

Original Research Article

Roncopathy and daytime somnolence in autotransport workers

Angel Ramirez Matus^{1*}, Carlos Eduardo Marina Hernandez², Lesly Joanna García Gómez²

¹Department General Surgery, ISSSTE Regional Hospital, Monterrey Nuevo, León, México

²School of Medicine, Universidad de Morelos, Morelos Nuevo, León, México

Received: 10 September 2023

Revised: 18 October 2023

Accepted: 19 October 2023

*Correspondence:

Dr. Angel Ramirez Matus,

E-mail: angelramirezmat@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Nuevo León state is a national leader in road accidents, according to official data, during 2016, there were 75,931 traffic accidents. There were also more than 600 deaths per year resulting from crashes. Snoring is a common social problem. Daytime sleepiness that interferes with an attention and functioning is a social health problem.

Methods: This was an analytical, cross-sectional and prospective study. Primary mode, epidemiological type, pilot test. Two instruments were used for data collection; the Epworth test, to measure excessive daytime sleepiness and the Berlin questionnaire for snoring. For the descriptive statistics we obtained the mean, standard deviation, as well as the frequencies as percentages. In the inferential statistics, the ordinal variables were correlated with the Spearman's Rho coefficient with α less than 0.05 and Chi square was used for the nominal variables.

Results: 30 participants were surveyed. 23.3% were identified with normal sleep, 6.7% with medium somnolence and 70% with abnormal somnolence. As for the snoring, 30% were without risk, 17% with low risk and 53% with high risk of suffering it. The snoring and diurnal sleepiness were correlated, finding a moderate positive relationship (0.517) and statistically significant ($p=0.003$).

Conclusions: Snoring and breathing disorders during sleep are associated with daytime sleepiness in truck workers.

Keywords: Snoring, Drowsiness, Workers

INTRODUCTION

Currently, Nuevo León is a national leader in road accidents, according to INEGI data, during 2016, there were 75,931 traffic accidents. There were also more than 600 deaths per year resulting from crashes, at least 12,000 injured and a cost of more than 3.4 billion pesos.¹ It is believed that among the multiple causes of road accidents is excessive daytime sleepiness that could be preceded by rhoncopathy.

Snoring is a common social problem. Snoring can be defined as the respiratory noise generated during sleep. It should be considered as something pathological, and not physiological, as previously thought, because its presence evidences an obstruction of the upper airway of variable degree, producing an anatomical variation and generating

turbulences in the underlying structures of the oropharynx, originating a sound that is identified as snoring, which can vary in tone and intensity.^{2,3}

Its pathophysiology is multifactorial, inspiratory and expiratory, in which various factors arise to generate an abnormal increase in upper airway resistance during sleep.⁴ In Mexico, it is considered a public health problem, due to its association with cardiovascular, neurological, arterial hypertension and pulmonary problems caused by hypoxemia.⁵ Daytime sleepiness that interferes with an individual's attention and functioning is a social health problem that is on the rise due to the life conditions that have been adopted and can be the initial symptom of multiple medical conditions, including narcolepsy, depression, sleep apnea, restless legs syndrome, changes in sleep habits, drug use, and circadian cycle disruption,

which can lead to vehicular accidents, decreased school or work performance, and decreased quality of life.⁶⁻⁸ Obstructive sleep apnea and chronic rhoncopathy are also related as pathologies and are among the most multidisciplinary diseases in medicine today.^{9,10} Although snoring and daytime sleepiness are very common, it is not known how many trucking workers in the citrus region of Nuevo Leon suffer from these conditions, and because trucking workers work night shifts, it may be that sleep-disordered breathing may be exacerbated in them.

This pathology is easily detected, so that accidents or associated diseases could be prevented by carrying out timely detection campaigns in high-risk workers, so the objective was to answer the research question: is there an association between rhoncopathy and daytime somnolence in the citrus region of Nuevo León, Mexico, and what is the percentage of suffering from each?

METHODS

This was an analytical, cross-sectional, prospective study. Primary modality, epidemiological type, pilot test.

The population was taken as the population of the citrus transportation workers (trailers and trucks) of the Nuevo Leon citrus region active in 2019, aged 18 and under 65 years old, with a valid driver's license, gender indistinct. 28 were men and 2 were women (Figure 1).

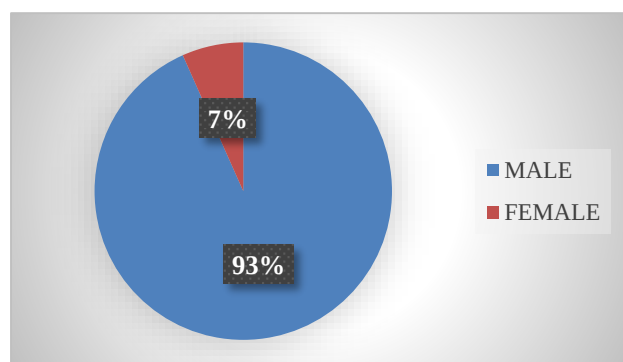


Figure 1: Sex distribution.

Thirty participants were surveyed at an average age of 39.1 ± 10.36 DE; with a minimum age of 24 years and a maximum age of 63 years. Participation in the study was free and voluntary, the signing of an informed consent document was requested from the transport workers, their data was kept anonymous, the research was submitted to the ethics committee of the University of Montemorelos and approved. for its dissemination. Exclusion criteria were subjects diagnosed with narcolepsy or who were undergoing any pharmacological treatment at the time of data collection (antihistamines, benzodiazepines, brimonidine, or psychiatric treatment). No subjects were excluded or eliminated. Two instruments were used for data collection; the Epworth test, which measures excessive daytime sleepiness. It consists of eight specific

questions, and each question with 4 options: never (0), low frequency (1), moderate frequency (2) and high frequency (3).

For the total score, a summation of the points obtained is made. A result between 0 and 6 points corresponds to normal, results between 7 and 8 points suggest mild to moderate daytime sleepiness. A sum of more than 9 points is suspicious of severe daytime sleepiness.

The second instrument assessed the risk of rhoncopathy. It was performed by means of the Berlin questionnaire. This focuses on ten questions, which are divided into three categories relevant to the symptomatology of tiredness during the day. If two of these three categories are positive, we are faced with a probable case of rhoncopathy that interferes with proper rest. The final score is classified as: no risk (3 negative categories), low risk (1 positive category) and high risk (2 or more positive categories).

A non-probabilistic quota sampling technique was used, with a sample size of 30, which was used to carry out a pilot test according to the central limit theorem. It was taken as an alternative hypothesis that there is an association between rhoncopathy and daytime sleepiness in autotransport workers in the citrus region of Nuevo León, Mexico during the year 2019.

For descriptive statistics, the mean, standard deviation and frequencies were obtained as percentages. For inferential statistics, ordinal variables were correlated with Spearman's Rho coefficient with α less than 0.05 and Chi-square was used for the correlation of nominal variables. The statistical software used for data analysis was IMB SPSS statistics 20.

Data collection was carried out in the cities of Allende, Montemorelos, Linares and General Terán in the state of Nuevo León. Workers were intercepted at their places of rest, so no permission was requested from any institution. Data collection takes place between February 10 and December 22, 2019. Regarding the size of the sample, a total of 30 transportation workers were included in order to carry out this work, as pilot test.

Informed consent was given verbally since the surveys were answered completely anonymously and the results of the scoring of both surveys were made known to the participants immediately.

RESULTS

Looking for the age's most susceptible to daytime sleepiness, according to the Epworth stage, it was found that: at an average age of 39 years, 23.3% maintained normal sleep, 6.7% with an average age of 48.5 years suffered from medium sleepiness and 70% at an average age of 38.2 years suffered from pathological sleepiness.

However, when they were staged according to the Berlin questionnaire to evaluate the risk of suffering from rhoncopathy and breathing disorders during sleep, it was observed that 30% with an average age of 42.5 years were at no risk, 16.7% with an average age of 37.4 years were at low risk and 53.4% were at high risk with an average age of 38.2 years. According to the total score of the Epworth test, most of the respondents had a pathological or abnormal sleepiness, with a minority of those who maintained an average sleepiness (Figure 2).

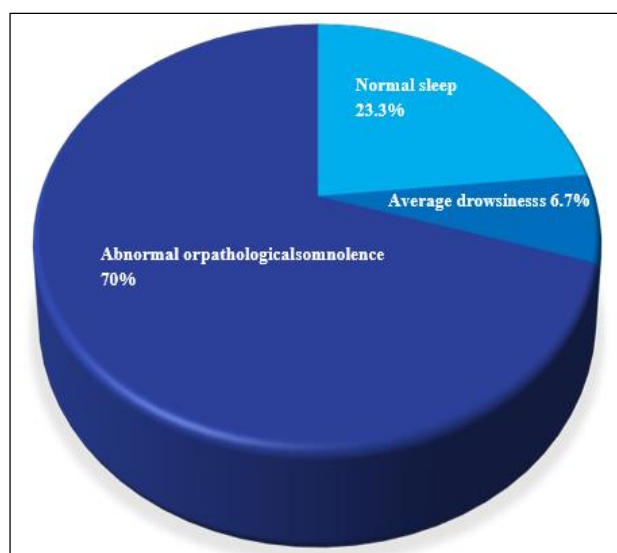


Figure 2: Stages of daytime sleepiness.

The prevalence of snoring was obtained on the basis of an item in the Berlin questionnaire asking about snoring, which showed that 83.3% of those surveyed snore, 13.3% do not snore and 3.3% do not know if they snore. In turn, the total score of the Berlin questionnaire was analyzed to determine the risk of suffering from snoring and/or respiratory disorders during sleep, and it was classified as: no risk, low risk and high risk. The results are shown in Figure 3.

Using Spearman's Rho coefficient, a correlation was sought between daytime sleepiness and rhoncopathy, taking the total score of the Berlin questionnaire to measure rhoncopathy and the Epworth test for daytime sleepiness, finding a statistically significant correlation ($p=0.003$), with a correlation coefficient of 0.517. This indicates that there is a strong moderate positive relationship.

Other important correlations identified in Epworth's survey items were that motor carrier workers who were drowsy or fell asleep during the day in the following situations: traveling as a passenger for 1 hour ($\sigma=0.607$), sitting in a quiet environment after lunch (without alcohol) ($\sigma=0.608$) and in a car while stopped in traffic for a few minutes ($\sigma=0.759$) is strongly related to having high risk of snoring or breathing disorders during sleep with a significance of $p=0.000$. When correlating daytime

sleepiness (Epworth test) with items of the Berlin questionnaire (snoring), it was analyzed that there is a correlation between weight gain in workers with greater daytime sleepiness ($\chi^2=10.46$, $p=0.033$) and the presence of snoring ($\chi^2=11.08$, $p=0.026$).033), the presence of snoring ($\chi^2=11.08$, $p=0.026$), greater frequency of snoring ($p=0.046$, $\sigma=0.403$), stopping breathing during sleep ($p=0.000$, $\sigma=0.670$), fatigue or tiredness during the day ($p=0.000$, $\sigma=0.680$) were also related to greater daytime sleepiness.

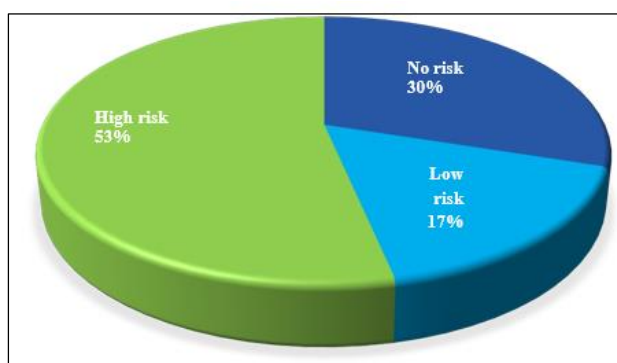


Figure 3: Stages of risk of rhonchopathy.

Autotransport workers who have most frequently felt drowsy or have fallen asleep while traveling as passengers in a vehicle or even driving, have a strong relationship with suffering from abnormal or pathological sleepiness ($p=0.000$, $\sigma=0.707$) likewise it is related to snoring ($\chi^2=13.81$, $p=0.001$).

Another way to observe the risk of presenting traffic accidents was that, when analyzing the data, 95.2% of the workers who presented drowsiness or fell asleep while they were passengers or driving a vehicle, were in the highest stage of the total Epworth test score. These data were found to be abnormal or pathological sleepiness ($\chi^2=15.11$, $p=0.001$). In addition, 100% of workers who had fallen asleep while driving were found to be at high risk for rhoncopathy and sleep disordered breathing and 33.3% of those who had fallen asleep while driving were found to be at no risk ($\chi^2=17.50$, $p=0.001$).

DISCUSSION

Although this is not a cause-effect or association study in a large sample, risk factors were found to be present in this pilot test sample. It is more difficult to find relationships, associations or predictive factors in small samples such as this one, however, in this study important relationships between snoring and sleepiness were found. Snoring is mostly associated with three nosological entities of progressive severity: simple snoring, increased upper airway resistance syndrome and sleep apnea-hypopnea syndrome.^{2,3}

Excessive daytime sleepiness is a public health problem that has been increasing according to the change in

lifestyle in recent decades.¹¹ An association between daytime sleepiness and rhoncopathy has been observed not only in the reported literature, but also in autotransport workers in the citrus region of Nuevo Leon, with a strong moderate positive relationship.^{10,12} This may indicate that workers at risk for rhoncopathy and sleep-disordered breathing suffer from abnormal daytime sleepiness. It is also worth mentioning that 80% of workers with abnormal or pathological sleepiness snore. INEGI data show that between 30 and 60% of men in Mexico over 45 years of age snore, the percentages being higher in subjects with a higher body mass index. Between 60 and 70% of patients with snoring are obese. It is also agreed that both snoring and excessive daytime sleepiness increase as weight and body mass index are higher.^{8,10,13-15} Data from the 2016 national health and nutrition survey say that while, in the general Mexican population, 54.8% of people who snore, only 17.5% present excessive daytime sleepiness.¹⁶

During the analysis of the data in this study, it was observed that the results were, in almost all cases, higher than the results obtained in the previous study. It reported in the medical literature for the Mexican population, finding that 83.3% snore, compared with the national percentage of 54.8%. Similarly, when observing the difference in daytime sleepiness (76.7%), it was found to be above the national percentage of 17.5% reported in the ENSANUT.¹⁷

It is believed that such reported data may be due to the occupation of the participants, since, by altering the circadian cycle due to their work, sleepiness may be more evident. Another relevant data was that all the workers were male and it has been observed that the overall prevalence of rhoncopathy is much higher in males than in females, although postmenopausal and obese women are also at higher risk.^{10,18} For several years, snoring has been recognized as a serious problem due to the mortality caused by drowsiness in traffic accidents, the increased risk of cardiovascular disease and work incapacity; therefore it is also important to mention that 92% of those interviewed have presented drowsiness or even fallen asleep at the wheel of moving cargo units on the road. It can be observed then that, based on the data found, it is associated with a high risk of occurrence of automobile traffic accidents.¹⁷

According to INEGI statistics, Nuevo Leon has been, for two consecutive years, first place nationally in road accidents.¹ All the drivers who confessed to having fallen asleep at the wheel were in the high-risk category for snoring and sleep-disordered breathing, which could recommend the future application of the Epworth test and the Berlin questionnaire in trucking workers, since these instruments help to stage the risk of the disease in order to subsequently look for associated comorbidities and thus employ specific treatment.⁵

Worldwide, many nations clearly establish that transportation workers and drivers must be carefully

studied for obstructive sleep apnea before granting or renewing a driver's license, as a way to prevent accidents. If this measure could be implemented in the state of Nuevo Leon, it could be a protective factor to avoid and/or reduce automobile accidents.¹⁹

Although it is true that the search for a correlation between rhoncopathy and excessive daytime sleepiness with road accidents does not correspond to the aims sought during this investigation, but it is intended to set a precedent for future investigations that plan to do so. Since the association between these two entities (rhoncopathy and daytime sleepiness) puts not only the patient's life at risk, but also the lives of other people, it is important to attend and detect these situations in time.

Limitations

Regarding the limitations of the study, we can argue that although the data obtained was anonymous and confidential, some transport workers may not answer the questions completely honestly, due to the implications that this could have on their jobs and with the authorities, for example, which the problem could be even more serious than what is presented in this study

CONCLUSION

Snoring and breathing disorders during sleep are associated with daytime sleepiness in truck workers in the citrus region of Nuevo Leon. The high prevalence of both snoring and daytime sleepiness could be a risk factor for road accidents. Due to the high prevalence of risk, it is proposed to study a larger population of truck drivers in Nuevo León in order to implement prevention programs in the future.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. INEGI. Land traffic accidents in urban and suburban areas. Dataset: Land traffic accidents, 2010. Available at: https://www.inegi.org.mx/sistemas/olap/consulta/general_ver4/MDXQueryData.aspx?pro. Accessed on 01 September 2023.
2. Perelló E, Esteller E. Chronic rhoncopathy and obstructive sleep apnea syndrome: the role of otorhinolaryngology. *Acta Otorrinolaringol Esp*. 2005;56(10):441-2.
3. Santamaría CA, Astudillo OD. Primary rhoncopathy and its clinical implications: End of the harmless entity paradigm. *Otorhinolaryngol. Cir Head Neck*. 2014;74(2):81-190.
4. Toledo Valdés C, Hidalgo González A, Díaz Martínez J, Cuevas Veliz I, Quintana Reyes A.

- Incidence and treatment of rhoncopathy at the "General Calixto García Íñiguez" University Hospital. *Rev Cubana Invest Bioméd.* 2009;29(4):437-44.
5. Guerrero-Zúñiga S, Gaona-Pineda EB, Cuevas-Nasu L, Torre-Bouscoulet L, Reyes-Zúñiga M, Shamah-Levy T, et al. Prevalence of sleep symptoms and risk of obstructive sleep apnea in Mexico. *Salud Publica Mex.* 2018;60(3):347-55.
6. López-Meza E, Olmos-Muñoz A, Vargas-Cañas S, Ramírez-Bermúdez J, López-Gómez M, Corona T, Volkers G. Excessive daytime sleepiness in Mexico city. *Gac Med Mex.* 2006;142(3):201-3.
7. Pagel JF. Excessive daytime sleepiness. *Am Fam Physician.* 2009;79(5):391-6.
8. Calvo CE, Gómez MH, Núñez PS. Sleep apnea syndrome in primary care. *Electr J Health Care.* 2011.
9. Chávez-González C, Soto AT. Risk assessment of obstructive sleep apnea syndrome and daytime sleepiness using the Berlin questionnaire and the Sleep Apnea Clinical Score and Epworth scales in patients with habitual snoring seen in the outpatient clinic. *Rev Chil Enferm Respir.* 2018;34:19-27.
10. Hidalgo-Martínez P, Lobelo R. Global, Latin American and Colombian epidemiology and mortality of obstructive sleep apnea-hypopnea syndrome (OSAHS). *Rev Fac Med.* 2017;65:17-20.
11. Ulloque Caamaño L, Monterrosa Castro Á, Carriazo Julio S. Daytime sleepiness and academic performance of medical students of a Colombian public university. *Rev. Biomedical Sciences.* 2013;4(1):2215.
12. Spuy I, Karunanayake CP, Dosman JA, McMullin K, Zhao G, Abonyi S, et al. Determinants of excessive daytime sleepiness in two First Nation communities. *BMC Pulm Med.* 2017;17(1):192.
13. Lao XQ, Thomas GN, Jiang CQ, Zhang WS, Adab P, Lam TH, et al. Obesity, high-sensitive C-reactive protein and snoring in older Chinese: the Guangzhou Biobank Cohort Study. *Respir Med.* 2010;104(11):1750-6.
14. Parejo Gallardo K, Saltos Cristiano CM. Medical treatment of obstructive sleep apnea-hypopnea syndrome (OSAHS). *Rev Fac Med.* 2017;65:101-3.
15. Amra B, Javani M, Soltaninejad F, Penzel T, Fietze I, Schoebel C, et al. Comparison of Berlin Questionnaire, STOP-Bang, and Epworth Sleepiness Scale for Diagnosing Obstructive Sleep Apnea in Persian Patients. *Int J Prev Med.* 2018;9:28.
16. Ministry of Health. National Health and Nutrition Survey, 2019. Available at: <https://www.gob.mx/cm>. Accessed on 01 September 2023.
17. Rakel RE. Clinical and societal consequences of obstructive sleep apnea and excessive daytime sleepiness. *Postgrad Med.* 2009;121(1):86-95.
18. Holley L. Obstructive Sleep Apnea, Insomnia, and Snoring: Evolutionary Adaptations to Increase Alertness During Sleep? *J Clin Sleep Med.* 2019;15(3):523.
19. Dubey A, Bajaj DK, Mishra A, Singh BP, Gupta V, Kant S, et al. Obstructive sleep apnea risk for driving license applicants in India - A community based study. *Int J Occup Med Environ Health.* 2018;31(1):25-36.

Cite this article as: Matus AR, Hernandez CEM, Gómez LJG. Roncopathy and daytime somnolence in autotransport workers. *Int Surg J* 2023;10:1732-6.