

The Effects of the Sleep Quality of 112 Emergency Health Workers in Kayseri, Turkey on Their Professional Life

Kayseri 112 Acil Sağlık Çalışanlarında Uyku Kalitesinin Mesleki Yaşam Üzerine Etkisi

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SUMMARY

Objectives

Sleep adequacy is one of the major determinants of a successful professional life. The aim of this study is to determine the sleep quality of emergency health workers and analyze its effects on their professional and social lives.

Methods

The study was carried out on 121 voluntary emergency health workers in 112 Emergency Aid Stations in Kayseri, Turkey, in 2011. The data was collected through the Socio-Demographics Form and the Pittsburgh Sleep Quality Index (PSQI) and analyzed via SPSS 18.00. The statistical analysis involved percentage and frequency distributions, mean±standard deviations, a chi-square test, correlations, and logistic regression analysis.

Results

The mean score of the participants according to the Pittsburgh Sleep Quality Index was 4.14±3.09, and 28.9% of participants had poor sleep quality. Being single and being a woman accounted for 11% (p=0.009, 95% CI: 0.111-0.726) and 7% (p=0.003, 95% CI: 0.065-0.564) of poor sleep quality respectively. There was a positive correlation between sleep quality scores and negative effects on professional and social life activities. Negative effects on professional activities included increased loss of attention and concentration (40.0%, p=0.016), increased failure to take emergency actions (57.9%, p=0.001), reduced motivation (46.2%, p=0.004), reduced performance (41.4%, p=0.024), and low work efficiency (48.1%, p=0.008). Poor sleep quality generally negatively affected the daily life of the workers (51.6%, p=0.004), restricted their social life activities (45.7%, p=0.034), and caused them to experience communication difficulties (34.7%, p=0.229).

Conclusions

One third of the emergency health workers had poor sleep quality and experienced high levels of sleep deficiency. Being a woman and being single were the most important factors in low sleep quality. Poor sleep quality continuously affected daily life and professional life negatively by leading to a serious level of fatigue, loss of attention-concentration, and low levels of motivation, performance and efficiency.

Key words: 112 Emergency Health Workers, professional life; sleep quality.

ÖZET

Amaç

Uyku yeterliliği başarılı iş yaşamının temel belirleyicilerindendir. Bu çalışmanın amacı acil sağlık çalışanlarında uyku kalitesini belirlemek, mesleki ve sosyal yaşam üzerine etkisini araştırmaktır.

Gereç ve Yöntem

Araştırma 2011 yılında Kayseri ilinde aktif hizmet veren 112 Acil Yardım İstasyonunda görev yapan gönüllü 121 Acil Sağlık Çalışanı üzerinde yürütüldü. Araştırmada, Sosyo-demografik Veri Formu ve Pittsburgh Uyku Kalitesi Ölçeği (PSQI) kullanıldı. Veriler SPSS 18.00 versiyonu ile değerlendirildi, istatistiksel analizde yüzde ve frekans dağılımları, ortalama±standart sapma, ki kare testi, korelasyon ve lojistik regresyon analizi kullanıldı.

Bulgular

Pittsburgh Uyku Kalitesi puan ortalaması 4.14±3.09 olan grubun %28.9'unun uyku kalitesi kötü idi. Kötü uyku kalitesinin %11'inden (p=0.009, %95 GA: 0.111-0.726) bekar olmak, %7'sinden (p=0.003, %95 GA: 0.065-0.564) ise kadın olmak sorumlu idi. Uyku kalitesi puanları ile mesleki ve sosyal yaşam etkinliklerinin olumsuz etkilenimi pozitif korelasyon gösterdi, uyku kalitesi kötü olan acil sağlık çalışanlarında, genellikle dikkat ve konsantrasyon kaybı (%40.0, p=0.016), acil müdahalelerde başarısızlık (%57.9, p=0.001), motivasyon (%46.2, p=0.004), performans (%41.4, p=0.024) ve iş verimi (%48.1, p=0.008) düşüklüğü yaşayanların oranı anlamlı düzeyde daha yüksekti. Düşük uyku kalitesi çalışanların günlük yaşam düzenini (%51.6, p=0.004) genellikle olumsuz etkiledi, sosyal yaşam sınırlılıkları (%45.7, p=0.034) ve iletişim güçlüğüne (%34.7, p=0.229) neden oldu.

Sonuç

Acil sağlık çalışanlarının üçte birinin uyku kalitesi kötü olup, grup düşük düzeyde uyku yeterliliği sorunu yaşamaktadır. Kadın ve bekar olmak uyku kalitesini düşüren en önemli faktörlerdir. Kötü uyku kalitesi hem günlük yaşam düzenini hem de ciddi düzeyde yorgunluk, dikkat-konsantrasyon kaybı, motivasyon, performans ve verim düşüklüğü yaratarak mesleki yaşamı sürekli olumsuz etkilemektedir.

Anahtar sözcükler: 112 Acil Sağlık Çalışanları; mesleki yaşam; uyku kalitesi.

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Introduction

Human beings have biological, psychological, social, and cultural needs that must be satisfied to maintain their existence. Sleep is one of such basic requirements.^[1,2] Sleep is linked to and compatible with the body's circadian rhythm.^[3] One of the main functions of the circadian rhythm is to prepare one for sleep, which is the rest period for the night. A disturbance to the circadian rhythm leads to a corresponding malfunction in one's sleep pattern. In fact, sleep quality, as well as its duration, is diminished by working at night, in shifts, or for irregular hours.^[4] Prolonged sleeplessness has adverse impacts on human life. Therefore, it is inevitable that a health worker suffering from prolonged sleeplessness owing to the shift system will experience negative influences on his/her mental and physical health.^[5]

Emergency care service delivery is a profession that requires the shift system. Working during the night influences the extent to which one is ready for and adapted to the next day. Subsequent outcomes may include work accidents and traumas. For example, nurses working in the night shift are commonly observed to experience work accidents associated with scalpel cuts and pricks with injector needles later in the day.^[6] Emergency health workers have to work beyond ordinary working hours or days, have duties and responsibilities that potentially pose fatal threats, compete with time, use different technologies, and cause a great deal of stress and pressure. Currently, most work on a 24-hour basis, meaning they are continuously working for 24 hours. They have to cope not only with occupational risks caused by the nature of the night shift but also with the risk of making mistakes brought about by overworking. It is a known fact that long hours and overworking puts one at greater the risk of making mistakes is at work. In fact, it is reported in the literature that nurses who work in 12.5-hour shifts are three times as likely to make mistakes as those who work for 8.5 hours, and that the former group is more susceptible to medication-related mistakes and injuries associated with needles.^[7]

To sum up, research suggests that working in shifts has an adverse impact on one's physiological and psychological health, thus negatively affecting the security of both workers and patients.^[8] There is compelling evidence that working in shifts has a permanent influence on sleep quality. According to the findings of a study on nurses, daytime sleep following the night shift is of rather low quality.^[9] Those working during the night sleep two to four hours less than daytime workers and suffer from sleep deficiency, functional disturbances and fatigue.

All this information suggests that emergency health workers likely have impaired sleep quality as a result of working in a way not compatible with their natural biological rhythms.

Additionally, impaired sleep of emergency health workers may possibly be reflected in their professional and social life.

The purpose of the present study is to identify the sleep quality of emergency health workers and to determine its effects on professional and social life.

Materials and Methods

The study was conducted on a total of 121 voluntary emergency health workers who worked for 112 Emergency Aid Stations that actively operated in Kayseri in 2011. The data were collected through face-to-face interviews and two instruments, namely the Socio-Demographics Form and the Pittsburgh Sleep Quality Index (PSQI).

The PSQI is comprised of 24 questions. 19 questions are based on self-report and the remaining five are answered by the spouse or roommate. The scored 18 questions contain 7 domains (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction). Each component is assigned a score ranging from zero to three. The sum of the scores in the seven domains yields the score for the whole scale. Thus, the overall score varies between zero and 21, with higher scores representing poorer sleep quality. A score of ≤ 5 in the overall PSQI suggests high sleep quality whereas a score of > 5 stands for poor sleep quality. For the present study, the effect of sleep quality on professional and social life was measured on a four-point scale (0=Never, 1=Rarely, 2=Often, 3=Always); however, the options often and always were merged into generally in the discussion section.^[10]

Statistical analysis

The continuous variables were represented in mean scores and standard deviation values whereas the discrete variables were expressed in terms of percentage and frequency distribution. The correlation among the categorical variables was studied via a chi-square test.

The correlation between the scores in sleep quality and variables in professional and social life was tested through a Pearson correlation analysis, while a logistic regression analysis was performed in order to identify the factors accounting for poor sleep quality. Sleep quality was identified as a dependent variable. Participants with a PSQI score of zero to five was assigned good=0 as a reference value whereas participants with a PSQI score of six to 20 was assigned poor=1 as a reference value. In addition, such variables as age, gender, educational status, marital status, length of service, and weekly working hours were accepted into the model as independent variables. The level of significance was $p < 0.05$.

The study was designed in accordance with the Helsinki principles of research.

Results

More than half of the participants (56.2%) were women, and 76% of them were 18 to 27 years old. In addition, 59.5% of the workers were single. As for their educational status, 68.6% were high school graduates whereas 31.4% had either an associate degree or bachelor's degree. Slightly more than half of the participants (52.9%) smoked, and 62% consumed large quantities of tea or coffee (Table 1).

Participant demographics were varied. 61.2% of the participants were emergency medical technicians and 20.7% were paramedics. For employment location, 69.4% of the participants worked for Emergency Aid Stations and the remaining 30.6% worked for Command and Control Centers. Nearly two-thirds of participants (64.5%) had been serving for one to five years. 70.2% of the participants worked on a 24-hour basis and 71.7% worked for 48 hours a week. Only 20% of participants functioned as ambulance drivers permanently twice a week. Out of these ambulance drivers, 7.4% were involved in a traffic accident when on duty.

Out of all the participants, 86% reported experiencing sleep deficiency at varying percentages (rarely-generally). The mean score of the participants in the Pittsburgh Sleep Quality Index was 4.14 ± 3.09 (min: 0, max: 14), and 28.9% had poor sleep quality (scores of 6 to 14). The prevalence of poor sleep quality was 39.7% ($p=0.004$) among women, 41.7% ($p<0.001$) among single participants, 31.6% ($p=0.005$) among university graduates, 33.4% ($p=0.003$) among those with a length of service less than five years, 36.5% ($p=0.014$) among emergency medical technicians, and 64.3% ($p=0.002$) among those who permanently worked in the night shift (Table 2).

The participants with poor sleep quality suffered from loss of attention or concentration (40%, $p=0.016$), failure to take emergency actions (57.9%, $p=0.001$), reduced motivation (46.2%, $p=0.004$), reduced performance (41.4%, $p=0.024$), and low work efficiency (48.1%, $p=0.008$). Poor sleep quality led the sufferers to experience negative influences on their daily life (51.6%, $p=0.004$), restrictions on their social life activities (45.7%, $p=0.034$), and communication difficulties (34.7%, $p=0.229$) (Table 3).

According to the correlation analysis, poorer sleep quality (higher PSQI scores) led to disturbances in daily life activities ($r=0.462$, $p<0.001$) and social life ($r=0.375$, $p<0.001$), excessive fatigue ($r=0.429$, $p<0.001$), reduced motivation ($r=0.318$, $p<0.001$), low work efficiency ($r=0.306$, $p=0.001$), reduced performance (0.275, $p=0.002$), failure to take emergency actions ($r=0.300$, $p=0.001$), and loss of attention and

concentration ($p=0.237$, $p=0.009$) (Table 4). The regression analysis indicated that two main predictors of poor sleep quality were being a woman (wald: 6.91, $p=0.09$, 95% Confidence Interval: 0.111-0.726) and being single (wald: 11.07, $p=0.001$, 95% Confidence Interval: 0.057-0.477).

Discussion

Nearly one-third of the participants reported that their sleep quality was poor. Among the main factors in low sleep quality were being a woman and single. In addition to disrupting one's daily life, low sleep quality also led sufferers to experience excessive fatigue, loss of attention/concentration, lack of motivation, and reduced performance, thereby having negative impacts on their professional life.

Table 1. The distribution of the emergency health workers by their descriptive characteristics

Descriptive characteristics	n	%
Gender		
Man	53	43.8
Woman	68	56.2
Total	121	100.0
Age groups		
18-27	92	76.0
28-37	26	21.5
38-46	3	2.5
Total	121	100.0
Marital status		
Married	49	40.5
Single	72	59.5
Total	121	100.0
Educational status		
High school	83	68.6
Associate degree	33	27.3
Bachelor's degree	5	4.1
Total	121	100.0
Length of service (Years)		
$\leq 1-5$	96	79.4
6-10	20	16.5
16-20	5	4.1
Total	121	100.0
Weekly work schedule		
Day shift (8.00 am-5.00 pm)	5	4.3
Night shift (5.00 pm-8.00 am)	14	11.5
Evening shift (5.00 pm-11.59 pm)	17	14.0
24-hour basis (8.00 am-8.00 am)	85	70.2
Total	121	100.0

Table 2. The scores of the emergency health workers in the pittsburgh sleep quality Index in reference to certain characteristics

Demographics and professional variables	Sleep quality						p
	Good (PSQI: 0 to 5 p) n=86		Poor (PSQI: 6 to 14 p) n=35		Total		
	n	%	n	%	n	%*	
Gender							
Man	45	84.9	8	15.1	53	43.8	0.004
Woman	41	60.3	27	39.7	68	56.2	
Marital status							
Married	44	89.8	5	10.2	49	40.5	<0.001
Single	42	58.3	30	41.7	72	59.5	
Educational status							
High school	60	72.3	23	27.7	83	68.6	0.005
Associate degree or bachelor's degree	26	68.4	12	31.6	38	31.4	
Length of service							
0-5 years	64	66.6	32	33.4	96	79.3	0.003
6-20 years	22	88.0	3	12.0	25	20.7	
Professional status							
Emergency medical technician (EMT)	47	63.5	27	36.5	74	61.1	0.014
Emergency medical technician (Paramedic)	18	72.0	7	28.0	25	20.7	
Physician-nurse-health officer	21	95.5	1	4.5	22	18.2	
Work Schedule							
8.00 am-5.00 pm (Day shift)	4	80.0	1	20.0	5	4.1	0.002
5.00 pm-8.00 am (Night shift)	5	35.7	9	64.3	14	11.6	
5.00 pm-11.59 pm (Evening shift)	12	70.6	5	29.4	17	14.0	
24-hour basis (8.00 am-8.00 am)	65	76.5	20	23.5	85	70.3	

* Column percentage.

Approximately one-third of the participants had low levels of sleep deficiency. Similarly, Machi et al.^[11] reported that the prevalence of sleep deficiency was 31% among emergency health workers. Shao et al.^[12] found a more profound prevalence of 57% among nurses who worked in shifts. The slight but frequent problems with sleep quality among the participants in our study could be attributed to the fact that the sample was mainly comprised of individuals that were young and within first years of their career, and thus they had not experienced shift intolerance yet. Another reason for the poor sleep quality might be that the great majority of the participants worked on a 24-hour basis.

According to the findings of the present study, one crucial factor in low sleep quality was gender. Similar to other studies, this study indicated that women had poorer sleep qual-

ity. Likewise, research on nurses indicates that women have lower sleep quality than men.^[13,14] According to Ruggiero,^[15] women health workers who work in shifts tend to have poorer sleep quality. In the present study, the women participants were more inclined to fatigue. Similarly, one finding of a study on the general public in Sweden is that women have more sleep-related problems although they sleep for longer than men.^[16] Difficulty falling asleep, uneasy sleep and fatigue cause women health workers to have increased stress and to experience physiological disturbances.^[16]

The other significant factor in poor sleep quality was being single. Similarly, Watanabe et al.^[14] conducted a study in a Japanese hospital on female nurses who work shifts, and observed that the effects of shift changes on sleep patterns were less strong among the married women than the sin-

Table 3. The effect of the sleep quality of the emergency health workers on their professional and social life

Variables in professional and social life	Sleep quality						p
	Good (PSQI: 0 to 5 p)		Poor (PSQI: 6 to 14 p)		Total*		
	n	%	n	%	n	%	
Sleep deficiency prior to the 24-hour duty							
Never	13	76.5	4	23.5	17	14.0	0.285
Sometimes	43	65.2	23	34.8	66	54.5	
Generally	30	78.9	8	21.1	38	31.4	
Fatigue							
Never	14	100.0	0	0.0	14	11.6	<0.001
Sometimes	65	77.4	19	22.6	84	69.4	
Generally	7	30.4	16	69.6	23	19.0	
Loss of attention and concentration							
Never	29	90.6	3	9.4	32	26.4	0.016
Sometimes	48	64.9	26	35.1	74	61.2	
Generally	9	60.0	6	40.0	15	12.4	
Failure to take emergency actions							
Never	35	87.5	5	12.5	40	33.1	0.001
Sometimes	43	69.4	19	30.6	62	51.2	
Generally	8	42.1	11	57.9	19	15.7	
Reduced job motivation							
Never	22	91.7	2	8.3	24	19.8	0.004
Sometimes	43	74.1	15	25.9	58	47.9	
Generally	21	53.8	18	46.2	39	32.2	
Reduced job performance							
Never	26	86.7	4	13.3	30	24.8	0.024
Sometimes	43	69.4	19	30.6	62	51.2	
Generally	17	58.6	12	41.4	29	24.0	
Low work efficiency							
Never	26	89.7	3	10.3	29	24.0	0.008
Sometimes	46	70.8	19	29.2	65	53.7	
Generally	14	51.9	13	48.1	27	22.3	
Communication difficulty							
Never	25	80.6	6	19.4	31	25.6	0.229
Sometimes	47	65.3	25	34.7	72	59.5	
Generally	14	77.8	4	22.2	18	14.9	
Negative effects on social life							
Never	25	78.1	7	21.9	32	26.4	0.034
Sometimes	42	77.8	12	22.2	54	44,6	
Generally	19	54.3	6	45.7	25	28.9	
Negative effects on daily life							
Never	27	84.4	5	15.6	32	26.4	0.004
Sometimes	44	75.9	14	24.1	58	47.9	
Generally	15	48.3	16	51.6	31	25.6	

* Column percentage.

gle women. According to Vidacek et al.,^[17] however, women who are married sleep for significantly shorter following the night shift when compared to those who are not married.

Such conflicting findings in the literature might result from the possibility that participants will have different familial/domestic responsibilities and life styles. To further compli-

cate this issue, Caliyurt^[4] reports that marital status has no influences whatsoever on sleep quality.

In the present study, poor sleep quality had negative impacts on the participants' professional and social life. It led to fatigue, loss of attention and concentration, failure to take emergency actions, and reduced job motivation and work

Table 4. The correlation between the scores of the emergency health workers in the Pittsburgh Sleep Quality Index and the variables in professional/social life

Variables in professional and social life	Rho	p
Negative effects on daily life	0.462	<0.001
Excessive fatigue	0.429	<0.001
Negative effects on social life	0.375	<0.001
Reduced motivation	0.318	<0.001
Low job efficiency	0.306	0.001
Failure to take emergency actions	0.300	0.001
Reduced performance	0.275	0.002
Loss of attention and concentration	0.235	0.009
Communication difficulty	0.151	0.098

efficiency. Sleep quality, as well as its duration, is diminished by working at night, in shifts, or for irregular hours.^[18] Emergency health workers represent one of the few professional groups that have to work during the night shift for varying hours for the extent of their career. Working during the night means that one will sleep during the day, which affects sleep both qualitatively and quantitatively. Working for varying hours has two influences on health, namely inability of the body to satisfy its biological rhythm, especially in terms of sleep and digestion, and disruptions in one's familial and social life. It is reported in the literature that a reduction of a night's sleep by 1.3 to 1.5 hours diminishes alertness in the following day by 32%.^[19] A disturbance in sleep quality as a consequence of working in shifts also influences job performance, as was demonstrated in the present study. From their study looking at the effects of working at night on the circadian rhythm and sleep quality among nurses, Brugne et al.^[20] concluded that working at night is not advisable. This study demonstrated that those who work at night generally lack attention between 02.00 and 04.00 am, and recommended that periodical periods of sleep and rest (e.g. at noon) could reduce the negative impacts of working at night.

Sleep deprivation among health workers and the negative impacts of fatigue is an interesting and relevant field of study. These subjects have significant impacts on patient safety and the local economy. The influence of sleep on cognitive function and performance are revealed through prospective and retrospective studies.^[20-22] Sleep is an important part of human life, and it is necessary for efficient performance. Experimental studies on sleep have demonstrated that sleep deprivation leads to disorders in cognitive functions such as attention-related problems,^[23] disturbances in practical functions, memory disorders, perception-related disorders, and affective disorders.^[23,24]

Ratcliff et al.^[25] reported that sleep deprivation has common but reversible influences on brain functions, especially cognitive functions. They stressed that sleep deprivation results in disturbances in decision-making mechanisms and information quality. Sleep deprivation is also reported to increase the risk of injuries and accidents. Sleeplessness, which results from working in shifts or on a 24-hour basis, is accompanied by mental and physical fatigue owing to irregular sleep patterns, frustration, distractibility, and irritation. Sleeplessness diminishes one's ability to self-maintain, affecting his or her preparedness for and adaptation to the next day as well as his or her quality of life.^[8,26] Human metabolism cannot adjust to working at night, and negative impacts on the body can persist even ten years after this type of working is abandoned.^[8]

In the present study, it was observed that emergency health workers with poor sleep quality were generally tired. Fatigue is a reaction to insufficient satisfaction of physical and psychological needs. It is also an indicator of the existence of a disease. Fatigue usually prevents one from performing activities that he or she would be able to carry out under normal conditions. It gradually and cumulatively reduces effective performance. Despite this, one can overcome with a period of good sleep. Even so, it is known that the effects of sleeplessness make it hard for one to handle various activities when he or she is awake.^[27,28]

Our study has some limitations. First, the data was collected through a survey based on subjective reporting. Second, the study did not include a control group comprised of individuals who did not work in night shifts. Finally, our population consisted of emergency health workers in Kayseri, and thus we cannot generalize our results to other occupational groups.

Conclusion

It is necessary for the working conditions at 112 Emergency Aid Stations, along with the length of shifts, to be reorganized. Areas allocated for rest during shifts should be improved and appropriate rest conditions should be established for the period following shifts. This will possibly better the currently poor sleep quality among emergency health workers, thus increasing work efficiency and performance and to enabling health workers to thrive in their profession.

Conflict of Interest

The authors declare that there is no potential conflicts of interest.

References

- Öztürk MO. Uyku bozuklukları, ruh sağlığı ve bozuklukları, Yenilenmiş 10. Basım. Ankara: Nobel Tıp Kitabevleri; 2004. p. 479-86.
- Papilla İ, Acioglu E. Obstrüktif uyku apne sendromu. *Hipokrat Dergisi* 2004;13:387-91.
- Ertekin S. Hastanede yatan hastalarda uyku kalitesinin değerlendirilmesi. Cumhuriyet Üniversitesi Sağlık Bilimleri Enstitüsü Yayınlanmamış Yüksek Lisans Tezi, Sivas, 1998.
- Çaliyurt O. Sirkadiyen uyku uyanıklık düzenini etkileyen ve çalışma gruplarında uyku kalitesinin değerlendirilmesi. Trakya Üniversitesi Tıp Fakültesi Psikiyatri Anabilim Dalı Yayınlanmamış Uzmanlık Tezi, Edirne, 1998.
- Demir M. Vardiya sistemi ile çalışan hemşirelerin vardiya sisteminden kaynaklanan sorunlar hakkındaki görüşleri. Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü Yayınlanmamış Bilim Uzmanlığı Tezi, Ankara, 1990.
- Sarquis LM, Felli VE. Occupational accidents with sharp instruments in nursing workers. [Article in Portuguese] *Rev Esc Enferm USP* 2002;36:222-30. [Abstract]
- Rogers AE, Hwang WT, Scott LD, Aiken LH, Dinges DF. The working hours of hospital staff nurses and patient safety. *Health Aff (Millwood)* 2004;23:202-12. [CrossRef](#)
- Bilazer FN, Konca GE, Uğur S, Uçak H, Erdemir F, Çıtak E. Türkiye'de hemşirelerin çalışma koşulları. *Türk Hemşireler Derneği* 2008;12-5.
- Fischer FM, Bruni Ade C, Berwerth A, Moreno CR, Fernandez Rde L, Riviello C. Do weekly and fast-rotating shiftwork schedules differentially affect duration and quality of sleep? *Int Arch Occup Environ Health* 1997;69:354-60. [CrossRef](#)
- Ağargün MY, Kara H, Anlar Ö. Pittsburgh uyku kalitesi indeksinin geçerliliği ve güvenilirliği. *Türk Psikiyatri Dergisi* 1996;2:107-15.
- Machi MS, Staum M, Callaway CW, Moore C, Jeong K, Suyama J, et al. The relationship between shift work, sleep, and cognition in career emergency physicians. *Acad Emerg Med* 2012;19:85-91. [CrossRef](#)
- Shao MF, Chou YC, Yeh MY, Tzeng WC. Sleep quality and quality of life in female shift-working nurses. *J Adv Nurs* 2010;66:1565-72. [CrossRef](#)
- Fischer FM, Teixeira LR, Borges FN, Goncalves MB, Ferreira RM. How nursing staff perceive the duration and quality of sleep and levels of alertness. [Article in Portuguese] *Cad Saude Publica* 2002;18:1261-9. [Abstract] [CrossRef](#)
- Watanabe M, Akamatsu Y, Furui H, Tomita T, Watanabe T, Kobayashi F. Effects of changing shift schedules from a full-day to a half-day shift before a night shift on physical activities and sleep patterns of single nurses and married nurses with children. *Ind Health* 2004;42:34-40. [CrossRef](#)
- Ruggiero JS. Correlates of fatigue in critical care nurses. *Res Nurs Health* 2003;26:434-44. [CrossRef](#)
- Edéll-Gustafsson UM. Sleep quality and responses to insufficient sleep in women on different work shifts. *J Clin Nurs* 2002;11:280-8. [CrossRef](#)
- Vidacek S, Radosević-Vidacek B, Kaliterna L, Prizmić Z. The productivity of female shift workers. [Article in Croatian] *Arh Hig Rada Toksikol* 1990;41:339-45. [Abstract]
- Ertekin Ş, Doğan O. Hastanede yatan hastalarda uyku kalitesinin değerlendirilmesi. Erzurum, VII. Ulusal Hemşirelik Kongresi Kitabı; 1999. p. 222-7.
- Karagozoglu S, Bingöl N. Sleep quality and job satisfaction of Turkish nurses. *Nurs Outlook* 2008;56:298-307. [CrossRef](#)
- Brugne JF. Effects of night work on circadian rhythms and sleep. *Prof Nurse* 1994;10:25-8.
- Drummond SP, Gillin JC, Brown GG. Increased cerebral response during a divided attention task following sleep deprivation. *J Sleep Res* 2001;10:85-92. [CrossRef](#)
- Bortoletto M, Tona Gde M, Scozzari S, Sarasso S, Stegagno L. Effects of sleep deprivation on auditory change detection: a N1-mismatch negativity study. *Int J Psychophysiol* 2011;81:312-6. [CrossRef](#)
- Killgore WD. Effects of sleep deprivation on cognition. *Prog Brain Res* 2010;185:105-29. [CrossRef](#)
- McCoy JG, Strecker RE. The cognitive cost of sleep lost. *Neurobiol Learn Mem* 2011;96:564-82. [CrossRef](#)
- Ratcliff R, Van Dongen HP. Sleep deprivation affects multiple distinct cognitive processes. *Psychon Bull Rev* 2009;16:742-51. [CrossRef](#)
- Karagözoğlu Ş, Çabuk S, Tahta Y, Temel F. Hastanede yatan yetişkin hastaların uykusunu etkileyen bazı faktörler. *Toraks Dergisi* 2007;8:234-40.
- Dement WC, Carskadon MA. Current perspectives on daytime sleepiness: the issues. *Sleep* 1982;5 Suppl 2:56-66.
- Haire JC, Ferguson SA, Tilleard JD, Negus P, Dorrian J, Thomas MJ. Effect of working consecutive night shifts on sleep time, prior wakefulness, perceived levels of fatigue and performance on a psychometric test in emergency registrars. *Emerg Med Australas* 2012;24:251-9. [CrossRef](#)