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Study of the prevalence of sleep apnea syndrome's symptoms in a Moroccan population

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ÖZET

Bir Fas popülasyonunda uyku apne sendromu prevalansı çalışması

Giriş: *Uyku apne sendromu genel popülasyonda gittikçe artan yaygın ve tanısız bir sendrom olup, Fas'ı da içeren bazı popülasyonlarda spesifik prevalansıyla ilgili çalışma bulunmamaktadır.*

Materyal ve Metod: *Bu çalışmanın amacı; 21-66 yaş aralığında, 288'i erkek ve 215'i kadından oluşan orta yaşlı bir Fas popülasyonunda epidemiyolojik araştırma ile horlama, tanıklı apne ve aşırı gündüz uykululuğu içeren uyku apne sendromunun temel klinik semptomların prevalansını iki anket ile belirlemektir: uykuyu değerlendirmek için Berlin anketi ve gündüz uykululuğunu değerlendirmek için Epworth skalası.*

Bulgular: *Ortalama yaş 42.7 ± 14.3 yıldı. Epworth uykululuk skalası skoru ortalama 6.9 ± 3.4 (1-16) olarak bulundu ve aşırı gündüz uykululuğu olanların %21.7'sinde 10'un üzerindeydi. Horlama ve apnenin genel popülasyonda prevalansı sırasıyla %54.7 ve %11.1, erkeklerde %63.9 ve %13.9, kadınlarda %42.3 ve %7.4'tü. On üçü kadın, 35'i erkek toplam 48 (%9.5) kişide uyku apne sendromunu düşündüren bu üç temel klinik bulgu mevcuttu. Bu subgrup genel popülasyona göre daha yaşlı (p= 0.04) ve daha kiloluydu (p= 0.03). Hipertansiyon varlığı bu subgrupta anlamlı olarak yüksek değildi.*

Sonuç: *Çalışmamızda, uyku apne sendromunun temel semptomlarının prevalansı yüksekti (%9.5). Tanının konulması ve Fas popülasyonunda kesin prevalansın belirlenmesi için poligrafi veya polisomnografi gereklidir.*

Anahtar Kelimeler: *Epidemiyoloji, uyku apne sendromu, gündüz uykululuğu, horlama, apne.*

SUMMARY

Study of the prevalence of sleep apnea syndrome's symptoms in a Moroccan population

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Introduction: *Sleep apnea syndrome is increasingly common in the general population and is under-diagnosed but we lack studies on the estimation of its specific prevalence in several populations including Morocco.*

Materials and Methods: *The aim of the study is to determine the prevalence of the main clinical symptoms of sleep apnea syndrome including snoring, witnessed apnea and excessive daytime sleepiness in a middle aged Moroccan population through an epidemiological investigation in 288 men and 215 women, aged between 21 to 66 years who completed two self-questionnaires: the Berlin questionnaire to assess sleep and the Epworth scale to assess daytime sleepiness.*

Results: *The mean age was 42.7 years ± 14.3. The Epworth Sleepiness Scale was on average 6.9 ± 3.4 (range: 1-16). It was above 10 in 21.7% in favor of excessive daytime sleepiness. The prevalence of snoring and apnea was respectively 54.7% and 11.1% in the general population, 63.9% and 13.9% in men, 42.3% and 7.4% in women. Forty eight subjects (9.5%) including 13 women and 35 men had the combination of these three main clinical signs suggestive of sleep apnea syndrome. This subpopulation was older (p= 0.04) and with more overweight (p= 0.03) than the general population. Hypertension rate was not statistically higher in this subgroup.*

Conclusion: *Prevalence of the main symptoms of sleep apnea syndrome is high in our study (9.5%). Polygraphy or polysomnography is warranted to diagnose and have an exact prevalence in the Moroccan population.*

Key Words: *Epidemiology, sleep apnea syndrome, daytime sleepiness, snoring, apnea.*

INTRODUCTION

The sleep apnea syndrome (SAS) is considered as a major public health because of its high prevalence in middle aged subjects, its involvement which is independent of other risk factors in the development of cardiovascular diseases such as hypertension especially resistant to treatment, coronary artery disease, heart failure and stroke (1-9). It is also a risk factor for diabetes and metabolic syndrome (10-12). Finally, it exposes to significant disruptions in the quality of life and an increased risk of car accidents (13).

For all these reasons, it is important to determine initially the prevalence of main symptoms of SAS in various world populations to assess the proportion of subjects that warrant exploration by polygraphy or polysomnography in order to make the diagnosis of this disease that still underdiagnosed even in developed countries and thus to allow initiating the appropriate treatment.

Epidemiological studies have focused on the Western populations. We lack studies of Asian, African and South American populations. The aim of the study is to determine the prevalence of main clinical symptoms of SAS in a population of Moroccan middle-aged adults.

MATERIALS and METHODS

This is a descriptive and epidemiological study which involved 503 subjects selected by simple random sampling: 288 men and 215 women in the general population, all of Moroccan origin, literate and aged from 20 to 65 years. The study was proposed and explained either by a pulmonologist or a medical student in fourth or sixth year of Medicine to 503 subjects whether they are part of their family, friends or people approached on the street. All of the subjects have made verbally consent to participate and then completed two self-questionnaires:

The Berlin questionnaire that calculate the estimated probability of clinical sleep disorders and collect the notion of snoring, weight, height, body mass index (BMI) and hypertension. The questionnaire consists of three categories; the positivity of at least two of them indicates a high probability of sleep apnea. Note that the hypertension was retained when the subjects were followed by a cardiologist, if not the blood pressure was measured by the pulmonologist or by the student in medicine. BMI was calculated by the weight (kg)/size^2 (m^2). The World Health Organization defines overweight as a BMI equal to or greater than 25 and obesity as a BMI equal to or greater than 30.

The Epworth Sleepiness Scale (ESS) which is a scale intended to measure daytime sleepiness by the use of a very short questionnaire that asks the subject to rate the probability of falling asleep on a scale of increasing probability from 0 to 3 for eight different situations. The scores for the eight questions are added together to obtain a single number. The Excessive daytime sleepiness (EDS) was considered present whenever the ESS score was > 10. The strong suspicion of SAS was retained by the association of its three main clinical signs that is excessive daytime sleepiness, snoring and apnea during sleep.

Statistical analysis was performed using the SPSS 13.0 for Windows® (SPSS Inc, Chicago, IL, USA) that allowed the analysis of demographic data (age, weight, BMI and hypertension) and respiratory data (daytime

sleepiness by ESE, snoring, apnea) of the general population and also by gender.

Quantitative values were expressed as mean and standard deviation and analyzed by the Student test (the distribution was normal), and qualitative values were expressed in number and percentage and analyzed by the chi^2 test. Values < 0.05 were considered statistically significant.

RESULTS

Demographic Data

The mean age was 42.7 years ± 14.3. There was a male predominance in 57.3%.

The mean weight was 65.5 kg ± 11.7 for men (BMI: 24.4 kg/m^2 ± 3.6) and 78.8 kg ± 11.1 for women (BMI: 25.7 kg/m^2 ± 3.5).

Fifty nine subjects (11.7%) were followed for hypertension, including 33 men and 26 women. Demographic data are represented by Table 1.

Respiratory Data

The ESS was on average 6.9 ± 3.4 (range: 1-16). It was above 10 in 21.7% (109 subjects) in favor of excessive daytime sleepiness.

The Berlin questionnaire was positive in 13.9% (70 subjects) with at least two positive categories.

The prevalence of snoring and apnea were respectively 54.7% and 11.1% in the general population, 63.9% and 13.9% in men, 42.3% and 7.4% in women with statistically significant differences between the subgroups respectively p< 0.001 and p< 0.03. Respiratory data are represented by Table 2.

A total of 48 subjects (9.5%) including 13 women and 35 men had the association of the three main clinical symptoms suggestive of sleep apnea syndrome. This subpopulation was older (p= 0.04) and with more overweight (p= 0.03) than the general population. Hypertension rate was not statistically higher in this subgroup. The characteristics of the subjects suspected having SAS are represented in Table 3.

DISCUSSION

The SAS is considered as a public health problem whose diagnosis is essential because of its several consequences and whose principal epidemiological studies have focused on the Western population. For these reasons the study was conducted in our context to provide information on the prevalence of its main symptoms which are represented by snoring, witnessed apnea and EDS. A total of 9.5% of the subjects were suspected clinically having SAS.

Epidemiological studies in this area are relatively recent. These various studies available today have faced several obstacles: first the diagnosis of SAS is based on polysomnography, a complex and expensive examination that is performed most often in hospital laboratory. Then the inhomogeneity at first of the definition of the disease

Table 1. Demographic data.

Demographic data	All subjects (n= 503)	Males (n= 288)	Females (n= 215)
Mean age ± SD	42.7 ± 14.3	44.2 ± 14.8	40.8 ± 14.4
Weight (kg) ± SD	71.2 ± 13.2	65.5 ± 11.7	78.8 ± 11.1
BMI (kg/m^2) ± SD	24.9 ± 3.6	24.4 ± 3.6	25.7 ± 3.5
Hypertension	59 (11.7%)	33 (11.5%)	26 (12.1%)

SD: Standard deviation, BMI: Body mass index.

Table 2. Respiratory data.

Respiratory data	All subjects (n= 503)	Males (n= 288)	Females (n= 215)	p
ESS	6.9 ± 3.4	6.9 ± 3.2	6.7 ± 3.7	NS
Snoring	275 (54.7%)	184 (63.9%)	91 (42.3%)	< 0.001
Apnea	56 (11.1%)	40 (13.9%)	16 (7.4%)	0.03
Positivity of Berlin questionnaire	70 (13.9%)	40 (13.9%)	30 (14%)	NS

ESS: Epworth sleepiness scale, NS: Not significant.

Table 3. Characteristics of the subjects suspected having sleep apnea syndrome (SAS).

Characteristics	All subjects (n= 503)	Subjects suspected having SAS (n= 48)	p
Mean age ± SD	42.7 ± 14.3	55.3 ± 7.3	0.04
Weight (kg) ± SD	71.2 ± 13.2	86.8 ± 12	0.03
BMI (kg/m^2) ± SD	24.9 ± 3.6	30.7 ± 2.2	0.03
Hypertension	59 (11.7%)	6 (12.5%)	NS
ESS	6.9 ± 3.4	12.08 ± 1.1	< 0.001

SD: Standard deviation, NS: Not significant, BMI: Body mass index, ESS: Epworth sleepiness scale.

and finally the differences in population which explains the differences among the observed prevalences.

The baseline study in this area is the one published by Young et al. in 1993 in the United States. An apnea-hypopnea index greater than 5 was found in 9% of women and 24% of men. This index associated to daytime sleepiness was found in 2% of women and 4% of men (1).

In Western countries, in a general way, the prevalence of sleep apnea in the adult population varies among studies from 3% to 28%, and it remains under-diagnosed even so the consequences caused by this disease are potentially serious (13).

In our study, 35 men had the combination of the main signs suggestive of SAS versus 13 women, which makes a sex ratio of about 3/1. It is well recognized that the male gender is a risk factor for developing SAS; in fact it is two to three times higher in the general population (14,15). This increased risk may be related to differences in the distribution of adipose tissue in men that present a model of central deposition of fat essentially around the neck, trunk and abdominal viscera comparing to women (16-18).

In adults, the prevalence of SAS also increases with age, this was found in our study where the mean age of subjects suspected having SAS is 55.3 years ± 7.3. In the study of Ancoli-Israel et al. which included 427 subjects over 65 years, the prevalence is particularly important after 65 years, indeed the frequency of an apnea-hypopnea index higher than 10 was 70% for men and 56% for women, that was 3 times higher comparing to middle-aged adults (19).

In our study the mean weight of persons suspected of SAS was 86.8 kg ± 12 with a BMI 30.7 kg/m^2 ± 2.2. It is well known that overweight and especially obesity is a risk factor for conventional SAS. In most recent series of literature, the average BMI of subjects is 30-35 kg/m^2 (20,21). In European studies, the mean BMI of patients having the disease is 30-33 kg/m^2 reminiscent our results. In U.S. studies, it is 33-35 kg/m^2 (22).

Mild to moderate obesity was associated with a significantly increased prevalence of sleep apnea (23).

In a cohort, Young and his colleagues showed that the increase of one standard deviation in BMI was associated with a fourfold risk for sleep apnea (1). In severe obesity (BMI > 40 kg/m^2), the prevalence of sleep apnea has been estimated between 40% and 90% and the severity of sleep apnea is usually greater than that found among lean (24-26).

In addition, Peppard et al. had provided evidence of a link between sleep apnea and obesity by demonstrating that a 10% change in body weight was associated with a parallel increase of approximately 30% of the apnea-hypopnea index (23).

As we noted earlier, the most common clinical signs in the SAS are represented by excessive daytime sleepiness, snoring and apnea. The 2 first symptoms were collected in our study by the Berlin questionnaire, the third by the ESS.

These clinical signs are explained by the fact that the SAS is characterized by a complete or partial obstruction of the upper airway on inspiration caused by the collapse of the pharyngeal structures occurring repeatedly during sleep cause of apnea. The resumption of breathing is strong and noisy cause of snoring. The repetition of these obstructive events leads to brief microarousals responsible for sleep fragmentation that leads to excessive daytime sleepiness and, thereby, an increase by a factor of 2 to 3 of car accident risk, a decrease in physical and mental performance and also personal and psychological problems (depression, isolation) (27,28). Treatment of SAS was associated with a significant improvement in the quality of life (29).

Respiratory pauses are responsible on the other hands of desaturations with sympathetic hyperactivity, exces-

sive production of oxidants and exaggerated intrathoracic pressure variations at the origin of cardiovascular and metabolic problems (30).

Although sleep apnea is the most common cause of excessive daytime sleepiness, this taken alone cannot be a criterion for discrimination of clinical disorder because between 30 and 50% of the general population report a significant sleepiness (20). This may be explained by the fact that the subjects often confuse fatigue and excessive daytime sleepiness.

The severity of excessive daytime sleepiness can be evaluated subjectively by various questionnaires, the most widely used is the Epworth Sleepiness Scale (31).

Snoring is a very common sign in the general population whose prevalence is increasing in both sexes after 35 years. It is assumed that 60% of men and 40% of women aged 40 to 60 are habitual snorers. That is why taken alone, snoring is also not considered synonymous to SAS but when it is regularly interrupted by apneas and it reappears in an intense way for the resumption of breathing it is very suggestive of the disease (31).

Finally, it should be noted that a witnessed apnea is a good sign predictor of SAS but does not predict the severity of the disease (32).

In total, 9.5% of our population (48 subjects), including 13 women and 35 men had the combination of the main clinical signs suggesting a sleep apnea syndrome. These subjects were older, and with more overweight (p= 0.03) than the general population.

There are limitations of our study. First the choice of the sample is limited to the literate urban population and has thus excluded the agricultural community, people living in rural areas or illiterate population. Then a larger sampler is recommended in future studies. Otherwise our study has been certainly a first step on the estimated prevalence of clinical symptoms suggesting the SAS in the Moroccan population, which has been found high in our study population (9.5%) but a polygraphic recording or polysomnography is warranted to diagnose and have an exact prevalence. These investigations are relatively heavy and complex which the realization of large representative samples of the general population is very difficult to imagine. Simpler means of diagnosis, less expensive, readily accepted and validated should be considered in future studies.

CONFLICT of INTEREST

None declared.

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