ASSESSMENT OF THE RISK AND LEVEL OF KNOWLEDGE ON OBSTRUCTIVE SLEEP APNEA SYNDROME OF THE PARTICIPANTS TO DRIVING SCHOOLS

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Abstract: The World Health Organization is focused on health promotion, which is actually a common activity in the social and medical field. Focusing the public health services on the means of prevention has a salutary role. Due to comorbidities and risk of road accidents, the obstructive sleep apnea syndrome (OSAS) draws the attention of the health services. We conducted an observational descriptive study, using as a tool the Modified Stop Bang questionnaire, applied to a number of 293 people registered at three driving schools. The Modified Stop Bang questionnaire can be used both as a screening method of OSAS and also as a method of informing the population in the process of obtaining a driving license on the OSAS. It is necessary the implementation in Health Services of some information systems on the population about OSAS, moreover the OSAS investigation should be compulsory in the medical record of the drivers’ enrolment in the driving school. A law should be passed in this respect.

Rezumat: Organizația Mondială a Sănătății este focușată asupra promovării sănătății, care reprezintă o activitate comună în domeniul social și medical. Focușarea serviciilor de sănătate publică asupra mijloacelor de prevenire deține un rol salutar. Datorită comorbidităților și riscului de accidente rutiere, sindromul de apnee în somn de tip obstructiv (SASO) atrage după sine o atenție deosebită Serviciilor de Sănătate. Am efectuat un studiu observațional, descriptiv, utilizând ca instrument de lucru chestionarul Stop Bang Modificat, aplicat unui număr de 293 de persoane înscrisă la 3 școli de soferi. Chestionarul StopBang Modificat poate fi utilizat atât ca și metodă de screening al SASO cât și ca metodă de informare asupra SASO la populația în curs de obținere a carnetului de conducere auto. Este necesară implementarea în Serviciile de Sănătate a unor sisteme de informare a populației asupra SASO, mai mult, de introducere Legislativă Rutteră a investiției SASO în dosarul medical de înscrisere la școala de conducători auto.

INTRODUCTION

The World Health Organization (WHO) believes that at the foundation of health promotion there are five principles, among which the last one refers to the promotion of health, which in fact is a joint activity in the social and medical health, the involvement of professionals in raising the health education of the entire population having an important role in spreading and sustaining health promotion.(1)

The public health practices to achieve the above stated aim, on the one hand involves assessing the health needs of the community, investigating the frequency of risks and the health hazards in the community, analyzing the identified health needs in order to detect the determinants and the other factors that contribute to these, building and sustaining a public health support, and secondly the development of coherent policies and plans for resolving the priority health needs, the evaluation of the programmes and services, and the information and education of the public.(1,2)

Starting with the presentation of the risk factors and getting to the development of pathologies among the population, the focus of the public health services on the ways of preventing has a salutary role.

Referring to the prevention, among the general population the intervention can be achieved at three levels: primary prevention, secondary and tertiary.

Furthermore, according to various authors, the prevention stages are:

- Basic prevention: preventing the emergence and the consolidation in the population of certain etiologic or risk factors previously nonexistent.
- Primary prevention: staying healthy by preventing the exposure to the risk factor or to the existing etiologic factor in the population.
- Secondary prevention: early detection of the deviations from health and their correction by early curative treatment. It is achieved by screening and advice (“counselling”).
- Tertiary prevention: improving the patient’s suffering through palliative and symptomatic treatment, recovery and social reintegration of the individuals at work and within the family. It addresses the chronic and disabling patients especially, and those with acute illness.

Individual health cannot be fully accomplished outside the family life and this determines in turn the health of the community in the context of a proper legislative support.(1,2)

In light of these data for public health, the existence of the obstructive sleep apnea syndrome (OSAS) in at least 2% of women and 4% of the male population aged over 40 years old, with a marked increase in the prevalence of snoring, along with...
numerous comorbidities and increase risk of road accidents, entails special attention of the health services on the risk factors for OSAS, on the existence of the OSAS screening methods for diagnosis and treatment, and on the level of knowledge of the pathology and its complications in the population.(3)

Obstructive sleep apnea syndrome is an obstructive disorder of breathing during sleep characterized by repeated episodes of complete or partial obstruction of the upper airways during sleep, associated with loud snoring and daytime sleepiness.(4)

Most patients with OSAS are overweight or obese, have a short thick neck (the neck circumference over 40 cm), a small chin, often smokers and sleepy in severe cases. The OSAS risk factors are: age groups over 40 years males, obesity, family factors, craniofacial anatomical elements (tonsillar hypertrophy, macroglossia, micrognathia, sagital) and other factors such as endocrine disorders (acromegaly, hypothyroidism), neuromuscular disease, gastroesophageal reflux, alcohol and sedatives. The OSAS symptoms are the snoring, reported apnea, excessive sleepiness during the day, morning headaches, attention deficit, decreased memory and professional performance. The gold standard for the diagnostic of OSAS is polysomnography, but if the clinical suspicion of OSAS is high, the cardio-respiratory polgraphy is used.

The treatment of OSAS: choosing the treatment is based on the severity of the disease, considering the apnea-hypopnea index, the clinical picture and the presence of associated diseases. The first recommendation given to overweight patients is to lose weight. For moderate and severe forms of obstructive sleep apnea, the main treatment option is night ventilation with continuous positive airways pressure by nasal or facial mask (CPAP).(3,5,6,7)

At present, it is now known that undiagnosed and untreated OSAS increases the risk of road accidents by up to 7 times.(8)

In this respect, it is necessary to pay specific attention to this disease, both in terms of avoiding risk factors, as well as in terms of screening, diagnosis and early treatment, to prevent OSAS complications both clinically and with respect to safety road traffic.

METHODS
We conducted an observational descriptive study, using the tool questionnaire, which was divided into 21 items, pre-formulated answers questions applied to a number of 293 persons enrolled in 2 driving schools from Turda and 1 from Câmpia Turzii, in the district of Cluj in order to get or to extend their driving licenses or to get another category.

The study was designed both to identify the risk factors in the development of OSAS and to assess the level of knowledge of this pathology and to test the opinion according some aspects regarding OSAS – utility of means of implementation and communication of the symptoms and the diagnosis of OSAS. It was also designed to test the opinion on the need to introduce the investigation for the confirmation/infirmation of OSAS in the medical records in order to obtain the driving license.

The results of this study will allow on the one hand to quantify the health of the current and the future drivers, participating in the study on the risk of car accidents, since it is known that the syndrome of obstructive sleep apnea undiagnosed and untreated increases the risk of car accidents, and on the other hand it will provide the population at risk, the possibility of being diagnosed and treated properly.

The questionnaire was applied during the period August to October 2014, and it was supplemented by self-registration. There were no cases of refusal to participate in the study.

The questionnaire used in this study – the Stop Bang modified questionnaire - is based on the original questionnaire STOP BANG which is the most reliable screening questionnaire of OSAS.(9) The amendments to the original questionnaire refer to a breakdown of the degree of snoring and sleepiness, and the addition of 2 parts, which refers to the level of knowledge of the population studied on the syndrome of obstructive sleep apnea, and the other to test the opinion on the ideas of the studied group on the coverage and the dissemination of information on the existence of this pathology and also to test the opinion about the introduce the investigation for the confirmation/infirmation of OSAS in the medical records in order to obtain the driving license.

The validation of the questionnaire was performed by pre-testing a pilot group of seven people, who were subsequently excluded from the survey.

The approval to conduct this survey was obtained from the Bioethics Committee of the ‘Iuliu-Hațieganu’ University of Medicine and Pharmacy

The questionnaire is anonymous and guarantees privacy and it is used for the research purpose only. An informed consent was obtained from the subjects of the study.

The criteria for inclusion: the persons enrolled in the driving school to get the driving license or to extend their driving licenses or to get another category; regardless of origin (urban, rural), age, religion and ethnicity; both genders (male, female); present at the driving school during the survey.

The criteria for exclusion: the refusal to participate in the survey; the absence from work on the day of the survey.

The data were processed through statistical and mathematical methods (10) using Microsoft Excel.

RESULTS

The characterization of the batch: Over two fifths of the respondents - 42.32% - are aged between 18 and 30 years old, over a third of them belong to the age group 41-50 years old, a share of 17.06% is held by subjects aged between 31-40 years old and the remaining 4.43% are over 50 years old. The non-responses have 0.34%. Over three quarters of the interviewed - 76.79% - are male and the remaining 23.21% female. Of the 293 subjects in the study, more than half, accounting for 51.88%, hold a driving license and a share of 42.32% - have normal weight, more than two-fifths, representing 42.32%, are overweight, and a share of 3.75% is held by underweight people. The degree of obesity is within 4.78% of the subjects, and in the 2nd degree of obesity there are 1.02% of the respondents (figure no. 1).
We note that over two-fifths of the respondents - 47.44% - say that their neck circumference is greater than 40 cm (figure no. 2).

Over two thirds (66.89%) of the respondents admit the presence of a light degree of sleepiness and fatigue during the day, and a share of 16.72% felt the symptoms in a moderate way, hard and very hard (figure no. 2).

Over one-fifth (21.58%) of the respondents who say they know they snore moderately, hard and very hard (figure no. 3).

Using the test for detecting OSAS, performed only a share of 1.71% of the respondents say that they have been diagnosed with hypertension (figure no. 2).

The low level of knowledge is reflected in the respondents’ attitude. Despite the fact that from the responses given by the interviewed previously, we can notice the presence of the risk factors for the emergence of OSAS - overweight, neck circumference greater than 40 cm, the presence of snoring, daytime fatigue and sleepiness and the presence of sleep apnea - only a share of 1.71% of the respondents say that they have been tested for OSAS (figure no. 4).

The analysis of the opinion on some aspects of OSAS shows that the largest share of respondents - 68.60%, 94.20%, 88.05% and 96.59% - say that they agree with the investigation for the diagnosis of OSAS in case the risk factors are present, considered beneficial the effect of OSAS information campaigns on reducing the risk of traffic accidents in the patients undiagnosed and untreated. All these confirm the usefulness of introducing the OSAS investigation in the medical record for the driving school enrollment. They would agree to direct acquaintances with OSAS symptoms for testing in case their own level of knowledge in this domain would be higher. The opinion of most of the respondents (92.49%) shows the need to increase the level of medical education in order to reduce the number of traffic accidents in the patients with OSAS (figure no. 5).

Most respondents - 71.67%, 91.13%, 86.35% and 84.64% - say they do not have knowledge of the existence of obstructive sleep apnea nor of its effect in increasing the risk of falling asleep while driving, do not know any undiagnosed and untreated OSAS effect in increasing the risk of accidents, and no knowledge of the existence of any treatment for OSAS (figure no. 3).

The aspects previously analyzed represent risk factors in the development of OSAS.

**Figure no. 2. Share of the interviewed subjects according to the risk factors in the development of OSAS**

<table>
<thead>
<tr>
<th>Risk factors for the existence of OSAS</th>
<th>respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck circumference &gt; 40 cm</td>
<td>47.44%</td>
</tr>
<tr>
<td>Snoring hard and very hard</td>
<td>38.77%</td>
</tr>
<tr>
<td>Daytime fatigue and sleepiness</td>
<td>16.72%</td>
</tr>
<tr>
<td>Presence of sleep apnea</td>
<td>21.58%</td>
</tr>
</tbody>
</table>

**Figure no. 3. Share of the respondents according to their level of knowledge of OSAS**

<table>
<thead>
<tr>
<th>Level of knowledge of OSAS</th>
<th>respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t know</td>
<td>31.40%</td>
</tr>
<tr>
<td>He knows</td>
<td>68.60%</td>
</tr>
<tr>
<td>I don’t know</td>
<td>0.00%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>31.40%</td>
</tr>
<tr>
<td>He knows</td>
<td>68.60%</td>
</tr>
<tr>
<td>I don’t know</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

**Figure no. 4. The average of the interviewed subjects who performed the test for detecting OSAS**

**Figure no. 5. The share of respondents according to their opinion on some aspects related to OSAS**

<table>
<thead>
<tr>
<th>Opinion on certain aspects of OSAS</th>
<th>respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making Test for OSAS</td>
<td>92.49%</td>
</tr>
<tr>
<td>Conducted</td>
<td>71.67%</td>
</tr>
<tr>
<td>Not performed</td>
<td>28.33%</td>
</tr>
<tr>
<td>Would guide</td>
<td>94.20%</td>
</tr>
<tr>
<td>Wouldn’t guide</td>
<td>5.80%</td>
</tr>
<tr>
<td>Would be beneficial</td>
<td>96.59%</td>
</tr>
<tr>
<td>Wouldn’t be beneficial</td>
<td>3.41%</td>
</tr>
<tr>
<td>I would not answer</td>
<td>94.20%</td>
</tr>
<tr>
<td>I would answer</td>
<td>5.80%</td>
</tr>
<tr>
<td>Diagnosed</td>
<td>96.59%</td>
</tr>
<tr>
<td>Agrees</td>
<td>3.41%</td>
</tr>
</tbody>
</table>

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**PUBLIC HEALTH AND MANAGEMENT**

It is well known in the literature the fact that the obesity and age are the main risk factors for OSAS and in particular the central obesity and the increased neck circumference are highly correlated with OSAS. (11,12) In the population studied the OSAS risk is met at a lower average age than the average age known in the literature (3) - so we can conclude that the prevalence of OSAS may exist in the population under 40 years. The study results can be found in other recent research, such as Lee YC which published a study in 2013 and noted the presence of OSAS and snoring in young soldiers in Korea, with age between 20-23 years. (13)

Currently, hypertension and OSAS coexist and approximately 60% of patients with OSAS had hypertension, whereas among hypertensive patients only 20% are affected by OSA. (14,15) Hypertension was found in a small proportion in the studied group because the group was composed of young population. People who work as drivers are young adults and less elderly.

The latter must be taken into account when assessing the safety of the road traffic, they may have severe disease with pronounced symptoms, so they can cause car accidents. Future studies on these age groups should be performed to elucidate this goal.

Although about half (48.12%) of the respondents are in the process of obtaining a driving license, it is estimated that about 80% of them will pass the exam, according to the median internal data of the 3 graduate driving schools where the questionnaire was to which drivers applied, so that we can consider this population as future car drivers, and according to the results of the survey, some may present the risk of sleep apnea, so there is the risk of future car accidents to happen.

Excessive daytime sleepiness and fatigue during the day typically for OSAS are the main factors road accidents. (16) In the study group the proportion was 66.82% with varying degrees of drowsiness and fatigue during the day, which are the same with those in the existing literature.

The level of knowledge is low in the studied population about this pathology and the negative effects of undiagnosed and untreated OSAS on the health, the quality of life and the traffic safety. In this sense further national campaigns of information of the existence, the diagnosis and the treatment of this pathology. At European level was performed for the first time in October 2013 the first multinational (20 countries) European project named Wake-up Bus with the aim of informing the population about this pathology and the negative effects of OSAS. (17)

The results of this project will be published in the future. (8) The present study could be classified as health promotion initiatives on national and European level.

The need for knowledge of the population is quantified through the response to questionnaires used. It is translated into a wish to be diagnosed in case of symptoms, so they can cause car accidents. Future studies on these age groups should be performed to elucidate this goal.

In conclusion, the Modified Stop Bang questionnaire can be used both as a screening method of the OSAS risk and as a method of information about OSAS of the population who want to obtain the driving license. It is compulsory for the Health Services to implement certain methods for informing the population on the obstructive sleep apnea, and moreover, to propose a law in the Traffic Regulations for the introduction of OSAS in the medical record of the drivers’ enrolment.

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REFERENCES

2. Borzan C. Noi abordări ale sănătății publice și have the neck circumference greater than 40 cm, more than two-fifths of them claim that they snore moderately, hard and very hard.
4. More than half of the total of 49 subjects, who invoke moderate, hard and very hard felt sleepiness and fatigue during the day, have a high body mass index, are overweight or obese of I and II degree.
5. Over a fifth of the respondents who say that their neck circumference is greater than 40 cm, confirmed the presence of daytime sleepiness and fatigue.
6. A fifth of the respondents who say that they snore moderately, hard and very hard, say that they felt different degrees of sleepiness and fatigue during the day.
7. Out of those with sleep apnea, one third claim that during the day they experience various degrees of sleepiness and fatigue.
8. The study reveals a low level of knowledge of the respondents on obstructive sleep apnea.
9. Only a share of 1.71% of the respondents says that they have been tested for OSAS.
10. Most respondents agree with the investigation for the diagnosis of OSAS in case the risk factors are present, considered beneficial the effect of OSAS information campaigns on reducing the risk of traffic accidents in the patients undiagnosed and untreated. All these confirm the usefulness of introducing the OSAS investigation in the medical record for the driving school enrolment. They would agree to direct acquaintances with OSAS symptoms for testing in case their own level of knowledge in this domain would be higher.
11. The study reveals the need felt and expressed by the respondents on enhancing the medical education on the symptoms, the signs and the treatment of OSAS to reduce the number of car accidents that occur in the case of people with this condition.

In conclusion, the Modified Stop Bang questionnaire can be used both as a screening method of the OSAS risk and as a method of information about OSAS of the population who want to obtain the driving license. It is compulsory for the Health Services to implement certain methods for informing the population on the obstructive sleep apnea, and moreover, to propose a law in the Traffic Regulations for the introduction of OSAS in the medical record of the drivers’ enrolment.