

Abstract

The Relationship of Working Hours and Work Intensity with Sleep Disturbance Among Continuous 12 Hours Day and Night Shift Workers in an Automobile Factory in Korea

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Backgrounds: The objective of this study is to explore the relationships of working hours and work intensity with sleep disturbance among 12-hour shift workers in an automobile factory in Korea.

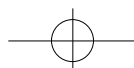
Methods: A questionnaire and a sleep diary were distributed among 2200 (25% of total workers) and 300 workers who were randomly selected in the 8700 workers in one car factory.

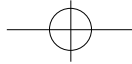
Among the 300 randomly selected workers, who were randomly selected, 262 workers filled out a sleep diary. For a questionnaire, 2200 (25%) among 8700 workers were randomly selected, 1200 (54% response rate) of whom filled out the questionnaire. The cross-sectional questionnaire and the sleep diary during 14 consecutive days were distributed and collected by workers' representatives, who were trained for the participatory action research in this study. One hundred and sixty workers' sleep diaries and questionnaires were merged by the same worker and used for the analysis in this study. Logistic regression analysis for repeated measurements was modeled using the prevalence of severe sleepiness at work (i.e. Karolinska Sleepiness Scale 7 or higher) as dependent variable and working hours, sleep pattern, work intensity and health behaviours as independent variables.

Results: The prevalence of severe sleepiness at the end of work was more than 60% after finishing night shift in the automobile factory. The main risk factors related to the severe sleepiness at the end of work were the night shift, long working hours more than 10 hours, the higher frequency of night shift per month, less free time between shifts, poor quality of sleep, deficit of sleeping hours and intensified work (reducing tendency of rest time per day and increasing tendency of additional working time) such as increasing tendency of absolute surplus value.

Discussion: We suggest that the 12-hour shift system, long working hours, intensified work and poor quantity as well as quality of sleep were the main risk factors for the severe sleepiness among the shift workers in the automobile factory in Korea.

Key Words: Shift, Sleepiness, Long working hours, Work intensity





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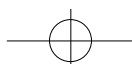
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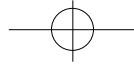
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Table 2.

	/	-	-	-	-	-	-	-	-
()	6.77 ± 1.41	7.83 ± 1.69	7.18 ± 1.01	7.02 ± 1.60	8.27 ± 2.31	8.48 ± 3.20	5.86 ± 2.85	8.79 ± 4.10	9.25 ± 3.48

Table 3.

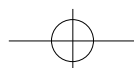
		F-value		p-value		F-value		p-value	
(-)		4.59	0.0322	0.39	0.5316	1.63	0.2023		
		0.05	0.8165	0.05	0.8301	0.42	0.5160		
		13.50	0.0003	0.64	0.4256	2.89	0.0913		
		94.24	<0.0001	3.12	0.0782	8.12	0.0047		

Table 4.

	(%)	(%)	(%)	(%)	(%)	(%)
	1.98	0.00	1.91	33.33	3.50	73.91
	9.90	0.00	12.90	31.43	20.91	69.39
	47.52	3.57	47.87	24.16	47.56	59.46
	29.70	20.00	30.70	17.39	23.99	47.52
	10.89	25.00	6.63	10.53	4.03	40.91
X2 test	68.7525	5.2413	796.8520	12.7347	613.8493	18.8954
	p-value: <.0001	p-value: 0.1550	p-value: <.0001	p-value: 0.0004	p-value: <.0001	p-value: <.0001

Table 5.

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	.56 ± 1.15	4.14 ± 1.51	4.50 ± 1.54
	5.05 ± 1.38	5.13 ± 1.74	6.77 ± 1.59





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Table 6.

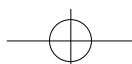
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	()	()							
3.56	4.00	4.25	4.18	4.12	4.00	4.44	4.72	5.00	
5.05	5.17	4.00	5.18	4.89	5.00	6.72	6.53	3.00	

Table 7.

(-)

	F-value	p-value	F-value	p-value	F-value	p-value	F-value	p-value
	14.62	0.0001	13.49	0.0002	1.50	0.2218	0.02	0.8960
	11.06	0.0009	10.63	0.0012	0.60	0.4395	0.20	0.6614
	16.78	<0.0001	14.93	0.0001	2.91	0.0925	1.20	0.3876
	20.35	<0.0001	14.45	0.0002	8.73	0.0036	2.33	0.1444
	4.00	0.0457	5.16	0.0233	0.32	0.5745	0.01	0.9142
	0.19	0.6635	0.00	0.9754	2.43	0.1223	0.15	0.7140
	25.43	<0.0001	24.67	<0.0001	0.74	0.3916	1.00	0.500
	245.12	<0.0001	245.12	<0.0001	35.08	<0.0001	0.74	0.4143





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54.6~66.1%

(Table 8).

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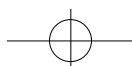
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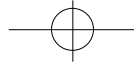
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Table 8.

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	8:30AM (20:30PM)	17:30PM (05:30AM)	19:30PM (07:30AM)	20:30PM (08:30AM)
()	10.23	25.00	25.63	28.57
()	9.94	54.55	66.12	58.70



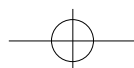


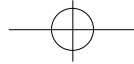
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Table 9.

		ORs	CI	ORs	CI	ORs	CI	ORs	CI	ORs	CI
36	35	1.00		1.00		1.00		1.00		1.00	
31~35	268	2.08	1.14-3.77	2.11	1.16-3.83	2.10	1.16-3.80	1.51	0.82-2.77	1.77	0.92-3.40
26~30	185	1.89	1.02-3.52	2.02	1.06-3.83	2.00	1.05-3.80	1.50	0.77-2.91	1.47	0.71-3.04
25	104	2.32	1.13-4.75	2.25	1.08-4.70	2.30	1.10-4.79	1.71	0.81-3.61	1.67	0.74-3.78
	170	1.00		1.00		1.00		1.00		1.00	
	427	1.36	0.85-2.18	1.33	0.84-2.11	1.26	0.79-2.00	1.33	0.84-2.11	1.18	0.72-1.94
가	423	1.00		1.00		1.00		1.00		1.00	
	55	1.24	0.54-2.83	1.22	0.58-2.58	1.22	0.58-2.56	1.18	0.57-2.43	1.53	0.73-3.19
가	317	1.00		1.00		1.00		1.00		1.00	
	158	1.24	0.79-1.96	1.27	0.80-2.01	1.24	0.78-1.97	1.24	0.79-1.97	1.61	0.97-2.70
	7	1.00		1.00		1.00		1.00		1.00	
	590	5.28	1.81-15.43	4.49	1.68-12.01	3.65	1.27-10.45	2.55	0.85-7.63	1.70	0.58-4.98
	190	1.00		1.00		1.00		1.00		1.00	
	407	4.40	3.31-5.85	4.45	3.31-5.98	4.23	3.14-5.71	4.20	5.66-3.11	4.11	3.05-5.54
10	37	1.00		1.00		1.00		1.00		1.00	
10~11	425	1.47	1.09-1.98	1.44	1.07-1.95	1.46	1.06-1.99	1.46	1.06-1.99	1.51	1.05-2.15
11	34	1.19	0.63-2.22	1.19	0.65-2.19	0.92	0.51-1.69	0.92	0.51-1.69	0.83	0.41-1.66
14	37	1.00		1.00		1.00		1.00		1.00	
13	256	1.34	1.00-1.82	1.34	0.99-1.82	1.34	0.98-1.84	1.34	0.98-1.84	1.43	0.99-2.07
12	169	1.71	1.15-2.53	1.65	1.11-2.44	1.69	1.13-2.52	1.69	1.13-2.52	1.63	1.05-2.54
11	34	1.25	0.68-2.32	1.24	0.68-2.27	0.99	0.55-1.79	0.99	0.55-1.79	0.84	0.42-1.69
	31	1.00		1.00		1.00		1.00		1.00	
10	115	1.98	1.07-3.65	2.24	1.30-3.85	2.14	1.25-3.69	2.13	1.21-3.77	1.67	0.93-3.01
11	163	2.52	1.37-4.62	2.98	1.70-5.22	2.89	1.64-5.09	2.72	1.49-4.96	2.13	1.12-4.05
12	137	2.25	1.19-4.27	2.61	1.49-4.57	2.42	1.38-4.22	2.35	1.33-4.17	1.84	0.99-3.40
13	151	2.38	1.29-4.41	2.43	1.41-4.20	2.35	1.36-4.08	2.27	1.27-4.07	2.07	1.10-3.91

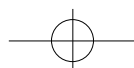


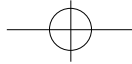


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		ORs	CI	ORs	CI	ORs	CI	ORs	CI	ORs	CI
8	161	1.00		1.00		1.00		1.00		1.00	
5~7	226	0.90	0.73-1.12	0.90	0.73-1.12	0.88	0.71-1.09	0.88	0.71-1.10	0.89	0.70-1.14
5	161	1.60	1.18-2.18	1.59	1.16-2.17	1.52	1.10-2.09	1.54	1.12-2.11	1.16	0.83-1.62
	13	1.00		1.00		1.00		1.00		1.00	
	107	0.81	0.53-1.24	0.84	0.55-1.27	0.81	0.54-1.23	0.75	0.49-1.15	0.98	0.60-1.58
	292	1.21	0.80-1.83	1.24	0.84-1.85	1.20	0.81-1.79	1.10	0.73-1.65	1.39	0.88-2.21
	135	1.61	0.99-2.61	1.69	1.06-2.69	1.65	1.04-2.62	1.52	0.96-2.42	1.87	1.09-3.19
	22	1.96	1.02-3.76	2.06	1.07-3.97	1.89	0.96-3.72	1.75	0.89-3.45	2.13	1.02-4.43
1	204	1.00		1.00		1.00		1.00		1.00	
2 ~3	246	0.85	0.64-1.13	0.79	0.59-1.05	0.74	0.55-1.00	0.72	0.54-0.98	0.69	0.49-0.97
3	147	1.11	0.78-1.58	1.00	0.69-1.45	0.99	0.67-1.44	0.98	0.67-1.44	0.95	0.62-1.45
1	576	1.00		1.00		1.00		1.00		1.00	
1~2	12	0.54	0.34-0.85	0.49	0.31-0.78	0.47	0.30-0.76	0.50	0.31-0.79	0.76	0.44-1.31
2	9	1.03	0.58-1.84	1.03	0.57-1.84	0.94	0.51-1.76	0.90	0.48-1.67	1.41	0.70-2.88
1	574	1.00		1.00		1.00		1.00		1.00	
2	13	0.53	0.26-1.11	0.57	0.26-1.25	0.60	0.30-1.22	0.64	0.32-1.29	0.56	0.26-1.24
3	10	1.01	0.36-2.84	1.01	0.35-2.90	0.93	0.37-2.34	0.95	0.35-2.58	1.06	0.39-2.87
25(kg m ²)	483	1.00		1.00		1.00		1.00		1.00	
25(kg m ²)	108	1.58	0.95-2.64	1.54	0.92-2.59	1.51	0.90-2.54	1.53	0.91-2.58	1.60	0.87-2.96
	131	1.00		1.00		1.00		1.00		1.00	
	75	1.03	0.54-1.95	1.11	0.59-2.07	1.15	0.62-2.15	1.20	0.65-2.21	1.35	0.69-2.64
	391	1.42	0.87-2.32	1.49	0.90-2.47	1.49	0.90-2.47	1.49	0.90-2.46	1.62	0.90-2.91





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