicates that ODC students were experiencing certain mental health related issues caused by COVID-19 which included anxiety, stress and sleeping patterns.
- Most of the students appeared to be satisfied with the online teaching provided by the college and the faculty were connected with the students most of the time.
- Students were not comfortable with the management of clinical education and expressed difficulty with regards to the open book assignments.
- There is a positive relationship between the management of online lectures and students' mental health.
- The findings from this study could apprise the managements of educational institutions in making academic decisions especially pertaining to clinical practice included in dental and medical programmes.
- Such information may also help other educational institutions like ODC to prepare and allocate resources to support its students in the future as needed.

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