Original Article

Factors affecting mental status and effects of shift work system in healthcare workers

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Abstract

Objectives: Shift work system causes many physical and mental health problems. This study aimed to investigate the effects of shift work on sleep quality, mental status, and quality of life of healthcare personnel. It also aimed to determine the population at risk for depression and anxiety disorders by assessing differences among the occupational groups.

Methods: This study was carried out with 219 healthcare personnel at Gazi University Hospital. Employees were classified according to their more recent working schedule (shift, non-shift) and occupational groups (doctor, nurse, and other). Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Pittsburg Sleep Quality Index (PSQI), Morningness-Eveningness Questionnaire (MEQ), Perceived Stress Scale (PSS), and Professional Quality of Life Scale (ProQOL) were administered to the employees.

Results: The BDI (p<0.000), BAI (p<0.001), PSS stress perception subscale (p=0.032), PSQI (p<0.001), and ProQOL burnout subscale (p<0.001) scores were significantly higher in shift personnel than non-shift personnel. When the participants were analyzed according to occupational groups, BAI scale scores were significantly higher in nurses (p=0.001) than doctors or others, whereas stress perception and burnout were significantly higher in physicians (p=0.003; p=0.005, respectively). There was no significant difference between the occupational groups in terms of BDI and occupational satisfaction (p=0.101; p=0.778, respectively). In the regression analysis, the most important predictor of the BDI and BAI score was working 41 hours or more. The most important predictor of the PSQI score was shift work.

Conclusion: According to these results, especially nurses and doctors working in shifts are at serious risk for depression, anxiety, and sleep disorders. Employees' awareness should be increased regarding the associated risk of smoking, which is a risk factor. Health care workers should be trained in stress management and sleep hygiene to prevent the occurrence of mental illnesses.

Keywords: Anxiety disorders; burnout; depression; health personnel; shift work sleep disorder.

Shift work system has existed for centuries but become more widespread with the industrial revolution after the invention of electricity. Due to the rapid progress in modern communication and the development of global economies, shift work system has become more common in work and social life. Shift work system has become a requirement especially for the business lines related to security, health, and industry, where employees should work for 24 hours. However, working in various shift systems has caused difficulties in social and health-related fields.

The shift work system constitutes approximately 20% to 25% of the workforce in industrialized countries,[1] and this rate is increasing. The rate of working in shifts increased from 17% in 2005 and 2010 to 21% in 2015 in the European Union countries.[2] This rate differs by country; it is 38% in the United States of America and 11% in Turkey in 2019. It is most frequently

What is known on this subject?
- Working in shifts impairs the sleep quality of healthcare professionals and causes a tendency for depression and anxiety disorders. These effects have a greater impact on the mental health of female employees, impairing their quality of life.

What is the contribution of this paper?
- Female healthcare personnel who are working in shifts and smoke are at serious risk of depression and anxiety disorders.

What is its contribution to the practice?
- All healthcare professionals, particularly female employees who are working in shifts and smoke, should be provided with training to increase their awareness on stress management and support for smoking cessation.

used in the health sector (40%), followed by the transportation (33%) and industry (28%) sectors.[3]

Studies on the effects of working at different hours have reported that it increases the risk of diseases and disorders such as gastritis, ulcers, hypertension, coronary heart disease, deep venous thrombosis and venous insufficiency, breast cancer, colon cancer, diabetes mellitus, metabolic disorders, depression, and sleep disorders,[4] and as a result, humans, who are biopsychosocial creatures, experience burnout and decreased quality of life.[5]

Humans' requirements and daily life activities occur in a rhythm, which changes during the daily life activities of people who work in shifts. This vital cycle, called circadian rhythm, is the fundamental system that regulates physical and mental health by regulating body temperature, fatigue, blood pressure, hormone release, mood, etc.[6] The synchronization of this rhythm depends on daylight. Melatonin, which regulates sleep and has an antioxidant effect, is not released in daylight causing impaired homeostasis. Previous studies have reported that shift work system impairs sleep quality due to changes in the rapid eye movement (REM) and non-REM (NREM) second phase sleep periods.[6,7] Furthermore, sleep disorders cause chronic fatigue, weakness in memory and attention, and mental disorders, in particular depression.[4,8] Studies have shown that older employees who work in shifts have lower sleep quality, have difficulties adapting to the requirements of working in shifts, and react less to the phase changes in daylight compared to younger employees.[9] In addition to older employees, female employees constitute another group affected by shift work system. It has been reported that diurnation and additional psychological symptoms are observed frequently in women working in shifts.[8,10] In nursing, where women constitute a large part of the workforce, shift work system triggers many psychiatric disorders, including particularly sleep disorders and depression as well as somatization, anxiety, and social dysfunction.[11] A study in Turkey reported that the rates of somatization, obsessive-compulsive symptoms, interpersonal sensitivity, anxiety, and paranoid ideation were higher and quality of life was lower among the nurses who worked in shifts.[12]

Shift work system is one of the most important factors that affect healthcare professionals' moods, in addition to other important factors such as sleep disorders, perceived stress, intense working hours, years worked in the profession, burnout, or satisfaction with their profession.[13] These factors depend on each other. For example, sleep disorders increase the tendency for depression and anxiety disorders. Depressed and anxious individuals have reduced satisfaction with their profession and experience increased burnout,[14] which in turn affects their quality of life. Deterioration of one factor often leads to deterioration of another factor, and improvement in one factor will contribute to the improvement of other factors.

Psychiatric nurses provide services in the protection and promotion of individual, family, and community mental health as well as in cases of mental disease. They play a key role and actively participate in the evaluation of problems experienced by healthcare personnel working in shifts who are at serious risk for mental and physical diseases.[15] A study that analyzes the variables such as depression, anxiety disorder, perceived stress, sleep disorders, and quality of life, as indicated above, for all mental health personnel, particularly psychiatric nurses and doctors would make a significant contribution to the literature. Therefore, this study analyzes the effects of shift work system on healthcare professionals' mental status, sleep quality, and quality of life, compares the levels of depression, anxiety, burnout, sleep quality, and quality of life in doctors, nurses, and other healthcare personnel, and determines the population at risk for mental disorders. Determination of the population at risk is critical for providing psychiatric nursing services effectively and efficiently.

Materials and Method

Study Type

This study was designed as a descriptive and cross-sectional study.

Study Population and Sample

The study was conducted with the healthcare professionals working at Gazi University Hospital in March and April 2016. The study population consisted of 670 nurses, 245 doctors, and 590 other healthcare professionals. The sample size was calculated using the G*Power 3 program considering the mean and standard deviation values of the variables of depression and anxiety in healthcare professionals in another study.[12,16] Accordingly, the researchers aimed to include a minimum of 158 healthcare professionals to achieve a confidence limit of 95%, a margin of error of 5%, and a testing power of 95%.

The profile of healthcare personnel indicates that nurses and doctors constitute the largest group among all healthcare professionals. They were also the main group in the present study. The "other healthcare professions" group in the present study included medical secretaries, medical officers, physiotherapists, psychologists, and caregivers. These groups were combined because they had inadequate numbers separately. The study sample consisted of 219 participants: 55 doctors, 80

nurses, and 84 other healthcare professionals. This sample size was higher than the number of participants determined in the power analysis, and all participants' data were analyzed considering that they represent the population better.

Data Collection and Assessment Tools

After the participants were informed and their consent was obtained, the prepared forms were distributed. The forms were collected from 250 healthcare professionals who agreed to participate in the study. Of the forms, 31 were not analyzed as they were only partially filled out or contained inconsistent answers. Consequently, 219 assessment forms were statistically analyzed.

The data were collected using a General Information Form, the Beck Anxiety Scale (BAS), the Beck Depression Inventory (BDI), the Morningness-Eveningness Questionnaire (MEQ), the Perceived Stress Scale (PSS), the Pittsburgh Sleep Quality Index (PSQI), and the Professional Quality of Life Scale (ProQOL).

The General Information Form was prepared by the researcher based on the literature and included the participants' sociodemographic data and information on their working life.

The BAS was developed by Beck et al.[17] as a self-assessment tool to determine the prevalence of anxiety symptoms experienced by individuals. Ulusoy et al.[18] tested the BAS for validity and reliability in Turkish and found its Cronbach's alpha coefficient to be 0.93. It is a four-point Likert type scale with 21 items. Higher scale scores indicate higher anxiety levels. In the present study, the Cronbach's alpha coefficient was 0.89.

The BDI was developed by Beck et al.[19] to determine the individuals' risk for depression and measure the severity of depression. It is a four-point Likert type scale with 21 items. It was tested for validity in Turkish by Hisli[20] in 1988. Higher scale scores indicate higher severity of depression. Its Cronbach's alpha coefficient was 0.80 in the Turkish validity study and 0.91 in the present study.

The MEQ was developed by Horne and Ostberg.[21] It consists of 19 questions assessing when individuals' physical and psychological performance is better within a 24 hour period and their preferences during sleep and wakefulness. The questionnaire was tested for reliability in Turkish.[22] Its Cronbach's alpha coefficient was 0.81 both in the Turkish reliability study and in the present study. Higher scale scores indicate increased morningness characteristics.

The PSS was developed by Cohen et al.[23] It consists of 14 items and assesses the extent to which individuals perceive some situations in their lives as stressful. The participants assess each item on a 5-point Likert type scale from "Never (0)" to "Very Often (4)." It was tested for validity and reliability in Turkish by Eskin et al.[24] Its Cronbach's alpha coefficient was 0.84 both in the Turkish reliability study and in the present study. Higher scale scores indicate higher perceived stress in individuals.

The PSQI is a questionnaire with 11 sections used to determine sleep quality. It was developed by Buysse et al. in 1989.[25]

It was tested for validity and reliability in Turkish by Ağargün et al. in 1996.[26] The PSQI has seven components, and its Cronbach's alpha coefficient is 0.80. The components are subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction, which yields a total score between 0 and 21. A total score higher than 5 indicates impaired sleep quality. In the present study, the Cronbach's alpha coefficient was 0.74.

The ProQOL, developed by Stamm,[27] consists of 30 items under three subscales. The compassion satisfaction subscale assesses the sense of satisfaction and pleasure experienced by employees when they help someone in need in a field related to their profession or job. The burnout subscale assesses the sense of burnout that emerges when employees have difficulty coping with the problems that occur in their working life and experience hopelessness. The compassion fatigue subscale assesses the symptoms that emerge when employees encounter stressful events. The participants assess each item on a 6-point Likert type scale from "Never (0)" to "Very Often. [6]" It was tested for validity and reliability in Turkish by Yeşil et al.[28] They found the Cronbach's alpha coefficients of the compassion satisfaction, burnout, and compassion fatigue subscales to be 0.84, 0.62, and 0.83, respectively. In the present study, the Cronbach's alpha coefficients were 0.85, 0.73, and 0.82, respectively.

Ethical Consideration

Ethical approval was obtained from the Ethics Committee of Gazi University with number 2017-78 on 2/10/2017. The aim and scope of the study were explained to the participants, and they were informed that their participation was voluntary and their personal information would be kept confidential. Any questions were answered and their written consent was obtained.

Data Analysis

The statistical analyses were performed using the SPSS 23.0 program. The descriptive statistics were presented as frequency, percentage, mean, and standard deviation. The qualitative data were compared using the chi-square test, and when the expected frequencies could not be met, using the Fisher Exact test. Whether the data are normally distributed was assessed using the Kolmogorov Smirnov test, which yielded insignificant results. However, it was reported that parametric tests show significant power and can be used when the sample size is higher than 30 in the analyzed groups and the kurtosis/skewness coefficients are between ±2.[29,30] Therefore, the One-Way Variance Analysis was used to compare the variables among the three groups and the Levene Analysis was used to assess the homogeneity of the groups' variances. The Tukey post hoc test was used when the variances were homogeneous, and the Tamhane's T2 test was used when they were heterogeneous. The independent samples t-test was used to compare the data of two groups. The scores of the BDI, BAS,

and PSQI were used as dependent variables in the multiple linear regression analysis. It was reported that while numerical variables are mainly used in multiple linear regression analysis, binary categorical variables or ordered variables such as education level can also be used.[31] Therefore, in the multiple linear regression analysis, categorical variables such as gender, marital status, and smoking were addressed in addition to the numerical variables such as age, body mass index, and years

of working. Significance levels were accepted to be p<0.05 for the statistical analysis.

Study Limitations

Doctors and nurses were analyzed as separate groups. However, medical secretaries, medical officers, physiotherapists, psychologists, caregivers, etc. were categorized under the "other professions" group because each group did not have

Table 1. Participants' sociodemographic characteristics according to working system (n=219)								
Variable	Non-shift (n=109)		Shift (n=110)		Total (n=219)		X²	p
	n	%	n	%	n	%		
Gender								
Female	85	78.0	65	59.1	150	68.5	8.199	0.004
Male	24	22.0	45	40.9	69	31.5		
Age group								
21–30 years	27	24.8	63	57.3	90	41.1	28.943	<0.001
31–40 years	42	38.5	33	30.0	75	34.2		
41 and older	40	36.7	14	12.7	54	24.7		
Marital status								
Single	29	26.6	46	41.8	75	34.2	12.455	0.002
Married	69	63.3	63	57.3	132	60.3		
Widow	11	10.1	1	0.9	12	5.5		
Profession								
Doctor	19	17.4	36	32.7	55	25.1	7.257	0.027
Nurse	42	38.5	38	34.5	80	36.5		
Other	48	44.0	36	32.7	84	38.4		
Education level								
Primary school	7	6.4	3	2.7	10	4.6	7.976	0.047
Middle school	3	2.8	13	11.8	16	7.3		
High school	17	15.6	16	14.5	33	15.1		
University	82	75.2	78	70.9	160	73.1		
Income level								
3000 TL and lower	27	24.8	32	29.1	59	26.9	0.323	0.570
3001 TL and higher	82	75.2	78	70.9	160	73.1		
Working hours								
Less than 40 hours	8	7.3	1	0.9	9	4.1	88.898	<0.001
40 hours	71	65.1	15	13.6	86	39.3		
41 to 48 hours	23	21.1	46	41.8	69	31.5		
49 to 56 hours	5	4.6	25	22.7	30	13.7		
57 hours and more	2	1.8	23	20.9	25	11.4		
Smoking								
No	82	75.2	76	69.1	158	72.1	0.744	0.388
Yes	27	24.8	34	30.9	61	27.9		
Alcohol								
No	95	87.2	78	70.9	173	79.0	7.758	0.005
Yes	14	12.8	32	29.1	46	21.0		
Having children								
No	33	30.3	63	57.3	96	43.8	15.130	<0.001
Yes	76	69.7	47	42.7	123	56.2		

Table 2. Comparison of the scale scores according to the working system

Variable	Non-shift (n=109)	Shift (n=110)	Total (n=219)	t	p
	Mean±SD	Mean±SD	Mean±SD		
BDI	6.96±7.71	11.54±9.71	9.25±9.07	-3.863	<0.001
BAS	5.52±6.59	8.77±8.47	7.10±7.75	-3.121	<0.001
PSS - Insufficient self-efficacy perception	10.90±3.75	10.87±4.05	10.86±3.89	0.067	0.946
PSS - Stress perception	12.37±4.57	13.79±5.29	13.07±4.99	-2.115	0.036
PSQI	5.44±3.33	7.61±3.59	6.50±3.61	-4.646	<0.001
ProQOL - Compassion satisfaction	33.54±8.66	30.98±9.67	32.36±9.12	2.062	0.040
ProQOL - Burnout	15.69±7.24	19.56±7.74	17.61±7.74	-3.813	<0.001
ProQOL - Compassion Fatigue	13.66±7.95	15.77±8.51	14.72±8.28	-1.890	0.049
MEQ	50.59±8.40	46.16±9.72	48.36±9.34	3.607	<0.001

BDI: Beck Depression Inventory; BAS: Beck Anxiety Scale; PSS: Perceived Stress Scale; PSQI: Pittsburgh Sleep Quality Index; ProQOL: Professional Quality of Life Scale; MEQ: Morningness-Eveningness Questionnaire; Mean: Mean value; SD: Standard deviation.

Table 3. Comparison of the scale scores according to profession

Variables	Doctor[1] (n=55)	Nurse[2] (n=80)	Other[3] (n=84)			Post Hoc	
	Mean±SD	Mean±SD	Mean±SD	F	p	Binaries	p
BDI	9.63±9.66	10.62±9.60	7.72±7.89	2.186	0.115		
BAS	6.49±6.02	9.98±9.90	4.83±5.20	10.099	<0.001	1–2	0.021
						2–3	<0.001
PSS - Insufficient Self-Efficacy Perception	10.92±4.00	10.95±3.66	10.80±4.08	0.030	0.971		
PSS - Stress Perception	14.67±4.64	13.28±457	11.85±5.30	5.627	0.004	1–3	0.004
PSQI	7.40±3.30	6.71±4.29	5.79±2.96	3.470	0.033	1–3	0.029
ProQOL-Compassion Satisfaction	32.16±10.19	31.78±9.00	32.76±8.92	0.229	0.795		
ProQOL-Burnout	20.03±7.47	18.02±7.81	15.70±7.40	5.606	0.004	1–3	0.003
ProQOL-Compassion Fatigue	13.36±7.32	16.29±8.58	14.14±8.45	2.389	0.094		
MEQ	45.83±9.01	49.23±7.88	48.54±10.71	1.103	0.334		

1: Doctor, 2: Nurse, 3: Other. BDI: Beck Depression Inventory; BAS: Beck Anxiety Scale; PSS: Perceived Stress Scale; PSQI: Pittsburgh Sleep Quality Index; ProQOL: Professional Quality of Life Scale; MEQ: Morningness-Eveningness Questionnaire; Mean: Mean value; SD: Standard deviation.

enough participants for statistical analysis. These personnel's working conditions, working hours, or different shift systems may have created a variance. The higher average age of the personnel not working in shifts compared to those working in shifts may have played a confounding role in the analyses of many variables. Similarly, the higher percentage of female personnel was also a limitation. The categorization of the non-shift and shift work systems was based on the latest schedule the participant worked. This may have caused a limitation on the assessment of the effect of the working system on mental status and quality of life if the most recent schedule did not reflect the usual working system.

Results

Table 1 shows the participants' sociodemographic charac-

teristics. Of the participants, 150 (68.5%) were female, 90 (41.1%) were aged between 21 and 30, 132 (60.3%) were married, and 160 (73.1%) had graduated from university. Of them, 160 (73.1%) had an income of 3001 TL and higher, 86 (39.3%) worked 40 hours a week, 110 (50.2%) worked in shifts, 61 (27.9%) smoked, 46 (21.0%) consumed alcohol, and 123 (56.2%) had children (Table 1).

Table 2 shows the assessment of the scales administered to the participants according to their working system. A statistically significant difference was found between the participants working and not working in shifts in terms of the BDI, the BAS, the stress perception subscale of the PSS, the PSQI, and the compassion satisfaction, burnout, and compassion fatigue subscales of the ProQOL (Table 2).

Table 3 shows the comparison of the mean scale scores according to profession. No statistically significant difference

Table 4. Results of the Multiple Linear Regression Analysis for the Prediction of the BDI, BAS, and PSQI Scores

Variable	BDI		BAS		PSQI	
	β (95% CI)	p	β (95% CI)	p	β (95% CI)	p
Age	-0.231 (-0.604; 0.058)	0.106	0.035 (-0.247; 0.318)	0.805	0.017 (-0.123; 0.139)	0.907
Gender (Female=1/Male=2)	-0.155 (-5.827; -0.216)	0.035	-0.238 (-6.351; -1.559)	0.001	-0.143 (-2.228; -0.006)	0.049
Marital status (Single=1/Married=2)	-0.092 (-6.087; 2.600)	0.430	0.032 (-3.181; 4.238)	0.779	-0.123 (-2.658; 0.782)	0.284
Education Level (High School and lower=1/University and higher=2)	0.200 (0.792; 7.357)	0.015	0.175 (0.238; 5.844)	0.034	0.217 (0.470; 3.069)	0.008
Income Level (3000 TL and lower=1/3001 TL and higher=2)	-0.053 (-4.097; 1.957)	0.487	0.008 (-2.439; 2.732)	0.911	-0.036 (-1.492; 0.905)	0.629
Body mass index	0.100 (-0.109; 0.667)	0.158	0.147 (0.020; 0.683)	0.038	0.079 (-0.065; 0.243)	0.254
Having Children (No=1/Yes=2)	0.030 (-4.212; 5.299)	0.822	-0.015 (-4.294; 3.828)	0.910	0.071 (-1.363; 2.403)	0.587
Years of working	0.198 (-0.008; 0.043)	0.175	-0.057 (-0.026; 0.017)	0.695	-0.099 (-0.013; 0.006)	0.490
Working system (Non-shift=1/Shift=2)	0.140 (-0.411; 5.478)	0.091	0.085 (-1.206; 3.823)	0.306	0.250 (0.644; 2.975)	0.003
Weekly working hours (40 hours and less=1/41 hours and more=2)	0.218 (0.910; 7.026)	0.011	0.280 (1.761; 6.985)	0.001	0.058 (-0.786; 1.636)	0.490
Smoking (No=1/Yes=2)	0.155 (0.392; 5.846)	0.025	0.129 (-0.100; 4.558)	0.061	0.166 (0.261; 2.421)	0.015
Alcohol consumption (No=1/Yes=2)	-0.016 (-3.513; 2.796)	0.823	-0.007 (-2.828; 2.561)	0.922	0.047 (-0.834; 1.664)	0.513
F	3.517		3.596		4.030	
p	<0.001		<0.001		<0.001	
R^2	0.170		0.173		0.190	

BDI: Beck Depression Inventory; BAS: Beck Anxiety Scale; PSQI: Pittsburg Sleep Quality Index.

was found between the professions in terms of the BDI, the insufficient self-efficacy perception of the PSS, and the compassion satisfaction and compassion fatigue subscales of the ProQOL. The comparison of the mean scores on the BDI, the stress perception subscale of the PSS, the PSQI, and the burnout subscale of the ProQOL indicated a statistically significant difference between the professions. Nurses had the highest mean score on the BAS, whereas doctors had the highest mean scores on the stress perception subscale of the PSS, the PSQI, and the burnout subscale of the ProQOL (Table 3).

Table 4 shows the results of the multiple linear regression analysis, which analyzed the healthcare professionals' scores on the BDI, BAS, and PSQI. Accordingly, the most important factor that affected depression in the healthcare professionals was weekly working hours, followed by an education level of university and higher, smoking, and female gender, respectively. The predictors of the BAS, which assesses anxiety disorder, were working for 41 hours and longer, female gender, an education level of university and higher, and body mass index (BMI), respectively, in the order of importance. The predictors of the PSQI, which assesses sleep disorder, were shift work system, an education level of university and higher, smoking, and female gender, respectively, in the order of importance.

Discussion

This study determined the effect of shift work system on healthcare professionals' mental status, sleep quality, and quality of life. It also analyzed the differences between these variables according to profession. Depression, anxiety disorder, sleep disorder, burnout, and stress perception levels were higher in the participants working in shifts. Nurses had the highest level of anxiety symptoms, whereas doctors had the highest level of sleep disorders, stress perception, and burnout. The most important predictor of depression and anxiety disorders was long working hours, whereas shift work system was the most important predictor of sleep disorders.

Considering the participants' mental status, it can be said that those working in shifts had a higher stress perception and a tendency for depression and anxiety disorders. The participants' higher stress perception scores may have caused an inclination towards depression and anxiety disorders. In a study conducted with 979 healthcare professionals working in shifts, the participants reported their mental health. [11] Of the participants, 45.4% were found to have mild to severe mental disorders. Anxiety and somatization disorders were at the highest rates (43.2% and

34.5%, respectively). The prevalence of depression was 11.2%. In the present study, a tendency for depression showed no difference according to profession. This finding suggests that all healthcare professionals seemed to have a similar risk of depression. Virtanen et al. prospectively followed 2123 healthcare professionals without psychiatric morbidity for mental diseases.[32] They found that those working in shifts were at approximately two times higher risk of depression even after adjusting for sociodemographic variables, chronic diseases, alcohol consumption, smoking, and job-related factors. In the present study, although the doctors' and nurses' BDI scores were higher than those of the other healthcare professionals, the difference was not statistically significant. Nevertheless, it was close to the significance level (p=0.101). Accordingly, it can be concluded that the burden of shift work system increases the risk for depression and anxiety in healthcare personnel, particularly doctors and nurses. However, some studies indicated that depression and shift work system were not directly related but indirectly related due to long working hours and sleep disorders.[33] Another study partially supports this result, showing that the symptoms of anxiety and depression were more frequently observed in those who worked in shifts and had impaired sleep quality.[34]

Sleep quality and duration were reported to reduce in those working in shifts.[35] The present study also found that sleep quality was poorer in those working in shifts. Doctors had poorer sleep quality compared to the other healthcare professionals. It is known that employees experience sleepiness the day after shift work due to low sleep quality, which impairs their social life and cognitive function.[36,37] A study that assessed sleepiness in working systems with a larger sample reported that the rate of sleepiness was highest in those working at night and lowest in those working in the daytime. It has been reported that sleep is affected in at least three-quarters of those working in shifts and the prevalence of sleep disorders is approximately 10% in them.[38]

Job satisfaction and burnout are important issues that affect the quality of life. A study conducted with nurses compared their job satisfaction according to different shift working systems (constantly days, constantly nights, and rotating shifts) and found that the nurses working in rotating shifts had the lowest job satisfaction.[39] It also reported that 54.9% of the participant nurses might have been at risk for mental diseases. The present study also found compassion satisfaction to be higher in those working in the non-shift system, which supports the literature. However, no difference was found between the professions in terms of compassion satisfaction. Another sub-factor of quality of life, burnout, was significantly higher in those working in shifts (according to the working system) and in doctors (according to profession) in the present study. Burnout is frequently observed in healthcare professionals who have intense contact with people, which causes an increase in the prevalence of various mental disorders, depression in particular, as well as a decrease in quality of life and job and life satisfaction.[40–42] Young age, female gender, high

expectations in the workplace, and employees' low control over the consequences of their work are risk factors for burnout.[43]

Compassion fatigue is defined as the physical, social, and mental burnout experienced by caregivers, which causes reduced willingness, and skills of empathize with and caregiving to others.[44] It is expressed as the cost of caregiving for healthcare professionals arising as a natural result of the caregiving relationship. Yoder conducted a study in 2010 and found that 15% of the nurses experienced compassion fatigue.[45] Khan et al.[46] reported that compassion fatigue was observed at a higher level in doctors and nurses compared to paramedical personnel. In the present study, compassion fatigue was significantly higher in the participants working in shifts. Although no significant difference was found between the professions in terms of compassion fatigue, nurses obtained the highest mean scores.

The present study indicated that the most important factor that affects depression and anxiety disorder was weekly working hours, whereas shift work system was the most important factor that affects sleep disorders. Virtanen et al.[47] reported that working for 40 hours or more in a week increased the tendency for depression by a factor of 1.66 and for anxiety disorders by a factor of 1.74 for the healthcare professionals whom they followed for 5 years. They also found that working for 40 hours or more in a week increased the risk for depression by a factor of 2.67 and for anxiety disorder by a factor of 2.84 for female healthcare professionals. Their study suggests that working for long periods affects female personnel more. The present study found a similar result. Female gender was a significant predictor for depression, anxiety, and sleep disorders in healthcare professionals. Another variable that may be related to these psychiatric disorders is education level. Although the studies analyzing the relationship between education level and depression are inconsistent, it seems to be a more common opinion that depression level decreases with a higher education level. A recent study reported that the possibility of depression decreased with a higher education duration.[48] Another study indicated that the prevalence of depression varied by education level. It showed that depression level was 7% in the uneducated participants, 38% in primary school graduates, 41% in middle school graduates, and 8% in university graduates.[49] This suggests that lower awareness of the uneducated participants may protect them from depression. This prevalence may decrease with a higher education level as educated people may seek a diagnosis of and treatment for depression. In the present study, an education level of university and higher was found to increase the tendency for depression, perhaps because participants with higher education levels were mostly included in the doctor or nurse groups.

While the level of smoking has decreased within the last 20 years, it has remained at relatively similar levels for those having a psychiatric disease.[50] There are a few hypotheses that try to explain smoking in those who have a psychiatric disease.

The most important hypotheses are smoking for self-medication and the fact that nicotine temporarily reduces the symptoms of anxiety/depression. However, considering its long-term effects, smoking is a precipitating agent for psychiatric disorders. A study conducted with 701 healthcare professionals determined depression in 37% of the smoking nurses and 17% of the non-smoking nurses.[51] The present study also found that smoking was one of the most important predictors of depression and sleep disorders in healthcare professionals. It is also suggested that shift work system increases the rate of smoking and caffeine intake by personnel to stay awake and increase their performance.[47] Accordingly, it can be concluded that shift work system may increase depression directly or may increase the tendency for depression indirectly through smoking.

Conclusion

Healthcare professionals, particularly nurses and doctors, are at serious risk for depression, anxiety, and sleep disorders. The reduction of long working hours is regarded as one of the most significant ways to prevent depression and anxiety disorders. The working and resting hours should be regulated in accordance with international criteria to reduce these psychiatric disorders in healthcare professionals. Psychiatric nurses and doctors play an important role in early diagnosis, prevention, and guiding the treatment of these disorders in healthcare professionals. The results of the present study serve as a guidance for psychiatric personnel as it shows the difficulties experienced by the healthcare professionals working in shifts. The risk for depression and sleep disorders was higher for female healthcare professionals who were smoking and had a higher education level. It is recommended that awareness be raised in this population regarding stress and sleep management and training programs be organized to decrease burnout and compassion fatigue. Psychiatric nurses should inform healthcare professionals about the fact that smoking increases depression and sleep disorders, increase the awareness on smoking cessation treatments, and provide guidance to access the treatment.

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