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Job Stress and Mental Health among Permanent Night Workers

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Abstract: Job Stress and Mental Health among Permanent Night Workers: Yoshihisa FUJINO, *et al.* Department of Clinical Epidemiology, Institute of Industrial Ecological Sciences, University of Occupational and Environmental Health—Shift work, including rotating shift night work, and permanent night work, causes mental health problems. In addition to the shift work system, job stress and individual background factors also relate to the mental health of workers, but details of job stress and mental health problems among permanent night workers are still unclear. The purpose of this study is to examine the amount of job stress and the mental health problems among permanent night workers, and also to examine what factors should determine the mental health condition of the permanent night worker. The study group consisted of 435 garbage workers, and 384 workers completed the questionnaire, which included the NIOSH generic job stress questionnaire and 30 items of the General Health Questionnaire (GHQ). Workers with a GHQ score of 7 or more were defined as having psychiatric disturbance. Multiple logistic regression was performed to estimate the odds ratios (ORs) for psychiatric disturbance, including age, type of work, working year, marital status, and some scales of the NIOSH generic job stress questionnaire. The married workers were less likely to have mental health problems than single workers (OR=0.49, 95% CI=0.29–0.85). The mental health of the workers with lower job control was better than the workers with higher job control (OR=0.46, 95% CI=0.26–0.79). The workers with a higher workload were more likely to have mental health problems (OR=2.86, 95% CI=1.76–4.67). This study showed that person with a high workload, high job control, and who were single had increased ORs for psychiatric disturbance among permanent night workers.
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Key words: Garbage worker, GHQ, Job stress, Mental health, Night worker, NIOSH generic job stress questionnaire

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Shift work, including rotating shift night work, and permanent night work, causes mental health problems, sleeping difficulties, fatigue, disruption of the circadian rhythm, and other physical health problems[1–5], but compared with rotating shift night work, permanent night work has been regarded as preferable, in terms of sleeping, circadian rhythm, and performance[2, 5]. Permanent night workers have a greater amount of sleep, and less sleeping disturbance than rotating shift night workers. Adaptation of the circadian rhythm can be achieved better in permanent night workers than in those on rotating shift night work. On the other hand, social and family life, and personal satisfaction may be worse with permanent night work than rotating shift night work. Less social support from family has been shown to increase the job stress and mental health problems of workers[6, 7].

In addition to the shift work system, job stress and individual background factors also relate to the mental health of workers[8]. Job demand, job workload, poor worksite support, and interpersonal conflict increase psychological distress, fatigue, anxiety, depression and irritation. Age, lifestyle, marital status, family structure, experience and character also modify the job stress and mental health of workers[7, 9–11].

However, the magnitude of the job stress, and mental health problems among the permanent night workers is still unclear, mainly because permanent night work is rare. The purpose of this study is to examine the amount of job stress and mental health problems among permanent night workers, and also to examine what factors should determine the mental health condition of the permanent night worker, by means of both the NIOSH generic job

stress questionnaire[12] and the General Health Questionnaire (GHQ)[13].

Materials and Methods

The study group consisted of 435 employees of all 13 companies to which A city entrusts its garbage-collecting project. The employees were divided into three types of worker: garbage collector, driver, and both. Considering the efficacy of work and safety of workers, home garbage is collected during the night in A city, because there is less traffic at night. Thus, employees basically work at night, more precisely from midnight to 7 a.m.

The survey was self-administrated and the questionnaire was composed of the 30-item Japanese version of the GHQ[14] and some scales in the Japanese version of the NIOSH generic job stress questionnaire[15, 16] (intragroup conflict, job control, social support from supervisor, social support from coworkers, social support from family/friends, quantitative workload, and non-work activities), in addition to individual background factors including age, marital status, years employed, and type of work. Among the subjects, 384 (88.3%) of the workers completed the questionnaires.

Statistical analysis

The subjects were classified according to the individual background items: age (under 25, 25–34, 35–43, and over 44 yr-old as quartiles), years employed (less than 4 yr, 4–9 yr, over 9 yr as tertiles), marital status (unmarried or married), and type of work (garbage collector, driver, and both). Multivariate analyses of variance were performed to calculate the adjusted means of each scale of the NIOSH generic job stress questionnaire, with the categories of background terms as the level of factors. Workers with a GHQ score of 7 or more were defined as having psychiatric disturbance. The cut-off score of 6/7 was considered reasonable in the study on the validity of the Japanese version of the 30-item GHQ score[17]. Logistic regression was used to estimate the odds ratio (OR) of each of the background items, such as age, years employed, marital status, type of work and selected scales of the NIOSH generic job stress questionnaire for psychiatric disturbance. The highest and middle tertiles of job control, social support from supervisor, social support from coworkers, social support from family/friends, and non-work activity, and the lowest and middle tertiles of Job conflict and quantitative workload were defined as reference categories in the model. The multivariate ORs for psychiatric disturbance including age, years employed, marital status, type of work, and selected scales of the NIOSH generic job stress questionnaire were then estimated. The calculations were performed with the Statistical Analysis System[18].

Table 1. Characteristics of the subjects[a]

Mean (SD)	
Age	37.4 (10.7)
Years employed	9.0 (8.0)
Niosh generic job stress questionanaire	
Intragroup conflict	20.1 (5.4)
Job control	32.3 (11.7)
Quantitative workload	31.6 (4.9)
Social support from supervisor	14.7 (3.5)
Social support from coworker	16.1 (2.5)
Social support from family/friend	16.4 (3.4)
Non-work activity	1.2 (1.0)
Percentages of groups	
Type of work	
driver	16.4
both	53.4
collector	30.2
Marital status	
married	64.0
Psychiatric disturbance[b]	40.9

[a] total number of the subjects was 384. [b] worker with a GHQ score of 7 or more.

Results

Table 1 shows the characteristics of the subjects and the means for the NIOSH generic job stress questionnaire. The mean age of 384 subjects was 37.4 (SD=10.7) and the mean years employed was 9 (SD=8). Thirty percent of the subjects were engaged as garbage collectors and 16.4% as drivers, and the remaining subjects were both drivers and collectors. Sixty-four percent of the subjects were married.

The means for the NIOSH generic job stress questionnaire and the results of analysis of variance are shown in Table 2. After multiple analyses of variance, both the means for intragroup conflict and the means for job control differed significantly according to the type of work. The means for quantitative workload differed significantly according to the number of years employed. Non-work activities differed significantly according to age group and marital status. There was a significant difference in the means for social support from coworkers in the groups according to years employed, and the means for social support from family/friends differed significantly according to marital status and type of work.

The results of the multiple logistic regressions are as follows (Table 3). The married workers were less likely to have mental health problems than single workers (OR=0.49, 95% CI=0.29–0.85). The mental health of the workers with lower job control was better than the workers with higher job control (OR=0.46, 95% CI=0.26–

Table 2. Comparisons of the NIOSH generic job stress questionnaire according to individual factors

	Intragroup Conflict					Job Control					Quantitative Workload					Non-work Activities				
	n	mean	SD	P[a]	P[b]	n	mean	SD	P[a]	P[b]	n	mean	SD	P[a]	P[b]	n	mean	SD	P[a]	P[b]
Age																				
<25	82	19.5	5.5	0.44	0.44	77	30.0	11.7	0.12	0.40	84	31.7	4.9	0.09	0.84	81	0.8	0.8	<0.01	<0.01
25–34	88	20.7	4.9			77	31.7	10.7			86	32.4	5.0			84	1.0	0.8		
35–43	83	20.3	5.1			84	32.3	11.4			88	31.9	4.7			79	1.4	1.0		
43<	77	19.8	6.3			72	34.9	12.7			78	30.6	4.5			72	1.5	1.0		
Marital status																				
married	212	19.9	5.4	0.41	0.76	194	32.7	11.3	0.25	0.75	216	31.4	4.9	0.53	0.73	200	1.4	0.8	<0.01	<0.01
single	118	20.4	5.6			116	31.3	12.4			120	32.0	4.7			116	0.8	1.0		
Years employed																				
<4	106	19.3	5.9	0.15	0.07	100	30.1	11.4	0.06	0.59	103	32.1	5.0	0.01	0.02	101	1.1	1.1	0.09	0.57
4–9	121	20.8	4.9			110	32.4	11.2			121	32.4	5.0			113	1.2	0.8		
9<	103	20.0	5.6			100	34.1	12.4			112	30.4	4.3			102	1.3	1.0		
Type of work																				
collector	49	18.0	5.3	0.01	0.01	48	35.8	12.6	<0.01	<0.01	54	30.1	5.1	0.01	0.13	49	1.5	0.9	0.08	0.75
both	182	20.6	5.7			172	29.6	10.4			181	32.0	4.7			173	1.1	1.0		
driver	99	20.1	4.9			90	35.3	12.5			101	31.9	4.8			94	1.2	0.8		

	Social Support from Supervisor					Social Support from Coworker					Social Support from Family/Friend				
	n	mean	SD	P[a]	P[b]	n	mean	SD	P[a]	P[b]	n	mean	SD	P[a]	P[b]
Age															
<25	84	13.8	3.7	0.09	0.11	85	16.3	2.6	0.02	0.13	85	16.3	3.6	0.42	0.25
25–34	87	14.9	3.3			89	16.7	2.1			87	16.9	2.7		
35–43	90	14.9	3.2			89	15.5	2.5			90	16.6	3.2		
43<	81	15.0	3.7			79	15.7	2.5			73	16.1	3.8		
Marital status															
married	219	14.7	3.7	0.42	0.92	219	16.3	2.4	0.14	0.09	214	17.3	2.9	<0.01	<0.01
single	123	14.5	3.2			123	15.9	2.5			121	15.2	3.7		
Years employed															
<4	108	15.0	3.3	0.43	0.26	105	16.4	2.6	0.01	0.03	104	16.3	3.8	0.25	0.11
4–9	123	14.4	3.3			124	16.5	2.3			125	16.9	3.0		
9<	111	14.6	3.9			113	15.5	2.4			106	16.2	3.3		
Type of work															
collector	54	15.5	3.6	0.10	0.25	51	16.4	2.6	0.55	0.23	50	17.5	2.9	0.06	0.03
both	183	14.5	3.4			184	16.2	2.5			181	16.1	3.6		
driver	105	14.5	3.6			107	16.0	2.3			104	16.7	3.1		

[a] P value derived from univariate analysis of variance. [b] P value derived from multiple variate analysis of variance, including age, marital status, years employed, and type of work.

Table 3. ORs of individual factors for psychiatric disturbance

			Univariate			Multivariate[b]		
	n	%[a]	OR	95% CI	P	OR	95% CI	P
Age								
<25	93	40.9	1.96	1.06–3.63	0.03	1.50	0.70–3.23	0.30
25–34	99	47.5	2.57	1.41–4.69	<0.01	2.05	0.95–4.40	0.07
35–43	96	49.0	2.72	1.49–5.00	<0.01	2.01	0.99–4.07	0.05
43<	96	26.0	reference			reference		
Marital status								
married	236	36.9	0.56	0.13–0.86	0.01	0.49	0.29–0.85	0.01
single	133	51.1	reference			reference		
Years employed								
<4	121	40.5	1.13	0.68–1.89	0.63	0.80	0.41–1.54	0.50
4–9	135	44.4	1.33	0.84–2.18	0.25	0.71	0.37–1.33	0.28
9<	128	37.5	reference			reference		
Type of work								
driver	61	26.2	0.45	0.24–0.85	0.01	0.61	0.29–1.28	0.19
both	198	43.9	0.95	0.60–1.51	0.83	0.89	0.51–1.57	0.69
collector	112	42.9	reference			reference		
Intragroup conflict								
high	110	44.6	1.24	0.79–1.93	0.36	1.10	0.67–1.81	0.71
low	274	39.4	reference			reference		
Job control								
low	99	26.3	0.42	0.25–0.69	<0.01	0.46	0.26–0.79	0.01
high	285	46.0	reference			reference		
Social support from supervisor								
low	117	42.7	1.12	0.72–1.73	0.63	1.41	0.82–2.43	0.22
high	267	40.1	reference			reference		
Social support from coworker								
low	110	38.2	0.85	0.54–1.34	0.49	1.00	0.54–1.85	0.99
high	274	42.0	reference			reference		
Social support from family/friend								
low	112	35.7	0.74	0.47–1.16	0.19	0.77	0.43–1.39	0.39
high	272	43.0	reference			reference		
Non-work activity								
low	120	39.2	0.90	0.58–1.40	0.64	0.76	0.44–1.32	0.33
high	264	41.7	reference			reference		
Work load								
high	110	61.8	3.37	2.12–5.33	<0.01	2.86	1.76–4.67	<0.01
low	274	32.5	reference			reference		

[a] percent of the workers with a GHQ score of 7 or more. [b] model includes age, years employed, marital status, type of work, intragroup conflict, job control, social support from supervisor, social support from coworker, social support from family/friend, non-work activity, and work load.

0.79). The workers with a higher workload were more likely to have mental health problems (OR=2.86, 95% CI=1.76–4.67).

Discussion

This study showed that the selected scales of the NIOSH generic job stress questionnaire differed for groups according to age, years employed, marital status,

and type of work, among permanent night workers. This study also showed that marital status, job control, and quantitative workload were significantly associated with psychiatric disturbance according to the GHQ.

The features of the present subjects according to NIOSH generic job stress questionnaire, when compared with a previous study conducted among Japanese workers, was that they had a lower quantitative workload, lower job control, and slightly higher social support from coworkers and family[19]. However, it is unclear whether these features were characterized by night work or garbage work, because scores in the NIOSH generic job stress questionnaire vary according to the type of job. According to the GHQ, there is no difference from other Japanese workers reported previously in the rate of psychiatric disturbance among the present subjects[20].

Job control was the lowest in those who worked as both collector and driver. Garbage is collected by small groups consisting of one driver and two or three collectors, and most of the workers who worked only as a driver or a collector were the leader of their group. Therefore, drivers and collectors are rather easily able to control their jobs. A possible explanation for the lowest intragroup conflict in collectors is because collectors can communicate with each other more than drivers due to this group makeup. The workers with over nine years employment had the lowest quantitative workload. Skilled workers could do the task easier than workers with little experience. Alternatively, workers with little experience might be allotted the harder tasks. Social support from coworkers was the lowest among persons with over nine years employment. Workers with more experience might be able to perform their task without help. It is natural that the married worker had stronger support from the family than the single worker. Persons who are married and older may tend to have a chance for non-work activities, such as hobbies, going out with their family, and participation in community activities.

Marital status is regarded as modifying the association between job stress and the mental health of the workers[7, 12], but the conjugal relationships of night workers might be different from those of daytime workers. Permanent night work may cause some difficulties in conjugal relationships, such as the gap in the daily life schedule between the couple, or difficulties in participating in childcare. Nevertheless, this study showed that marriage is an important factor maintaining the mental health of permanent night workers. In the present study, the workers with high job control had a high OR for psychiatric disturbance, which is inconsistent with previous studies which revealed that low job control increases job stress and health problems[21, 22]; but the relation between job control and job stress should be treated carefully. One study showed that job control negatively correlated with subjective fatigue symptoms among middle-aged Japanese working men[23]. The study explained that the reaction to job control in workers in Western countries differed from Japan. Moreover, another study[24] showed that the availability of control opportunities that exceed the individual's ability to take advantage of them can produce negative outcomes including both self-report and psychophysiological indices of stress, and poorer task performance. In addition, workers with a desire for low control appear to suffer more when provided with greater rather than fewer opportunities to exert control. If workers in the present study prefer simple tasks with low job control, higher job control increases mental health problems. The present study also found that a quantitative workload was strongly associated with mental health problems among permanent night workers, which is consistent with previous studies which were conducted among daytime workers or shift workers[8, 25, 26]. However, the interpretation of this result should be limited because this study was cross-sectional, and a person with a psychiatric disturbance may feel that a task is harder than a person without a psychiatric disturbance.

The limitations and validity of this study should be mentioned. First, logistic regression assumes that explanatory variables are independent of each other. The factors including the logistic regression model in this study were not significantly correlated with each other (correlation coefficient: γ=0.01–0.47), except for between age and years employed (γ=0.61), and between social support from coworkers and supervisor (γ=0.60). To avoid the statistical problem known as multicollinearity, we compared the results of multiple logistic regression with the results of univariate logistic regression, and found that the estimated ORs of each variable were all similar. Therefore it can be practically concluded that the effect of multicollinearity was small. Second, the validity of using a GHQ to measure the mental health of worker should be mentioned. The Japanese version of GHQ-30[13, 14] is widely used in Japan, and several studies have revealed that sensitivity of the cut-off point of 6/7 is 92% and 79%, and specificity is 85%[17], although these studies used neurosis outpatients or hospital outpatients as subjects, and the application of their cut-off point to a working population is a problem.

In conclusion, the worker who had a high quantitative workload, high job control, and was single was likely to have mental health problems, but further study is necessary to examine whether these factors in permanent night work influence mental health more than those in other working styles, such as daytime work or rotating shift night work. Furthermore, our finding that high job control increased psychiatric disturbance among permanent night workers was unexpected, and remains unclear. This should also be clarified by further study.

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