

Post COVID-19 pandemic assessment of quality of life of dental students using the WHOQOL-BREF questionnaire

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Abstract.

BACKGROUND: COVID-19 bitterly jolted the lives of masses around the globe, and affected the physical, mental, health, and quality of life of majority of individuals.

OBJECTIVE: The aim of the study was to assess the quality of life of dental students of public and private colleges and those residing in college accommodation and own home using the WHOQOL-BREF questionnaire.

METHODS: This cross-sectional study was conducted amongst 402 dental students of a private and public university. Students' *t*-test was used to compare the data. Relationship between gender, institute and accommodation (college accommodation or own home) was assessed by multiple linear regression. *P*-value of <0.05 was taken significant.

RESULTS: The participants rated their quality of life to be good (mean Score $3.99 \pm SD 0.93$) during the post COVID-19 pandemic, while satisfaction with health was neutral to satisfactory (mean Score $3.77 \pm SD 0.87$). A significant difference regarding physical health and social relationship domains was observed between the private and public university students. Significant differences in all domains of QOL was also reported among students living in own homes versus those students utilizing college accommodation.

CONCLUSION: The post COVID-19 quality of life of dental students in both private and public institutes differed with respect to physical and environmental domains. The difference was more significant among the student living in college accommodation than those living at home, which underscores that efforts should be made to facilitate the students to improve their quality of life post pandemic so that they may be more focused on studies and perform better.

Keywords: Social domain, health domain, mental well-being, environmental domain

1. Introduction

COVID-19 is a neoteric transpired viral infection that within a minimal stretch of time, became a global pandemic since its initial reporting back in December 2019 in Wuhan, China [1]. It bitterly jolted the lives of masses and created havoc around the world resulting in deaths of millions. COVID-19 not only

jeopardized the existence of every individual, but also affected their physical, mental, general health and wellbeing [2, 3]. To curb the situation strict quarantine measures including restricted out-door physical activities, confinement to homes, travel prohibitions, prolonged enforced lockdowns and social isolation measures were imposed to protect the people from this deadly, contagious disease [4, 5]. Extreme measures were taken to overcome the pandemic; however, heightened confusion, insecurity and uncertainty had a negative impact on the mental health as well as quality of life of the already stressed and anxious people

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[6, 7]. Research conducted by Brooks et al. suggested that the negative effects suffered by the people due to quarantine were akin to symptoms of post-traumatic stress disorder (PTSD), anxiety, and depression [8].

Medical and dental university students when compared with general public experience higher levels of stress, emotional distress and exhaustion which affect their quality of life [9]. A survey conducted on university students, revealed significant increase in stress, depression, anxiety, and PTSD among the students during the COVID-19 crises [10]. Wang et al. surveyed the university students of US and concluded that about 48% students experienced depression, 38% experienced anxiety and 18% had suicidal thoughts during the COVID-19 lockdown which was quite alarming [11]. A study conducted in India by Menon et al. showed that more than three-fourths of medical and dental university students experienced great stress during COVID-19. Uncertainty about the future, academic progress and family health were the major stress factors observed [12]. Another recently conducted study by Agius et al. observed that COVID-19 pandemic evoked fear of tarnishing their manual dexterity skills (due to hospital outpatient-department closures) in students. They were also anxious regarding its consequences on their professional training, and skills [13].

Quality of life (QOL) is a broad, multidimensional concept that comprises physical health, mental health, economic conditions, personal beliefs and interaction with the environment [14, 15]. In other words, quality of life and wellbeing in terms of health involve a combination of various bio-psychosocial factors [16]. The WHO QOL-BREF was developed by a team of WHO QOL to formulate a document that would efficiently address the concept and definition of quality of life and can be applied cross-culturally for assessing QOL. It encompasses the physical health domain which takes into account facets such as mobility, discomforts, laziness/energy and dependency in performing the day-to-day activities of an individual whereas psychological domain consists of cognitive capabilities, perceptions regarding self-esteem, appearance and spirituality. Social domain includes personal, social and sexual relationships and environmental domain takes into account details pertaining to safety/security, freedom, living conditions, pollution and leisure/recreational activities. All of these facets comprehensively measure QOL among the population.

Previous research executed in Pakistan among healthcare professionals (HCP) using WHO QOL-

BREF depicted their relatively less satisfaction with physical and environmental domains and considerable satisfaction with the social domains of QOL because HCP have long working hours and stressful jobs but more social interaction with patients in their daily routines [17]. Another study by Al-Shibani reported favorable satisfaction of dental students regarding the environment domain, psychological domain and physical domain of QOL [28].

Conversely to former research findings, education and learning of undergraduate medical students was greatly affected during COVID-19 and created psychosocial changes which comprised of excessive worrying, restlessness, irritability, body aches and lack of concentration during daily activities among students especially females, during the time of home quarantine effecting their QOL [18, 19]. Research conducted on private medical and dental students of Lahore also identified poor quality of sleep and mental health during the COVID-19 lockdown [20, 21]. Nizam et al. reported alarmingly high levels of perceived stress among medical, dental, pharmacy and allied students from all over Pakistan and emphasized stress management techniques to be implicated for students' psychological improvement [22].

Although multiple studies have catered to the psychological issues of medical and dental students in Pakistan and around the globe during the COVID-19 lockdown, but researches addressing the quality of life after relaxation of COVID-19 restrictions are scarce. None of the research compared the differences in the quality of life between private and public sector dental universities' students. Hence, the objective of this study was to assess the quality of life of public and private sector college/university of Karachi and compare the findings between the students residing in college accommodation (away from family) or own home (with family and guardian). This research will help determine the measures that are required to be taken in the right direction to overcome the academic stresses of students so that they may perform better during their daily life routines and improve the quality of life amidst the period of ongoing uncertainty.

2. Materials and methods

2.1. Study setting and population

This descriptive, cross-sectional study was conducted amongst all undergraduate dental students (males and females) of Bahria University Den-

tal College (BUDC) representing the private sector university and Dow University of Health Sciences (DUHS) representing the public sector university at Karachi.

2.2. Sample size

The sample size was computed as 388 using online OpenEpi software (<https://www.openepi.com/SampleSize/SSCohort.htm>) for X-sectional studies version 3.01, keeping confidence level of 99% and 1% margin of error. However, the sample size was rounded off to 400 to prevent errors in data analysis due to drop-off.

2.3. Duration of study and sampling technique

The research data was collected during a period of 3 months, i.e., from May and July 2021. Data from private sector dental students was obtained via convenience sampling technique whereas data from public sector university students was obtained using cluster sampling technique keeping year of education, age and place of availability as clusters.

2.4. Ethical approval

The study was approved and ethical permission was obtained from the Ethics Review Committee of Bahria University (ERC 76/2021) before commencement of the research. The study was executed in accordance with the Declaration of Helsinki.

2.5. Inclusion and exclusion criteria

The inclusion criteria for the participants included students from each professional year of BDS, students willing to participate in the study and those who filled in the questionnaires completely. The exclusion criteria included participants not giving consent to participate and those absent on the day of data collection.

2.6. Data collection procedure

All the dental students from 1st to final year BDS, studying in BUDC and DUHS were approached for data collection during their free periods. The objectives and purpose of study were explained to each participant. Willingness to fill in the form was taken as consent to participate in the study. Informed consent was also signed by every participant. The average response time for the questionnaire was about 10–15 min.

2.7. Study tool

The questionnaire/scale used for this research was a modified version of validated World Health Organization Quality of Life Scale-Short Form (WHO QOL-BREF) consisting of 26 questions [23]. The WHOQOL-BREF questionnaire was selected as this incorporates questions pertaining to physical, psychological, social and environmental domains of quality of life rather than other scales and questionnaires which assessed generally anxiety and depression such as DASS-21 scale. Also it has been recommended by the World Health Organization (WHO) as a validated tool and is possibly one of the best tools for assessing the quality of life.

The initial part of questionnaire comprised of demographic details while the subsequent portion comprised of 24 questions pertaining to four domains of well-being, each containing questions specific for each domain. For instance, physical health component comprised of 7 questions relating to daily life events, energy, working capability, rest and sleep, medicinal dependency, fatigue, mobility related pain and discomfort.

The psychological domain catered to 6 questions relating to negative or positive feelings, self-esteem, bodily appearance and image, religion, thinking, learning, memory and concentration. The social relationship domain consisting of 3 items social support and personal relationships while 8 facets of the environmental domain encompassed financial resources, safe-security, accessibility to quality health care system, home, and physical environment along with recreation/leisure activities opportunities.

One question asked the respondents how they would rate their quality of life and the second inquired about their perceived satisfaction with their own health. Each question was rated using the 5-point Likert scale, where score 1 represented dissatisfaction and disagreement and score 5 depicted higher satisfaction and agreement. Therefore, lower score (1–2.5) signified poor quality of life whereas higher scores (3.5–5) denoted better quality of life. The overall reliability of the scale was found to be 0.836, assessed through Cronbach's alpha.

2.8. Data analysis

All the collected data was processed and analyzed by the Statistical Package for Social Sciences, version 23 (IBM Corp., Armonk, NY, USA). Descriptive analysis was used to express categorical data

which was represented as frequency and percentages while continuous variables were expressed as mean and standard deviation (SD). Cronbach's alpha was employed to estimate the reliability of the WHOQOL-BREF domains. Student's *t*-test compared the means of four domains whereas Pearson's correlation assessed correlation between the four domains with the overall quality of life and satisfaction with health. Relationships between gender, institute and students residing at home or college accommodations with quality of life domains were assessed by multiple linear regression.

3. Results

A total number of 402 proformas of participating students were found accurate and incorporated in the study after a thorough assessment for incomplete and faulty filled proformas. Out of the 402 students, 85.3% ($n=343$) were females, while male constituted about 14.7% ($n=50$) of the study population. The mean age of the participants was 20.87 years. Bahria University Dental College representing the private sector comprised about 45.3% participants, whereas 54.7% participants belonged to Dow University of Health Sciences, which represented the government/public sector. Most of the participating students (30.8%) belonged to 3rd year of Bachelor of Dental Surgery program (BDS) followed by 24.9% from 1st year. Students/participants residing in hostel facilities to pursue their degrees were about 32.3% while 67.6% participants were non-hostelites living with families or relatives (Table 1).

Table 1

Demographic characteristics of the study participants

Characteristics	n	%
Gender		
Male	59	14.7%
Female	343	85.3%
Institute		
Private	182	45.3%
Public	220	54.7%
Year of study		
1 ST	100	24.9%
2 ND	80	19.9%
3 RD	124	30.8%
4 TH	98	24.4%
Residency		
Hostelite	130	32.33%
Non – hostelite	272	67.6%

n = sample number/ frequency, % = percentage.

The mean scores of WHOQOL-BREF domains, rate of quality of life and satisfaction with health along with the Cronbach's alpha coefficient were assessed. The participants rated their quality of life to be good during the post COVID-19 period (3.99 ± 0.93), while satisfaction with health was neutral to satisfactory (3.77 ± 0.87) where 1 represented very poor/very dissatisfaction while 5 depicted very good and very satisfied. Cronbach's alpha showed that the reliability and internal consistency between the 4 domains was good with a mean value > 0.8 stipulating good internal uniformity among the domains (Table 2).

Comparison between the four domains of WHOQOL revealed a statistically significant difference between the students of both public and private sector institutions with respect to physical health domains ($p=0.019^*$) and social relationship domains ($p=0.047^*$).

The psychological and environmental domains, however, showed non-significant difference. Meanwhile statistically significant differences were observed for all the 4 domains among the students living the life of a hostelite versus the students who were living with their own families or close relatives (non-hostelites) (Table 3).

Pearson's correlation coefficient demonstrated a significantly higher and positive correlation between the mental health and environmental domains with the students' personal satisfaction with health whereas a moderate association with the physical and social domain ($p < 0.001^*$). However, a moderately positive and significant association was observed with physical, mental, social and environmental health and students' rate of quality of life ($p < 0.001^*$) (Table 4).

Multiple linear regression model shows that gender was statistically associated with Psychological domain ($B = -0.027$, 95% CI = -0.049 to -0.005 , standardized $\beta = -0.210$, $p = 0.017$) and Social domains ($B = 0.19$, 95% CI = 0.005 to 0.034 , standardized $\beta = 0.165$, $p = 0.009$) of quality of life. Public/private sector institute also significantly influenced the Physical domain ($B = 0.042$, 95% CI = -0.015 to -0.070 , standardized $\beta = 0.245$, $p = 0.003^*$), Social domain ($B = 0.0271$, 95% CI = 0.001 to -0.042 , standardized $\beta = 0.130$, $p = 0.040^*$) and Environmental domains ($B = -0.023$, 95% CI = -0.045 to -0.001 , standardized $\beta = -0.173$, $p = 0.037^*$) whereas the residency (hostelite/non-hostelite) of the students was significantly associated with only the Social domain ($B = 0.036$, 95% CI = 0.017 to 0.055 , stan-

Table 2
Descriptive statistics and Cronbach's alpha score related to domains

Domains	Mean	SD	Min	Max	Cronbach's alpha
Physical health domain (D1)	12.9723	2.89271	4.57	20.0	0.832
Psychological domain (D2)	14.2023	2.77402	4.67	20.0	0.832
Social relationship (D3)	15.5257	3.04988	4.00	20.0	0.836
Environmental domain (D4)	16.4610	3.73577	5.33	23.33	0.827
Rate your quality of life	3.99	0.93	1.0	5.0	0.846
How satisfied are you with your health?	3.77	0.874	1.0	5.0	0.846

Descriptive statistics, SD = Standard Deviation, D = domains.

Table 3
Comparison of domains among private and public sector institutes and between students living in homes versus students residing in college/university accommodation

Domain	Specification	Mean \pm Std. Deviation	P-value
Institute			
Physical health domain (D1)	Private	12.59 \pm 2.47	0.019*
	Public	13.28 \pm 3.16	
Psychological domain (D2)	Private	14.07 \pm 2.47	0.397*
	Public	14.30 \pm 2.99	
Social relationship (D3)	Private	15.19 \pm 2.94	0.047*
	Public	15.80 \pm 3.11	
Environmental domain (D4)	Private	16.40 \pm 3.39	0.791
	Public	16.50 \pm 4.00	
Residency			
Physical health domain (D1)	Own home	12.36 \pm 2.66	0.003*
	College accommodation	13.27 \pm 2.95	
Psychological domain (D2)	Own home	13.74 \pm 2.18	0.019*
	College accommodation	14.43 \pm 2.72	
Social relationship (D3)	Own home	14.42 \pm 3.36	<0.001*
	College accommodation	16.06 \pm 2.73	
Environmental domain (D4)	Own home	15.45 \pm 4.18	<0.001*
	College accommodation	16.97 \pm 3.39	

Students *t*-Test, * = significant *p*-value < 0.05, D = domains.

Table 4
Correlation of students' quality of life domains with their rating and satisfaction with quality of life

Variable		Physical health	Mental health	Social health	Environmental health
Rate your quality of life	Correlation coefficient (r)	0.453	0.572	0.501	0.552
	<i>p</i> -value	<0.001*	<0.001*	<0.001*	<0.001*
How satisfied are you with your health?	Correlation coefficient (r)	0.585	0.624	0.507	0.618
	<i>p</i> -value	<0.001*	<0.001*	<0.001*	<0.001*

Pearson correlation, * = Significant *p*-value < 0.05.

standardized $\beta = 0.234, p < 0.001^*$). Year of education did not show any significant association with any of the 4 domains of quality of life (Table 5).

4. Discussion

The COVID-19 pandemic left unprecedented impact and deleteriously burdened the lives of millions of children and adolescents in every part of the world, affecting their health and quality of life causing mental health issues and heightened anxiety [24]. This study is the first in Pakistan, aimed to assess the

level of quality of life of dental students according to different domains of quality of life and explore its comparison between students studying in public and private sector universities and residing in personal or rented residential spaces (hostelite/non-hostelite) during the post COVID-19 phase.

Female students predominated forming 85.3% of the study population. Similar higher female predominance was also observed by Huseyin (74.5%) in Turkey and Zhang (62%) in China [6, 10]. Contrasting male predominance of 52% as compared to 48% females was however reported in a study conducted in Saudi Arabia [18]. The reason for contrasting male

Table 5
Multiple linear regression model association of objective variables with the domains of quality of life

Variables	Unstandardized coefficients		Standardized coefficients	t	P-value	95 % C.I for B	
	B	SE	Beta			Lower bound	Upper bound
Gender							
Physical domain	0.009	0.010	0.076	0.925	0.355	-0.010	0.029
Psychological domain	-0.027	0.011	-0.210	-2.394	0.017*	-0.049	-0.005
Social domain	0.019	0.007	0.165	2.607	0.009*	0.005	0.034
Environmental domain	0.006	0.008	0.065	0.788	0.431	-0.009	0.022
Institute							
Physical	0.042	0.014	0.245	2.997	0.003*	0.015	0.070
Psychological	-0.016	0.016	-0.090	-1.033	0.302	-0.047	0.015
Social	0.021	0.010	0.130	2.057	0.040*	0.001	0.042
Environmental	-0.023	0.011	-0.173	-2.089	0.037*	-0.045	-0.001
Year of study							
Physical	0.056	0.032	0.146	1.767	0.078	-0.006	0.118
Psychological	-0.035	0.035	-0.086	-0.977	0.329	-0.104	0.035
Social	-0.031	0.023	-0.084	-1.313	0.190	-0.076	0.015
Environmental	0.024	0.025	0.081	0.976	0.330	-0.025	0.073
Residency							
Physical	0.010	0.013	0.059	0.732	0.465*	-0.016	0.035
Psychological	-0.027	0.015	-0.157	-1.824	0.069	-0.056	0.002
Social	0.036	0.010	0.234	3.770	<0.001*	0.017	0.055
Environmental	0.014	0.010	0.113	1.395	0.164	-0.006	0.035

* = Significant p -value < 0.05, C.I = Confidence Interval, SE = Standard Error.

dominance may be due to differences in cultural norms since educational opportunities for males are more in Saudi Arabia as compared to females.

Quality of life (QOL) is a broad term that evaluates people's health [25]. The WHO defines quality of life as "an individual's perception of their position in life, in the context of culture and value system in which they live and in relation to their goals, expectations, standards and concerns" [26]. It concentrates on the proper physical, psychological and social functioning of the human body in their environment. WHOQOL-BREF, a brief version of WHOQOL-100, that is employed in this study to determine the QOL under the 4 important domains that represent the physical, psychological, social and environmental domains [27].

The mean scores of WHOQOL-BREF scale's domains among the present study population were found favorable and similar to a study by Al-Shibani [28] (Table 2). In this study, the mean physical health scores and psychological domain scores (12.97 and 14.20) was reported to be less when compared with the findings of a similar study (19.77 and 17.64) [28]. Decreased physical health domain (D1) scores are reflected by the reduced psychological domain (D2) scores and signify that lack of physical activity tends to influence mental health. In short they have a directly proportional response to each. Environmental domain score was found to be highest

in the present study. Comparable highest scores in environmental domains were observed in studies by Malibary et al. in Saudi Arabia and Naseem et al. in Pakistan [29, 30]. These observations underpin the influence that COVID-19 lockdown measures had, both on the physical and mental health of the students, the after-effects of which are still taking time to recover and normalize. Lower mean scores in psychological (12.71), social (13.65) and environmental domains (12.25) were also reported in Italian students by Epifanio et al. in comparison to our students [31]. The lower scores in the aforementioned domains may be due to the fact that Italian population was severely affected by the wraths of COVID-19 and this badly affected their quality of life as represented by the QOL scale's score. Higher physical composite score was however found to be associated with higher mental comparative scores in collegiate students by Snedden in the USA [32]. The proposed reason for these results may be because the study was conducted in 2018, a time when the world was free from any global pandemic threats and implications of lockdown measures did not exist to halt the propagation of the deadly COVID-19 virus.

An Iranian study by Shahrestanaki et al. conducted on medical science students using the WHOQOL-BREF questionnaire found higher domain scores (physical domain = 24.50, psychological domain = 20.53, environment = 25.96), and higher

overall quality of life scores (7.26) as compared to the present study [33]. These contrasting findings with the present study, promotes that QOL of students was better and satisfactory in the pre-COVID than the post-COVID period. A recent study carried out in Jordan also reported lower mental and physical health related quality of life among the health care students that was influenced by academic as well as lifestyle related factors [34]. Salman et al. also observed adverse impact on the mental health of 4 major university students of Pakistan and emphasized that mental health of students was affected as a result of COVID-19 and should not be ignored [35].

University life is an important period of an individual's life, where they acquire knowledge, new skills, gain experiences, and develop and expand their social networks. However, for many students, especially hostelites, this can be stressful since they must manage life on their own, away from their families, worry about financial constraints, and lead an independent lifestyle [36]. The present study observed a statistically significant difference in all the 4 domains of quality of life between hostelites (students living away from family) and non-hostelites students (living with their family). Alsubaie et al. reported that quality of life of university students who had family/friends and social support had a better quality of life which was evident by better psychological domain (21.37 ± 3.60) and social relationship (11.0 ± 2.49) scores and no depression [36]. These findings underpin the essential influence that presence of family/friends or near and dear ones have on one's mental health and wellbeing. These findings support the statistically significant and contrasting results in all the quality of life domains between hostelites and non-hostelites reported in our study. (Table 3) A longitudinal study on medical students in Korea revealed that friends and family constitute an individual's support system and had a statistically significant and positive influence on all the sub-domain scores of quality of life [9]. Abdullah et al. found out that mental and social QOL was affected in students of a public medical university during the pandemic when they were compared with general population norms and participants who had greater family and friends support. A higher QOL score was also seen in these students in correlation to those living away from family [37].

Statistically significant difference was also reported in the physical domain ($p=0.019^*$) and social relation domain ($p=0.047^*$) among the public sector and private sector students with no

difference in psychological and environmental domains of QOL during the post-COVID period. The difference may be observed due to lifestyle changes and better privileges available to private sector students in comparison to public sector students. These findings are comparable to a similar study in Pakistan [30]. Statistically significant and moderately positive correlation existed between the dental students' QOL domain scores and their personal rating of satisfaction with health. Hence in view of the findings it is imperative to note that the COVID-19 pandemic did affect the quality of life of students studying in health care facilities. Thus, by facilitating our students with stress relieving measures, and incorporation of friendly conducive learning environment, will help them overcome their physical, psychological and social deficiencies and normalize their lives again.

Strengths of this study are that it was a comparative, multi-centric research executed to assess the impact which COVID-19 had on the quality of life via a validated WHOQOL-BREF questionnaire on dental students who were already stressed due to the educational uncertainty posed by the COVID-19 pandemic. Evaluation of QOL of our students will help us devise policies whereby efforts will be directed towards reducing the mental and environmental stresses imposed on the students due to academic burden as well as COVID-19 lockdown measures, so that they may be able to perform better and further improve their quality of lives.

4.1. Limitations

The current study was conducted on students from a single private and public sector dental institute within the reach of the researchers. Secondly in this study only dental students were involved whilst the QOL of students belonging to other medical and non-medical specialties were not considered. Also, the gender discrepancies observed in our study may prevent generalization of result for male and female students' population.

4.2. Recommendations

Few recommendations that have been identified for future research, which includes conducting research on a larger sample size, catering multiple universities involving both medical/ dental and non-medical specialties from public and private sectors, and explore their quality of life post-COVID-19. Future research

must consider taking equal number of male and female participants, which would prevent biasness and authenticate the results. This will help researchers to understand the difficulties being experienced by the students of both genders that would help overcome their problems and improve the quality of lives. This will also enable students to utilize their full potential towards attaining education as well as serve as better pillars for the nation in its progress and development.

5. Conclusion

WHOQOL-BREF was found to be a validated, reliable and effective tool for assessing the quality of life of dental students during the post-COVID-19 period. Overall students rated their QOL to be good and were satisfied with their health. However, statistically significant difference was observed in the mean QOL domains' score among the students residing in own homes with the students utilizing college accommodation, while the difference between public and private sector students was observed in physical health and social domains only. Psychological and environmental domains were similar in both the sector students signifying that COVID-19 had similar impact on the mental and physical environment of every student.

Ethical approval

Institutional ethical approval (ERC 76/2021) was obtained prior to commencement of research.

Informed consent

Informed consent was obtained from all participants.

Conflict of interest

The authors have no conflict of interest to declare.

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