

Influence of Night Shift Work on Psychologic State and Quality of Life in Health Workers

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ÖZET

Sağlık çalışanlarında vardiyalı çalışma sisteminin sebep olduğu genel ruhsal belirtiler ve yaşam kalitesi üzerine etkisi

Amaç: Bu çalışmada, sağlık çalışanlarında vardiyalı sistemin sebep olduğu genel ruhsal belirtiler ve bunların yaşam kalitesi üzerindeki etkilerinin araştırılması amaçlanmıştır.

Yöntem: Çalışmaya bir kamu hastanesinde görevli hemşireler dâhil edilmiştir. Gündüz görev yapan 42 ve vardiyalı sistemde çalışan 45 hemşire, ruhsal belirtilerin ve şiddetlerinin taranması amacıyla SCL-90-R ve yaşam kalitesinin değerlendirilmesi amacıyla SF-36 ölçekleriyle değerlendirilmiştir.

Bulgular: Vardiyalı sistemde çalışan bireylerde SCL-90-R alt ölçeklerinden somatizasyon, obsesif-kompulsif, kişiler arası duyarlılık, kaygı, paranoid düşünce puanları ile genel belirti indeksi puanı istatistiksel olarak anlamlı bir biçimde daha yüksekti. Depresyon, hostilite, fobi ve psikotizm alt ölçeklerinde gruplar arasında anlamlı bir farklılık bulunmamıştır. Vardiyalı çalışan grupta, SF-36 alt ölçeklerinden fiziksel fonksiyon ve ağrı alanlarında yaşam kalitesinin gündüz çalışanlara göre daha bozuk olduğu; genel sağlık, fiziksel rol güçlüğü, emosyonel rol güçlüğü, mental sağlık, enerji ve sosyal fonksiyon yönünden iki grup arasında anlamlı farklılık olmadığı tespit edilmiştir.

Sonuç: Bu çalışma, vardiyalı sistemde çalışmanın hemşirelerde psikiyatrik bozuklukların oluşması ve düşük yaşam kalitesi açısından olası bir risk etkeni olduğunu göstermiştir. Bu nedenle, çalışma saatlerinin çalışanlarda oluşabilecek sorunlar dikkate alınarak düzenlenmesi yaşam kalitesinin iyileştirilmesine katkıda bulunacaktır.

Anahtar kelimeler: Kaygı, ağrı, yaşam kalitesi, vardiya

ABSTRACT

Influence of night shift work on psychologic state and quality of life in health workers

Objective: This study aimed to assess the symptoms of psychopathology caused by the shift-work and to evaluate their impact on the quality of life.

Method: Forty-two nurses working at daytime and 45 nurses working at the night shift were evaluated with Symptom Checklist-90-R (SCL-90-R) and Short Form 36 (SF-36) for assessing general psychiatric symptoms and quality of life.

Results: Shift-work nurses reported significantly higher somatization, obsessive-compulsive, interpersonal sensitivity, anxiety, paranoid ideation and global severity index scores than daytime nurses. Significant differences were not found in the depression, hostility, phobic anxiety and psychoticism scores. Shift-work nurses also reported significantly worse scores on pain and physical function compared with daytime nurses.

Conclusion: In our study, shift-work was shown to be a potential risk factor for increased psychiatric morbidity and low quality of life among nurses. Therefore, adjusting the work schedule with the potential problems of the workers may improve their life quality.

Key words: Anxiety, pain, quality of life, shift-work

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INTRODUCTION

Economical and social conditions may require to work not only at daytime but also at shift-work containing night hours. Health workers, security officers, factory workers, telecommunication workers and people working at transportation and entertainment

sectors all have to work in shift-work system. Shift-workers are prone to several physical and mental problems due to disruption of the sleep-wake cycle and changes in usual working and social life (1). One out of every five worker in Europe are shift-workers and one out of every shift-worker leave their jobs due to difficulties related with this working system (2). Due to

reasons such as changing social conditions, increasing income level, preference of the employer, technological changes and competitive environment, night-working is becoming more widespread (3).

In people who have to work at nights due to shift-work, cerebrovascular diseases, coronary artery diseases, hypertension, diabetes and other health problems are more prevalent than people working regularly at daytime (4-7). Besides these physical diseases, psychiatric disorders and social adaptation problems are also highly prevalent (7,8). Depression and anxiety disorders are highly prevalent at shift-workers accompanied by sleepiness, fatigue, and cognitive disorders including memory and concentration impairment (9-11). Mood and sleep disorders are usually seen concomitantly. Sleepiness due to night shift-work may cause lack of energy, forgetfulness, reduced concentration and lack of interest and which may be confused as depressive disorder and it may be difficult to make differential diagnosis (12). The most important reason of highly prevalent depression and anxiety disorder is; regulating the working hours at the time interval which circadian system changes the balance towards sleep and regulating the sleep hours at the time interval which circadian system changes the balance towards wakefulness. These alterations which are regulated by biological rhythm but disrupted by working hours make the background of aforementioned psychopathological conditions (13).

Working at nighttime at shift-work impairs quality of life by chronic fatigue, sleepiness and somatic symptoms and also by hindering requirements of daily social life (14). There is prominent irritability, reduction in coping skills with stress and reduction of resistance to prevent psychological problems (15). Reduction in social activities is also quite evident compared to people working regularly at daytime (16).

In this study, we aimed to investigate to detect general psychiatric symptoms and signs and their impact on quality of life caused by shift-work in health workers.

METHODS

Nurses working at a public hospital in Van County

and carrying the requirements of the study were included. Exclusion criteria were being graduated less than a year ago, currently having a psychiatric or chronic disease and using psychotropic drugs. Daytime working group was used to define individuals working regularly at daytime but not at night. Shift-work group was used to define night and daytime workers working at 8 (three-shift system) or 12 hour (two-shift system) cycles. Individuals were recruited to the study voluntarily. Out of a total 145 nurses, ones who did not want to be recruited, on leave or absence, being graduated less than a year ago, currently having a psychiatric or chronic disease and using psychotropic drugs were not recruited to the study. Participants were determined by surveying all clinics and no specific exclusion criterion was used related with the department. In conclusion, 42 nurses working at daytime and 45 nurses working at shifts were evaluated to detect psychiatric symptoms and signs and severity of symptoms by SCL-90-R scale and to assess quality of life by SF-36 scale. Study was approved by the ethics council and evaluation was performed at daytime by the residents of psychiatry department.

Data Collection Tools

Symptom Check List Scale (SCL-90-R): This scale was developed by Derogatis to determine the distribution and severity of psychiatric symptoms of subjects in both clinical and research settings (17). This scale is a self-reported, answered as "none" and "very much" like in five-item likert type containing 90 items and 10 sub-units. Questions were answered considering the last one week including the current day. Nine sub-units were named as follows: Somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. Validity and reliability of this scale for our country was shown by Dağ et al.

SF-36 Quality of Life Scale: SF-36 evaluates both the positive and negative aspects of general health status. It consists of physical functioning, role limitations due to physical health, bodily pain, general health perceptions, vitality, social functioning, role limitations

Table 1: Comparison of sociodemographic characteristics of daytime and shift-work groups

	Daytime (N=42)		Shift (N=45)		
	N	(%)	N	(%)	
Gender					
Men	12	28.6	14	31.1	$\chi^2(1) = 0.067$ p=0.796
Women	30	71.4	21	68.9	
Marital Status					
Single	18	42.9	20	44.4	$\chi^2(1) = 0.022$ p=0.881
Married	24	57.1	25	64.6	
Age (Mean±SS)	29.6±4.4		27.9±4.1		t(85)=1.773 p=0.08

χ^2 : Chi-square test, t: Student's t test

due to emotional problems and mental health sub-scales. Scores of sub-units are between 0 and 100 and a higher score shows better health status. A total score is not calculated. Scale was developed by Rand Corporation (19) to evaluate quality of life and translated to Turkish and also validity and reliability study was done (20).

Statistical Analysis

In order to determine the sociodemographic characteristics of the sample group, descriptive analyses were performed. All statistical analyses were done with SPSS 16.0 package software. When comparing the groups, for categorical variables chi-square and for numerical variables student's t-test were used. Level of significance was pre-determined as $p < 0.05$.

RESULTS

Daytime group included to the study consisted of 12 men (28.6%) and 30 women (71.4%); 18 of them were single (42.9%), 24 were married (57.1%) and mean age was 29.6 ± 4.4 . Shift-work group consisted of 14 men (31.1%), 31 women (68.9%); 20 of them were single (44.4%) and 25' were married (65.6%). Mean age of this group was 27.9 ± 4.1 . Sociodemographic characteristics of daytime and shift-work groups are shown in Table 1 (Table 1). No significant difference was found between the groups regarding age, gender and marital status ($p > 0.05$).

When two groups were compared according to SCL-90-R, somatization ($t = -2.283$, $p = 0.025$), obsessive-compulsive ($t = -2.318$, $p = 0.023$), interpersonal sensitivity ($t = -2.146$, $p = 0.035$), anxiety ($t = -2.384$, $p = 0.019$) and paranoid ideation ($t = -2.457$, $p = 0.016$) sub-scales of SCL-90-R and general symptom index ($t = -2.352$, $p = 0.021$) scores were found statistically significantly higher at shift-time workers. There were no statistically significant differences in depression, hostility, phobia and psychoticism sub-scales (Table 2).

When two groups were compared according to SF-36 Quality Of Life Index; in physical functioning ($t = -2.11$, $p = 0.03$) and bodily pain ($t = -2.05$, $p = 0.04$) domains, quality of life of shift-time workers was worse than daytime workers and no significant difference was found in general health perceptions, role limitations due to physical health, role limitations due to emotional problems, mental health and vitality and social functioning sub-scales of SF-36 (Table 3).

DISCUSSION

In our study, we found that healthcare professionals working at night shift-work showed more psychiatric symptoms than daytime workers and their scores at somatization, obsessive-compulsive, interpersonal sensitivity, anxiety and paranoid ideation sub-scales of SCL-90-R and general symptom scores were found significantly higher. Our results were similar with several studies showing that shift-work has a negative impact on people's physiological and psychological health and social lives (3,21,22).

Table 2: Comparison of SCL-90-R sub-scale scores of daytime and shift-work groups

SCL-90-R sub-scales	Daytime Group mean±SS	Shift Group mean±SS	t	p
Somatization	0.68 ±0.47	0.97±0.65	-2.283	0.025*
Obsessive-compulsive	0.76±0.65	1.07±0.58	-2.318	0.023*
Interpersonal sensitivity	0.80±0.59	1.09±0.66	-2.146	0.035*
Depression	0.73±0.51	0.94±0.60	-1.729	0.088
Anxiety	0.69±0.55	0.98±0.71	-2.384	0.019*
Hostility	0.70±0.71	0.99±0.76	-1.801	0.075
Phobia	0.43±0.48	0.51±0.53	-0.682	0.497
Paranoid ideation	0.73±0.67	1.11±0.76	-2.457	0.016*
Psychoticism	0.55±0.62	0.62±0.58	-0.499	0.619
General symptom level	0.69±0.49	0.93±0.47	-2.352	0.021*

t, Student's t test, * p<0.05 : Significant difference

Table 3: Comparison of SF-36 sub-scale scores of daytime and shift-work groups

	Daytime Group mean±SS	Shift Group mean±SS	t	p
General health perceptions	61.4±17.2	62.8±21.4	-0.33	0.74
Physical functioning	61.3±30.3	49.4±21.5	-2.11	0.03*
Role limitations due to physical health	50.0±36.6	48.8±36.5	0.14	0.88
Role limitations due to emotional problems	52.3±25.6	42.9±35.9	1.39	0.16
Bodily Pain	67.8±20.0	58.5±22.0	-2.05	0.04*
Mental health	64.9±16.5	67.5±15.3	-0.75	0.45
Vitality	54.2±18.9	57.7±21.5	-0.80	0.42
Social functioning	67.8±26.6	75.5±25.8	-1.36	0.17

t, Student's t test, * p<0.05 : Significant difference

In our study, although no significant difference was found at depression sub-scale, scores of interpersonal sensitivity sub-scale which is closely related with depression was found significantly higher in nighttime shift-workers. According to proposed relationship between depression and interpersonal rejection, interpersonal sensitivity is a characteristic of personality predisposed to depression and is a risk factor in the development of depressive disorders (23,24). Impairment of interpersonal relations causes diminishing social support and difficulties of life and consequent impairment in quality of life (22,25).

Higher levels of anxiety are expected at shift-workers due to longer periods of work, physically and socially negative working conditions, alteration of sleep-wake cycle, cognitive problems due to sleepiness and fatigue after working all night long (26-29). In a study Ardekani et al. (30) done among 1195 health professionals, results similar to our study were obtained and they found that anxiety and somatization were more prevalent than other psychiatric disorders including depression at

individuals working at night-time shifts. In another study by Kubo et al. (31) which showed a higher level of anxiety among night-time shift-workers, they reported that level of anxiety is correlated with sleep disorders. However, higher anxiety level is also related with many cardiovascular and endocrine changes (32).

When higher prevalence of psychiatric symptoms in shift-workers is considered, higher prevalence of obsessive-compulsive and paranoid ideation sub-scales in night shift-workers compared to daytime workers is an important finding and are similar with the studies showing higher amount of psychiatric symptoms and signs in this group (33, 34). Several authors described night working system as chronic partial sleep deprivation (35, 36). Sleep deprivation effect of this system has a role in the emergence of psychopathology. Kahn-Greene et al. (37) reported that temporary anxiety, depression, somatic symptoms and paranoia seen after sleep deprivation are due to reduced cerebral blood flow in prefrontal cortex. This study points out the importance of chronic sleep deprivation on both new

and temporary obsession and paranoid thoughts and also emergence of background psychopathology.

Higher scores obtained from both somatization subscale and physical functioning and bodily pain domains of quality of life scale in this shift-work group can be interpreted as representation of emotional problems as somatic symptoms and disorders; this working system which directly impairs circadian rhythm causes some somatic symptoms on its own. In a study by World Health Organization (WHO) done at 14 countries, 15 centers among 5438 patients, somatic symptoms and emotional disturbance was found to be highly relevant (38). Additionally, sleepiness and fatigue were seen the most due to night sleep deprivation (39). Fatigue generally shows an increased mental effort to carry out daily functions and this can often occur as somatic symptoms (15, 40). Samaha et al. (41) similarly reported that somatic symptoms such as headache and backache accompanied chronic fatigue symptoms in nighttime shift workers. From this point of view, chronic fatigue due to impaired sleep-wake cycle and inadequate sleep quality with difficult emotional processes cause somatic symptoms such as pain and physical disabilities in sensitive people.

Working at night at shift-work system may also impair cognitive functions. Sarıcaoğlu et al. (42), compared cognitive functions and anxiety levels of 15 anesthesiology residents working at day shift and 18

working at night shift, they found significant reduction of cognitive functions after the night shift. However, no significant difference of anxiety levels was found between the two groups. Similarly, in another study done to investigate the impact of shift-work of nurses on state-trait anxiety levels, contrary to our study, "trait anxiety" level was not affected by shift-work and "state anxiety" level was found higher at nurses continuously working at daytime shift compared to nurses working at both daytime and night shifts (43).

Our study has a few limitations. First of all, implementation at a single hospital, relatively small sample size and absence of evaluating gender differences suggest the need of careful interpretation of the generalization findings. Moreover, investigating other sociodemographic parameters affecting quality of life such as economical conditions and residential area (rural or urban) might have contributed to the interpretation of the study results.

In conclusion, working at night shifts may disrupt circadian rhythm which is regulated by inner and outer stimuli. For this reason, several physical and psychiatric problems reducing quality of life may occur such as somatic symptoms, impairment of physical functions and pain. There is strong need for new studies like ours done to describe problems due to shift-work correctly and to take precautions such as selecting people suitable for night working hours.

REFERENCES

1. İncir G. Vardiya çalışması ve kronobiyojik araştırmalar. *Verimlilik Dergisi* 1998; 1:59-72. (Article in Turkish)
2. Ha M, Park J. Shiftwork and metabolic risk factors of cardiovascular disease. *J Occup Health* 2005; 47: 89-95.
3. Nicholson PJ, D'Auriat DAP. Shift work, health, the working time regulations and health assessments. *Occup Med (Lond)* 1999; 49:127-137.
4. Dochi M, Sakata K. Relationship between shift-work and hypercholesterolemia in Japan. *Scand J Work Environ Health* 2008; 34:33-39.
5. Morikava Y, Nakagawa H, Miura K, Soyama Y, Ishizaki M, Kido T. Shift-work and the risk of diabetes mellitus among Japanese male factory workers. *Scand J Work Environ Health* 2005; 31:179-183.
6. Oishi M, Suwazano Y, Sakata K, Okubo Y, Harada H, Kobayashi E. A longitudinal study on the relationship between shift-work and the progression of hypertension in male workers. *J Hypertens* 2005; 23:2173-2178.
7. Knutsson A, Hallquist J, Reuterwall C, Theorell T, Akerstedt T. Shift-work and infarction: a case control study. *Occup Environ Med* 1999; 56:46-50.
8. Ohayon MM, Lemoine P, Arnaud-Briant V, Dreyfus M. Prevalence and consequences of sleep disorders in a shift worker population. *J Psychosom Res* 2002; 53:577-583.
9. Scott AJ, Monk TH, Brink LL. Shiftwork as a risk factor for depression: a pilot study. *Int J Occup Environ Health* 1997; 3 (Suppl.3):2-9.
10. Drake CL, Roehrs T, Richardson G, Walsh JK, Roth T. Shift work sleep disorder: prevalence and consequences beyond that of symptomatic day workers. *Sleep* 2004; 27:1453-1462.
11. Akerstedt T, Wright KP. Sleep loss and fatigue in shift work and shift work disorder. *Sleep Med Clin* 2009; 4:257-271.
12. Culpepper L. The social and economic burden of shift-work disorder. *J Fam Pract* 2010; (Suppl.1):3-11.

13. [Dittner AJ, Wessely SC, Brown RG. The assessment of fatigue: a practical guide for clinicians and researchers. J Psychosom Res 2004; 56:157-170.](#)
14. [Puca FM, Perrucci S, Prudenzano MP, Savarese M, Misceo S, Perilli S, Palumbo M, Libro G, Genco S. Quality of life in shift work syndrome. Funct Neurol 1996;11:261-268.](#)
15. [Saijo Y, Ueno T, Hashimoto Y. Twenty-four-hour shift work, depressive symptoms, and job dissatisfaction among Japanese firefighters. Am J Ind Med 2008;51:380-391.](#)
16. [Schwartz JR. Recognition of shift-work disorder in primary care. J Fam Pract 2010; 59 \(Suppl.1\):18-23.](#)
17. [Derogatis LR. Confirmation of the dimensional structure of the SCL-90: a study in construct validation. J Clin Psychiatry 1977; 33:981-989.](#)
18. [Dağ İ. Belirti tarama listesi \(SCL-90-R\)'nin üniversite öğrencileri için güvenilirliği ve geçerliliği. Turk Psikiyatri Derg 2001; 2:5-12. \(Article in Turkish\)](#)
19. [Ware JE Jr, Sherbourne CD. The MOS 36-item Short-Form Health Survey \(SF-36\). I. Conceptual framework and item selection. Med Care 1992; 30:473-483.](#)
20. [Koçyiğit H, Aydemir Ö, Fişek G, Ölmez N, Memiş A. Kısa Form-36 \(KF-36\)'nin Türkçe versiyonu'nun güvenilirliği ve geçerliliği. İlaç ve Tedavi Dergisi 1999; 12:102-106. \(Article in Turkish\)](#)
21. [Williams C. Work-life balance of shift workers. Perspectives on labour and income 2008; 9:5-16.](#)
22. [Tamagawaa R, Lob B, Booth R. Tolerance of shift work. Applied Ergonomics 2007; 38: 635-642.](#)
23. [Zuroff D, Duncan, N. Self-Criticism and conflict resolution in romantic couples. Can J Behav Sci 1999; 31:137-149.](#)
24. [Boyce P, Parker G, Barnett B, Cooney M, Smith F. Personality as a vulnerability factor to depression. Br J Psychiatry 1991; 159:106-114.](#)
25. [Harb GC, Heimberg RG, Fresco DM, Scheiner FR, Liebowitz MR. The psychometric properties of interpersonal sensitivity measure in social anxiety disorder. Behav Res Ther 2002; 40:961-979.](#)
26. [Akerstedt T. Shift work and disturbed sleep/wakefulness. Occup Med 2003; 53:89-94.](#)
27. [Keller SM. Effects of extended work shifts and shift work on patient safety, productivity, and employee health. AAOHN J 2009; 57:497-502.](#)
28. [Takahashi M, Iwasaki K, Sasaki T, Kubo T, Mori I, Otsuka Y. Worktime control-dependent reductions in fatigue, sleep problems, and depression. Appl Ergon 2011; 42:244-250.](#)
29. [Pıçakçıefe M. Çalışma yaşamı ve anksiyete. TAF Preventive Medicine Bulletin 2010; 9:367-374.](#)
30. [Ardekani ZZ, Kakooei H, Ayattollahi SM, Choobineh A, Seraji GN. Prevalence of mental disorders among shift work hospital nurses in Shiraz, Iran. Pak J Biol Sci 2008; 11:1605-1609.](#)
31. [Kubo T, Maruyama T, Shirane K, Otomo H, Matsumoto T, Oyama I. Anxiety about starting three-shift work among female workers: findings from the female shift-workers' health study. J UOEH 2008; 1:30:1-10.](#)
32. [Munakata M, Ichii S, Nunokawa T, Saito Y, Nobuhiko Ito, Fukudo S, Yoshinaga K. Influence of night shift work on psychologic state and cardiovascular and neuroendocrine responses in healthy nurses. Hypertens Res 2001; 24:25-31.](#)
33. [Driesen K, Jansen NW, Kant I, Mohren DC, van Amelsvoort LG. Depressed mood in the working population: associations with work schedules and working hours. Chronobiol Int 2010; 27:1062-1079.](#)
34. [Nasrabadi AN, Seif H, Latifi M, Rasoolzadeh N, Emami AH. Night shift work experiences among Iranian nurses: a qualitative study. Int Nurs Rev 2009; 56:498-503.](#)
35. [Bonnet M, Arand DL. We are chronically sleep deprived. Sleep 1995; 18:908-911.](#)
36. [Tepasa DI, Mahana RP. The many meanings of sleep. Work & Stress 1989; 3:93-102.](#)
37. [Kahn-Greene ET, Killgore DB, Kamimori GH, Balkin TJ, Killgore WDS. The effects of sleep deprivation on symptoms of psychopathology in healthy adults. Sleep Med 2007;8: 215-221.](#)
38. [Sartorius N, Ustun TB, Costa e Silva JA, Goldberg D, Lecrubier Y, Ormel J, Von Korff M, Wittchen HU. An international study of psychological problems in primary care. Preliminary report from the World Health Organization Collaborative Project on "Psychological Problems in General Health Care." Arch Gen Psychiatry 1993; 50:819-24.](#)
39. [Smith L, Tanigawa T, Takahashi M, Mutou K, Tachibana N, Kage Y, Iso H. Shiftwork locus of control, situational and behavioural effects on sleepiness and fatigue in shiftworkers. Ind Health 2005; 43:151-70.](#)
40. [Beurskens AJ, Bultmann U, Kant I, Vercoulen JH, Bleijenberg G, Swaen GM. Fatigue among working people: validity of a questionnaire measure. Occup Environ Med 2000; 57:353-357.](#)
41. [Samaha E, Lal S, Samaha N, Wyndham J. Psychological, lifestyle and coping contributors to chronic fatigue in shift-worker nurses. J Adv Nurs 2007; 59:221-232.](#)
42. [Sancaoğlu F, Akıncı SB, Gözaçan A, Güner B, Rezaki M, Aypar Ü. Gece ve gündüz vardiya çalışmasının bir grup anestezi asistanının dikkat ve anksiyete düzeyleri üzerine etkisi. Türk Psikiyatri Derg 2005; 16:106-112.](#)
43. [Demir A. Hemşirelerin vardiya ile çalışmalarının anksiyete ve arteryel kan basıncına etkisinin irdelenmesi. Atatürk Üniversitesi Hemşirelik Yüksekokulu Dergisi 2005; 8:40-54. \(Article in Turkish\)](#)