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Assessment of anxiety level and sleep quality of medical staff treating patients with COVID-19

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Abstract. – OBJECTIVE: Worldwide transmission of the novel coronavirus (COVID-19) and related morbidity and mortality has presented a global challenge for several reasons. One such underrecognized and unaddressed aspect is the emotional health problems that medical staff have developed during this pandemic. The purpose of this one-month study was to examine anxiety levels and sleep quality of 100 medical staff members who worked in medical clinics treating COVID-19 patients in Saudi hospitals and to investigate the association of both anxiety levels and sleep quality with age, sex, and distinctive demographics.

MATERIALS AND METHODS: We investigated anxiety levels and sleep quality of 100 medical staff members (age range 20-60 years) who worked in medical clinics treating COVID-19 patients in Saudi hospitals and the association of both anxiety levels and sleep quality with age, sex, and distinctive demographics. Anxiety levels and sleep quality were measured using the Self-Rating Anxiety Scale and the Pittsburgh Sleep Quality Index (SAS and PSQI, respectively).

RESULTS: A significant increment in anxiety and poor sleep quality was found in medical staff caring for COVID-19 patients. Anxiety levels in females were higher than males; however, poor sleep quality was somewhat higher in males vs. females but did not vary between age groups. Age was significantly negatively correlated with anxiety symptoms; individuals < 40 years old *vs.* ≥ 40 had more significant anxiety levels. We observed that medical staff with top-level salaries demonstrated a significant correlation (p = 0.028) between poor sleep quality and ill effects *vs.* those who had lower pay rates. A correlation between income and anxiety was not found.

CONCLUSIONS: The higher the probability and intensity of exposure to coronavirus patients, the more noteworthy the danger that medical staff will experience the ill effects of mental issues.

Key Words:
Anxiety, Sleep quality, SARS-CoV-2, COVID-19, Psychological.

Introduction

Since its origin in December 2019 in the Hubei Territory of China, the novel Coronavirus (COVID-19) has been spreading rapidly both locally and globally[1,2]. Within one month, the infection brought about by the virus was viewed as a public health crisis by the World Health Organization (WHO) and pronounced a pandemic in March 2020[3]. The main players in the midst of the development of this infectious disease in all countries worldwide are health care workers who are continuously involved in treating and screening this condition[4]. WHO recommended the reduction of stress and psychological distress in health care providers[5]. Keeping all medical staff protected from chronic stress and poor mental health during this response means that they will have a better capacity to perform their responsibilities[6].

Epidemics of infectious diseases affect the mental health and well-being of uninfected populations as well as affecting the physical health of patients. Anxiety, depression, and stress levels in general population have increased with the spread of new infectious diseases, such as severe acute respiratory syndrome (SARS), and previous studies have

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shown that survivors of SARS, would be subjected to depression, stress, anxiety, and posttraumatic stress disorder[7,8]. At the time of the coronavirus beginnings in central China, few people with mild disease, associated cases with infection, and individuals who had been in close contact with patients or conceivably high-risk surroundings were isolated at home. Regardless of whether or not self-isolated people build up immunity and remain well, they regularly experience the ill effects of antagonistic mental impacts. Critically, the impacts of psychological well-being and sleep on immunity have been shown in the past studies[9].

Medical care services' personnel are not resistant to the COVID-19-related mental issues. Among medical services' workers, frontline workers included directly in taking care of these patients are at more risk than others. The reasons behind such challenging mental outcomes in this group range from additional responsibilities/work hours, deficient individual protective gear, over-enthusiastic news media, and feeling that they are insufficiently supported by those around them[10-12].

Another significant cause of such mental effects is the infection rate among medical staff. Great quality sleep can help lower an individual's susceptibility to viral infection. Along these lines, emotional wellness and sleep quality are essential considerations in the number of individuals who have self-isolated because of their expanded risk of contracting/spreading COVID-19[13]. Mental well-being and sleep are influenced by several demographic factors. Recently, few examinations have explored mental manifestations in the populace under comparative conditions[14,15].

Subsequently, in Saudi Arabia, when facing this unexpected global health crisis, the medical staff, such as physicians, nurses, and pharmacists, have been under considerable psychological pressure. Along these lines, this study aimed to evaluate anxiety, sleep quality, and psychological wellness of the medical staff level utilizing both the Zung Self-Rating Anxiety Scale and the Pittsburgh Sleep Quality Record (SAS and PSQI, respectively) and its related components among medical staff treating patients with COVID-19.

Materials and Methods

Study Participants

This survey was carried out in King Abdullah Bin Abdulaziz University Hospital, Security Forces Hospital, and King Saud Medical City. All tools and equipment in these hospitals are available. This study covered various level of the structure. This research involved 100 medical staff (26 male and 74 females with ages ranging from 20 to 60 years) from few specialties that treated patients with COVID-19 in June and July 2020. All study participants were physicians, pharmacists, nurses, and dentists who worked inpatient and outpatient clinics, and all volunteered to take part in the investigation. All study members had the option to provide a consent to proceed the study. All responses to the study's questionnaires were anonymous.

Study Design

An empirical, cross-sectional clinical examination was conducted incorporating the utilization of self-detailed surveys. Demographic and social information from the medical staff was obtained. Levels of anxiety and sleep quality were estimated using approved clinical surveys and scoring frameworks. All surveys were completed anonymously by the 100 study participants.

Demographic and Social Data

The study members' demographic and social information included age, sexual orientation, nationality, training, marital status, monthly income, professional status, department, and working experience.

The Self-Rating Anxiety Scale (SAS)

The Self-Rating Anxiety Scale (SAS) was used to measure the degree of anxiety of the medical staff[16]. The SAS survey contained 20 items consisting of four evaluations with questions evaluating feelings of anxiety and mood over the past seven days. A total score of 20 was then increased by 1.25, with higher scores showing more serious degrees of anxiety[16]. The Cronbach's alpha for inward consistency for the utilization of the SAS was 0.835.

The Pittsburgh Sleep Quality Index (PSQI)

The Pittsburgh Sleep Quality Index (PSQI) survey was used to enumerate sleep quality using an 18-item scale containing seven items, which included sleep quality, sleep span, sleep latency, habitual sleep proficiency, sleep disturbance influence, use of sleep aids, and daytime dysfunction[17]. Each measurement score range from 0 to 3, with a complete range of scores from 0 to 21 with a higher score indicating lower sleep quality[17]. The Cronbach's alpha for inner consistency for the utilization of the PSQI was 0.853.

Statistical Analysis

Continuous and categorical variables were summarized as mean values ± standard deviation (SD) and frequency (percentage), respectively. We used the chi-square test to identify the differences in categorical variables between groups. If the information showed a skewed distribution, the Kruskal-Wallis H test was used to test for significant differences in straight-out factors. The intermediary impacts of the factors were analyzed utilizing IBM SPSS AMOS version 21.0 (IBM Corp., Armonk, NY, USA).

Results

Relation of Gender to Anxiety and Sleep Quality

One hundred responses were obtained. Out of the 100, 26 were male, and 74 were females. Ages ranged from 20 to 60 years. For anxiety levels, 45 (45%) individual staff members reported without anxiety "within normal range", and 41 (41%) reported higher levels of anxiety. The percentage of female staff members with anxiety (59.5.5%) was higher than that reported by males (42.3%), with no correlation between gender and anxiety (p = 0.13, X^2 = 2.287), as shown in Table I.

Anxiety prevalence was higher in females (59.5%) when compared to males (42.3%), and the prevalence of poor sleep quality was slightly higher in males (88.5%) than females (78.4%). In any case, differences in both of these variables did not reach statistical significance when tested with the appropriate chi-square tests (p = 0.130 and 0.260 separately), as shown in Table I.

Relationship of Age With Anxiety and Sleep Quality

Subjects over 40 years of age had a significantly lower prevalence of anxiety (odds ratio [OR] 0.28, 95% confidence interval [CI] 0.11-0.69) compared to people under 40. Sleep quality did not differ between age groups. To examine the correlation of age with anxiety, the Spearman's r coefficient was calculated (r = −0.304; p = 0.002) and showed that age was negatively associated with anxiety symptoms. To analyze which age group had lower anxiety levels, the Kruskal-Wallis H test was used and showed a statistically significant contrast in anxiety seriousness between the dissimilar age categories, χ^2= 12.58; p = 0.006 (Table II). The mean ± SD rank anxiety severity was 57.93 ± 14.71 for the age group 20-29, 51.37±13.56 for the age group > 29-40, 46.11 ± 13.35 for the age group > 40-50, and 26.91±10.64 for the age group > 50-60. People in the age group > 50-60 had the lowest anxiety level. Sleep quality did not differ between the different age groups (Table III).

Relation of Demographic Data to Anxiety and Sleep Quality

In the study, 100 individuals from the medical staff completed the surveys. The demographics and working information of the study members are shown in Table IV.

No relationship was found among anxiety and sleep quality (Spearman's r = −0.131; p = 0.195). No other critical interactions were found between demographic information and tested factors that appeared in Table II. However, a significant connection between the age and anxiety levels was discovered (Spearman's r = −0.304; p = 0.002) as shown in Tables III and IV. Additionally, the sleep

Table I. Relationship of gender with anxiety and sleep quality.

	LIR group	MTX group	MTX+LIR group	
	No Anxiety Symptoms	**With anxiety symptoms**	**OR (95% CI)**	**X^2 (p-value)**
Male	15 (57.7%)	11 (42.3%)	1	2.287 (0.130)
Female	30 (40.5%)	44 (59.5%)	2 (0.8-4.94)	
	Good Sleep quality	**Poor sleep quality**		
Male	3 (11.5%)	23 (88.5%)	1	1.271 (0.260)
Female	16 (21.6%)	58 (78.4%)	0.47 (0.12-1.78)	

OR: odds ratio 95% CI: 95% confidence interval.

Table II. Relationship of age with anxiety and sleep quality.

No Anxiety Symptoms	With anxiety symptoms	OR (95% CI)	X^2 (*p*-value)
< 40			
25 (35.7%)	45 (64.3%)	1	8.129 (0.006)
> 40			
20 (66.7%)	10 (33.3%)	0.28 (0.11-0.69)	
Good Sleep quality	Poor sleep quality		
< 40			
15 (21.4%)	55 (78.6%)	1	0.894 (0.344)
> 40			
4 (13.3%)	26 (86.7%)	1.77 (0.54-5.87)	

OR: odds ratio 95% CI: 95% confidence interval.

quality of the medical staff was low, with a mean PSQI score of 9.56 ± 3.72 and a typical Saudian PSQI score of 7 points.

Nonetheless, a weak relationship was found between higher monthly income and poor sleep quality (Spearman's r = 0.172; $p = 0.88$). The income group (< 5000) had higher sleep quality than the other two groups based on the Kruskal-Wallis test ($\chi^2 = 7.122$; $p = 0.028$) with a poor sleep quality with a mean PSQI score of 8.73 for the income group (< 5000 SAR), 9.23 for (5000-10000 SAR), and 9.7 for (>10000 SAR).

Discussion

This research utilized the SAS and PSQI to evaluate the association between anxiety levels and sleep quality; likewise, we evaluated the association between the demographic characteristics, anxiety and sleep quality of the medical staff who treated patients with COVID-19 in June and July 2020 in Saudi Arabia. Anxiety levels and sleep quality were estimated utilizing the SAS and PSQI. Likewise, the sleep quality of the medical staff was low with a mean PSQI score of 9.56 in contrast to the normal Saudi PSQI score of 7 points, and the sleep quality of medical staff who treated coronavirus patients was generally low. A few factors may have brought about the decrease in sleep quality of the medical staff. The discoveries from this investigation showed that anxiety and poor sleep quality increased because of the increment in the number of cases of COVID-19 in Saudi Arabia. Firstline medical staff need to wear defensive masks and defensive clothing, which may cause added mental pressure; in addition, the staff works consistently in the isolation wards under high workloads and high intensity. Likewise, some of the patients could not be cured since COVID-19 is related to patient mortality[1-3].

Regardless of the relationship of gender to anxiety and sleep quality in this research, a statistically significant relationship was not reached,

Table III. Relation of demographic to anxiety and sleep quality.

Variable	Anxiety Symptoms		Sleep quality	
	Spearman's r	*p*-value	Spearman's r	*p*-value
Gender	0.151	0.133	−0.113	0.264
Age	**−0.304**	**0.002**	0.032	0.750
Nationality	−0.099	0.327	−0.056	0.577
Education	−0.185	0.065	0.022	0.826
Marital status	−0.099	0.329	0.008	0.936
Monthly income	−0.098	0.331	0.172	0.088
Professional	0.123	0.222	0.164	0.103
Department	0.061	0.549	0.193	0.054
Working experience	−0.152	0.131	0.046	0.647
Anxiety Symptoms	1.000	-	−0.131	0.195
Sleep Quality	−0.131	0.195	1.000	-

Table IV. Basic demographic data and its relation to anxiety and sleep quality of the tested cohort.

Variable	No anxiety symptoms		with anxiety symptoms		X^2	*p*	Good sleep quality		Poor sleep quality		X^2	*p*
	No.	percent	No.	Percent			No.	percent	No.	percent		
Gender					2.28	0.17					1.27	0.385
Male	15	57.7%	11	42.3%			3	11.5%	23	88.5%		
Female	30	40.5%	44	59.5%			16	21.6%	58	78.4%		
Age					12.7	**0.005**					1.737	0.622
20-29	14	32.6%	29	67.4%			8	18.6%	35	81.4%		
> 29-40	11	40.7%	16	59.3%			7	25.9%	20	74.1%		
> 40-50	10	52.6%	9	47.4%			2	10.5%	17	89.5%		
> 50-60	10	90.9%	1	9.1%			2	18.2%	9	81.8%		
Nationality					0.98	0.322					0.319	0.57
Saudi	38	43.20%	50	56.80%			16	18.20%	72	81.80%		
Non-Saudi	7	58.30%	5	41.70%			3	25%	9	75%		
Education					3.79	0.184						
College or below	1	16.70%	5	83.30%			0	0.00%	6	100.00%	1.7	0.38
BSc	28	42.40%	38	57.60%			15	22.70%	51	77.30%		
Masters or above	16	57.10%	12	42.90%			4	14.30%	24	85.70%		
Marital Status					1.8	1					4.7	0.153
Single	13	37.10%	22	62.90%			8	22.90%	27	77.10%		
Married	29	50.00%	29	50.00%			8	13.80%	50	86.20%		
Divorced	2	40.00%	3	60.00%			2	40.00%	3	60.00%		
Widow	1	50.00%	1	50.00%			1	50.00%	1	50.00%		
Monthly Income					1.1	0.52					5.98	**0.037**
< 5000 SAR	2	28.60%	5	71.40%			4	57.10%	3	42.90%		
5000-10000 SAR	9	40.90%	13	59.10%			4	18.20%	18	81.80%		
> 10000 SAR	34	47.90%	37	52.10%			11	15.50%	60	84.50%		
Profession					5.323	0.138					3.656	0.3
Doctor	12	66.70%	6	33.30%			6	33.30%	12	66.70%		
Pharmacist	28	38.40%	45	61.60%			12	16.40%	61	83.60%		
Nurse	2	50.00%	2	50.00%			0	0.00%	4	100.00%		
Dentist	3	60.00%	2	40.00%			1	20.00%	4	80.00%		
Department					4.3	0.795					12.503	**0.045**
Intensive care unit (ICU)	1	100.00%	0	0.00%			0	0.00%	1	100.00%		
Internal medicine (IM)	4	66.70%	2	33.30%			2	33.30%	4	66.70%		
Emergency room (ER)	1	25.00%	3	75.00%			3	75.00%	1	25.00%		

Table continued

Table IV. ***(Continued).*** Basic demographic data and its relation to anxiety and sleep quality of the tested cohort.

Variable	No anxiety symptoms		with anxiety symptoms		X^2	*p*	Good sleep quality		Poor sleep quality		X^2	*p*
	No.	percent	No.	Percent			No.	percent	No.	percent		
Department					4.3	0.795					12.503	**0.045**
Surgery	2	66.70%	1	33.30%			0	0.00%	3	100.00%		
Pharmacy	20	42.60%	27	57.40%			9	19.10%	38	80.90%		
Clinical pharmacy	7	41.20%	10	58.80%			3	17.60%	14	82.40%		
Dentist clinic	4	57.10%	3	42.90%			2	28.60%	5	71.40%		
Other	6	40.00%	9	60.00%			0	0.00%	15	100.00%		
Working experience					4.5	0.104					1.9	0.38
< 2 years	13	40.60%	19	59.40%			8	25.00%	24	75.00%		
2-5 years	6	28.60%	15	71.40%			2	9.50%	19	90.50%		
> 5 years	26	55.30%	21	44.70%			9	19.10%	38	80.90%		

yet the level of the anxiety of the female medical staff members was higher than in males. Nevertheless, poor sleep quality was marginally higher in males when compared with females. A comparable study supports these outcomes in which the females presented higher anxiety levels than did the males[18]. The mix of anxiety, stress, and self-reliance of the medical staff affected their sleep quality. Anxiety influences sleep quality on the basis that anxious individuals regularly think that it is difficult to fall asleep and may often awaken during sleep[19].

Additionally, the combination of anxiety and sleep problems may make it hard to fall asleep[20]. The way in which stress is firmly identified with sleep quality was confirmed in a previous report[21]. An increase in stress can add degrees of vigilance with respect to the environment, which will subsequently cause a decrease in sleep quality[22]. Notwithstanding, self-adequacy is a positive mental status it may contribute to improving sleep quality[23]. Under pressure, people with high self-reliance are able to maintain relatively stable emotions and may face less setbacks with respect to sleep onset, less episodes of night awakening, and less sleep anxiety[24]. Self-efficacy additionally causes an increase in concentration and self-control[25]. Despite the fact that all medical staff experience pressure at work, individuals who have high self-reliance can handle their feelings and attempt to sleep routinely after work. Along these lines, the medical staff with high self-reliance, may have great sleep quality. Anxiety appears to increase susceptibility to work pressure and the workplace and also negatively affects self-reliant qualities since it causes a decrease in the presentation of positive and initiative characters[26,27].

Age has a negative significant correlation with anxiety symptoms. People under the age of forty presented higher anxiety levels than those over the age of forty. Also, the percentage of higher anxiety levels in women was higher than in men. A similar study showed that older adults reported lower levels of health anxiety than young adults, suggesting age-related differences in the severity of health anxiety existance[28]. Younger adults may be at greater risk for developing anxiety compared to older adults. As anticipated, older adults specified higher use of reappraisal as an emotional guideline, which has likewise been found in earlier studies[29]. Older adults also reported higher perceived anxiety control, although this finding differed from previous research[30]. Anxiety and/or depression were more prevalent in younger people and those with high estimates of individual risk.

In this study, sleep quality did not vary between diverse age groups, and no relationship was found among anxiety and sleep quality of the subjects; however, the level of poor sleep quality in men was higher than in women. Age, as expected, is significantly and inversely related to sleep quality. However, our data are not compatible with data from previous literature. This finding may be due to the fact that COVID-19 possesses a high risk to all medical staff regardless the age, and hospital admissions , also deaths have also been recorded among medical staff of all ages. A previous study in individuals over the age of 50 found an increase

in the prevalence of insomnia. Many studies suggested a strong association between quality of sleep and age[31,32]. The senior medical staff with longer working hours tended to possess more professional skills and social experience when dealing with a complex situation, explaining their lower perceived stress and better resilience.

We observed that the medical staff with high incomes significantly suffered ($p = 0.028$) more from poor sleep quality compared to those with lower salaries (< 5000) with a significant correlation but did not find a significant correlation between income and anxiety. The reasons for this finding are not clear at the current period. However, the health and economic threats that COVID-19 provides may be undermining traditional male gender roles, also the higher prevalence of mortality rate among males during the British COVID-19 pandemic might have played a part through this issue. The reasons for the elevation in male mortality rate are not instantaneously clear[15].

Conclusions

This study indicates that the medical staff needs suitable and continuous psychological intervention because the medical staff suffers from high-intensity exposure when subjected to treating COVID-19 patients. Also, a high prevalence of anxiety and poor sleep quality was detected in medical staff involved with COVID-19 patients.

Ethics Statment

This investigation was conducted based on the Helsinki guidelines. All participants were provided with a signed informed consent prior to participating in the study. Princess Nourah Bint Abdulrahman University approved the study: IRB registeration number with KACST, KSA: H-01-R-059; IRB Log number: 20-0137.

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Conflicts of Interest

The authors declare no conflicts of interest.

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