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Relation between road accidents and sleep quality of heavy vehicle drivers in Yazd

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ABSTRACT

Aims: The aim of this study was to study the sleep quality of truck and trailer drivers in Yazd and its relation with traffic accidents and associated expenses.
Materials and Methods: This cross-sectional descriptive study included nonrandom simple method including 200 truck and trailer drivers. A two-sectional questionnaire was used: the first section included the standard Pittsburgh sleep quality questionnaire, while the second section included demographic characteristics of the subjects. Data were analyzed using descriptive statistical method and T-test analysis through SPSS 17 software.
Findings: The mean daily sleep period of the subjects under study was 6.46 ± 1.8 h and the mean of sleep quality score was 7.22 ± 2.72 h. Of the total, 75.5% had a sleep quality score greater than 5 that depicts the low quality of sleep in them. 29.5% had suffered from accidents in the last decade and 28% of those were due to sleepiness. The distribution of the sleep quality score on basis of sleep duration and falling sleep time was meaningful. The distribution of history of cigarettes smoking, narcotics abuse, and use of sedatives on basis of sleep quality score was also significant ($P < 0.05$).
Conclusion: The results showed that 75.5% of the truck and trailer drivers had sleep quality disorders and accidents resulting in injuries. Sleep quality in drivers who had precedence of accidents was lower than the drivers without any accidents so sleepiness can be one of the main causes of accidents among the professional drivers in Iran.

Key words: Sleep quality, traffic accidents, truck and trailer drivers

INTRODUCTION

Heavy vehicular accidents are one of the major general health discussions and it is estimated that half of them result in deaths and serious injuries.[1] In the year 2006 in USA, truck accidents resulted in 5200 deaths and 125,000 injuries.[2] According to the report of the traffic department of the Islamic Republic of Iran in 2008, 27,000 people died due to road accidents which is the highest per capita in the world.[3] Sleepiness and sleep in drivers are the main causes of road accidents.[4-8] According to the report of the Safety and Transport Department of America, 80% of the road accidents are due to mistakes of the drivers, while 7% are due to sleep of the drivers behind wheels.[9] These accidents result in damages worth billions of dollars per year.[10] In Iran, approximately 50% of those killed in accidents are at the age

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15–43 years which is considered as the most effective group with respect to economics.[11]

According to the results of various studies regarding vehicular accidents, sleep disorders are the cause of accidents in 1–3% in USA, 10% in France, and 33% in Australia.[12]

Sleepiness in truck and trailer drivers during long trips is due to lack of sleep in increased work hours, lack of ideal sleep conditions, and uniformity of work in a long shift work which results in a meaningful increase in vehicular accidents.[13] Also, the severity of the accidents due to sleepiness is also more because of the absence of control factors.[14] According to the results of the studies on commercial and heavy vehicle drivers, the type of work, number of jobs of one individual, number of work hours, and day or night shift are the various peculiarities in types and causes of accidents. In addition, the percentage of road accidents due to sleepiness is different in various countries due to the difference in socioeconomical conditions of various countries.[12]

Sleepiness and its effect on alertness are doubly important in road accidents as not only the life of the involved person is in danger but also other lives are also at risk. Therefore, its recognition in commercial and professional drivers is important for prevention of accidents and economical problems arising due to it. This study was done with the intention of studying the relation between vehicular accidents and sleep disorders in truck and trailer drivers of Yazd province. The aim of the study was to determine the pittsburgh sleep quality index (PSQI) and factors affecting sleep quality in these drivers. It is clear that by recognizing the factors affecting sleep quality and their relation with accidents, effective steps can be taken by the related organizations for preventing vehicular road accidents in the future.

MATERIALS AND METHODS

This descriptive cross-sectional study was done in the spring of 2008. Sampling method was nonrandom simple method and 240 drivers who had referred to the Occupational Health Clinic for procuring their health card were included in the study. Of these, 40 were excluded due to incorrect or incomplete questionnaire and use of hallucinogens or medical conditions such as mania, narcosis, depression, and epilepsy. Instrument for data collection was a two-part questionnaire. The first part included demographic characteristics of the population under study such as age, work experience, literacy level, and history of medical conditions followed by history of vehicular road accidents that included number of acquittals and amount of damage due to the accidents. The second part included the standard PSQI whose reliability and validity has been confirmed both internationally and in Iran.[3] The questionnaire was initially translated into Persian by specialists and translated back into English for confirmation. A Cronbach's alpha coefficient of 0.78–0.82 was reported and 40 questionnaires were completed before the start of the study to determine the problems before implementation.[12,15-18]

This questionnaire has been designed to measure the sleep quality and diagnosis of people with good or bad quality of sleep. The questionnaire includes questions in seven sections whose fields include the following: personal views about sleep quality, duration of sleep, late sleep, usefulness of habits in effective sleep, use of sedatives, and disorders in day activities that is scored between 0 and 3 by the researchers. Therefore, the range of scores is between 0 and 21 and the higher the score, the worse the quality of sleep. According to the designers, scores greater than 5 pertaining to sleep disorders are worth consideration.[19] The questionnaire was completed by the researchers at the occupational health Clinic of Yazd and the data were analyzed using descriptive statistical method and *T*-test analysis through SPSS 17 software.

RESULTS

A total of 200 truck and trailer drivers of Yazd were studied, and all were men of which 16.5% were illiterates, 50.5% had primary school education, 30.5% higher secondary education, and only 2.5% had university bachelor or higher degrees. More than 70% were married. The results showed that 16.5% had history of cardiovascular diseases, 9% pulmonary diseases, 4% hepatic diseases, 4.5% renal diseases, 9.5% diabetes, and 16% had history of hypertension. Also, 24.5% had history of narcotics use. Cigarette smoking and narcotics use had a significant relationship with the sleep quality score ($P = 0.03$, $P = 0.004$). Use of sedatives also had a significant relationship with the sleep quality score ($P = 0.03$). The results of the study showed that 75.5% of the subjects under study had a sleep quality score greater than 5.

The distribution and mean of the variables including work experience sleep quality score, sleep duration in 24 hours, BMI, and age are presented in Table 1.

The results showed that 29.5% of the drivers had met with road accidents in the past 5 years and 28.5% of them reported that sleepiness was the main cause of the accidents.

Table 2 depicts the relationship between sleep quality variable and sleep duration in 24 h, falling sleep time, and also history of traffic accidents in the past 5 years.

The results showed a significant relationship between sleep duration in 24 h and the sleep quality score ($P = <0.02$) such that the quality of sleep was less in those drivers with shorter duration of sleep. There was also a significant

relationship between falling sleep time and sleep quality score ($P < 0.05$). The results showed that the drivers with history of traffic accidents in the past 5 years had a sleep quality score greater than 5.

Table 3 depicts the relationship between sleep quality score and number of acquittals in previous accidents. It also shows the number of accidents that resulted in both injury and damage.

Table 4 shows the relationship between history of traffic accidents in truck and trailer drivers of Yazd and sleep duration in 24 h, falling sleep time along with injury and damage in accidents.

According to the results, there was a significant relationship between history of traffic accidents with injury and damage.

Table 1: Statistical description

Variable	Minimum	Maximum	Mean	Standard deviation
Work experience	1	52	0.6350	0.6341
Sleep quality	1	16	0.2250	2.716
Sleep duration in 24 h	1	12	0.46	0.804
BMI	0.731	0.883	0.1881	0.2733
Age	21	58	37.93	9.854

DISCUSSION AND CONCLUSION

This study reviewed and assessed the quality of sleep in truck and trailer drivers of Yazd. Drivers of suburban heavy vehicles in whom quality of sleep can affect accidents were studied. Poor quality of sleep can be a risk factor for incidence. The mean sleep quality score in this study in truck and trailer drivers was 7.22 ± 2.72. The mean sleep quality score in drivers involved in traffic accidents in Iran that have resulted in injury and death is 6.5 ± 28.[12] The mean sleep quality score in Brazilian drivers is reported to be 4.95 ± 2.56.[20] Thus, the sleep quality score of drivers in Yazd is relatively unsuitable. The reason for this could be the location of Yazd on the lengthy and overwhelming North–South highway of Iran resulting in tiredness and sleepiness in the drivers. Yazd is located on the narcotics transit route and 24.5% of the subjects under study had history of narcotics use that is several times more than the norm of society.[12] This could also be an important factor affecting sleep quality. Of the drivers who had met with road accidents previously, 28.5% reported the main cause of accidents to be sleepiness.[12] Various studies over the last two decades have shown a clear relationship between sleep disorders and road accidents.[21-24] The percentage of traffic accidents in heavy vehicles due to sleepiness is different in various countries. In California, 67% of the truck accidents are related to sleepiness,[25] while in England it is between 10 and 20%. In this study, 29.5%

Table 2: Pittsburgh sleep quality index distribution and its relation to sleep duration in 24 h, falling sleep time and accident in the past 5 years

Variable PQSI		Pittsburgh sleep quality index				*P* value
		5≥		>5		
		Frequency	Percent	Frequency	Percent	
Sleep duration in 24 h	<5	6	12.2	54	35.8	0.002
	5-6	10	20.4	39	25.8	
	6-7	11	22.4	24	15.9	
	>7	22	44.9	34	22.5	
Falling sleep time	1-5 A.M	9	18.4	48	31.8	0.05
	20-24.30	40	81.6	103	68.2	
Accident in the past 5 years	yes	12	24.5	47	31.1	0.24
	no	37	75.5	104	68.9	

Table 3: Pittsburgh sleep quality index distribution and its relation to number of acquittals and injury and damage

Variable PQSI		Pittsburgh sleep quality index				*P* value
		≤5		>5		
		Frequency	Percent	Frequency	Percent	
Number of acquittals	Not guilty	41	83.7	116	76.8	0.84
	1–2	5	10.2	20	13.2	
	2–3	2	4.1	11	7.3	
	3–4	1	2	3	2	
	>4	0	0	1	0.7	
Number of economical and life damage	no	32	65.3	65	45	0.28
	1–2	10	20.4	34	22.5	
	2–3	5	10.3	24	15.9	
	3–4	1	2	8	5.3	
	4–5	1	2	8	5.3	
	5–6	1	0	7	4.6	
	6–7	1	0	1	0.7	
	>7	1	0	1	0.7	

Table 4: Distribution of accident in the past 5 years and its relation to sleep duration in 24 hours, falling sleep time and number of injury and damage in truck drivers

Variable PQSI		Accident in the past year				*P* value
		Yes		No		
		Frequency	Percent	Frequency	Percent	
Sleep duration in 24 h	<5	13	22	47	33.3	0.37
	5–6	14	23.7	35	24.8	
	6–7	12	20.3	23	16.3	
	>7	20	33.9	36	25.5	
Falling sleep time	1–5 A.M	17	28.8	40	28.4	0.53
	20–24.30	42	71.2	101	71.6	
Number of injury and damage	No	2	3.4	98	69.5	0.00
	1–2	24	40.7	20	14.2	
	2–3	13	22	16	11.3	
	>3	20	33.9	27	19.1	

of the truck and trailer drivers of Yazd had met with road accidents in the past 5 years that is comparable with other countries. In Sweden, 36.6% of professional truck and bus drivers had met with at least one accident.[26] Similarly, 13.1% of Brazilian truck drivers had met with accidents in the past 5 years.[20] It can be inferred from Table 2 that the history of accidents in the past 5 years in drivers with favorable sleep quality was 24.5%, while this was 31.1% in drivers with low sleep quality. In another study evaluating the sleep quality of drivers involved in road accidents resulting in injury and death, it was determined that sleep quality has a direct relationship with accidents,[12]

It can be inferred from Table 3 that 83.7% of the drivers with good sleep quality were not guilty in accidents, while 76.8% of drivers with low sleep quality were guilty in road accidents. Similarly, 34.7% of drivers with good sleep quality had suffered from injuries and damages, while 55% of drivers with low sleep quality had suffered injuries and damages. It can be inferred form Table 4 that traffic accidents have a significant relationship with the amount of material and medical losses.

As most of the traffic accidents are due to mistakes by the drivers, they should sleep for at least 6 h before their journey in order to reduce sleepiness.[6] Whenever a driver feels sleepy (heaviness with symptoms of eyelids, yawning, difficulty in maintaining head position, being pushed to one side, diversion, inability to accurately recollect the distance covered, forgetting traffic signs and restlessness), he should stop at the nearest station in order to sleep and move again only after overcoming the feeling of sleepiness. He should park in the parking every 2 h. The driver should be accompanied by another person on long journeys in order to control his sleepiness. He should refrain from using narcotics, alcohol, sedatives, and other drugs reducing vigilance. The drivers should be educated about sleep health. Highway security and vehicles should be supervised more aggressively and publicity about continuous compliance with safety should be implemented. Also, greater cooperation between various organizations in case of accidents and scientific expertise of academic experts should be used to improve safety and health. This study showed that sleep quality in drivers who had precedence of accidents was lower than the drivers without any accidents so sleepiness can be one of the main causes of accidents among the professional drivers in Iran.

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