



Determination of Chronotype, Quality of Life, Sleep Quality, and Social Jetlag in Shift Working Nurses

Vardiyalı Çalışan Hemşirelerde Kronotip, Yaşam Kalitesi, Uyku Kalitesi ve Sosyal Jetlag'ın Belirlenmesi

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Abstract

Objective: This study determined the effects of chronotypes, social jetlag levels, and sleep quality on the quality of life of shift-working nurses.

Materials and Methods: This descriptive study was conducted on nurses working in shifts at a university hospital in Turkey from 2021 to 2022. The data were collected with the "Descriptive Information Form", "Pittsburgh Sleep Quality Index", "Self-assessment morningness-eveningness questionnaire" and "Professional Quality of Life Scale", Questions Regarding Social Jetlag Periods.

Results: It was determined that 14.2% of the nurses had a chronotype close to the morning type, 68.7% had an intermediate type chronotype, and 17.2% had a chronotype close to the evening type. It was found that the burnout levels of females taking part in the study were statistically higher than those of males. It was determined that nurses working in emergency and intensive care units experienced higher empathy fatigue and sleep latency and daytime dysfunction compared to nurses working in normal services. In the study, it was found that nurses working daytime + on-duty had higher daytime dysfunction than nurses working on permanent duty.

Conclusion: Because of the study, it was determined that the sleep quality of the nurses working in shifts deteriorated, and they also experienced empathy fatigue and burnout professionally. To increase the sleep quality of the employees, the working rest hours International Labor Organization of the nurses working in shifts should be arranged per the criteria of the Nurses Association of other countries.

Keywords: Shift worker, social jetlag, sleep, quality of life, chronotypes

Öz

Amaç: Bu çalışmada, vardiyalı çalışan hemşirelerin kronotipleri, sosyal jetlag düzeyleri ve uyku kalitesinin yaşam kalitesine etkisinin belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Bu tanımlayıcı çalışmaya, Türkiye'de bir üniversite hastanesinde 2021-2022 yılları arasında vardiyalı olarak çalışan hemşireler dahil edilmiştir. Veriler "Tanımlayıcı Bilgi Formu", "Pittsburg Uyku Kalitesi İndeksi", "Kişisel değerlendirme sabah-akşam anketi", "Profesyonel Yaşam Kalitesi Ölçeği" ve sosyal jetlag dönemlerine ilişkin sorular ile toplanmıştır.

Bulgular: Hemşirelerin %14,2'sinin sabah tipine yakın, %68,7'sinin ara tip, %17,2'sinin akşam tipine yakın kronotipe sahip olduğu belirlendi. Araştırmaya katılan kadınların tükenmişlik düzeylerinin erkeklere göre istatistiksel olarak daha yüksek olduğu bulundu. Acil ve yoğun bakım ünitelerinde çalışan hemşirelerin normal servislerde çalışan hemşirelere göre daha yüksek empati yorgunluğu, uyku gecikmesi ve gündüz işlev bozukluğu yaşadıkları belirlendi. Araştırmada gündüz ve nöbette çalışan hemşirelerin, sürekli nöbette çalışan hemşirelere göre daha yüksek gündüz işlev bozukluğuna sahip oldukları bulundu.

Sonuç: Çalışmada vardiyalı çalışan hemşirelerin uyku kalitelerinin bozulduğu, mesleki anlamda da empati yorgunluğu ve tükenmişlik yaşadıkları belirlenmiştir. Çalışanların uyku kalitesini artırmak için vardiyalı çalışan hemşirelerin çalışma ve dinlenme saatleri diğer ülke Hemşireler Birliği kriterlerine göre düzenlenmelidir.

Anahtar Kelimeler: Vardiyalı çalışan, sosyal jetlag, uyku, yaşam kalitesi, kronotipler

Introduction

Sleep is a state of inactivity that allows the whole body to rest. Sleep is a reversible renewal period in which all the systems of the bodywork, with different phases and regular rhythms (1). The internal rhythm of the sleep-wake cycle is normally synchronized with the alternation of the day-night

cycle and social routines. Disruptions in synchronization can cause sleep problems (2). Depending on the internal circadian rhythm of the individuals, there may be differences in the sleep and activity timings they prefer. These differences in sleep and activity times are called chronotypes (3). There are three different chronotypes in humans, namely morning type, intermediate type, and evening type (4). Morning and evening

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types differ in sleep-wake timing and mental-physical activation over 24 hours. Morning types go to bed early and get up early, and their mental and physical performance is high in the early hours of the day (5). Evening types go to bed later and get up late and achieve their best performance in the second half of the day. Intermediate types try to adapt to the cycle (4).

With introducing the definition of social jetlag (SJL) into our lives, it has been noticed that sleep quality changes not only according to the chronotypes of individuals. It has been reported that SJL is because of the mismatch between the person's internal clock (circadian rhythm) and external clock (social working hours), a misunderstanding of the sleep-wake cycle and circadian rhythm (6). The SJL measures the inconsistency between circadian and social clocks that often cause chronic sleep loss (7).

Although the negative effects of shift work on people are known, this is inevitable for nurses. For nurses to monitor their patients continuously and to provide more effective care at all hours of the day, their perceptions must be constantly open. In addition, it is important to adapt nurses' chronotypes regarding SJL and to develop department-specific shift programs in shift departments for interventions that promote sleep quality and life quality of nurses working in shifts. This descriptive study aimed to examine the chronotypes, SJL levels, sleep quality, and quality of life of shift nurses.

Materials and Methods

Study Design, Participants

This is a descriptive study conducted between 1 November 2021 and 1 February 2022. The study was conducted by nurses working in shifts in a university hospital in Turkey. The inclusion criteria for the study are subjects aged 18 years or older, who volunteer to participate in the study, and work for one year or more in 8-hour alternating shifts, including at least two consecutive night shifts. The number of nurses who met these criteria and participated in the study was 134.

This study was carried out by The Code of Ethics of the World Medical Association (Declaration of Helsinki). The study was approved by the Ethics Committee of the Selçuk University (E.155799, date 13.10.2021). All participants provided written informed permission.

Data Collections

The data were collected with the "Descriptive Information Form", "Self-assessment Morningness-eveningness Questionnaire (MEQ)", "Professional Quality of Life Scale (ProQOL R-IV)", and "Pittsburg Sleep Quality Index (PSQI)". Because of the Coronavirus disease-2019 pandemic measures, the questionnaire was applied to the nurses via the link created on the google form. In the data collection form; an informed consent text, including the purpose of the study, was created. Questionnaires were collected through nurse online groups (WhatsApp, Instagram, Telegram).

Descriptive Information Form

There are 10 questions, 7 of which question the sociodemographic characteristics of nurses and 3 questions about their working characteristics.

Self-Assessment Morningness-Eveningness Questionnaire (MEQ)

The MEQ was developed by Horne and Ostberg (8) in 1976. Its Turkish adaptation was done by Pündük et al. (9). The form comprises 19 MEQ items. The score to be got from the form varies between 16 and 86. Individuals with a total score between 70 and 86 are "definitely morning-type" Individuals with a score between 59-69 are "close to morning-type", individuals with a score of 42-58 are "intermediate type", individuals with a score of 31-41 Individuals with a score between 16 and 30 are considered as "definite evening type". The Cronbach's alpha value of the form was calculated as 0.81 and it was valid and reliable (9). In our study, the Cronbach's alpha value of the form was 0.73.

Professional Quality of Life Scale (ProQOL R-IV)

The original name of the scale is the ProQOL R-IV. It was developed by Stamm (10) in 2005. Yesil et al. (11) performed the Turkish validity and reliability of the scale in 2010. Sub-dimensions of the scale are professional satisfaction, burnout, empathy fatigue. The scale consists of three sub-dimensions and 30 items and is in a five-point Likert type. A high score in the professional satisfaction sub-dimension shows the level of satisfaction or satisfaction as a helper. A high score from the burnout sub-dimension shows a high level of burnout. Employees with high scores in the peer fatigue sub-dimension are recommended to receive support or help. The Cronbach's alpha value of the scale was calculated as 0.848. In this study, the Cronbach's alpha value of the scale was calculated as 0.81.

Pittsburg Sleep Quality Index (PSQI)

The PSQI was developed in 1989 by Buysse et al. (12). A Turkish validity and reliability study was conducted by Agargun et al. (13). In the PSQI, sleep quality was evaluated according to seven subscales: Subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction in the last month. The final score varied between 0 and 21 (12,13). A total PSQI score higher than five is considered an indicator of poor sleep quality.

Questions Regarding SJL Periods

It comprises 3 questions, including the average light exposure time of the people taking part in the study during the day and the duration of feeling sleepless during the day and night shifts (14).

Statistical Analysis

Statistical analyses were performed using the Statistical Package for Social Sciences 24.0. Descriptive statistics were evaluated with number, percentage, mean, median, and standard deviation. The Kolmogorov-Smirnov and the Shapiro-Wilk tests were applied to test the normality distribution. When the hypothesis of normality was rejected, we used the nonparametric Mann-

Whitney U test. Values of $p < 0.05$ were considered statistically significant.

Results

The study was conducted with 134 nurses, 72.4% ($n=97$) female, and 27.6% ($n=37$) male. The ages of the nurses taking part in the study ranged from 18 to 50, with an average of 28 years old. It was stated that 46.3% of the nurses taking part in the study were married, 67.2% were educated at the undergraduate level, and 97% lived in the city center. It was stated that 74.6% of the nurses worked for 40 hours or more per week, and 70.9% of them worked daytime + watch (Table 1).

In Table 2, 14.2% of the nurses are close to the morning type, 68.7% to the intermediate type, and 17.2% to the evening type. The average duration of light exposure during the day was found to be 2.5 hours on average, the average feeling of sleeplessness during the day shift was 2.16 hours, and the average duration of feeling sleepless during the night shift was found to be 3.02 hours. The mean PSQI score is 8.95 ± 2.25 .

In Table 3, the burnout levels of females taking part in the study were found to be statistically higher than males ($p < 0.05$).

When the sleep quality sub-dimensions were examined in the study, it was determined that male nurses used more sleeping pills ($p < 0.05$). When the taking part nurses were compared with the work unit, it was found that the nurses working in the emergency room, intensive care units, and operating rooms experienced higher empathy fatigue than the nurses working in the normal service ($p < 0.05$). In addition, it was determined that the nurses working in the emergency room, intensive care, and operating room experienced sleep latency and daytime dysfunction more than the nurses working in the service.

The mean exposure times of the nurses working in the emergency room, intensive care, and operating rooms during the day were statistically higher than the nurses working in the service ($p < 0.05$). The duration of feeling sleepless in the day shift was found to be statistically higher in those who worked 40 hours or more per week than those who worked 40 hours or fewer ($p < 0.05$). In the study, it was also found that nurses working daytime + on-duty had more daytime dysfunction than nurses working on permanent duty.

Discussion

This study was conducted to determine the chronotypes, SJL status, sleep quality, and quality of life of nurses working in shifts. In the study, the chronotypes of the nurses were 14.2% morning person, 68.7% intermediate type, and 17.2% evening type. There is no definite morning type and no definite evening type in the study. When the chronotypes scores of the nurses are examined, it is seen that most of them are composed of intermediate types, and the morning-lover types make up the least number of groups. Similar to our study, studies have shown that most nurses are intermediate types (15,16). In other studies on the determination of chronotypes, it was found that nurses working in shifts were the most intermediate type and the least evening type (17,18). Our study results are like the literature. In the study, when the SJL status of the nurses was examined; it was found that the average duration of light exposure during the day was 2.5 hours, an average of 2.16 hours in the day shift, and an average of 3.02 hours in the night shift. When the studies with SJL are examined; it has been found that the SJL duration measured in individuals is greater than 1 hour and 36 minutes, 1 hour and 25 minutes, and close to approximately 2 hours (19-21). The same situation was found among night shift workers (22). The study suggests that the shift work of nurses prolongs the SJL period.

In the study, the total mean score of the nurses' PSQI was 8.95. In a similar study, the mean PSQI total score of nurses working in shifts was 8.30 (23). These averages show that the sleep quality of the nurses working on duty is poor. This situation is attributed to the lack of regular night sleep among nurses working on duty.

In the study, the burnout levels of females were found to be higher than males ($p < 0.05$). In the literature, it has been determined that the burnout levels of nurses are affected by gender and that women experience burnout more than men (24,25). Our result is like the literature. That the burnout level

Age	Min-max (median) Ort \pm SD	18-50 (25) 28.94 \pm 8.25
		n (%)
Gender	Woman	97 (72.4)
	Men	37 (27.6)
Marital status	Married	62 (46.3)
	Single	72 (53.7)
Education level	High school	8 (6.0)
	Associate degree	29 (21.6)
	Licence	90 (67.2)
	Master's/PhD	7 (5.2)
Family type	Small family	122 (91.0)
	Extended family	9 (6.7)
	Broken family	3 (2.2)
Living place	Province	130 (97.0)
	District	4 (3.0)
Child status	No children	77 (57.5)
	1 child	22 (16.4)
	2 kids	30 (22.4)
	3 or more children	5 (3.7)
Working unit	Emergency room/intensive care/ operating room	54 (40.3)
	Service	80 (59.7)
Weekly working time	40 hours and below	34 (25.4)
	40 hours or more	100 (74.6)
Mode of operation	Constant night shift	39 (29.1)
	Day + night shift mode	95 (70.9)

SD: Standard deviation

		n (%)	Min-max	Ort ± SD	Median
Chronotype	Close to morningish type	19 (14.2)	59-69	62.84±3.23	63
	Close to the evening type	23 (17.2)	31-41	36.60±3.88	38
	Intermediate type	92 (68.7)	43-58	50.44±4.39	50
SJL	Average duration of light exposure during the day (minute) 31-60 min	50 (37.3)	1-4	2.50±1.12	2
	Average time to feel sleepy during the day shift (minute) 31-60 min	60 (44.8)	1-4	2.16±0.94	2
	Average time to feel sleepy during the night shift (minute) 61-90 min	52 (38.8)	1-4	3.02±0.84	3
PSQI total (0-21)		-	4-18	8.95±2.25	8.50

SJL: Social jetlag, PSQI: Pittsburg Sleep Quality Index

of women is higher than that of men may be, since women are more emotional than men.

In the study, the average male's use of sleeping pills (0.43±0.80) was found to be higher than females. In a study, it was reported that the average sleep medication use among nurses' PSQI sub-components was 0.09±0.38, but no gender comparison was made (26). No study has been found in the literature on gender and the use of sleeping pills. Our research in this area adds new information to the literature.

When the quality of life of the workers was examined, it was found that the level of empathy fatigue of the nurses working in units such as intensive care, operating room, and emergency services was higher than the nurses working in normal services. Another study conducted in the emergency department stated that the vast majority of employees are at high or moderate risk for empathy fatigue (27). We think that working in shifts in specialized units increases the level of empathy fatigue among nurses.

In the study, it was determined that the nurses working in the emergency room, intensive care, and operating room experienced higher sleep latency than the nurses working in the service. In a similar study, it was stated that nurses working in intensive care and emergency units had poor sleep quality compared to nurses working inwards (28). Our findings support the literature in this area.

In the study, the mean exposure times of nurses working in the emergency room, intensive care unit, and operating room during the day were found to be statistically higher than the nurses working in the service (p<0.05). There is an increase in daytime sleepiness because of insufficient sleep time and disruption in circadian rhythm in shift workers (29). It is like

literature. The duration of feeling sleepless in the day shift was found to be statistically higher in those who worked 40 hours or more per week than those who worked 40 hours or fewer (p<0.05). When the study were examined, it was stated that nurses working in shifts experienced daytime sleepiness during the day (30). The results support our study and it was found that shift work increases daytime sleepiness.

Study Limitations

This study is limited to nurses working at a university hospital in Turkey.

Conclusion

It has been determined that the sleep quality of nurses working in shifts is low and affects their quality of life. It has been determined that the nurses have a long SJL life expectancy and have the most intermediate type among the chronotype, but this situation does not have a significant effect on sleep and quality of life. In addition, it was determined that shift work caused nurses' sleep quality, sleep latency, sleep disturbance, and daytime sleep dysfunction, and also impaired their quality of life.

It is recommended to provide training for quality sleep to increase the sleep quality of nurses and, therefore, their quality of life. The working and resting hours of nurses working in shifts should be arranged following the criteria of the International Labor Organization and the Nurses Association of other countries (USA, Australia); the number of nurse staff should be increased; the number of seizures should be reduced; help improve sleep quality.

Table 3. Comparison of the socio-demographic characteristics of the participants with their quality of life, chronotype characteristics, and PSQI scores

	MEQ			ProQOL R-IV		
	Close to morningish type	Intermediate type	Close to the evening type	Professional satisfaction	Burnout	Companion fatigue
	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$
Gender						
Woman	62.71±3.40	50.97±4.07	36.62±3.55	19.36±5.56	22.38±4.26	21.19±5.69
Male	63.20±3.03	49.04±4.9	36.57±4.85	17.54±4.69	20.67±3.58	20.18±4.52
p**	0.573	0.085	0.814	0.064	0.017	0.753
Working unit						
Emergency room/intensive care/operating room	62.00±2.75	49.51±4.63	37.36±3.90	19.66±5.52	22.07±4.75	22.18±5.73
Service	63.23±3.46	51.07±4.14	35.91±3.89	18.31±5.25	21.80±3.69	20.06±5.02
p**	0.521	0.102	0.235	0.123	0.907	0.020
Weekly working time						
40 hours and below	63.25±3.94	51.47±4.54	36.00±4.76	18.61±4.09	21.97±2.82	19.88±4.46
40 hours or more	62.73±3.17	50.10±4.32	36.87±3.57	18.94±5.77	21.89±4.51	21.27±5.66
p**	0.736	0.201	0.769	0.685	0.449	0.134
Way of working						
Constant seizure	64.80±3.34	50.80±4.10	36.50±4.34	18.56±4.90	21.89±3.08	21.35±4.78
Day + night seizure	62.14±3.00	50.30±4.52	36.66±3.77	18.97±5.59	21.91±4.52	20.73±5.64
p**	0.156	0.708	0.975	0.852	0.679	0.116
**Mann-Whitney U test, MEQ: Morningness-eveningness questionnaire, ProQOL R-IV: Professional Quality of Life Scale, SJL: Social jetlag, PSQI: Pittsburg Sleep Quality Index, SD: Standard deviation						

Ethics

Ethics Committee Approval: This study was carried out by The Code of Ethics of the World Medical Association (Declaration of Helsinki). The study was approved by the Ethics Committee of the Selçuk University (E.155799, date no: 13.10.2021).

Informed Consent: All participants provided written informed permission.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Concept: B.M., P.T.T., A.Y.K., H.İ.T., Design: B.M., A.Y.K., Data Collection or Processing: B.M., P.T.T., A.Y.K., H.İ.T., Analysis or Interpretation: B.M., P.T.T., A.Y.K., H.İ.T., Literature Search: B.M., P.T.T., A.Y.K., H.İ.T., Writing: B.M., P.T.T., A.Y.K., H.İ.T.

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Table 3. Comparison of the socio-demographic characteristics of the participants with their quality of life, chronotype characteristics, and PSQI scores

PSQI							SJL			
Subjective sleep quality	Sleep latency (delay)	Sleep time	Habitual sleep activity	Sleeping disorder	Use of sleeping pills	Daytime dysfunction	Light exposure during the day	Feeling sleepy during the day shift	Feeling sleepy during the night shift	
$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$	
2.64±0.50	1.85±0.74	1.12±0.38	0.40±0.97	1.15±0.54	0.13±0.39	1.41±0.76	2.50±1.14	2.11±0.92	3.07±0.81	
2.56±0.50	1.83±0.72	1.21±0.47	0.54±1.09	1.29±0.57	0.43±0.80	1.64±0.67	2.51±1.09	2.29±0.99	2.91±0.89	
0.414	0.874	0.189	0.495	0.242	0.018	0.087	0.929	0.344	0.394	
2.68±0.46	1.72±0.69	1.10±0.34	0.42±0.96	1.15±0.55	0.21±0.52	1.35±0.71	2.88±1.09	2.35±1.04	3.12±0.91	
2.53±0.53	2.03±0.77	1.22±0.50	0.46±1.07	1.25±0.55	0.22±0.60	1.66±0.75	2.25±1.08	2.03±0.84	2.96±0.78	
0.070	0.013	0.094	0.878	0.265	0.855	0.022	0.001	0.108	0.188	
2.67±0.47	1.73±0.61	1.08±0.28	0.35±0.91	1.08±0.45	0.17±0.45	1.41±0.70	2.23±1.10	1.82±0.83	3.02±0.79	
2.61±0.51	1.89±0.77	1.17±0.45	0.47±1.03	1.23±0.58	0.23±0.58	1.50±0.75	2.60±1.12	2.28±0.95	3.03±0.85	
0.474	0.318	0.413	0.560	0.253	0.811	0.483	0.100	0.015	0.959	
2.53±0.50	1.97±0.70	1.10±0.30	0.46±1.02	1.23±0.58	0.23±0.62	1.69±0.76	2.43±1.14	2.23±0.98	3.17±0.82	
2.66±0.49	1.80±0.75	1.16±0.45	0.43±1.00	1.17±0.54	0.21±0.52	1.38±0.71	2.53±1.12	2.13±0.92	2.96±0.84	
0.199	0.212	0.555	0.662	0.787	0.969	0.031	0.629	0.662	0.174	

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