

Sleep quality and its related factors in intercity bus drivers

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Abstract

Aims: Sleeping is one of the basic physiological needs of human beings and has an important effect on people's everyday activities. One of the prevalent disorders in humans is sleeping disorder. This disorder can have serious effects on humans such as increasing human errors during work, especially during driving. This study was designed to evaluate the quality of sleep and its related factors in Kerman inter-city bus drivers.

Methods: This cross-sectional study was done in 2011. One hundred inter-city bus drivers were chosen by simple random sampling. Sleep quality was evaluated by the standard Petersburg Questionnaire and data were analyzed by independent T-test, ANOVA, Pearson correlation and Chi-square test using SPSS 15 software.

Results: The mean driving hours of each driver was 7.71 ± 0.81 hours a day and the mean score of sleep quality in the drivers was 6.98 ± 0.34 from 21 scores, and 61% of them had poor sleep quality. There was a significant relationship between the quality of sleep and age ($p=0.01$) and job satisfaction ($p=0.001$). The drivers that had had an accident in the last 5 years were more likely to have poor sleep quality ($p=0.013$).

Conclusion: The sleep quality is not satisfactory among the majority of Kerman inter-city bus drivers. Certain initiatives should be implemented for improving drivers' sleep quality and timely and adequate rest and restricting their work hours in order to prevent accidents and save passengers from harm.

Keywords: Sleep Quality, Bus Drivers, Kerman

Introduction

Sleeping is an inseparable part of human life [1]. Many physiological, mental, psychological, and behavioral variables belonging to humans are changing similarly and in tune with each other. The source of these variables relates the inner environment of human body and is called the body's ecological cycles or biological rhythms. Among these ecological cycles, the most important one is circa din cycle which is repeated each day long [2]. Sleeping through different mechanism causes the removal of fatigue and regaining power to start daily activities [1]. Each person is usually one third of his/her lifetime in sleep [2, 3 and 4]. Sleep with high quality plays a vital role in body and mental health [3]. Paying attention to sleep quality is important for two reasons. Firstly, sleeping complaints are widespread; secondly, sleep without quality is an index of many diseases [5]. More than 30% of people in the world suffer from sleeping disorders. It can be said that sleeping disorders are among the biggest mental disorders [4]. The previous researches show that problems derived from sleeping can lead to the emergence of many physical and mental disorders, including lack of appetite, physical and mental tiredness, lack of concentration, nervous, behavioral, physiologic changes, the decrease in the speed of information analysis, increase in human slips

and incidence, decrease in consciousness and depression and anxiety [3, 6, 7, 8]. Also, effects such as the increase in the heart (or cardiac) and arterial diseases, the increase in digestion disorders and tendency to take medicine are the results of sleep disorders [6]. Car accidents are also one of the most health problems derived from driver's sleep disorders which threaten human's health. The casualties stemmed from these accidents are so expansive that they are called war-at-roads [2]. Sleeplessness and sleep disorder are among the most important reasons for fatal driving accidents in roads, rails and air and other work incidences [4]. These accidents have costs equating several billion dollars annually [9 and 10]. These financial and human costs are so high in Europe that the European Union decided to half the death rate derived from accidents by the year 2010, using different factors such as enacting new regulations limiting working hours, and informing drivers [11, 12 and 13]. Previous studies show that there are relations among age, gender, occupation, social status, physical and mental health and sleep quality [14]. In the US, there are reports of more than 100,000 accidents annually with around 40,000 casualties and 1550 death derived from driver's sleepiness [15]. The results of a research in England showed that driving between 2 A.M. and 5 A.M. increases the danger of car accidents up to 5 times [16]. Also, Philip et al. estimated that

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around half of the drivers reduce the length of their sleep, 24 hours before beginning long travels of whom 12.5% had sleep shortage more than 3 hours and 3% had sleep shortage more than 6 hours [17, 18]. In Iran, the death rate stemming from driving accidents is the first in the world which demonstrates the importance of this issue [19]. Reports also show that annually 200,000 accidents occur in the roads throughout Iran which indicates that in average one life is claimed in road accidents each 20 minutes [20]. With respect to the above-mentioned issues, and the importance of the driving job and the role of drivers in the passengers' health and also the high death and incidence rate in Iran and with respect to the point that cultural, social and economic conditions cause the information available about the drivers' sleep to be used only in that specific geographical region, and not to be practical for other regions, thus, we decided to accomplish the present study so as to increase efficiency and to prevent the decline in job functionality and the emergence of diseases and disorders in drivers, by using this research's findings.

Methods

This study is a cross-sectional one which was done in June 2011. The society under investigation was 100 bus drivers from Kerman's bus terminal carrying passengers to other cities. The sample size equating 81 people was calculated with the precision of 0.05% and the acceptable error of 0.09%, based on *Kakooe et al.*'s research in which 78.2% of Tehran's outer-city bus drivers had inadequate sleep quality. To increase the accuracy, 100 people participated in this study [2]. The sampling method was as follows: Two main passenger-carrying companies (or corporates) located in Kerman's intercity bus terminal, which mainly carry passengers among cities, were asked to cooperate and drivers were selected by simple randomization from the list of all drivers working there, who entered the study after being informed. The data was collected using a demographic questionnaire and the Pittsburgh standard questionnaire of sleep quality which was made by *Bysey et al.* to measure sleep quality and to help to recognize the people who have good and bad sleep. The validity of the Persian version of Pittsburgh questionnaire of sleep quality and its reliability was confirmed using Cronbach Alpha coefficient, amounting 0.83 [1, 2]. This questionnaire includes sleep quality and 7 scores for scales of 1) The individual's overall description of sleep quality, 2) delay in going to sleep, 3) The length of efficient sleep, 4) Sleep adequacy (which is calculated based on the ratio between the length of efficient sleep and the

time being on the bed), 5) Sleep disorders (which is defined as the individual's night awakenings), 6) The consumption rate of sleeping-inducing medicine and 7) Morning functionality (which is in the form of the problems derived from sleeping disorders which are experienced by the individual during the day). Based on simple Likert scale, each component of the questionnaire receives a score of 0 to 3. Scores of 0, 1, 2 and 3 in each component represent normal situation, the existence of a trivial problem, medium and extreme respectively. The sum of the seven scores constitutes the overall score which is from 0 to 21. The overall score of 5 and lower means the sleep quality is good and the score of 6 and higher means inadequacy of sleep quality.

After finishing sampling and collecting data, this data was transferred to SPSS 15 software and was analyzed through the independent statistical T-test, ANOVA, Pearson Correlation Coefficient and Chi-square.

Table 1- Demographic features in the form of absolute and relative frequency (n=100)

Sleep quality→ Variable↓	Adequate	Inadequate	Sum	Level of significance	
Education level	Illiterate	0	0	0	0.106
	Primary	8	4	12	
	Secondary	13	26	39	
	Diploma and higher	18	31	49	
Marital status	Married	37	52	89	0.13
	Single	2	9	11	
Functionality	Regular	24	47	71	0.095
	Irregular	15	14	29	
Job satisfaction	Yes	25	19	44	0.001*
	No	14	42	56	
Smoking	Yes	18	23	59	0.4
	No	21	38	41	
Ownership of the vehicle	Owner	2	10	12	0.22
	Driver	34	48	82	
	Sharer	3	3	6	
The number of days staying home	Less than 10 days	23	48	71	0.034*
	More than 10 days	16	13	29	
Accidents in the past year	Yes	2	2	4	0.64
	No	37	59	96	
Accidents in the past 5 years	Yes	1	12	13	0.013*
	No	38	49	87	
BMI	More than 25	23	32	55	0.52
	Lower than 25	16	29	45	
Total		39	61	100	-

*Significant at the level of 0.05

Results

In this study, 100 people of men bus drivers were

assessed and the results of statistical analysis show that the drivers' age range was between 26 and 63 and their average age was 40.06 ± 0.98 and their average BMI index was 25.99 ± 0.36 kilograms per square meter. Also, their driving experience was between 1 and 44 years and its average was 16.23 ± 0.93 years and on average the experience of having First Grade driving license among drivers was 13.97 ± 0.943 years. Driving was the only job for 97% of the drivers under investigation and the rest (3%) had also another job. The average length of driving in each day was 7.71 ± 0.811 hours and the average of the nights in which they were at home per month was 10.82 ± 1.03 days (the median was 5.5 days) and the average of their actual sleeping hours was 6.87 ± 1.33 hours in a day. Also, the time necessary to go to sleep ranged between 1 and 120 minutes and its average was 19.49 ± 2.31 minutes (the median was 10.0). 13% of drivers expressed that they take medicine to go to sleep. Their education level, marital status, their functionality, job satisfaction status, smoking, the status of ownership of the vehicle and the number of accidents in the past 1 and 5 years are provided in Table 1. To measure job satisfaction, it was asked from a driver in the form of a question whether he is satisfied with his job or not.

Before investigating the questionnaires, the drivers expressed their sleep quality in the past month as 19% (excellent sleep quality), 68% (rather good sleep quality), 9% (rather bad sleep quality) and 4% (terrible sleep quality). But after calculating the overall score of sleep quality among drivers, its average was 6.98 ± 0.34 scores out of overall 21 scores which meant that 61% of had inadequate sleep quality and 39% of them had adequate sleep quality. The drivers' main problem was inadequacy of sleep and the least problem was using sleeping-inducing medicine. The frequency of the problem's intensity related to each of the seven components is provided in Table 2.

In continuing analysis between different variables, it was discovered that there was a significant relation between age and sleep quality ($p=0.01$). Drivers who had sleep disorder had the average age of 38.05 years and drivers who had no sleep disorders had the average age of 43.21 years. Also, there was a significant relation between job satisfaction and sleep quality ($p=0.001$), in a way that 56% of the drivers were not satisfied with the driving job and among those who were not satisfied, 75% had inadequate sleep quality. With respect to the point that the average number of nights in which the drivers stayed at home was 10.82 ± 1.03 , those drivers who stayed at home less than 10 nights, had inadequate sleep quality

in comparison with the other drivers ($p=0.034$). In addition, those drivers who had accident in the past 5 years had inadequate sleep quality as well ($p=0.013$). Other variables whose relations were investigated with sleep quality were not significant and are provided in Table 1.

Table 2- Comparing (relative and absolute) frequency of the intensity related to each component and the overall score of the Pittsburgh sleep quality questionnaire (n=100)

The intensity of signs→ Components↓	Natural	Slight problem	Medium problem	Intense problem
Individual's overall description from sleep quality	19	68	9	4
Lag in going to sleep	33	40	15	12
Length of efficient sleep	47	25	16	12
Sleep adequacy	34	9	6	51
Sleep disorders	3	83	14	0
The consumption rate of sleep-inducing medicine	94	5	1	0
Morning function	27	42	26	5

Discussion

In this study, 61% of Kerman's intercity bus drivers had inadequate and undesirable sleep quality. Based on these results and those of others, it seems that sleep disorder is very widespread among drivers. Researches done on the driver's sleep quality are limited but show the rate of inadequate sleep quality more than those in this research. For example, *Kakooei et al.*'s research among Tehran's intercity bus drivers showed that 78.2% of them suffer from inadequate sleep quality [2]. In the same respect, *Hassanzadeh et al.* showed that 73.5% of drivers suffer sleep quality problems [9]. In this research, the average of overall score of sleep quality in drivers was 6.98 ± 0.336 scores out of the total score of 21. In *Kakooei et al.*'s study, the average of the overall score of sleep quality was 7.2 ± 2.7 scores out of the total of 21 [3]. In *Hassanzadeh et al.*'s study, the average of the total score of sleep quality was 6.5 ± 2.8 scores [9]. In this study, drivers described their sleep quality in the past month as 19% (excellent sleep quality), 68% (rather good), 9% (rather bad) and the other 4% (terrible sleep quality). In *Hassanzadeh et al.*'s study, 46.8% of drivers, in total, assessed their sleep quality as excellent, 38.4% as good, 12.8% as rather bad, and 2% as terrible [9]. Also, in *Kakooei et al.*'s study done among Tehran's bus drivers, 5.5% of drivers in total described their sleep quality as excellent, 81.8% as good and 12.7% rather bad [2]. Thus, it seems that in most cases, drivers are not aware of their inadequate

sleep quality and although, they perceive their sleep quality as good, they are facing the problems derived from sleep disorder.

In the present study, the average of driver's actual sleep length was 6.87 ± 1.33 hours in a day which is considered adequate on the whole. *Castro's* et al. research done in Peru showed that 55% of bus drivers sleep less than 6 hours in a day [21]. In *Yee's* et al. research in New Zealand, 12.5% of them slept less than 6 hours [22]. In *Hassanzadeh* et al.'s research, the average of sleep length was 6.3 ± 1.5 hours [9] and in *Kakooei* et al.'s research, the average of sleep length in a day was 6.5 ± 1.7 hours which is, to a large extent, in harmony with the results of the present study [3].

In this study, there was a significant relation between job satisfaction and sleep quality ($p=0.001$) which corresponds with *Kakooei* et al.'s study ($p=0.007$). In a way that drivers who were dissatisfied with their job, also suffered from inadequate sleep quality [2]. In this study, there was a significant relation between drivers' age and sleep quality ($p=0.01$) and those suffering from sleep disorders had lower average age. In *Hojjati* et al.'s research, it became clear that drivers with lower ages had lower sleep quality [19] which probably derives from the longer working hours among the young drivers. Also, in this research as in other research, there was no significant relation between the experience of having First Grade driving license or between BMI and sleep quality [2].

Among the important results of this study is the significant relation between the existence of sleep disorder in the drivers and the occurrence of accidents in the past five years which can represent the importance of drivers' adequate sleep in preventing the occurrence of inter-city accidents.

One of the other problems which most drivers indicated is the excessive sensitivity of the road police and intercity inspections so as to wake the assistant drivers while they are sleeping in the bus cabin which led to the decrease in their sleep quality. As such, it is necessary that more attention be paid to this particular problem of drivers by authorities, planners, health section managers, managers of transportation and road police.

One of the study's limitations was the concentration only on intercity bus drivers and not considering other drivers, and as such, the inability to investigate and compare sleep quality among different drivers. Therefore, it is proposed that similar research be done about sleep quality among the drivers of the hired inter-city cars and those of truck drivers and if they also face similar problems, serious measures be taken to solve this problem in different groups of drivers.

Conclusion

With respect to the point that sleep is one of important factors which can affect people's health and their social activities, including the occurrence of car accidents; thus, to prevent accidents and injuries to the passengers and the huge costs (amounting to billions) derived from irreversible accidents and damages, it is necessary for measures to be taken concerning improving the sleep quality among bus drivers and regular, adequate and appropriate rests, and limiting working hours of the drivers in a day.

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References

- 1- Barsam T. Sleep quality changes in workers exposed to extremely low frequency electromagnetic fields in high voltage electricity substations in Kerman district [dissertation]. Kerman: Kerman University; 2011. [Persian]
- 2- Kakooei H, Zare S, Akhlaghi A, Panahi D. Evaluation of sleep quality in bus drivers in Tehran. *Traf Manag Stud.* 2010;5(16):1-10. [Persian]
- 3- Mosavi F, Golestan B, Mohseni E, Tabatabai R. Sleep quality and related factors in interns and externs of Tehran Islamic Azad university medical students. *Islamic Azad Univ Med Sci J.* 2010;20(4):4-9. [Persian]
- 4- Ghoraihi SA, Aghajani AH. Sleep quality in Zanjan university medical students. *Tehran Univ Med Sci J.* 2008;66(1):61-7. [Persian]
- 5- IzadiAvnjy FS, Hajbaghery MA, Afazl MR. Quality of sleep and its related factors in the hospitalized elderly patients of Kashan hospitals in 2007. *Fayz J.* 2008;12(4):52-9. [Persian]
- 6- Salehi K, Alhani F, Sadegh-Niat K, Mahmoudifar Y, Rouhi N. Quality of sleep and related factors among Imam Khomeini hospital staff nurses. *Iran Univ Med Sci J.* 2010;23(63):18-25. [Persian]
- 7- Mokarami H, Kakvyy H, Dehdashti AR, Jahani Y, Ebrahimi H. Comparison of general health status and quality of sleep, shift workers in a workplace press. *Kermanshah Univ Med Sci Res J.* 2010;14(3):237-43. [Persian]
- 8- Saremi M, KhaniJzny R, Tassi P. Comparison of fatigue, sleep quality and quantity at once old and young farmers. *Med Res.* 2008;32(2):135-9.
- 9- Benca R, Quintas J. Sleep and host defenses: A review. *Sleep.* 1997;20(11):1027-37.
- 10- Brown I. Driver fatigue. *Human Fact.* 1994;36(2):298-314.
- 11- Hassan-Zadeh M, Alavi K, MirGhalebani F, Yadollahi Z,

- Ghrayy B, SadeghiKia A. Sleep quality in Iranian drivers recognized as responsible for severe road accidents. *Behav Sci Res.* 2008;6(2):97-107.
- 12- Philip P. Sleepiness of occupational drivers. *Indus Health.* 2005;43(1):20-3.
- 13- Council Regulation (EEC). Harmonization of certain social legislation related to road transport. Belgium: The European Parliament and the Council of the European Union; 1985.
- 14- Nobahar M, Vaffaii A. Evaluation of types of sleep disorders and methods of dealing with the elderly. *Salmand J.* 2007;2(4):263-8. [Persian]
- 15- NCSDR/NHTSA Expert Panel on Driver Fatigue. Drowsy diverging and automobile crashes. Washington: National Highway Transportation Safety Administration; 1997.
- 16- Connor J. Driver sleepiness and risk of serious injury to car occupants: Population based case control study. *BMJ.* 2002;324(7346):1125-8.
- 17- Irwin M. Effects of sleep and sleep loss on immunity and cytokines. *Brain Behav Immune.* 2002;16(5):503-12.
- 18- Kupperman M, Lubeck D, Mazonson P, Patrick D, Stewart A, Buesching D, et al. Sleep problems and their correlates in a working population. *Gen Int Med.* 1995;10(1):25-32.
- 19- Hojjati H, Taheri N, Heydari B, Taheri F. Sleep-quality investigation of bus drivers working in the Gorgan's passenger terminal and its relation with the public health in 2008-2009. *Occup Health Iran.* 2010;7(2):20-4. [Persian]
- 20- Sadeghniat K. Cross sectional effect of sleep abnormality and occupational activity. New York; Holistic Third Congress of Sleep Abnormality, 2005.
- 21- Rev de Castro J, Gallo J, Loureiro H. Tiredness and sleepiness in bus drivers and road accidents in Peru: A quantitative study. *Rev Panam Salud Publica.* 2004;16(1):11-8.
- 22- Yee B, Campbell A, Beasley R, Neill A. Sleep disorders: A potential role in New Zealand motor vehicle accidents. *Int Med J.* 2000;32:297-304.
- 23- Philip P, Ghorayeb I, Stoohs R, Menny JC, Dabadie P, Bioulac B, et al. Determinant of sleepiness in automobile drivers. *J Psychosom Res.* 1996;41(3):279-88.