

SLEEPINESS AMONG IRANIAN LORRY DRIVERS

K. Sadeghniai and Y. Labbafinejad*

Department of Occupational and Environmental Medicine, School of Medicine, Medical Sciences/ University of Tehran, Tehran, Iran

Abstract- Excessive daytime sleepiness (EDS) denotes a propensity to doze off or fall asleep unintentionally during the day, particularly in passive situations. There is cumulative evidence pointing to an association between sleepiness and probability of involvement in motor vehicle crashes. This study was designed to determine the prevalence of sleepiness in a group of Iranian lorry drivers and its association with accidents. A cross-sectional study was carried out in lorry drivers of Tehran goods transportation terminal in 2005. This study used a questionnaire and the Epworth Sleepiness Scale (ESS). The questionnaire included questions regarding demographic features, professional data, sleep habits and excessive daytime sleepiness. A total of 386 male drivers, aged 43.23 ± 9.72 years were included in the study. ESS was higher than 10 points in 9.1% of the interviewees; 50.8% never have driven drowsy, although 36% rarely, 7.3% half of the times, 4.9% almost always and 1% always have driven drowsy. Logistic regression analysis indicated that EDS, age and job satisfaction were associated with an increased risk of accidents. Sleepiness is a prevailing symptom in lorry drivers and is probably related to accidents.

© 2007 Tehran University of Medical Sciences. All rights reserved.

Acta Medica Iranica, 45(2): 149-152; 2007

Key words: Epworth sleepiness scale, excessive daytime sleepiness, lorry drivers, accidents

INTRODUCTION

Excessive daytime sleepiness (EDS) denotes a propensity to doze off or fall asleep unintentionally during the day, particularly in passive situations (1-4). The prevalence of EDS ranges from 4% to 31% in different studies (1, 3-7). Sleepiness reduces performance capability induced by slow information processing, increased periods of non responding or delayed responding during attention based tasks, increased reaction times, reduced vigilance, reduced accuracy of short-term memory, and accelerated decrements in performance with time-on-task. This leads to human error and potentially increases the risk of accidents (1, 8-11).

There is cumulative evidence pointing to an association between sleepiness and probability of involvement in motor vehicle crashes (1, 9, 12-14). According to research conducted by Shiomi, excessive sleepiness during driving was associated with an Epworth Sleepiness Scale (ESS) score of > 11 (15). Another research on 438 lorry drivers in Brazil showed that 22% of drivers were reported to fall asleep while driving, and the ESS was higher than 10 points in 28% of the interviewees (16). Based on Maycock's survey in 1997, the probability of feeling close to falling asleep at the wheel has been related to the ESS using a logistic model (14). Analysis of the data gathered in that survey showed that 29% of drivers had felt close to falling asleep at the wheel in the last 12 month (17). In a recent article, 24 percent of drivers were proved to have excessive sleepiness, and increasing sleepiness was related to an increased accident risk (18). This study is a research project designed to determine the prevalence of EDS among lorry drivers and to evaluate the association between EDS and motor vehicle crashes.

Received: 25 Jan. 2006, Revised: 30 Apr. 2006, Accepted: 20 May 2006

*** Corresponding Author:**

Y. Labbafinejad, Department of Occupational and Environmental Medicine, School of Medicine, Medical Sciences/ University of Tehran, Tehran, Iran
Tel: +98 912 1755344
Fax: +98 21 66405588
E-mail: ylabbafinejad@yahoo.com

MATERIALS AND METHODS

A cross-sectional study was carried out in Tehran goods transportation terminal in summer 2005 to determine the prevalence of sleepiness in a group of Iranian lorry drivers and its association with accidents.

A total of 386 professional lorry drivers were invited to participate in this study through a non random sequential sampling. The sample was among drivers who were coming to the terminal for restoring their work documents. Almost all of the invited drivers responded. We obtained informed consent from all participants.

Demographic data including age, body mass index (BMI) and marital status; occupational data including years of professional driving, job satisfaction, doze off while driving and history of accidents were collected through a questionnaire.

The sleep assessment was based on a sleep questionnaire, the ESS. This eight item questionnaire has been designed to determine a subject's likelihood to doze off or fall asleep in different situations. All questions are rated on a scale of 0-3; a score above 10 is considered positive for EDS (1). The ESS is one of the most widely subjective methods used to assess EDS. It is a questionnaire-based scale, the application of which is brief and very simple, with minimal cost involved. In addition, this instrument has a suitable level of internal consistency for application in research. A cutoff score higher than 10 has 93.5% sensitivity and 100% specificity in order to distinguish EDS from normal daytime sleepiness (16).

We used the SPSS ver. 11.5 for data entry and analyzing. Quantitative variables were expressed as mean \pm standard deviation (SD), and qualitative variables were expressed as percentages. Chi-square tests for categorical data and independent-samples *t* test or one-way analysis of variance (ANOVA) to compare differences between means, were conducted. Binary logistic regression model were fitted to the data to test the association between accidents and EDS while controlling several possible confounders. Two-tailed *P* values of 0.05 or less were deemed to be statistically significant, and 95% confidence intervals (CI) were calculated for results.

RESULTS

All responders were male with mean age of 43.23 ± 9.72 years. Their body mass index ranged from 16.16 to 40.83 kg/m² and mean BMI was 26.37 ± 3.88 kg/m² among all. Most of the subjects were married (91.2%). In educational level, 56.2% had only attended elementary or guidance school and 36.8% had attended high school.

The mean number of years of professional driving was 16.06 ± 10.19 years. The mean number of hours spent driving each day was 11.56 ± 3.70 h; 23.8% of drivers drove up to 8 hours, 76.2% drove more than 8 hours while 16% more than 15 hours per day. Twenty seven percent of drivers didn't get satisfaction from their work and almost 30% of them had history of car accidents in the past 5 years.

40.9% of cases have slept less than 7 hours and 10.1% less than 5 hours, although 90.4% liked to sleep more than 8 hours per night. They had a mean of 6.85 ± 1.20 h sleep per night and 30.1% had sleep deprivation. 50.8% of drivers have not driven drowsy, 36% seldom, 7.3% in half of the times, 4.9% most of the times, and 1% always have driven drowsy. 5.2% of cases have always used co-drivers, 10.4% sometimes do so, while 84.5% have never used co-drivers and have driven alone.

Mean ESS was 4.77 ± 3.27 . The ESS was zero in 7.5%, 1-6 in 67.9%, 7-9 in 15.5% and higher than 10, indicating EDS, in 9.1% of cases.

The mean of age was nearly three years less in the group with a positive history of accidents ($P = 0.014$). Less accidents were seen in satisfied drivers (OR, 1.836; 95% CI, 1.146-2.943; and P , 0.011). Drivers with a positive history of accidents, had a less mean of years of professional driving (P , 0.019), had been more driven drowsy (OR, 1.711; 95% CI, 1.104-2.651; and P , 0.016) and EDS were more common in that group (OR, 2.388; 95% CI, 1.159-4.717; and P , 0.015). The mean score of ESS was 5.61 ± 3.35 in the group with a positive history of accidents compared with 4.39 ± 3.17 in the group without accidents ($P = 0.001$). No difference between the groups were found with regard to the marital status and BMI ($P > 0.05$).

Binary logistic regression analysis was conducted to explore the association between accidents (yes/no)

Table 1. Logistic regression results for predicting accidents by excessive daytime sleepiness (EDS) and several control variables

Variable	Odds Ratio	95%CI	P value
EDS (yes/no)	2.4	1.143-5.039	0.021
Age (years)	0.971	0.947-0.996	0.026
BMI (≥ 30 / < 30)	0.863	0.476-1.567	0.629
Job satisfaction (yes/no)	1.741	1.054-2.876	0.030
Marital status (married/bachelor)	1.672	0.765-3.652	0.197
Drowsy driving (yes/no)	1.415	0.888-2.256	0.145

Abbreviations: CI, confidence interval; EDS, excessive daytime sleepiness; BMI, body mass index

and excessive daytime sleepiness (yes/no); while controlling possible control variables (namely age, BMI, job satisfaction, marital status and drowsy driving). The results are presented in Table 1. EDS was found to be associated with more than a two fold increased risk of accidents (adjusted OR, 2.4; 95% CI, 1.143-5.039; and *P*, 0.021). Among the possible control variables, only age and job satisfaction were proved to be significant beyond EDS.

DISCUSSION

The prevalence of EDS, as evaluated by the ESS, in a population of lorry drivers in Tehran goods transportation terminal was 9.1%. These data are considerably lower than those reported in published studies (16, 18). Recently, Howard *et al.* evaluated the prevalence of EDS measured using the ESS in a large sample of Australian commercial vehicle drivers, and reported a prevalence of 24% (16, 18). In this sample of lorry drivers, particularly stressful work and responsibility might lead to sleepiness misperception, thus, affecting their alertness. In addition, they may be unwilling to report sleepiness due to punishment by employers and so on (information bias).

Criticisms of the ESS include its subjectivity: in this instrument, perception of sleepiness is determined by a self rating score rather than an objective measurement of the symptom. We would add, particularly in the present group, the possibility of recall bias and information bias. Moreover, the large sample size, precluded the use of a validated objective sleepiness measurement such as Multiple Sleep Latency Test (MSLT).

This group of male lorry drivers presented a high mean body mass index that is a well-known risk

factor for obstructive sleep apnea syndrome (OSAS). Although OSAS was not a primary goal in the present study, its role in causing traffic accidents has been well demonstrated, and it may be related to EDS (16).

This study explored the association between EDS and the risk of sustaining a traffic accident in lorry drivers. The risk of accidents remained significant even after controlling several potent confounders, for example age, job satisfaction, marital status and BMI. In Iran, we still lack a strict policy towards controlling these professionals, so poor sleep hygiene and overtime work are often observed. In addition, it must be pointed that road traffic conditions are usually poor, which may be another contributing factor for accidents.

Sleepiness when driving is a neglected issue in Iran. The authorities and the occupational health physicians should be more aware of the possibility of sleepiness in lorry drivers and its overall risks. From our data, routine evaluations of sleepiness in lorry drivers must be mandatory. Additional studies focusing on sleep disorders would be worthwhile when EDS is a concern (16).

Conflict of interests

The authors declare that they have no competing interests.

REFERENCES

- Melamed S, Oksenberg A. Excessive daytime sleepiness and risk of occupational injuries in non-shift daytime workers. *Sleep*. 2002 May 1; 25(3):315-322.
- Moldofsky H. Evaluation of daytime sleepiness. *Clin Chest Med*. 1992 Sep; 13(3):417-425.

Sleepiness among Iranian lorry drivers

3. Roth T, Roehrs TA. Etiologies and sequelae of excessive daytime sleepiness. *Clin Ther.* 1996 Jul-Aug; 18(4):562-576.
4. Johns M, Hocking B. Daytime sleepiness and sleep habits of Australian workers. *Sleep.* 1997 Oct; 20(10):844-849.
5. Lavie P. Incidence of sleep apnea in a presumably healthy working population: a significant relationship with excessive daytime sleepiness. *Sleep.* 1983; 6(4):312-318.
6. Liu X, Uchiyama M, Kim K, Okawa M, Shibui K, Kudo Y, Doi Y, Minowa M, Ogihara R. Sleep loss and daytime sleepiness in the general adult population of Japan. *Psychiatry Res.* 2000 Feb 14; 93(1):1-11.
7. Stradling JR, Barbour C, Glennon J, Langford BA, Crosby JH. Prevalence of sleepiness and its relation to autonomic evidence of arousals and increased inspiratory effort in a community based population of men and women. *J Sleep Res.* 2000 Dec; 9(4):381-388.
8. Bedard MA, Montplaisir J, Richer F, Malo J. Nocturnal hypoxemia as a determinant of vigilance impairment in sleep apnea syndrome. *Chest.* 1991 Aug; 100(2):367-370.
9. Dinges DF. An overview of sleepiness and accidents. 1995 Dec; 4(S2):4-14.
10. Dinges DF, Pack F, Williams K, Gillen KA, Powell JW, Ott GE, Aptowicz C, Pack AI. Cumulative sleepiness, mood disturbance, and psychomotor vigilance performance decrements during a week of sleep restricted to 4-5 hours per night. *Sleep.* 1997 Apr; 20(4):267-277.
11. Redline S, Strauss ME, Adams N, Winters M, Roebuck T, Spry K, Rosenberg C, Adams K. Neuropsychological function in mild sleep-disordered breathing. *Sleep.* 1997 Feb; 20(2):160-167.
12. Horne JA, Reyner LA. Driver sleepiness. 1995 Dec; 4(S2):23-29.
13. Leger D. The cost of sleep-related accidents: a report for the National Commission on Sleep Disorders Research. *Sleep.* 1994 Feb; 17(1):84-93.
14. Maycock G. Sleepiness and driving: the experience of U.K. car drivers. *Accid Anal Prev.* 1997 Jul; 29(4):453-462.
15. Shiomi T, Arita AT, Sasanabe R, Banno K, Yamakawa H, Hasegawa R, Ozeki K, Okada M, Ito A. Falling asleep while driving and automobile accidents among patients with obstructive sleep apnea-hypopnea syndrome. *Psychiatry Clin Neurosci.* 2002 Jun; 56(3):333-334.
16. Canani SF, John AB, Raymundi MG, Schonwald S, Menna Barreto SS. Prevalence of sleepiness in a group of Brazilian lorry drivers. *Public Health.* 2005 Oct; 119(10):925-929.
17. Maycock G. Sleepiness and driving: the experience of U.K. car drivers. *Accid Anal Prev.* 1997 Jul; 29(4):453-462.
18. Howard ME, Desai AV, Grunstein RR, Hukins C, Armstrong JG, Joffe D, Swann P, Campbell DA, Pierce RJ. Sleepiness, sleep-disordered breathing, and accident risk factors in commercial vehicle drivers. *Am J Respir Crit Care Med.* 2004 Nov 1; 170(9):1014-1021.