Levels of Anxiety and Depression amongst the Frontline Healthcare Workers of COVID-19: A Cross-Sectional Survey with Follow-Up

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Abstract

Purpose of the study: Outbreaks of infectious diseases are known to have significant psychological effects not only on the general population but on health care workers as well. The COVID-19 pandemic also has been a challenge for Healthcare workers across the globe when it comes to their mental health.

Study design: This is an observational cross-sectional study, carried out amongst the frontline doctors of COVID-19 units, by a well-structured questionnaire using Google Forms. The two scales used measure anxiety and depression among the healthcare workers were the Hamilton anxiety scale (HAM-A), and the hospital anxiety and depression scale (HADS).

Results: The mean age of all the participants in the study was 25.40 ± 1.61, including 57% house officers/interns and 43% medical residents/postgraduate trainees. Both the anxiety and depression scales were significantly higher in house officers as compared to their senior doctors (residents/postgraduate trainees). According to HAM-A, 62% of respondents were in the mild category, 20% mild to moderate, 5% moderate to severe, while 14 respondents (13%) were in severe anxiety category. The HAM-A (P=0.078) and HADS for anxiety was significantly higher in females (P=0.001), while HADS for depression was statistically indifferent among the gender. The means of all scales got improved after the postings in Corona wards. The duration of practice also had an inverse correlation observed with all the studied scales.

Conclusion: Depression and anxiety were seen quite higher in our population of health care workers with significant improvements that were observed after completing the rotations of corona units.

1. Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been identified to be a causative pathogen for the coronavirus disease 2019 (COVID-19) [1]. This disease was known to emerge in Wuhan, China, and gradually spread across the globe and the WHO declared in March of this year that COVID-19 as pandemic [1].

Outbreaks of infectious diseases are known to have significant psychological effects not only on the general population but on health care workers as well [2]. An example of this is psychological ramifications noted during the SARS outbreak, where studies documented the acute stress reactions experienced by healthcare workers [2]. Evidence from previous studies conducted during the Ebola and SARS outbreaks showed that healthcare workers (HCWs) were likely to suffer from adverse psychological conditions, such as anxiety, fear, and stigmatization [1].

Healthcare workers are subjected to increased amounts of stress during this pandemic [3]. This is due to the very nature of their jobs, such as direct contact and treatment of infected patients [3]. This raises fear for the contraction of the pathogen, the risk of transmitting the virus to their families and working under great pressure because of the increased patient load [3]. The rise in the number of cases, deaths, increased workloads, and exhaustion of personnel protection equipment (PPE) also adds to the psychological stress [3]. Many HCWs have also been reassigned to work within COVID-19 units outside of their usual medical specialties and expertise to manage the huge workload and patient volume. [4] In New York City, HCWs taking care of COVID-19 patients have been reported to commit suicide [4].

Apart from the physical and pathological effects of diseases on the human body, a few symptoms can be attributed to the psychological sequelae of these infectious disease outbreaks [2]. Such symptoms have been noted in the Ebola and SARS virus outbreaks [2]. Studies have reported 10% of HCWs reported having anxiety, feeling depressed, and

somatization as a result of working during such outbreaks [3]. A recent Chinese study found that depression, stress-related symptoms, and anxiety were prevalent in 50.7%, 44.7%, and 73.4% respectively of their HCWs [3].

The COVID-19 pandemic has been a challenge for the HCWs across the globe when it comes to their mental health, and the situation seen in Pakistan is no different. Unfortunately, there is a dearth of data regarding the mental health, anxiety, and stress levels being faced by the frontline healthcare workers in the country. This study aims to assess the levels of depression and anxiety among the young HCWs working in corona units of tertiary care hospitals in Pakistan and to compare them with respect to their gender, professional rank, and duration of practice, while the secondary objective was to assess whether those levels of anxiety get better or worse after working in those units.

2. Methodology

This is an observational cross-sectional study, carried out amongst the doctors of Dow University Hospital, and Liaquat National Hospital, Karachi, Pakistan. A well-structured questionnaire was administered by using Google Forms and was made available online (https://forms.gle/1rfD3Z2uJ9usa47R8) [5]. Before our questionnaire, a consent form was attached to allow the use of collected data. The questionnaire consisted of 2 parts, the first being demography (name, age, professional rank, duration of practice, hospital affiliation, etc.) while second part including 2 scales to measure anxiety and depression among the healthcare workers including Hamilton anxiety scale [6], and the hospital anxiety and depression scale (HADS) [7]. There were 27 questions in total, 13 belonged to the Hamilton anxiety scale, while 7 belonged to anxiety assessment and the other 7 to depression assessment by HADS. Each question had 5 responses in Hamilton anxiety scale ranging from not present to severe, while 4 varying responses in HADS, and participants were asked to choose one amongst them. The study participants included were Healthcare workers, that is, postgraduate trainee/medical residents or house officers/interns who were posted specifically in Corona isolation wards and Intensive care units. All those who haven't worked in Corona related units were excluded from the study. The questionnaire link was then circulated among the healthcare workers through social media platforms (WhatsApp) and was asked to fill before or during their postings in corona units. The bias of receiving irrelevant (non-COVID working doctors) responses was reduced by posting the questionnaire on COVID-doctors' group only. The participants who completed their postings in corona units were then asked again to fill the questionnaire to compare their anxiety levels before and after working in corona units.

A sample size of 109 was calculated by using OpenEpi sample size calculator [8], in which we used 5% as a margin of error, 95% as confidence interval (CI), 150 as population size and anticipated frequency of outcome factor in the population of 50%. The responses were gathered through a convenient sampling method until the sample size was met. The response percentage of each question has been shown in (Figure 1). The responses were then put into the Hamilton anxiety scale calculator from MDCalc [9] and the HADS calculator from the BGP article [10]. The responses of the study participants were then compared amongst gender, professional rank, and duration of practice. All the analysis was conducted by using the Statistical Package for Social Science (SPSS) version 25.0 (IBM Corp,

Chicago, IL, USA). A p-value of <0.05 was considered statistically significant (two-tailed). Chi-square and Fisher exact tests were used respectively to calculate qualitative measures according to the limitation of data, while McNemar Bowker's test was used for repeated measures. An independent sample t-test was used to estimate quantitative measures amongst the study groups while paired sample t-test for repeated ones.
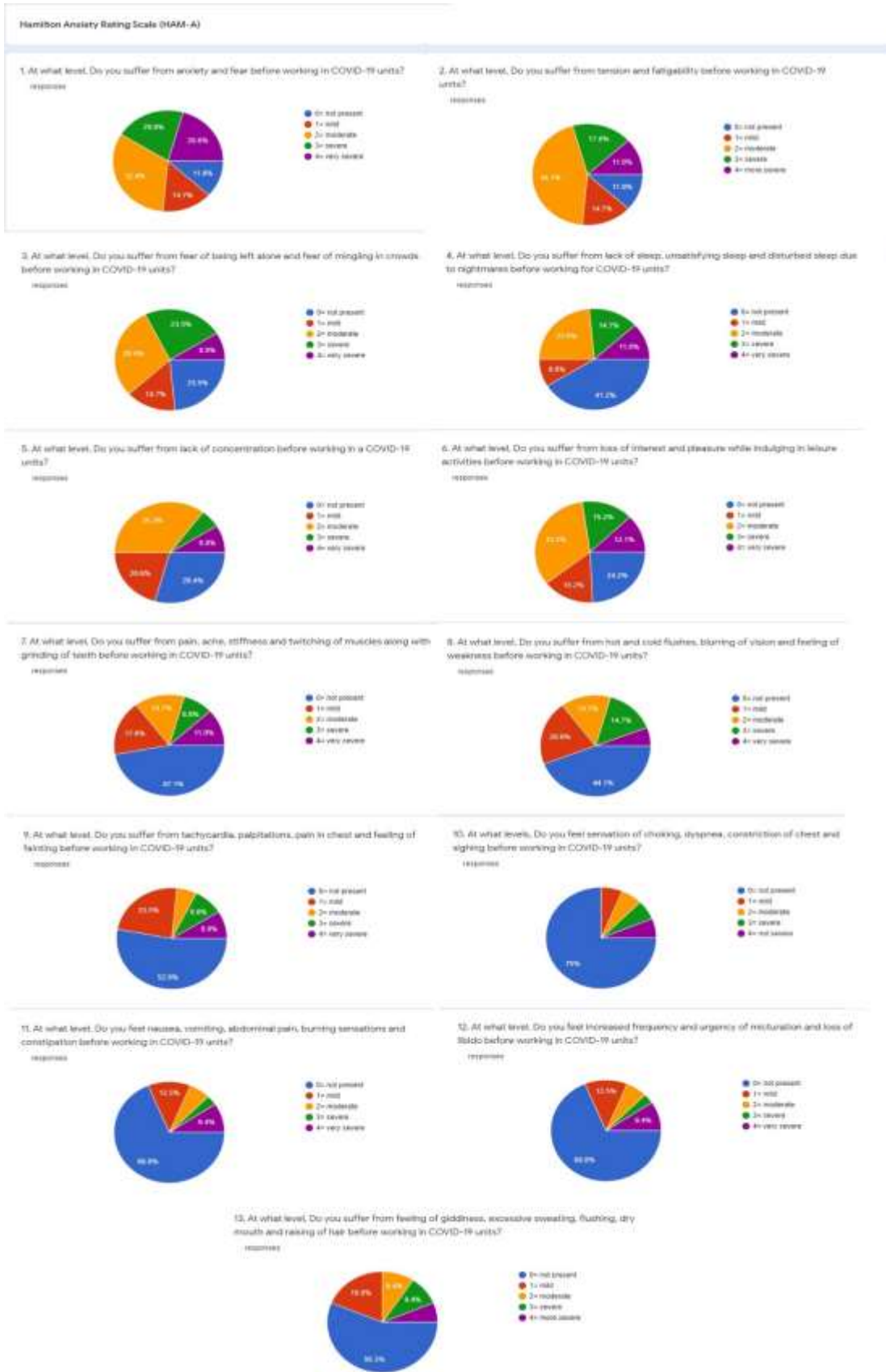
Hamilton Anxiety Rating Scale (HAM-A)

1. At what level, Do you suffer from anxiety and fear before working in COVID-19 units?
responses

2. At what level, Do you suffer from tension and fatigability before working in COVID-19 units?
responses

3. At what level, Do you suffer from fear of being left alone and fear of mingling in crowds before working in COVID-19 units?
responses

4. At what level, Do you suffer from lack of sleep, unsatisfying sleep and disturbed sleep due to nightmares before working for COVID-19 units?
responses

5. At what level, Do you suffer from lack of concentration before working in a COVID-19 units?
responses

6. At what level, Do you suffer from loss of interest and pleasure while indulging in leisure activities before working in COVID-19 units?
responses

7. At what level, Do you suffer from pain, ache, stiffness and twitching of muscles along with grinding of teeth before working in COVID-19 units?
responses

8. At what level, Do you suffer from hot and cold flushes, blurring of vision and feeling of weakness before working in COVID-19 units?
responses

9. At what level, Do you suffer from tachycardia, palpitations, pain in chest and feeling of fainting before working in COVID-19 units?
responses

10. At what levels, Do you feel sensation of choking, dyspnea, constriction of chest and sighing before working in COVID-19 units?
responses

11. At what level, Do you feel nausea, vomiting, abdominal pain, burning sensations and constipation before working in COVID-19 units?
responses

12. At what level, Do you feel increased frequency and urgency of micturation and loss of libido before working in COVID-19 units?
responses

13. At what level, Do you suffer from feeling of giddiness, excessive sweating, flushing, dry mouth and raising of hair before working in COVID-19 units?
responses

Figure 1: Showing the response percentage of each question by the respondents.

3. Results

The mean age of all the young doctor participants in the study was 25.40 ± 1.61 with an equal male to female ratio as shown in (Table 1). Around 57% of respondents were house officers/interns while 43% were medical residents/postgraduate trainees of various departments. The mean duration of practice of house officers was quite less than that of medical residents (P<0.001) mostly having a training program of 4 years as compared to only 1 year of house job/internship. The Hamilton anxiety scale (HAM-A) (P=0.078) and Hospital anxiety depression scale (HADS) for anxiety was significantly higher in females (P=0.001), while HADS for depression was statistically indifferent among the gender as shown in (Table 2A). Both the anxiety and depression scales were significantly higher in house officers as compared to their senior doctors (residents/postgraduate trainees).

S.no	Table 1: General characteristics of the respondents (n=109).			p-value
1	Mean age in years	25.40 ± 1.61		0.170*
	Males (n=53)	25.62 ± 1.79		
	Females (n=56)	25.19 ± 1.40		
2	Medical profession rank	House officer/Interns: 62 (56.9%)		<0.001*
		Mean age: 24.51 ± 1.06		
		Residents/Postgraduate Trainee: 47 (21.21%)		
		Mean age: 26.57 ± 1.47		
3	Durations of Practice (in months)	11.14 ± 9.84		<0.001*
		House officer/Interns: 5.09 ± 1.77		
		Residents/Postgraduate Trainee: 19.12 ± 10.44		
4	Distribution of gender amongst professional rank	House officer/Interns:	Residents/ Postgraduate Trainee:	0.955**
		Males: 30 (56.6%)	Males: 23 (43.4%)	
		Females: 32 (57.1%)	Females: 24 (48.9%)	
indicates p-value calculated by independent sample t-test.				
*** indicates p-value calculated by chi-square test.*				

Table 2A: Anxiety scales used before or during corona ward postings.

Variable Scales		Study groups				P-value
		Mean	±SD	Mean	±SD	
		Males		Females		
Hamilton anxiety scale		13.39	9.20	17.05	12.01	0.078*
Hospital anxiety and depression scale (HADS)	For anxiety	6.60	4.85	9.91	5.61	0.001*
	For depression	7.09	5.09	6.98	4.71	0.905*
-		House officer/Interns:		Residents/Postgraduate Trainee		-
Hamilton anxiety scale		17.35	11.76	12.53	8.90	0.016*
Hospital anxiety and depression scale (HADS)	For anxiety	10.06	5.00	5.97	5.28	<0.001*
	For depression	8.12	5.10	5.59	4.19	0.005*

Table 2B: Anxiety scales after corona ward postings.

-		Males		Females		-
Hamilton anxiety scale		10.24	6.51	10.58	7.21	0.795*
Hospital anxiety and depression scale (HADS)	For anxiety	5.33	2.94	6.51	3.91	0.080*
	For depression	5.54	3.06	5.12	2.89	0.462*
-		House officer/Interns		Residents/Postgraduate Trainee		-
Hamilton anxiety scale		11.14	6.76	9.46	6.93	0.208*
Hospital anxiety and depression scale (HADS	For anxiety	6.77	3.54	4.85	3.18	0.004*
	For depression	5.85	3.18	4.63	2.54	0.029*
indicates p-value calculated by independent sample t-test.						

According to Hamilton anxiety scale, 62% respondents were in the mild category, 20% mild to moderate, 5% moderate to severe, while 14 respondents (13%) were in severe anxiety category, out of whom 11 respondents were female house officers (P=0.070), as also demonstrated by a high mean value of female house officers in (Figure 2A). While only 3 male residents reported severe anxiety according to HAM-A as shown in (Table 3). The mean HAM-A of all the respondents was 15.27 ± 10.84 which got improved to 10.42 ± 6.85 post working in corona units (P<0.001), also 90% of the respondents fell into mild anxiety category with massive improvements shown by female house officers (P=0.012) as shown in (Table 4).

Table 3: Frequency of anxiety scales grading amongst the study groups.

Variables	Scales				p-value
	Hamilton anxiety scales				
Frequency- n (%)	Mild (≤17)	Mild to moderate (18-24)	Moderate to severe (25-30)	Severe (>30)	-
All participants	68 (62%)	22 (20%)	5 (4%)	14 (13%)	
Males	33 (62%)	13 (24%)	4 (7%)	3 (6%)	0.070*
Females	35 (62%)	9 (16%)	1 (2%)	11 (20%)	
House officer/ interns	36 (58%)	12 (19%)	3 (5%)	11 (18%)	0.378*
Residents/ Postgraduate trainee	32 (68%)	10 (21%)	2 (4%)	3 (6%)	
For anxiety	Hospital anxiety and depression scale (HADS)				
	Normal (≤7)	Mild (8-10)	Moderate (11-14)	Severe (>15)	-
All participants	51 (47%)	21 (19%)	22 (20%)	15 (14%)	
Males	31 (58%)	12 (23%)	7 (13%)	3 (6%)	0.012**
Females	20 (36%)	9 (16%)	15 (27%)	12 (21%)	
House officer/ interns	15 (24%)	18 (29%)	18 (29%)	11 (18%)	<0.001**
Residents/ Postgraduate trainee	36 (77%)	3 (6%)	4 (7%)	4 (7%)	
For depression	Hospital anxiety and depression scale (HADS)				
	Normal (≤7)	Mild (8-10)	Moderate (11-14)	Severe (>15)	-
All participants	64 (59%)	17 (16%)	19 (17%)	9 (8%)	
Males	30 (57%)	13 (24%)	3 (6%)	7 (13%)	0.001*
Females	34 (61%)	4 (7%)	16 (29%)	2 (3%)	
House officer/ interns	30 (48%)	12 (19%)	12 (19%)	8 (13%)	0.047*
Residents/ Postgraduate trainee	34 (72%)	5 (11%)	7 (15%)	1 (2%)	
indicates p-value calculated by Fisher's exact test.					
indicates p-value calculated by chi-square test.					

Table 4: Comparison of anxiety scales after Corona ward postings.

Variables and Scales		Mean ± SD				P-value
		Groups				
Hamilton anxiety scale	Before	15.27 ± 10.84				<0.001*
	After	10.42 ± 6.85				
Frequencies		Mild	Mild to moderate	Moderate to severe	Severe	-
All respondents	Before	68 (62%)	22 (20%)	5 (4%)	14 (13%)	<0.001**
	After	98 (90%)	4 (4%)	4 (4%)	3 (3%)	
Males	Before	33 (62%)	13 (24%)	4 (7%)	3 (6%)	0.013**
	After	48 (90%)	3 (6%)	1 (2%)	1 (2%)	
Females	Before	35 (62%)	9 (16%)	1 (2%)	11 (20%)	0.012**
	After	50 (89%)	1 (2%)	3 (5%)	2 (4%)	
House officer/ Interns	Before	36 (58%)	12 (19%)	3 (5%)	11 (18%)	0.003**
	After	55 (89%)	3 (5%)	2 (3%)	2 (3%)	
Residents/ Postgraduate trainee	Before	32 (68%)	10 (21%)	2 (4%)	3 (6%)	0.030**
	After	43 (92%)	1 (2%)	2 (4%)	1 (2%)	
HADS (for anxiety)	Before	8.30 ± 5.49				<0.001*
	After	5.94 ± 3.51				
Frequencies		Normal	Mild	Moderate	Severe	-
All respondents	Before	51 (47%)	21 (19%)	22 (20%)	15 (14%)	<0.001**
	After	81 (74%)	18 (16%)	6 (5%)	4 (4%)	
Males	Before	31 (58%)	12 (23%)	7 (13%)	3 (6%)	0.047**
	After	43 (81%)	8 (15%)	1 (2%)	1 (2%)	
Females	Before	20 (36%)	9 (16%)	15 (27%)	12 (21%)	<0.001**
	After	38 (68%)	10 (18%)	5 (9%)	3 (5%)	
House officer/ Interns	Before	15 (24%)	18 (29%)	18 (29%)	11 (18%)	<0.001**
	After	40 (64%)	15 (24%)	4 (7%)	3 (5%)	
Residents/ Postgraduate trainee	Before	36 (77%)	3 (6%)	4 (7%)	4 (7%)	0.275**
	After	41 (87%)	3 (6%)	2 (4%)	1 (2%)	
HADS (for depression)	Before	7.03 ± 4.87				<0.001*
	After	5.33 ± 2.97				
Frequencies		Normal	Mild	Moderate	Severe	-
All respondents	Before	64 (59%)	17 (16%)	19 (17%)	9 (8%)	<0.001**
	After	91 (83%)	10 (9%)	5 (5%)	3 (3%)	
Males	Before	30 (57%)	13 (24%)	3 (6%)	7 (13%)	0.004**
	After	44 (83%)	4 (7%)	4 (7%)	1 (2%)	
Females	Before	34 (61%)	4 (7%)	16 (29%)	2 (3%)	<0.001**
	After	47 (84%)	6 (11%)	1 (2%)	2 (3%)	
House officer/ Interns	Before	30 (48%)	12 (19%)	12 (19%)	8 (13%)	<0.001**
	After	48 (77%)	8 (13%)	4 (6%)	2 (3%)	
Residents/ Postgraduate trainee	Before	34 (72%)	5 (11%)	7 (15%)	1 (2%)	0.023**
	After	43 (92%)	2 (4%)	1 (2%)	1 (2%)	
* Paired sample t-test, ** McNemar-Bowker's test.						

The mean HADS for anxiety before/during working in corona units was significantly higher (8.30 ± 5.49) which again comprised mostly of females (P=0.012) and house officers (P<0.001), which improved to 5.94 ± 3.51 (P<0.001) post-work, with the least improving pattern seen in male residents as visible in (Figure 2A). The HADS for depression before/during corona posting was also higher with most male respondents were in mild or severe depression, and most female respondents were in moderate depression category (P=0.001). The mean got improved from 7.03 ± 4.87 to 5.33 ± 2.97 post working in corona units (P<0.001), with male residents again least affected while male house officers still having slightly higher mean also showed the highest improvement as well.

The duration of practice had an inverse correlation observed with all the studied scales in the HCWs. (Figure 2B) showing that the anxiety levels are significantly higher in 1st month of internship followed by a second peak in those with 6-8 months of practice, while also in 1st year of residency followed by 3rd year of residency, with 2nd year of residents were having the least scores of anxiety as well as depression. The same pattern can also be seen with significant improvement of scores after corona ward postings as shown in (Figure 2C), massive improvement is visible by those in 7-8 months of practice, while 3rd to 4th year residents showing lowest improvements. The correlation of HAM-A was significant with the duration of practice before/during corona posting as opposed to after posting (Figure 2D). The correlation of HADS for anxiety (before/during posting) was maximum with the duration of practice, r= -0.351 (P<0.001), and after corona postings, r= -0.221 (P=0.021), as shown in (Figure 2E). The HADs for depression were also significantly correlated with the duration of practice both before and after corona ward postings (Figure 2F). Overall, after corona ward postings, significant improvements were seen in all groups of respondents, with no difference in HAM-A among gender (P=0.795) and professional rank (P=0.208), while HADS for anxiety was still found higher in females (P=0.080) and house officers (P=0.004), and HADS for depression was only higher in house officers post improvements (P=0.029) as shown in (Table 2B).
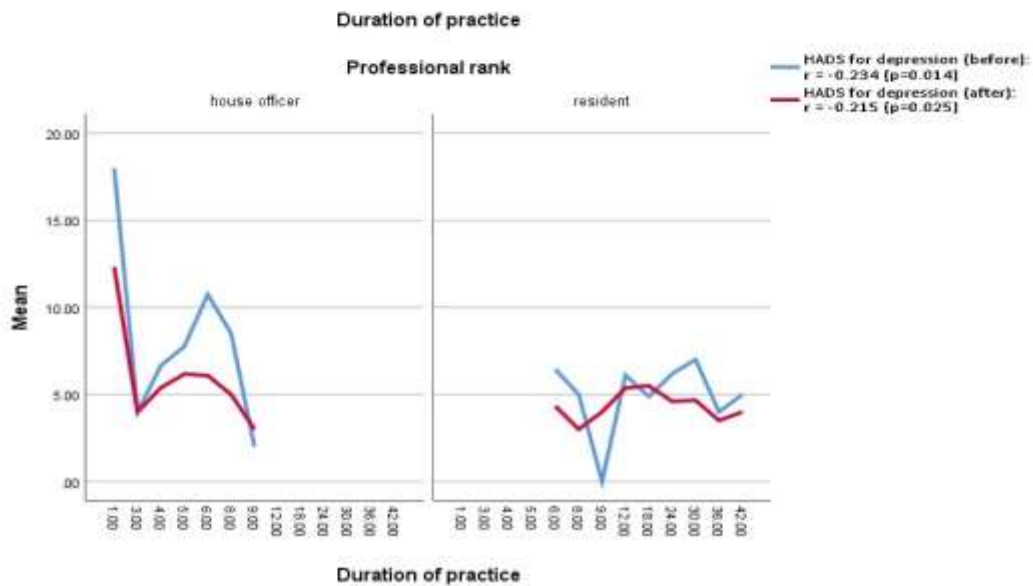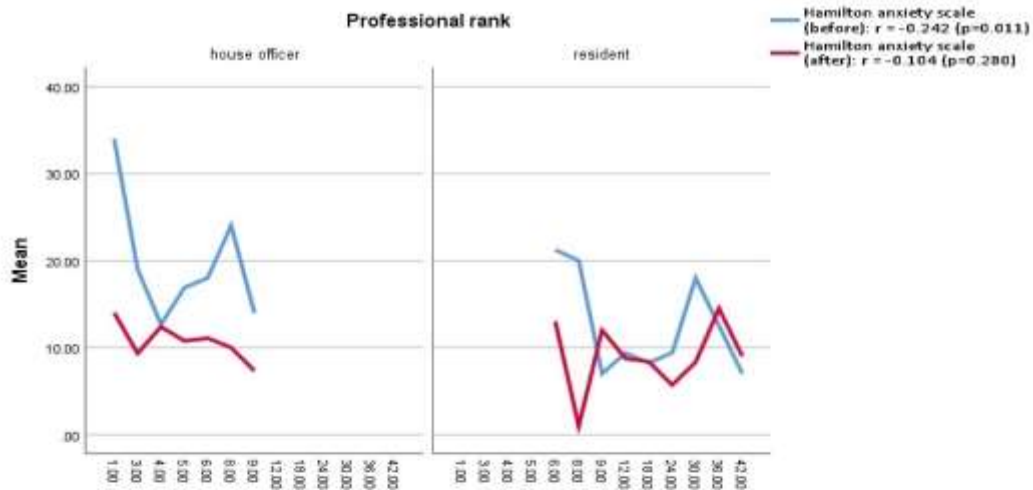
4. Discussion

Our study surveyed the prevalence of anxiety and depression among health care workers comprising of physicians treating sufferers of COVID-19 in hospitals. In our observation, limited studies have been conducted in order to determine mental health symptoms among frontline health care providers working in COVID-19 units. Studies conducted by Lai et al, and others indicated the age of 26 years, thus coinciding with findings of our study [1, 11, 12]. Multiple studies indicated gender predilection among health care providers participating in survey with females in the majority as compared to males, an outcome contrasting our study reporting an equal number of male and female participants [1-3, 11, 12]. A study conducted in a similar pattern reported 50.4% of depression and 44.6% of anxiety among health care providers serving in COVID-19 units of Wuhan, outcomes coinciding with the results of our study [11]. Various studies quoted decreased frequency of anxiety and depression among health care workers when compared with frequencies recorded in our study, meanwhile, a study of Istanbul reported increased frequency for depression and decreased for anxiety, both outcomes not correlating with our results [1-4, 12]. A greater number of studies signified female gender and young health care providers reporting heightened levels of anxiety an outcome consistent with findings of our study [1-3, 11, 12]. Our study reported the incidence of depression heightened among young health care providers, while no gender difference among participants suffering from depression was observed, a finding contrasting outcomes of several studies depicting female gender prominent in acquiring depression [3, 11, 12]. A study observed by Wen Lu, et al. and another study conducted among health care providers of Istanbul depicted lesser mean values of anxiety and depression among participants thus contrasting our results projecting increased mean values [2, 3]. A study conducted in Fujian province of China, quoted 22.6% mild to moderate anxiety among participants an outcome coinciding with our study, while the decreased prevalence of severe anxiety contrasting our results [13], while the same study quoted decreased prevalence of mild, moderate and severe depression, an outcome not synchronizing with our study quoting increased frequencies [13]. Another study reported outcomes regarding frequencies of mild and severe depression among participants correlating with our results, while the increased incidence of moderate depression, an outcome contrasting with our study [3]. Frequencies regarding mild, moderate, and severe anxiety among participants were decreased in the study mentioned above when compared with findings of our study thus contrasting our results [3]. Lastly, a study conducted in the same population recently has identified a 43% prevalence of depression/anxiety among frontline doctors of Pakistan, with many factors linked along with it including increased workload, duty hours, having children amongst household members and decreased knowledge regarding the infectivity of the disease [14].

Despite an improvement in frequencies of anxiety and depression among health care providers after serving their duties in COVID-19 units included in our study, still, the levels of anxiety and depression are recorded higher when compared to other populations. The limitation of the study included the lack of insight by senior faculty members supervising the corona units, as the study focused only on the young frontline doctors.

5. Conclusions

Depression and anxiety were seen quite higher in our population of health care workers with significant improvements that were observed after completing the rotations of corona units. Mental health can play an important role in defining the health care response towards a pandemic. Mental health needs to be a priority for doctors and other health care providers on the frontline, and amidst a global pandemic, it should be one of the key elements of adaptability in a society that is confronted by a perplexing number of challenges. Training programs or short courses/ workshops should be carried out amongst the frontline doctor before corona unit duties for helping them to cope up with the anxiety levels.

Disclosure Statement

The authors declare no conflicts of interest with this article's content.

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Ethical Approval Statement

Ethical approval was taken in this study from institutional review board, and consent to participate has been taken from all the patient's guardian with informed written consent.

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