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ORIGINAL ARTICLE

Obstructive Sleep Apnea: Epidemiology and Portuguese patients profile

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Abstract
Introduction: Obstructive Sleep Apnea (OSA) is characterized by recurrent episodes of apnea and hypopnea, secondary to collapse of the upper airways during sleep. OSA is frequently associated to cardiovascular complications. In Portugal, its magnitude is unknown.
Methods: In 2014 a cross-sectional study was performed using the Portuguese General Practitioner (GP) Sentinel Network (Rede Médicos Sentinela). Participants GP reported all OSA cases diagnosed and registered in their lists of users on the 31 December 2013.

Frequency of OSA has been estimated by sex and age. OSA patients were also characterized by method of diagnosis, treatment, and underlying conditions.

Association between risk factors and severe OSA (*odds ratio*) was calculated using a logistic regression model adjusting confounding.
Results: Prevalence of OSA on the population aged 25 years or more was 0.89% (95 CI: 0.80–1.00%); it was higher in males 1.47% (95 CI: 1.30–1.67%) and in those aged between 65 and 74 (2.35%). Most had severe OSA (48.4%). Hypertension (75.9%), obesity (74.2%) and diabetes mellitus (34.1%) were the most frequent comorbidities. Being a male (OR: 2.6; 95 CI: 1.2–5.8) and having obesity (OR: 4.0; 95 CI: 1.8–8.6) were associated with an increased risk of severe OSA.
Conclusion: Found frequency of OSA was lower than other countries estimates, which may be explained by differences on case definition but can also suggest underdiagnosis of this condition as reported by other authors.

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Introduction

The Obstructive Sleep Apnea (OSA) is characterized by recurrent episodes of apnea or hypopnea secondary to a collapse of the upper airways during sleep.

A wide variability in OSA prevalence is found between studies due to important differences in cases definition and study population.[1]

It is estimated that the prevalence of OSA (defined by the presence of episodes of hypopnea and apnea and frequent daytime sleepiness) in adult men vary between 1% and 5%.[1] Considering OSA definition currently used (occurrence of more than 5 episodes of apnea and hypopnea per hour), prevalence of OSA, accordingly sex and age group, can vary between 2% and 28%, half of which is classified as moderate or severe.[2,3] Prevalence of undiagnosed OSA may range between 0.3% and 5%.[4]

As OSA affects mainly middle-aged and obese males,[5] it is recognized that the increase in obesity may contribute to an increase in OSA prevalence.

In addition to its high magnitude, the clinical importance of OSA comes from its cardiovascular effects, consequences on morbidity and mortality[6,7] and also neuropsychological changes that increase the occurrence of occupational and traffic accidents.[8] OSA is a risk factor for hypertension and it is also known that high blood pressure risk increases with severity of OSA.[9] In fact, given the high frequency of OSA within individuals with hypertension,[10] the latest standard for hypertension diagnostic approach recommends performing OSA diagnosis in cases of high blood pressure which are resistant to treatment and have a non-dipper pattern on 24 h records of blood pressure.[11,12] It is also known that prevalence of sleep-disordered breathing among patients who had strokes is high, ranging between 44% and 74%,[13] emphasizing that the presence of OSA in these patients is associated with an increased risk of premature mortality.[14]

The association between Diabetes and OSA has recently been described and there is emerging evidence that OSA constitutes a risk factor for development of resistance to insulin[15] independently of obesity, which may be involved in metabolic syndrome development.[16]

Another aspect that reinforces the importance of the diagnosis of OSA is linked to the efficacy of nasal Continuous Positive Airway Pressure (CPAP) therapy in reversing neuropsychological disorders and reducing cardiovascular events.[17] As a consequence of CPAP treatment, reduction of excessive daytime sleepiness contributes to quality of life improvement and accident risk reduction but also the occurrence of high blood pressure is clearly lower in the short and long term.[18]

Although Portuguese prevalence of OSA is unknown, considering the high prevalence of adult obesity in Portugal[19] a high prevalence of OSA can be expected in the adult Portuguese population. Neither is the patient profile with OSA known, especially in terms of severity, treatment, comorbidities and use of health services.

As it is not currently feasible to implement a population based survey to estimate the Portuguese prevalence of OSA, the first approach to the subject is to estimate the frequency of OSA known within the population under observation of the General Practitioner (GP) Sentinel Network and to characterize OSA patients.

Material and methods

A cross sectional study was performed within the GP Sentinel Network (known as *Rede Médicos Sentinela)*, which has national distribution and 117 GP in 2013.

At the beginning of the study all Sentinel GP included in the *Rede Médicos Sentinela* in 2013 and also GPs that joined the network in the first trimester of 2014 (a total of 7) were invited to participate. Invitation was sent by email and renewed by phone call. The study protocol, questionnaire forms and detailed study instructions were sent to all doctors that accepted to take part in the study.

GP participation consisted in filling in a questionnaire for each and all of their patients diagnosed with OSA at 31st of December of 2013, using existing recorded information data to collect following data:

1. Sex and age.
2. Diagnostic, including: diagnostic date, overnight polysomnography or overnight respiratory polygraphy performance, apnea–hypopnea index, respiratory disturb index.
3. Comorbidities: diabetes, high blood pressure, obesity, coronary disease, stroke, acute myocardial infarction, arrhythmia, heart failure, occurrence of traffic accident (as driver).
4. Treatment: CPAP, specialized sleep medical appointment.

An *OSA case* was defined as someone having a previous diagnosis of OSA performed by a specialist and known by the patient's family doctor.

A *Severe OSA* was defined as someone having an apnea–hypopnea index or respiratory disturb index equal or higher than 30.

Proportion of OSA was estimated by sex and age group using the sum of users aged 25 years and more followed by each participating GP as denominator (total of 34,909 individuals that comprises the study sample).

95 Confidence intervals (95 CI) were computed using Wilson method.[20] No estimates were presented for age groups with less than 5 cases.

Mean (and 95 CI) and median were computed for numeric variables; proportions (and 95 CI) for categorical variables.

χ^2 test was used to identify variables associated to severe OSA and a logistic regression model, using all variables in which χ^2 significant level was <0.20, was performed to estimate adjusted *Odds Ratio* (and 95 CI) of having severe OSA among all OSA patients.

Model assumptions of the final regression model were checked by residual analysis. *Hosmer and Lemeshow* test was used to check the goodness of the final regression model.

Results

29 (of 124) GP agreed to participate, giving a population under observation of 34,909 individuals (Table 1). All the GP that accepted participating in the study sent information relating to OSA cases, which corresponds to a 100% participation rate. In relation to sex and age distribution, no