FEAR OF CONTRACTING COVID-19 INFECTION AND ASSOCIATED PERCEIVED STRESS AMONG ADULTS WITH MULTIMORBIDITY: A COMPARATIVE CROSS-SECTIONAL STUDY

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ABSTRACT

Background and Objective: The global impact of COVID-19 has disproportionately affected individuals with comorbidities. Myths and misinformation about this emerging disease may have created fear and resultant mental health challenges. We aimed to examine the level of awareness and fear about COVID-19, and the perceived stress among patients with multimorbidity attending a tertiary care hospital of a developing country.

Methods: This cross-sectional comparative study was conducted in a tertiary care hospital of Lahore, Pakistan from 15 May 2022 through 20 December 2023, including 411 adult participants using systematic random sampling method to select every third OPD patient with ≥ 2 chronic conditions. A semi-structured questionnaire was used to record socio-demographic data, co-morbid conditions, and COVID-19 information sources. We used Perceived Stress Scale (PSS) to categorize stress. Data analysis employed univariate and bivariate descriptive and inferential statistical techniques, using Chi-Square test for statistical significance. Binary logistic regression was used to identify the determinants of perceived stress using SPSS version 26.

Results: Of 411 participants, 216 (53%) were men with 106 (49%) were over the age of 50 years. Age difference between genders was not statistically significant (p=0.69). Most participants were employed and from urban areas. Hypertension (48.7%) and diabetes mellitus (48.2%) was the common combination for multimorbidity with predominance in women (p<0.05). Fear of COVID-19 resulted in higher stress in women than men (moderate-to-high perceived stress of 72% versus 63%). We found higher odds of perceived stress in those with higher education (OR=2.36), those aged 35-50 years (OR=1.11) and among diabetics (OR=1.42).

Conclusion: Despite considerable awareness about COVID-19 modes of transmission and preventive strategies among adults with multimorbidity, there exist a substantial moderate to high perceived stress in men and women living in a developing country and they are fearful of contracting this disease and its subsequent consequences.

Key Words: COVID-19, multimorbidity, comorbid conditions, stress, fear, Perceived Stress Scale, infection, cross-sectional study

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A cluster of atypical pneumonia cases was reported during December 2019 in Wuhan City of China. Considering previous outbreaks of SARS in this region, the health officials notified these cases as SARS-CoV-2.[1] Later, the World Health Organization (WHO) labeled this infection as COVID-19 and the associated virus as SARS-CoV-2.[2,3] To date, over

650 million confirmed cases of Covid 19 infection and over 6.6 million deaths have been reported globally.[4] In Pakistan, more than 1.5 million cases were reported since 2020 with 30 thousand deaths.[5]

Data suggest that COVID-19 infection and its subsequent complications occur predominantly in individuals with pre-existing multimorbidity.[6] Awareness campaigns using print, electronic, and social media have repeatedly propagated this information during the pandemic in Pakistan. This generated a sense of fear among people, especially in older individuals and those with chronic illnesses. This may result in anxiety and subsequently mental health issues. Additionally, several misconceptions and misinformation about this infection arose in the community which further created confusion, a sense of distress, especially among those suffering from conditions like diabetes mellitus, hypertension, autoimmune diseases, chronic obstructive airways diseases, malignancies, and others. Moreover, emerging evidence was also suggesting higher mortality from infection among individuals suffering from renal disease (29%), heart failure (32%), hypertension (20%), and diabetes mellitus (22%),[7-9] which has further aggravated the fear and distress.

Previous studies have mainly focused on reporting the impact of this disease upon physical health in terms of mortality numbers, complications and effectiveness of novel treatments. Few studies have reported on its effect on mental health issues such as sleep deprivation, generalized anxiety, and depression. Most reports are from developed countries with reasonably good establishments for mental health issues.[10-13] In developing countries like Pakistan, research addressing mental health problems while living through COVID-19 pandemic is scanty. We did not find studies providing evidence on mental health problems resulting from the fear of contracting this infection and the extent of perceived stress among individuals with multimorbidity. Our study aimed to quantify stress among adults with multimorbidity attending a public sector tertiary care hospital of Lahore. Level of awareness about COVID-19 modes of transmission, preventive strategies adopted by the individuals, influence of media, perception about the pandemic and fear was also described.

METHODS

This cross-sectional comparative study was conducted between 15 May 2022 through 20 December 2023 at a public sector tertiary care hospital of Lahore, Pakistan. Lahore is a cosmopolitan city of more than 14 million people. Jinnah Hospital Lahore is a teaching hospital affiliated with Allama Iqbal Medical College Lahore and comprising of 1700 in-patient beds, and with more than 5000 out-patients visiting per day from all urban towns and surrounding semi-urban and rural suburbs. After obtaining approval from the Ethical Research Board of Allama Iqbal Medical College Lahore (ref:257/26/05/2022/S1-ERB), individuals aged 18 years or above, either sex and having two or more long term chronic illnesses including diabetes mellitus, hypertension, ischemic heart disease, COPD, pulmonary tuberculosis, autoimmune diseases, cancer, renal failure, chronic liver disease, patients taking immunosuppressant therapy or with any other chronic disease lasting for 3 months or longer were invited for this study. Recruitment was conducted among clients attending for consultation in OPD, admitted patients or those accompanying attendants and having any of the mentioned co-morbid conditions/ chronic diseases. We excluded those individuals who were in intensive care units, or in emergency departments and those already were diagnosed with psychiatric illnesses or learning disabilities. Using Open Epi sample size calculator, the estimated sample size was 384 which was based on an anticipated frequency of having stress due to fear of contracting COVID-19 infection as 50% with 5% absolute precision and at 95% confidence level. Furthermore, 15% of this estimation was added to account for missing data and non-response. Of 443 individuals invited for this study, our final analysis included the data of 411 participants since 17 (3.8%) refused to participate and 15 had missing data on relevant variables. (Figure 1). We used systematic random sampling technique to select the participant

in a way that every third client exiting from OPD or every third attendant waiting (starting from first sitting on right hand side) or admitted to the wards (starting first from right hand side of the ward entrance). In case of refusal, the next person was invited and those refusing the interview were counted to calculate the non-response/ decline rate.

A self administered structured questionnaire was used to record socio-demographic data and information regarding co-morbid conditions, awareness about the COVID-19 outbreak, sources of COVID-19 information, and feelings and thoughts about contracting this infection. Perceived stress scores were measured by the Cohen's Perceived Stress Scale (PSS), a validated scale developed by Sheldon Cohen,[10] which is widely used to measure perceived stress concerning daily life events during the last month. It is a 10 items scale which enquires whether a person is angry or stressed about certain daily events and to what extent and responses are using five-point Likert scale (0 = Never 1 = Almost Never, 2 = Sometimes, 3 = Fairly Often, and 4 = Very Often). We added the wording "due to COVID-19 pandemic" with each item during the interview to ask specifically the effect of individuals life during the COVID-19 pandemic environment. For instance, a item number 7 stated "How often have you been able to control irritations in your life during this pandemic?". Interviewers were trained on the questionnaire and each interview started with a verbal informed consent, explaining the participants about the objectives of the study, their role and about data confidentiality. Each participant had the right to refuse or withdraw any time from this study. Each form was checked for missing entries before leaving the interviewee.

Scoring of perceived stress was calculated using the method prescribed by the original developers.[10] Items 1,2,3,6,9,10 were given scores from 0 to 4 (0 =never, 1 = almost never, 2=sometimes, 3=fairly often, 4=very often). Reverse coding was used for item numbers 4,5,7,8 (0=4, 1=3, 2=2, 3=1, 4=0) before summing up the total stress scores. Scores ranging from 0-13 were considered low stress; scores ranging from 14-26 were considered moderate stress; and scores ranging from 27-40 were considered high perceived stress.

Data management and analysis were conducted using SPSS version 26. De-identification of personal data were done using a coded file to ensure confidentiality. Cleaning and checking for consistency of the data was undertaken by running frequency tables and graphs before final analysis. Frequency and percentages were calculated for categorical variables. Responses on nominal data were tabulated and 2x2 tables were generated to cross tabulate sociodemographic characteristics with gender of the participants. Statistically significant difference was analyzed using the Chi-Squared test and a p-value less than or equal to 0.05 was considered as statistically significant. Normality assumption of quantitative data was checked and if found skewed, these variables were converted to meaningful categories. The association of perceived stress scores was determined with sociodemographic characteristics and disease profiles. Binary logistic regression was used to adjust for confounding factors and assess the predictors of perceived stress. In our adjusted regression model, we examined the odds (with 95% confidence interval) of having low/ moderate stress against high perceived stress in relation to age, sex, education status, marital status, employment status, area of residence, duration of illness, presence of diabetes, and hypertension. The lowest category was used as a reference category. Omnibus test of model coefficients and Hosmer and Lameshow test was used to assess the predictive ability of our logistic regression model.

RESULTS

Of 443 participants invited for this study, 17 (3.8%) refused to participate and data of 15 participants were excluded due to missing values on relevant variables. Finally, data of 411 participants were analyzed (Figure 1). There were 216 (52.6%) men and 195(47.4%) women. Of 216 men, 106(49.1%) were aged more than 50 years. Similarly, most women in our sample were also aged more than 50 years (52.3%). Almost two-third of

Table 1: *Baseline characteristics of the participants to assess fear of contracting COVID-19 infection and the resultant perceived stress in individuals residing in the cosmopolitan city of Lahore, Pakistan (n=411)*

Characteristics	Frequency (%)	Frequency (%)	p-value
	Men (n=216)	Women (n=195)	
Age (in years)			
<35 years	27(12.5%)	26(13.3%)	0.69
35-50 years	83(38.4%)	67(34.4%)	
>50 years	106(49.1%)	102(52.3%)	
Employment status			
Unemployed	55 (25.5%)	137(29.7%)	<0.001
Employed	161(74.5%)	58 (70.3%)	
Area of residence			
Rural	81(37.5%)	73(37.4%)	0.98
Urban	135(62.5%)	122(62.6%)	
Marital status			
Single	20(9.3%)	08(4.1%)	0.11
Married	175(81.0%)	169(86.7%)	
Widowed/ Divorced	21(9.7%)	18(9.2%)	
Educational Status			
No Schooling	82(38.7%)	77(39.5%)	0.72
Completed up to 10 th grade	79(37.5%)	75(38.5%)	
Completed college/University	55(23.8%)	43(22.1%)	
Had chronic condition? *			
Diabetes Mellitus (n=198; 48.2%)	96(44.4%)	102(52.3%)	0.11
Hypertension (n= 200; 48.7%)	94(43.5%)	106(54.4%)	0.02
Ischemic Heart disease (n=99; 24.1%)	61(28.2%)	38(19.5%)	0.03
Chronic Renal Disease (n=43; 10.1%)	17(7.9%)	26(13.3%)	0.07
Chronic Liver disease (n=45; 10.9%)	24(11.1%)	21(10.8%)	0.91
Asthma (n=53; 12.5%)	24(11.1%)	29(14.9%)	0.25
COPD (n=24; 5.8%)	18(8.3%)	06(3.1%)	0.02
Cancer (n=25; 6.1%)	12(5.6%)	13(6.7%)	0.63
Duration chronic diseases			
<one year	47(21.8%)	35(17.9%)	0.11
1-5 years	58(26.9%)	40(20.5%)	
>5 years	111(51.4%)	120(61.6%)	

participants belonged to urban areas (about 62%). About 40% of men and women did not attend any formal schooling (Table 1). Hypertension (200; 48.7%) and diabetes mellitus (198; 48.2%) were the most common chronic disease observed in our sample and about half of them had these diseases for more than five years (Table 1). Regarding the source of knowledge about COVID-19, 171 (42.8%) reported the use of more than one source which included electronic media, print media, social media, and even personal interactions with other individuals.

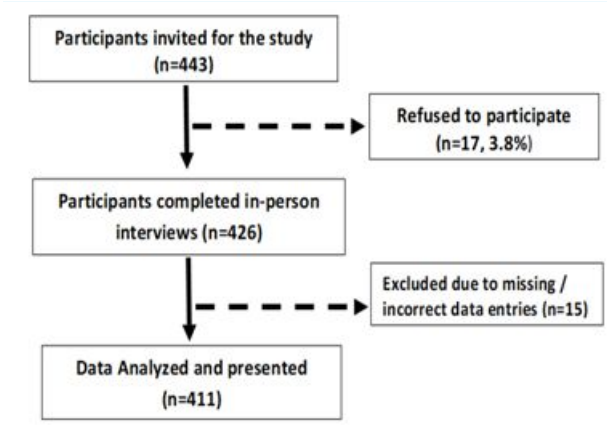

Figure-1: *Selection Process of participants.*

Table 2 shows the level of awareness among men and women regrading COVID-19 mode of transmission, people most at risk and about the preventive strategies for prevention. Of 216 men, 62 (28.7%) reported that this disease was spread by coughing/sneezing and 77(35.6%) were aware of its person-to-person transmission due to not observing social distance. On the other hand, 68(34.9%) and 43(22.1%) women were aware of these modes of transmission respectively. About 40% of men and 34% of women were of the opinion that this disease is most commonly affecting those aged 50 years and above (Table 2). More than half of men and women responded that COVID-19 affect both healthy and diseased individuals, whereas only 32% men (n=69) and 22% women (n=43) reported that people with chronic illnesses were most at risk. About preventive strategies against COVID-19, more than 50% men and women were aware of using combination of wearing a mask, social distancing, avoidance of gatherings, and frequent hand washing as effective modes of disease prevention (Table 2). Regarding the perception of participants about the COVID-19 pandemic, we found that 61% of individuals perceived hospitals as being safe during the pandemic while 36% reported that media was sensationalizing the disease, whereas 28% of the participants believed the pandemic to be a foreign conspiracy (Figure 2). Most women compared to men were showing fear of going outside (63% versus 54%), repeated handwash (59% versus 51%), feeling uneasiness to go to work place (40% versus 36%), and fear of meeting COVID-19 patients (30% versus 22%) which disturbed their sleep (Figure 3).

Table 2: *Level of awareness regarding COVID-19 among individuals with chronic diseases residing in the cosmopolitan city of Lahore, Pakistan (n=411)*

Characteristics	Frequency (%) Men (n=216)	Frequency (%) Women (n=195)	*p-value*
How does COVID-19 infection spread?			
Coughing/sneezing	62(28.7%)	68(34.9%)	0.06
No social distance (hand-shake/ hug)	77(35.6%)	43(22.1%)	
Touching surfaces/door handles/towels)	06(2.8%)	06(3.1%)	
Not using a face mask	11(5.1%)	10(5.1%)	
A combination of all the above	54(25.0%)	57(29.2%)	
Do not know	06(2.8%)	11(5.6%)	
Which age group is most at risk of COVID-19?			
Children	05(2.3%)	06(3.1%)	0.61
Both Children and adults	60(27.8%)	53(27.2%)	
Adults aged >50 years	87(40.3%)	67(34.4%)	
Adults aged <50 years	43(19.9%)	50(25.6%)	
No response/ Do not Know	21(9.7%)	19(9.7%)	
Does COVID-19 affect people with disease?			
Healthy individuals	32(14.8%)	38(19.5%)	*0.06*
Individuals with chronic disease	69(31.9%)	43(22.1%)	
Both Healthy and diseased individuals	115(53.2%)	114(58.7%)	
Preventive strategies against COVID-19			
Wear mask	26(12.0%)	30(15.4%)	*0.75*
Wear a mask and keep social distance	56(25.9%)	54(27.7%)	
Avoid gatherings	28(13.0%)	25(12.8%)	
Combination of all above	106(50.9%)	109(55.9%)	

About perceived stress resulting from fear of disease, we found that 129(66%) of women and 127(59%) of men had moderate level stress respectively (Figure 4).

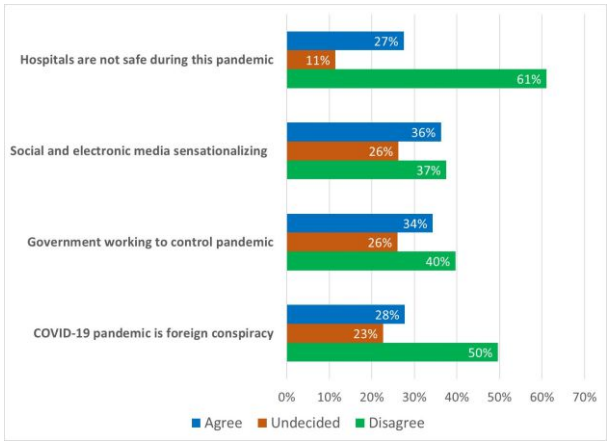

Figure-2: *Perception of the COVID-19 pandemic among individuals with chronic diseases (n=411).*

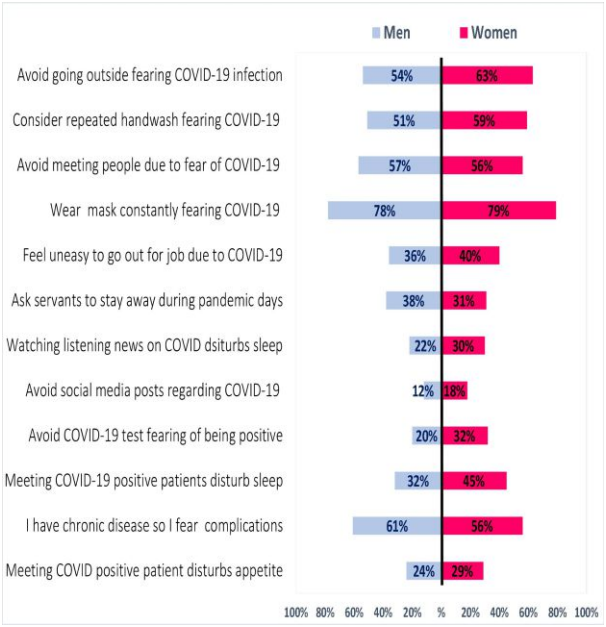

Figure-3: *Fear of contracting COVID-19 infection and protective strategies among individuals with chronic diseases residing in a cosmopolitan city of Lahore, Pakistan (n=411).*

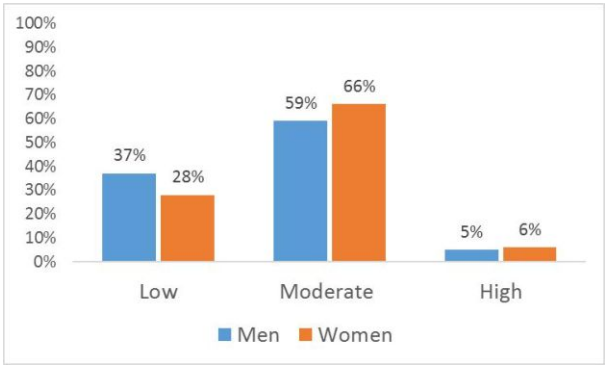

Figure-4: *Perceived stress resulting from the fear of contracting COVID-19 infection during pandemic among individuals with chronic diseases (Men=216, Women=195).*

Stress score based on perceived stress score using 10 items (Low stress=0-13, Moderate stress =14- 26, and High stress=27-40

Table 3 shows the results of the binary logistic regression analysis. In this model, we examined the odds of having moderate to high perceived stress compared with low stress from fear of contracting COVID-19 infection. We found that those individuals having completed education higher than the 10th grade were found to have two times greater odds of having stress (OR=2.36, 95% CI: 1.15-4.86; p= 0.02). Although, we observed higher odds of stress among diabetics (OR=1.42), in females(OR=1.31), widowed (OR=2.81), and those aged 35-50 years(OR=1.11), however, wide confidence intervals indicate imprecision of our estimates and associations were not statistically significant (Table 3).

Table 3: Likelihood of having perceived stress (moderate to high stress) due to the fear of contracting COVID-19 infection during the pandemic among individuals with chronic diseases (n=411)

Predictors of perceived stress	log odds	Odds ratio	95% CI. of Odds ratio	*p-value*
Age (years)				
<35 years	Reference	Reference	Reference	
35-50 years	0.106	1.11	0.50-2.46	0.79
>50 years	-0.069	0.93	0.43-2.04	0.86
Sex				
Female	Reference	Reference	Reference	
Male	-0.257	0.77	0.46-1.28	0.32
Marital status				
Single	Reference	Reference	Reference	
Married	0.107	1.11	0.42-2.90	0.82
Widowed/ Divorced	1.025	2.81	0.77-10.11	0.12
Residence				
Rural	Reference	Reference	Reference	
Urban	-0.208	0.81	0.51-1.28	0.38
Educational status				
No Schooling	Reference	Reference	Reference	
Completed up to 10th Grade	0.434	1.54	0.92-2.58	0.09
Completed more than 10th grade	0.862	2.36	1.15-4.86	0.02
Employment Status				
Unemployed	Reference	Reference	Reference	
Employed	0.301	1.35	0.74-2.45	0.34
Duration of chronic disease				
<one year	Reference	Reference	Reference	
1-5 years	-0.583	0.56	0.29-1.08	0.08
>5 years	-0.274	0.76	0.41-1.40	0.38
Diabetes Present				
No	Reference	Reference	Reference	
Yes	0.351	1.42	0.90-2.23	0.13
Hypertension Present				
No	Reference	Reference	Reference	
Yes	0.095	1.01	0.69-1.73	0.68

DISCUSSION

The unprecedented global outbreak of COVID-19 has significantly altered the landscape of healthcare-seeking behaviors and stress perceptions among individuals, particularly those with pre-existing comorbid conditions. In this cross-sectional study conducted at a large sized public sector tertiary care hospital in Lahore, Pakistan, we aimed to assess the level of awareness, perception of COVID-19 and the perceived stress level resulting from fear of contracting COVID-19 infection among adults with comorbid conditions. We found that the majority of the participants had moderate level stress, and higher levels were reported among women than men. Similarly, participants with higher education had higher odds of stress. The major fear of the study participants was the fear of complications of COVID-19 infection and the use of masks along with avoiding going out was their most practiced preventive strategy. A considerable number of participants were aware that infection spread through coughing and sneezing and it being more likely to affect older individuals.

Our results indicate that more than two-third participants with multimorbidity have moderate level stress of contracting infection. Their fear was not unfounded since current evidence is corroborating with the observation that those aged more than 50 years and with multimorbidity are more vulnerable to experience complications and death. A very few studies have been published in this context and our results are consistent with them, for instance, Sayyed et al.[11] reported that majority of the (53%) of respondents with chronic diseases experienced moderate to extremely severe levels of stress compared to healthy controls ($p<0.00$), while Kontodimopoulos et al.[12] in their study on Greek population found significantly higher fear levels among comorbid individuals. Other studies have reported that women have higher levels of fear and mental health issues including stress than men ($p < 0.001$),[13,14] which is coherent to our results of our study, with the difference that we did not find the difference statistically significant.

In our investigation of the predictors of stress associated with the fear of COVID-19 infection, we identified education, particularly beyond the 10th grade, as a significant predictor, with individuals in this educational bracket exhibiting higher odds of stress. Similar observation was reported by Sayyed et al. where the fear of COVID increased with higher educational level. However, our findings diverge from those reported by Kontodimopoulos et al,[12] who observed that higher education acted as a protective factor against the fear of COVID-19. This observation was further supported by Aksoy et al,[15] who reported elevated stress levels among individuals with lower levels of education (primary graduates) (p-value<0.01). The discrepancies in our findings compared to Kontodimopoulos et al. and Aksoy et al. may stem from variations in sample demographics and cultural contexts. Additionally, the exclusion of illiterate and individuals below the secondary level of education in Sayyed's study could have influenced the observed trends. This underscores the need for further research to elucidate the intricate relationship between education and psychological response to the pandemic.

Regarding other predictors of stress, we failed to establish any significant relationship of stress with age, gender, residence, employment, or marital status. Although, our analysis showed that living in urban area was associated with more stress, but our association may not be generalized to wider population. Being diabetic showed higher odds of stress similar to the findings of other studies,[11,16-18] however we did not find association with any other co-morbid condition.

Although, being a single-centre study with limited generalizability of findings and cross-sectional nature of study which poses inherent limitations in establishing causal and temporal relationships, the present study is one of its kind which not only assessed the level of stress due to fear of COVID-19 infection and its predictors but it also explored various fears of co-morbid individuals and their protective strategies. It goes on further to explore the level of awareness regarding mode of transmission and prevention. It is the first study to report on the mental health outcomes of Pakistani adults suffering from chronic diseases during the COVID-19 pandemic. The inclusion of individuals with diverse comorbid conditions contributes to the study's richness and allows for a nuanced exploration of stress perceptions across various health contexts. The use of a validated perceived stress scale (PSS) enhances the reliability of stress assessments. Ethical considerations, including approval from the Ethical Research Board and informed consent, showed the commitment of research team to ethical research practices, ensuring participant rights and confidentiality. Advanced statistical analyses, like binary logistic regression, provided a sophisticated framework for exploring the factors influencing stress perceptions.

CONCLUSION

Despite considerable awareness about COVID-19 infection's modes of transmission and prevention strategies in adults with multimorbidity, there exist a substantial moderate level perceived stress in men and women living in a developing country, more in women, who are fearful of contracting this disease and its subsequent consequences. This underscores the significance of incorporating psychological considerations into public health efforts and emphasizes the necessity for focused interventions to alleviate stress related to the fear of COVID-19, particularly among those with comorbidities.

Ethical Approval:
Approval for this study was obtained from institutional research ethical board of Allama Iqbal Medical College/Jinnalh Hospital Lahore (vide reference no. 257/26/05/2022/S1-ERB).

Conflict of Interest: *None*
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Author's Contribution

Conceptualization study design	YR, UA, GQ
Data Acquisition	YR, UA, MFB, MM
Data Analysis/ interpretation	YR, MM, HSR
Manuscript drafting	YR, UA, MFB, MM, HSR
Manuscript review	YR, UA, MM, GQ

All authors read and approved the final draft.

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