Epidemiological profile of a sleep laboratory

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ABSTRACT

Objective: To determine the clinical characteristics of patients who underwent polysomnography studies (PSG), as well as the most common diagnoses found in a sleep laboratory in Lima, Peru. **Patients and methods:** all the patients referred to a sleep laboratory in the city of Lima were evaluated. They filled out a data collection form and afterwards underwent a polysomnography. **Results:** 102 patients were evaluated, 70 of them were men (68.82%) with an average age of 41.62 years, and average body mass index of 26.82 kg/m2. The most common discomforts were: somnolence in 56 patients (54.90%), snoring in 10 (9.80%), and excessive tiredness in 10 (9.80%). The most common polysomnography diagnosis was Obstructive Sleep Apnea Syndrome (OSAS) in 36 patients (35.29%), followed by primary snoring in 20 (19.61%), normal result in 14 (13.73%), epilepsy in 10 (9.80%), among other diagnoses (21.57%). **Conclusions:** Patients referred to a sleep laboratory for PSG study were mostly men, with an average age of 41.62 years. The most common discomfort was somnolence; the most frequent diagnosis was OSAS in 35.29%, followed by primary snoring in 19.61%.

Key words: Epidemiology. Polysomnography. Sleep Apnea. Sleep laboratory. Snoring. Somnolence.

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How to cite this article: Lira D, Custodio N, Linares J, Herrera-Pérez E, Núñez del Prado L, Castro-Suárez S, Bujaico E. Epidemiological profile of a sleep laboratory. Interciencia. 2013;4(1):21-27

INTRODUCTION

In the field of medicine, sleep is no longer a part of life which has little importance, and has started to acquire greater and greater relevance because of the current knowledge of its impact on physical health, emotional state[1,2] and immune system[3,4]. Pathologies associated with sleep, among which obstructive sleep apnea syndrome (OSAS) stands out due to its importance, having a prevalence of 4% in men and 2% in women[5] according to several epidemiological studies, have progressively become diseases for which patients actively ask for assistance, and physicians evaluate with greater dedication, precisely because of its greater dissemination[6]. These diseases have been conveniently systematized by the American Academy of Sleep Medicine in the last International Classification of Sleep Disorders (ICSD-2)[7], which has become the standard for their study and management.

OSAS is a frequent[8,9] pathology and is a public health problem, characterized by somnolence; neuropsychiatric and cardiorespiratory disorders, secondary for an anatomo-functional alteration of the upper airway leading to repeated episodes of obstruction during sleep, causing falls in oxygen saturation and transitory arousals leading to non-refreshing sleep[10]; some studies have found association of OSAS with age, male gender and body mass index[11]; likewise, OSAS incidence has been associated with several diseases such as arterial hypertension[12], ictus[13-15], the increase of heart failure incidence[16], among others[1,17,18].

For many years, Peru has had a low development of the subspecialty of sleep medicine; in addition, there were very few sleep laboratories that could perform polysomnography studies (PSG), which is the gold standard for diagnosing most of the diseases of sleep medicine[19,20], since other auxiliary examinations, such as polygraphy, have not shown the same level of sensitivity and specificity. PSG studies began to be performed in Peru recently in 1997[21], and currently there is a higher number of sleep laboratories in public and private health facilities, which are being gradually implemented, assisting a group of diseases which were undervalued by the Peruvian health system before.

This problem of a limited number of centers, PSG teams and staff trained in sleep medicine, not only happens in our country, a Spanish study shows a similar low coverage in PSG studies and in the treatment of sleep disorders[11], despite the current knowledge of the importance of these diseases and their impact on health.

PSG consists of the simultaneous recording of neurophysiological, cardiological and respiratory variables, which allow the assessment of the quantity and quality of sleep[7], as well as the identification of the different cardiac, respiratory, motor events, and its repercussion on sleep[22]. This allows us to make a hypnogram, which is the graphical representation of sleep in its diverse phases, as well as the events occurred simultaneously.

This study seeks to determine the clinical characteristics of the patients who underwent PSG studies, as well as the most common diagnoses found in a sleep laboratory in the city of Lima, Peru.

PATIENTS AND METHODS

All of the patients coming from public and private insurance companies, self-insurances, providers of health services, as well as private consultation offices, referred by their physicians, for taking a PSG in a sleep laboratory in the city of Lima, from January 2010 to August 2011, underwent a retrospective, descriptive study. All of them filled out a data collection form, where demographic information, such as filiation, age, gender, weight, height, date of birth, marital status, education level, job, working hours; as well as clinical information on sleep conditions, such as the number of pillows used to sleep, if you sleep with somebody, if you have discomfort when working, if you fall asleep during the day, sleep characteristics, medication and pathological history was collected. The form used is that one commonly used by all the patients who were referred for PSG study. It was made by the medical staff of the sleep laboratory to collect the most possible information, so as to contribute to interpret the PSG study, and was filled out by

all the patients, with staff previously trained for its filling, for a homogeneous data collection. Such an instrument has not been validated yet. Subsequently, all the patients underwent the PSG.

All the patients who filled out completely the data collection form and underwent the PSG during six hours at least were included in the study; the patients who did not fill out completely the data collection form and who could not complete at least six hours of the PSG study for inconvenience due to the cables or any other reason were excluded.

The PSG was performed in all the patients during the night or in their habitual time of sleep, recording for no lower than six hours and at least 180 minutes of sleep in the trace obtained. During all the PSG studies, six channels of electroencephalography (EEG), two channels of electrooculography (EOG), one channel of electromyography of the chin surface (EMG), one channel of electrocardiogram (ECG), one channel of thermistor of naso-buccal airflow, one channel of nasal airflow pressure, one channel of abdominal respiratory effort (ABD), one channel of thoracic respiratory effort (THO), one channel of oxygen saturation (SaO_2) by means of a pulse oximetry, two channels of surface electromyography of lower limbs (EMG), one channel of snoring sensor and one channel of body position sensor were registered; in addition, events occurred with synchronized video were recorded, with the PSG under infrared light, so that the patient's behavior could be observed during the registration, which allowed to establish an electro-clinical correlation with any event occurred during the trace, according to the international regulations accepted[23,24].

Afterwards PSG tracings were reviewed and analyzed manually according to the standard regulation[23,24]. The qualification of sleep phases was performed in periods of 30 seconds each one; and the activity of sleeplessness, transition from sleeplessness to sleep, and the different phases of sleep were determined.

The data obtained from each PSG study were the total sleep time, time of sleeplessness, total time recorded, efficiency of sleep (total time of sleep/ total time of recording), latency at the beginning of sleep, latency of sleep Rapid Eye Movement (REM), duration and proportion of sleep phases based on total time, frequency of apneas/hypopneas per hour of sleep (apnea/hypopnea index), values of saturation and desaturation events, total number and index of periodic movements per hour of sleep, total number and index of micro-arousals per hour of sleep, and their relation with cardiorespiratory events or movements of limbs, heart rate and hypnogram (which is the graphical representation of distribution and proportion of sleep phases with different cardiorespiratory variables, as well as information analysis, final diagnosis and recommendations).

All the information was recorded in a table using OpenOffice.org™ 3.x Calc Guide; it was subsequently submitted to statistical analysis with the Epi Info™ 3.3.2 program and the results were presented in tables.

RESULTS

Out of 107 patients in total referred to the sleep laboratory for undergoing PSG during the period of study, five were excluded because they failed the inclusion criteria, finally 102 patients were tested, 70 men (68.82%) and 32 women (31.37%), with an average age of 41.62 ± 17.56 years old, with an average weight of 73.08 ± 21.36 Kg, an average size of 1.63 ± 0.19 m, an average body mass index of 26.82 ± 5.44. Information concerning education level, marital status and job of the patients included in the study is shown in tables 1, 2 and 3, respectively.

In relation to the number of pillows used to sleep: 53 patients used one pillow (51.96%), 29 used two pillows (28.43%), 14 did not use pillows (13.72%) and 6 used three or more pillows (5.88%).

The most common discomfort reported before performing the PSG was somnolence in 57 patients (55.88%), followed by snoring in 10 patients (9.80%),

excessive tiredness in 10 patients (9.80%), among other complaints in 25 patients (24.50%) (Table 4).

Table 1. Marital status of the sleep laboratory's patients.

Marital status	N	%
Married	69	67.65
Single	17	16.67
Not applicable because of age	12	11.76
Divorced	2	1.96
Partner	2	1.96
Total	**102**	**100.00**

Table 2. Education level of the sleep laboratory's patients.

Education level	N	%
Superior, currently working	77	75.49
Full high school education, currently working	13	12.75
Currently studying elementary or high school	7	6.86
Not applicable because of age	4	3.92
Full elementary education, currently working	1	0.98
Total	**102**	**100.00**

Table 3. Occupation of the sleep laboratory's patients.

Opcupación	N	%
Employee	29	28.43
Student	13	12.75
Engineer	13	12.75
Housewife	7	6.86
Technician	7	6.86
Teacher	5	4.90
Administrator	4	3.92
Independent	3	2.94
Retired	3	2.94
Police retired	3	2.94
Manager	2	1.96
Doctor	2	1.96
Not applicable	2	1.96
Architect	1	0.98
Driver	1	0.98
Chef	1	0.98
Housemaid	1	0.98
Economist	1	0.98
Judicial Magistrate	1	0.98
Journalist	1	0.98
Medical representative	1	0.98
Security officer	1	0.98
Total	**102**	**100.00**

The main and most common polysomnographic diagnosis was OSAS in 36 patients (35.29%), followed by primary snoring in 20 patients (19.61%), normal result in 14 patients (13.73%), and epilepsy in 10 patients (9.80%), among other diagnoses (21.57%) (Table 5).

When evaluating comorbidities, we found that 24 patients (23.52%) had two or more diagnoses, being OSAS and the periodic movement of lower limbs, the most associated pathologies in 8 patients (7.84%).

Table 4. Most common discomfort of the sleep laboratory's patients.

Diagnosis	N	%
Somnolence	57	55.88
Snoring	10	9.80
Excessive tiredness	10	9.80
Headache	7	6.86
Bad mood	3	2.94
Stress	2	1.96
Fall asleep	2	1.96
Pressure at work	2	1.96
Memory loss	2	1.96
Backache	1	0.98
Dizziness	1	0.98
Loss of concentration	1	0.98
Fear of losing face	1	0.98
Low concentration	1	0.98
Poor performance	1	0.98
Irritation	1	0.98
Total	**102**	**100.00**

Table 5. Main polysomnographic diagnosis of the sleep laboratory's patients.

Main diagnosis	N	%
Obstructive sleep apnea syndrome	36	35.29
Primary snoring	20	19.61
Normal result	14	13.73
Epilepsy	10	9.80
Periodic motion of lower limbs	6	5.88
Idiopathic insomnia	5	4.90
Insomnia due to medical diseases	4	3.92
Secondary insomnia for drugs consumption	3	2.94
Psychophysiological insomnia	2	1.96
Upper Airway Resistance Syndrome	1	0.98
Restless legs syndrome	1	0.98
Total	**102**	**100.00**

DISCUSSION

When we evaluated patients' average age in our study, we found that it is 41.62 years, which is within the age range of the economically active population of our country, confirming the suspicion of high, economic and social impact on patients suffering sleep disorders. According to similar studies in our country there is a similar average age of 49.5 years[21], like in a study made in Spain where the average age in women was 48.9 year and 46.7 in men[19].

Most of our patients (68.82%) were men, a finding that has been made in almost all PSG studies both in our country and in other countries[9,21], associated with a higher prevalence of OSAS and other sleep disorders within male population.

Regarding education level (Table 2), 75.49% of our patients had a high educational level. This finding could be explained because most of our patients were referred by their insurance companies and health insurance services, which could have biased the sample. Moreover, this higher education level of the patients could be associated with a greater understanding of sleep diseases, information search on the internet to explain their symptoms, which would make them seek specialized medical assistance more actively.

When analyzing the occupation of our patients (Table 3), we found even 22 different sectors ranging from students, housewives, to the most diverse professions and trades; which would demonstrate the wide variety of people suffering sleep disorders.

Somnolence was the most frequently reported discomfort in our study, affecting 55.88% of the patients (Table 4), followed by snoring with 9.80%, and excessive tiredness in the same percentage of patients. These three discomforts generate great difficulties as they reduce academic and work performance of patients, and therefore, affecting their quality of life. The most reported discomforts in a Spanish sleep laboratory were snoring with 52.2%, followed by excessive daytime somnolence with 47.8% and possible apnea with 21.3%[19]. In both studies somnolence stands out as one of the most frequent complaints. Excessive daytime somnolence, defined as the tendency to fall asleep in circumstances when the person should be awake, would be determined by several factors such as lack of sleep, poor quality of sleep, circadian rhythm disorder and the use of some medicines[25,26].

Finding OSAS as the disease most frequently diagnosed by PSG in our sleep laboratory (35.29%) confirms the importance of this disease in sleep medicine, as well as the impact it would have on general population, especially in the economically active population as in our study, whose average age is 41.62 years. Studies in Peru have also found that OSAS is the most common pathology in sleep laboratories with 76.92%[21], like in Spain, where it was confirmed that 48.3% of the patients referred for PSG with that diagnostic presumption in effect had OSAS[19]. This condition not only causes other chronic cardio-respiratory diseases in the long term, but it is also associated with a higher incidence of depression, a lower cognitive[27,28] performance and a higher risk to suffer workplace or traffic[29-33] accidents. Studies have shown that OSAS treatment would help to reduce the costs associated with the occurrence of traffic accidents, avoiding the loss of many human lifes[29]. PSG tracing of patients with OSAS is clear when showing a significant oxygen desaturation (Figure 1), associated with episodes of apnea and hypopnea, with the consequent suffering of the brain tissue. Because of being chronic, this fact generates progressive and irreversible damages.

Many patients were referred to the PSG study to rule out epilepsy predominantly at night, being confirmed the diagnosis of epilepsy in 10 of them (9.80%), even considering those patients of whom there was no previous suspicion. This was a higher percentage than that one reported in another report by PSG in Peru, which found 5.12% of patients with ictal activity[21].

Although the subspecialty of sleep medicine is being progressively developed in our country, due to the increased knowledge by medical staff and the greater number of centers performing PSG studies (which provides more importance to these diseases); it is necessary to accredit sleep laboratories in our

country and to standardize procedures, diagnostic criteria and treatment options, considering that management of many of these conditions requires the participation not only of neurologists, but also of other medical specialties.

It is still pending the task of educating the population, which will promote the importance of sleep in the normal functioning of human body, and will show that its various diseases deeply affect the quality of life34; decrease work performance; and, in the long term, may become a condition for the emergence of various chronic diseases.

In conclusion, 68.82% of patients referred to a sleep laboratory for study with PSG were men, with an average age of 41.62 years, different education levels and occupations. The most common discomfort was somnolence, manifested in 55.88%, and the most common diagnoses were OSAS in 35.29% and primary snoring with 19.61%.

GRANTS OR FUNDING SOURCES

None.

CONFLICT OF INTEREST

The authors do not report conflicts of interest regarding this document.

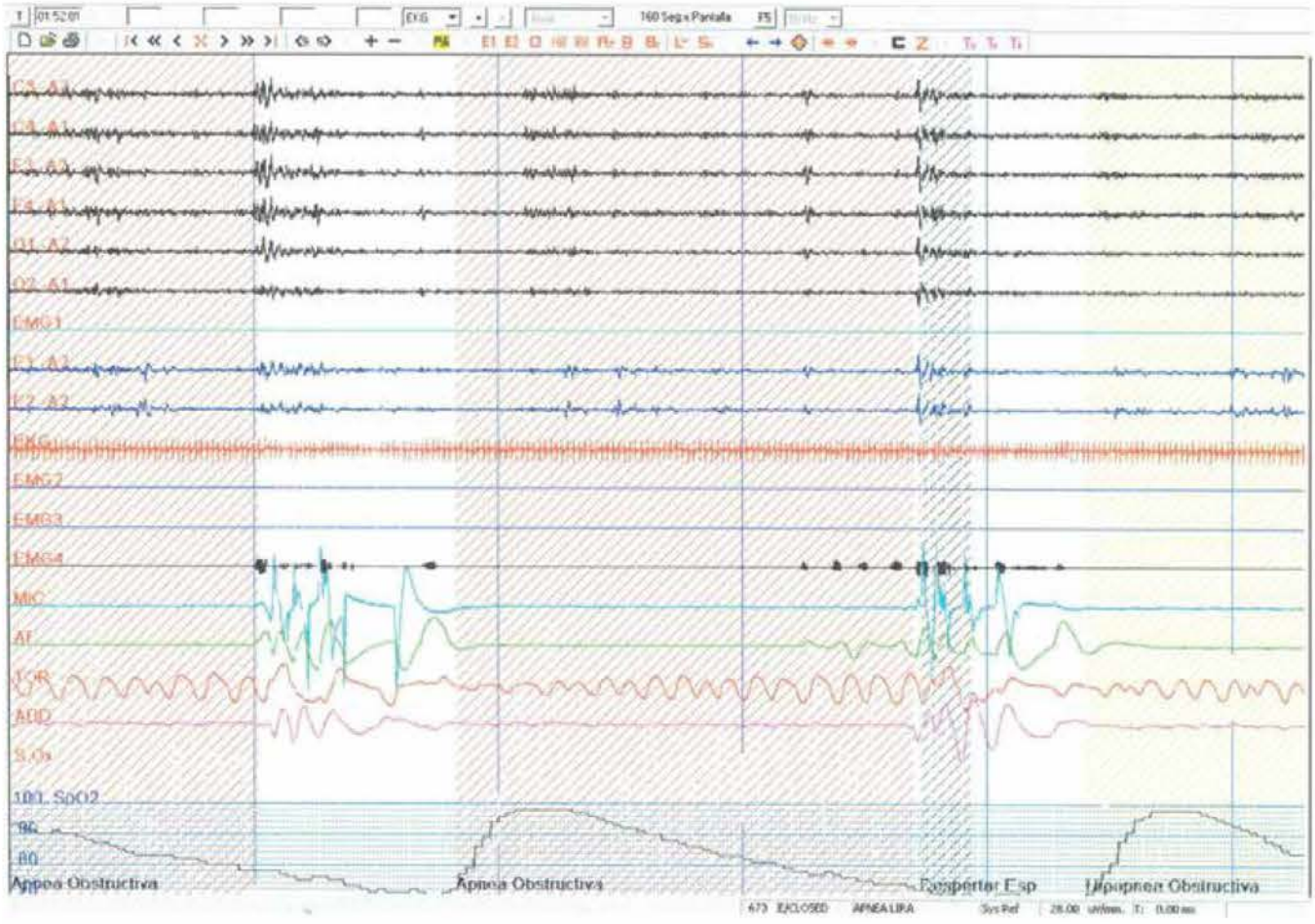

Figure 1. Polysomnography of a patient with obstructive sleep apnea syndrome in severe degree, where there is evidence of oxygen desaturation associated with apnea and hypopnea episodes.

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