Computational Impact Analysis of Mental Health and Stress Coping of University Students amid COVID-19 Pandemic

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Abstract

Objectives: To compare the levels of anxiety on GAD-7 scale among undergraduates of dental, medical and engineering students during COVID-19. The secondary objectives were to correlate the factors influencing level of anxiety and to assess the coping strategies practiced by undergraduates' students of Karachi duri.ng COVID-19 outbreak.

Methodology: The cross-sectional based survey was conducted online among the medical, dental and engineering undergraduates' university students of private sector in Karachi through purposive sampling technique during COVID-19 lock down period. The GAD-7 validated tool was used along with the demographic variables, related stress factors and the coping skills practiced during this outbreak. Total 571 questionnaires were found completed in all sections. The data was analyzed on SPSS version 23. P-value <0.05 was considered as statistically significant.

Results: The mental health of the students was assessed on GADS-7 scale as normal, mild, moderate and severe levels. From the total (n=18-3.2%) were normal, (n=132-23.1%) had mild, (n=343-60.1%) had moderate and (n=78-13.7%) had severe anxiety level on GADS-7. The levels of anxiety on GAD-7 scale were all positively associated with the related stressors at p-value of 0.000. Moreover the results depicted that there was a moderate and positive correlation found (0.456, 0.447, 0.512 and 0.452) for all related stressors and GAD-7 scale. Taking breaks from watching, reading news regarding the outbreak of COVID-19, meditation and engaging in some other activities were the most frequently used coping strategies for all levels of anxiety among three cohorts of undergraduates'.

Conclusion: Undergraduates has shown 96.9% drastically increased level of anxiety during the outbreak of COVID 19 pandemic. Taking breaks from watching, reading news regarding the outbreak of COVID-19 was the most frequent behavior practiced by the students.

Keywords:
Coping Skills, COVID-19, Dental Undergraduates, Medical Undergraduate, Mental Health.

1. Introduction

The COVID-19 termed as novel COVID-19 has aggressively expanded in entire world from China in Dec 2019 [1] and in Pakistan from Feb 28th, 2020 [2]. The COVID-19 expressed as acute pneumonic infections [1]. It is termed as novel due to its typical features of previously unknown MERS (Middle East respiratory syndrome in 2011 and SARS-COV-2 (severe acute respiratory syndrome coronavirus 2) in 2002-2003. The WHO declared public health emergency on January 30-2020 of international concerns [3].

Worldwide; COVID-19 causes 355461 fatalities till May 28-2020 [2] and placed a huge burden on healthcare system worldwide including Pakistan [4]. There were total 1260 deaths, 61,227 confirmed cases, 20,231 recovered cases of COVID-19 in Pakistan till May-28-2020 [2]. The development of vaccination or treatment against the pandemic of COVID-19 is formidable challenge for developed and developing countries. Strict precautionary measures are enforced in majority of countries where case incidences and case fatalities are increasing not on daily basis but on hourly basis.

The precautionary measures includes closure of educational institutes, social distancing, frequent hand washing for 20 seconds ,wearing mask , social isolation and lock down is been enforced worldwide. The COVID-19 pandemic has dreadful consequences on every aspect of human life such as economical, healthcare, educational, social and cultural.

In Pakistan the educational institutes were closed from March 18-2020 to implement social distancing and to prevent the local transmission of COVID-19 among students. All these preventive measures especially social distancing, self isolation, lock down and closure of educational institutes posed a huge burden on psychological health on every individual on this earth. People all around the world are facing various mental disorders during this COVID-19 outbreak such as anxiety, post traumatic disorder during self isolation and quarantine because of the uncertain consequences of this outbreak [5].

Recent studies have been conducted in China to assess the impact of COVID-19 pandemic on the psychological health of healthcare workers, patients, older people, children and college students in which 24.9% of college students were experiencing anxiety during the COVID-19 crisis [4][6][7][8]. According to the literature; studies have been conducted in Pakistan to assess the psychological impacts of COVID-19 on front line workers, adults [9]. However; the impact of COVID-19 on psychological health of undergraduates students and the coping skills practiced

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during this pandemic in Karachi Pakistan is unattended in literature to date and indeed it was the rationale of this study.

Though; delaying in reopening of the educational institutes due to the increasing COVID-19 cases; have the frightful impact on the psychological health of the undergraduate students. There are various anxiety assessment tools used in literature to assess the psychological health of dental undergraduates [10][11].

The GAD-7 (Generalized Anxiety Disorder Scale) is 7 item validated tool used for screening and diagnosis of anxiety disorders. The GAD-7 is a modified version of "Patient Health Questionnaire-PHQ" (1999 Spitzer et al) which was the first developed self reported questionnaire to screen the general anxiety disorders in primary health care settings [12]. The GAD-7 tool is easy to score and takes approximately less than 3 minutes [13]. Now; GAD-7 is widely used in research and in clinical practice to screen anxiety disorders because of its efficiency and diagnostic reliability [14]. According to Moreno et al. 2019; the GAD-7 is used for diagnosis and evaluation of severity of anxiety disorders, panic disorders, post-traumatic stress disorders and social phobia [15]. For undergraduate college and universities students it is significantly important to address their psychological health during public health emergencies such as COVID-19 pandemic. This study will assist to evade the emotional losses and find the appropriate strategies to regulate the behavior during the crisis of COVID-19.

Therefore; the primary objective of this study was to compare the levels of anxiety on GAD-7 scale among undergraduates of dental, medical and engineering students during COVID-19. The secondary objectives were to correlate the factors influencing level of anxiety among undergraduate of dental, medical and engineering students and to assess the coping strategies practiced by undergraduates' students of Karachi during COVID-19.

2. Methodology

The cross-sectional based survey was conducted online among the medical, dental and engineering undergraduates' university students of private sector in Karachi through purposive sampling technique. This study was executed from 5th to 25th May -2020 after obtaining the ERC approval from Bahria University Medical and Dental College numbered 50-2020. The questionnaire comprised of five sections; in first section the consent was obtained from participants by providing the rationale of the study and anonymity of the subjects was assured.

The second section comprised of the demographic parameters such as age, gender, undergraduate course, steady family income, live with parents and any relative infected with COVID-19. The third section was regarding the psychological assessment based on GAD-7 questionnaire. The GADS-7 is a validated tool and has established internal consistency of Cronbach's $\alpha = 0.911$) [4].

The psychological assessment was rated as levels of anxiety among undergraduates as normal, mild, moderate and severe. The minimum and maximum score was 0 and 21. The 0 score is rated as normal, and 1-7, 8-14 and 15-21 were rated as mild, moderate and severe respectively. The fourth section was regarding the stress coping strategies during COVID-19 and nine options were provided as take breaks from watching, reading or listening to news/stories regarding pandemic, take deep breaths and stretch, meditate, exercise regularly, get plenty of sleep, try to do some other activities you enjoy, connect with others and any other coping skills apart from the mentioned options. The last section was inquired about the factors influencing stress during this pandemic and the responses were on four point likert scale as 0-3 same as the responses of GAD-7 tool. Participants were rated the responses as experienced during last two weeks.

The content validity of the study tool was reviewed by the five public health experts of the institutes and the corrections was incorporated before conducting the pilot studies among fifteen students of physiotherapy. The results of the pilot study were not included in the final data analysis.

The sample size was calculated by standard formula for sample size calculation by keeping the prevalence of 24.9% [5]. The calculated sample size was 288 but as to bring more significant results and keeping in mind the 20% wastage; the augmented sample size was 600. Total 600 questionnaires were distributed in three undergraduates' institutes of medical, dental and engineering. The administrative permission was obtained verbally before executing the study in engineering institute. Total 571 questionnaires were found completed in all sections. The data was analyzed on SPSS version 23. Mean was calculated for age, frequency was calculated for gender, undergraduate course, steady family income, lived with parents and any relative infected with COVID-19.

Kolmogorov-Smirnov and Shapiro-Wilk test were used to check the normality of data. Association of demographic variables in three cohorts of students was analyzed with chi square. The inferential statistics was performed for quantitative variables such as Kruskal Wallis and Mann Whitney U Test. The spearman correlation coefficient analysis was performed for the related stressors of COVID-19 such as economic, academic, daily life influences and social support during COVID-19 among students of three programs. Spearman's correlation coefficient, r, will be used to evaluate the association between COVID-19-related

stressors, including economic and daily-life related stressors, as well as stressors related to delays in academic activities, and anxiety level. P-value <0.05 was considered as statistically significant.

3. Results

There were total (n=203-35.5%) medical, (n=228-39.9%) dental and (n=140-24.5%) engineering undergraduates. There were total 154 (27%) male and 417 (73%) female undergraduates. The mean age of the students was 21.75+ 2.39. From the total subjects (n=453-79.3%) lived in urban areas, (n=87-15.2%) belonged to urban rural areas and (n=31-5.4%) from rural areas. Total (n=401-70.2%) undergraduates have steady family income, (n=501-87.7%) lived with parents and (n=120-21%) students' relative or acquaintance were infected with COVID-19 (Table-2).

3.1 Levels of Anxiety on GADS-7

The mental health of the students was assessed on GADS-7 scale as normal, mild, moderate and severe levels. From the total (n=18-3.2%) were normal, (n=132-23.1%) had mild, (n=343-60.1%) had moderate and (n=78-13.7%) had severe anxiety level on GADS-7 scale-Table-1.

Table-1. Undergraduates Students with Levels of Anxiety on GAD-7

Levels of Anxiety	N	%
Normal	18	3.2
Mild	132	23.1
Moderate	343	60.1
Severe	78	13.7

Table-2 revealed the demographic factors which can influence the levels of anxiety of during COVID-19 outbreak. Female students were found to have greater levels of anxiety as compare to male students. There was statistically significant difference showed among students lived in urban areas, steady family income, lived with parents and were found to have mild levels of anxiety at (88.6%, 84%,95.4%) respectively. Those students whose relative or acquaintance got infected with COVID-19 were experiencing severe (28.2%) level of anxiety and calculated p-value was 0.001. There was statistically significant difference found in levels of anxiety and students' residential place, steady family income and lived with parents during COVID-19 on GAD-7 scale at p-value of 0.016, 0.000 and 0.002 respectively-Table-2.

Table-3 revealed the comparison of mean ranks of levels of anxiety of three undergraduates cohorts; there was statistically significant difference found between mild and

Table-2. Univariate Analysis of Levels of Anxiety and influencing demographic factors of Undergraduates Students during COVID-19 pandemic.

Demographic Variables		Total = 571		Normal $n = 18$		Mild $n = 132$		Moderate $n = 343$		Severe $n = 78$		P-Value	
		N	%	*N*	%	*N*	%	*N*	%	*N*	%		
Gender	**Male**	154	27	5	27.7	28	21.2	101	29.4	20	25.6	0.089	Mann Whitney U-Test
	Female	417	73	13	72.2	104	78.7	242	70.5	58	74.3		
Residential Place	**Urban**	453	79.3	17	94.4	117	88.6	260	75.8	59	75.6	0.016	Kruskal-Wallis Test
	Urban-Rural	87	15.2	1	5.5	11	8.3	62	18	13	16.6		
	Rural	31	5.4	0	0	4	3	21	6.1	6	7.6		
Steady Family Income	**Yes**	401	70.2	16	88.8	111	84	219	63.8	56	71	0.000	Mann Whitney U-Test
	No	170	29.7	2	11.1	21	16	124	36.1	23	29		
Live with Parents	**Yes**	501	87.7	16	88.8	126	95.4	292	85.1	67	85.8	0.002	Mann Whitney U-Test
	No	70	12.2	2	11.1	6	4.5	61	17.7	11	14.1		
Relative or Family got COVID-19	**Yes**	120	21	2	11.1	8	6	88	25.6	22	28.2	0.001	Fischer Exact Test
	No	451	78.9	16	88.8	124	94	255	74.3	56	71.7		

Table-3. Comparing the mean ranks of levels of Anxiety on GAD-7 scale among three undergraduate Programs

Level of Anxiety GAD-7	Medical $n = 203$ Mean Rank	Dental $n = 228$ Mean Rank	Engineering $n = 140$ Mean Rank	P-Value Kruskal Wallis Test
Normal	289.37	279.97	290.92	0.061
Mild	266.21	283.13	319.37	0.000
Moderate	304.20	302.23	233.18	0.000
Severe	284.21	278.67	300.53	0.110

moderate levels of anxiety at p-value=0.000 on GAD-7 scale. (Table-3)

3.2 Interpretation

The correlation analysis of related stressors of COVID-19 included economic influence, academic delays, influence on daily life and social support for levels of anxiety among three cohorts of students.

The levels of anxiety on GAD-7 scale were all positively associated with the related stressors at p-value of 0.000. Moreover the results depicted that there was a moderate and positive correlation found (0.456, 0.447, 0.512 and 0.452) for all related stressors and GAD-7 score-Table-4.

Fig.1. depicted that taking breaks from watching, reading news regarding the outbreak of COVID-19 was the most frequent coping strategy used by (n=268) of students followed by engaging in some other activities (n=241).

On the other hand meditation and get plenty of sleep was the second most equally used coping strategy by all the students (n=156) during this outbreak of COVID-19.

Table-4. Spearman Correlation Analysis of GAD-7 Score and the related stressors of COVID-19

Related Stressors	GAD-7 Score "R"	P-Value
Worried about economic influences	0.456	0.000
Worried about academic delays	0.447	0.000
Influence on daily life	0.512	0.000
Social Support	0.452	0.000

R = Spearman Correlation Coefficient

3.3 Coping Strategies

Graph 1 depicted that taking breaks from watching, reading news regarding the outbreak of COVID-19, meditation and engaging in some other activities were the most frequently used coping strategies in all levels of anxiety among three cohorts of undergraduates'.

4. Discussion

There were ample studies proposed the effects of public health emergencies on mental health of undergraduate students expressed as psychological distress, depression, high level of anxiety and stress due to routine challenges of teaching and assessment [16][17][18][19][20][21][22][23][24]. This study was aimed to assess the impact of COVID-19 outbreak on mental health of undergraduate students, the factors influenced the stress and the coping skills practiced by the students. Though, our study has shown 96.9% level of anxiety during COVID-19 outbreak. The drastically

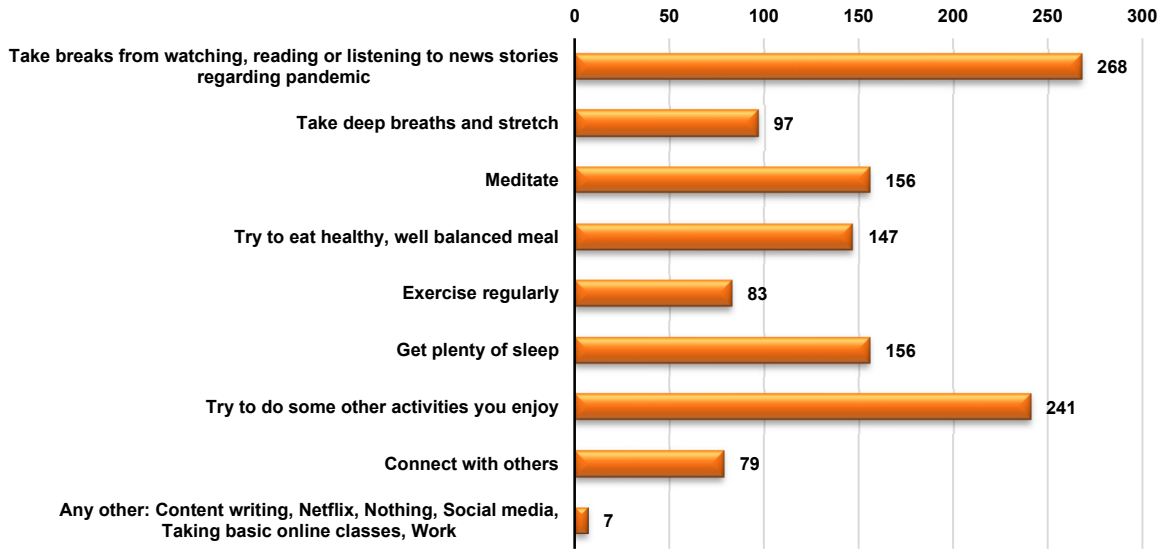

Fig.1. Coping Strategies during COVID-19 outbreak among undergraduates students of Karachi

increased level of anxiety in our study might be related to closure of educational institutes and lock down period and social distancing. Interpersonal communication is increased in this social distancing phase which is one of the important reason to deteriorate the mental health of the students [4]. Though emergency remote teaching has been executed in various educational institutes but it is difficult to conduct clinical content on virtual student environment which might be the reason of increase level of anxiety and fear of future employment [4]. The similar levels of stress were reported by Soma Gupta et al in which academic workload was the reason of 91.1% stress in majority of students [25]. In our study female students were found to be more affected with this pandemic situation comparing to male students as increased in overall level of anxiety reflecting compromised psychological health and analogous results were revealed from the various studies conducted worldwide on undergraduate medical students in which female students have been more affected psychologically as compared to male students [20][21][22][23]. However, Sat Pal et al reported increase mild to moderate anxiety levels in males then in female students [24] and in contrast Choi's in his overall findings, reported male students had higher levels of depression than female student's [26]. However no significant gender difference was found in our study as COVID-19 outbreak has similar psychological effects on general population irrespective to gender [4].

It is indicated in our study that demographic factors such as living in urban areas, steady family income , live with parents and any relative or acquaintance got infected with COVID-19 were associated with levels of anxiety; as living in urban areas have conducive effects on students anxiety level due to available resources. Living with parents and sound family finance has a positive effects on the stress level. These results were comparable to the study of Wenjun et al conducted in China [4]. The findings of our study regarding stress and anxiety in dental students as compare to engineering students are in agreement with the studies of Mane Abhay et al [27] and Chevvan R. et al [28] which have revealed that dental students reported more stress than students of engineering [29] and when compared with medical students, they have increase mild to moderate anxiety and stress then dental and engineering students agreeing with an study of Dutta AP et al published in 2005 [30] however recent studies reported engineering and dental students have experienced more stress then medical students [31][32][33].

Our study findings demonstrated positive and significant correlation between related stressors during COVID-19 (economic influence, academic delays, influence on daily life and social support) and scores of levels of anxiety among undergraduate students. The influence on daily life influenced higher than other stressors during the pandemic as people are isolated in their homes and social distancing is enforced. However studies reported that the most usual effecting stressor were academic concerns [34][35] fear of poor performance in examination, lack of recreation, loneliness, living in hostel or rental houses and family problem [36][37] in contrast one of the recent studies of Ethopia reported the related stresses increasing stress in engineering students are "Facing financial problem, poor social support, lack of interest in their field of study and unresolved conflict with roommate [38].

To get rid of these stressors is really very essential for mental health, one of the studies showed that how much it is crucial to empower undergraduate students training to cope with a stressful life by different adaptive strategies and skills, if not then will lead to depression which ends up in "increased utilization of maladaptive (dysfunctional) coping methods" [39].

The coping strategies commonly used by students in our study were taking breaks from watching news and television along with getting engaged in activities they enjoy. As the alarming sensational headline regarding COVID-19 pandemic have multiply the stress level [4]. However in a non-pandemic conditions positive reframing [39], praying or spiritual activity, followed by watching movies, communication with friends and family support was commonly approached strategies [35]. Two recent studies, Steiner-Hofbauer, V et al, [40] reported that spiritual activity affects negatively and positive thinking helps them to decrease stress and surprisingly the strong coping strategy reported was social support and second by Lee and Goldstein [41] suggested that social support from friends or love partner is buffering stress related problems in young adults but not family support. The limitation of the study included the subjective nature of the coping skills section used in the study. Therefore, it is recommended to start online counseling sessions so that the students can solicit assistance from professional counselors which should be easily accessible for students in need of psychological care or support. Additionally, universities should work on the curriculum modification during COVID-19 crisis and assess stressful academic content and try to implement necessary changes.

As there is a change in learning environment, new engaging strategies of assessment, teaching and learning should be incorporated and a multidimensional approach could be appropriate and fruitful.

5. Conclusion

Undergraduates has shown 96.9% drastically increased level of anxiety during the outbreak of COVID 19 pandemic. Taking breaks from watching, reading news regarding the outbreak of COVID-19 was the most frequent behavior practiced by the students.

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