ORIGINAL RESEARCH

A study of the prevalence of obstructive sleep apnea among university students with excessive daytime sleepiness

Estudio de la prevalencia de apnea obstructiva del sueño en estudiantes universitarios con somnolencia diurna excesiva

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Abstract

Introduction: Obstructive sleep apnea (OSA) is one of the leading secondary causes of sleepiness. However, the literature on its prevalence among health science students with sleepiness is scarce.
Objective: To establish the prevalence of OSA among students with excessive daytime sleepiness (EDS) at a university in Santa Marta, Colombia.
Materials and methods: A descriptive prevalence study was carried out in 655 health science students (medicine, nursing, dentistry, and psychology). The participants completed the Epworth Sleepiness Scale (ESS, Cronbach's alpha 0.82), as well as an ad hoc questionnaire (sociodemographic information and clinical variables related to OSA). Students with EDS (ESS≥11) underwent home respiratory polygraphy to confirm the presence of OSA (apnea/hypopnea index [AHI] ≥5).
Results: Of the 655 students screened, 186 (28.40%) had EDS. In this subgroup, the mean age was 21.08 years (SD=2.47) and 70.43% were female. Furthermore, 67.20% were medical students; 12.37% were nursing students; 10.75% were psychology students; and 9.68% were dentistry students. The mean AHI was 1.40 (SD=2.53) and 19 (10.21%) had OSA, of which 18 (94.74%) were mild cases (AHI=5.00-14.99).
Conclusions: In the present study, carried out at a public university in Santa Marta, 10% of health sciences students with EDS were diagnosed with OSA. Further studies should investigate OSA independently of the EDS diagnosis as determined by the ESS score.

Resumen

Introducción. La apnea obstructiva del sueño (AOS) es una de las principales causas secundarias de somnolencia. No obstante, la literatura sobre su prevalencia en estudiantes de ciencias de la salud con somnolencia es escasa.
Objetivo. Establecer la prevalencia de AOS en estudiantes con somnolencia diurna excesiva (SDE) de una universidad de Santa Marta, Colombia.
Materiales y métodos. Estudio descriptivo de prevalencia realizado en 655 estudiantes de ciencias de la salud (medicina, enfermería, odontología y psicología). Los participantes diligenciaron la Escala de Somnolencia de Epworth (ESE, alfa de Cronbach de 0.82), así como un cuestionario ad hoc (información sociodemográfica y variables clínicas relacionadas con la AOS). En aquellos estudiantes con SDE (EES≥11) se realizó una poligrafía respiratoria domiciliaria para confirmar la presencia de AOS (índice de apnea/hipopnea [IAH] ≥5).
Resultados. De los 655 estudiantes tamizados, 186 (28.40%) tenían SDE. En este subgrupo, la edad promedio fue 21.08 años (DE=2.47) y 70.43% eran mujeres; además, 67.20% eran estudiantes de medicina; 12.37%, de enfermería; 10.75%, de psicología, y 9.68%, de odontología. El IAH promedio fue 1.40 (DE=2.53) y 19 (10.21%) tenían AOS, de los cuales 18 (94.74%) eran casos leves (IAH=5.00-14.99).
Conclusiones. En el presente estudio, realizado en una universidad pública de Santa Marta, 1 de cada 10 estudiantes de ciencias de la salud con SDE tuvo AOS. Futuros estudios deben investigar la AOS independientemente del diagnóstico de SDE según la puntuación en la ESE.

Introduction

Excessive daytime sleepiness (EDS) is a highly prevalent symptom[1] that may have various causes such as inadequate sleep, sleep breathing disorders (obstructive sleep apnea [OSA], central sleep apnea, sleep-related hypoventilation, and sleep-related hypoxemia), sleep-wake circadian rhythm disorders, and central hypersomnolence disorders (idiopathic hypersomnia, narcolepsy, and Kleine-Levin syndrome).[1,2] This symptom may also be related to mental disorders such as anxiety and depression.[1]

The worldwide prevalence of EDS among university students is considerably high (33.32%-42.70%).[3,4] In Colombia, according to Sánchez-Oviedo *et al.*,[5] who carried out a study on health care students from the southwestern part of the country, 85% of higher education students have some degree of EDS.

Usually, EDS in university students is related to academic activity load, which results in a limited number of sleep hours.[6] However, other possible causes, such as OSA, are rarely considered, as its prevalence is relatively low in this population.[7] OSA is characterized by repeated episodes of complete (apnea) or partial (hypopnea) upper airway collapse causing oxygen desaturation or awakening from sleep.[1,2,8] These episodes cause sleep fragmentation, cortical arousal, awakenings, and inability to achieve and maintain more restorative sleep stages, resulting in EDS.[1,2,8] OSA diagnosis is based on the combined evaluation of clinical manifestations and objective sleep study findings, which can be obtained by polysomnography or respiratory polygraphy.[2,9,10] An individual is considered to have OSA when the apnea-hypopnea index (AHI) is >5 in 1 hour.[10]

The study of EDS in university students has been limited to describing its frequency and identifying associated variables,[3,4,11,12] but few studies have explored its primary causes, for example OSA, probably because the risk of developing this disorder increases with age, being more frequent in older adults.[13] In this regard, Costa *et al.*,[14] in a study conducted in Brazil in 64 medical students, found that 10.94% were at high risk of developing OSA (Berlin questionnaire) and that 6.25% had OSA (polysomnography type 3), while Suzuki *et al.*,[15] in a study conducted in Japan in 59 university students, reported that, based on the Epworth Sleepiness Scale (ESE) results, 33 had EDS, distributed as follows: 16 (27.12%) had insufficient sleep syndrome; 6 (10.17%) had narcolepsy; 5 (8.47%) had insomnia; 3 (5.08%) had idiopathic hypersomnia; 1 (1.69%) had delayed sleep phase syndrome; 1 (1.69%) had periodic limb movement disorder; and 1 (1.69%) had OSA. However, it should be noted that both studies had small samples (<100 participants) and used different methods of screening for OSA.[14,15] Given these limitations and the observed variation in the frequency of OSA, it is necessary to establish the prevalence of this disorder among young adults with different demographic characteristics.

EDS among university students can be explained by the presence of OSA in some cases.[14,15] However, it is necessary to consider primary causes other than academic overload, insufficient sleep, or negative emotional states like anxiety or depression.[6,16,17] According to the clinical consensus, timely identification and management of OSA can significantly improve the quality of life of affected individuals,[18] reduce the risk of cardiovascular disease,[19] and improve cognitive functioning.[20] The latter is highly relevant in the context of university students, since optimal cognitive functioning is essential to successfully meet *all* the academic demands of this educational level.[21]

Considering the above, the objective of the present study was to establish the prevalence of OSA among students with EDS at a public university in Santa Marta, Colombia.

Materials and methods

Study type and sample

Descriptive epidemiologic study. The study population was comprised of first through fifth year (1st-10th semester) health science students enrolled in undergraduate programs during the second academic semester of 2022 (medicine) and in 2023 (nursing, dentistry, and psychology). A total of 2 194 students were included (610, 497, 552, and 535 from the medicine, nursing, dentistry, and psychology programs, respectively).

After obtaining the appropriate permissions from the directors of the aforementioned academic programs, all students ≥18 years old were invited to take part in the study. Students were personally recruited in classrooms on the dates and at the times previously agreed upon with the professors of all active courses in the four academic programs; students attending elective courses were excluded. Considering that a sample size of 178 students with EDS would be sufficient to estimate an OSA prevalence of 8%, with a margin of error of 4% and a confidence level of 95%,[22] at least 600 students were expected to be screened for sleepiness (33% positive for this sleep disorder).[3,4] In addition, by convenience, it was decided that 50% of the participants should be medical students and the remaining 50% from the other programs, equally distributed. Finally, 655 students were included in the screening stage.

Procedures

The facilitators in charge of administering the questionnaire went to the classrooms on the days and at the times agreed upon with the professors of each course. Once informed of the objectives and phases of the study, students were encouraged to participate voluntarily. Individuals who agreed to take part in the study were asked in the classroom to fill out the instruments described below. It should be noted that, similar to the invitation process, the administration of the instruments had been previously agreed upon with the professors of the courses.

First, an ad hoc questionnaire was administered to collect sociodemographic information (biological sex, age, socioeconomic level [income level], program, and academic semester). Then, they were asked to fill out the ESS, an 8-question instrument that surveys the likelihood of falling asleep in everyday situations. Each item has 4 response options that are scored on a 0 to 3 Likert scale, with a total score between 0 and 24 points; scores >10 are considered positive for EDS.[23] The ESS has shown high internal consistency in the Colombian population,[24] and the present study was no exception, with a Cronbach alpha of 0.82.

Subsequently, EDS-positive students were contacted by telephone to schedule a home respiratory polygraphy (ApneaLink Air device) to confirm the presence of OSA. Prior to device installation, a trained and experienced assistant nurse asked for clinical characteristics related to OSA and quantified them (presence of snoring, fatigue, choking during sleep, hypertension, body mass index >35kg/m², and neck circumference >43cm). The ApneaLink Air equipment records five variables: respiratory effort, pulse, oxygen saturation, nasal flow, and snoring. Students with an AHI≥5 were diagnosed with OSA.[10] Data were recorded overnight and collected the following morning for reading and interpretation.

Data were collected between September and November 2022 for medical students and September and November 2023 for the remaining students.

Statistical analysis

Data are described using absolute frequencies and percentages for qualitative variables and means (M), standard deviations (SD), and ranges (minimum and maximum) for quantitative variables. All analyses were performed in SPSS v.23.0.[25]

Ethical considerations

The study adhered to the ethical principles for biomedical research involving human subjects established in the Declaration of Helsinki[26] and the scientific, technical and administrative standards for health research contained in Resolution 8430 of 1993 issued by the Colombian Ministry of Health.[27] Moreover, it was reviewed and approved by the Research Ethics Committee of the Universidad del Magdalena by means of minutes No. 005 of June 9, 2022, and minutes No. 007 of August 31, 2023.

Results

Of the 655 participants screened, 309 (47.18%) were medical students; 124 (18.92%) were nursing students; 111 (16.95%) were dental students; and 111 (16.95%) were psychology students. Out of the study group, 186 (28.40%) had EDS as measured by the ESS score (score ≥11). The mean age in this subgroup was 21.08 years (SD=2.47), with a minimum of 18 and a maximum of 31 years, and 70.43% were female. Table 1 shows the demographic characteristics of the participants.

Table 1. Sociodemographic characteristics of students with excessive daytime sleepiness (n=186).

Variable		Frequency	%
Biological sex	Female	131	70.43
	Male	55	29.57
Socioeconomic level (income)	Low	123	66.13
	Medium	62	33.33
	High	1	0.54
Program	Nursing	23	12.37
	Medicine	125	67.20
	Dentistry	18	9.68
	Psychology	20	10.75
Academic term	First	6	3.23
	Second	5	2.69
	Third	5	2.69
	Fourth	20	10.75
	Fifth	20	10.75
	Sixth	30	16.13
	Eighth	19	10.22
	Ninth	32	17.20
	Tenth	19	10.22

Concerning clinical characteristics related to OSA in students with EDS, 133 (71.51%) reported snoring, 167 (89.78%) reported fatigue, and 8 (4.30%) had hypertension. Table 2 shows the clinical characteristics of students with EDS.

Table 2. Clinical characteristics of students with excessive daytime sleepiness (n=186).

Variable		Frequency	%
Snoring	Yes	133	71.51
	No	53	28.49
Fatigue	Yes	167	89.78
	No	19	10.22
Choking during sleep	Yes	37	19.89
	No	149	80.11
Hypertension	Yes	8	4.30
	No	178	95.70
Body mass index >35kg/m^2	Yes	2	1.08
	No	184	98.92
Neck circumference >43cm	Yes	3	1.61
	No	183	98.39

Finally, the mean AHI was 1.40 (SD=2.53; minimum range: 0.00, maximum range: 19.80) and 19 students (10.21%, 95%CI: 5.86-14.56) had OSA, of which 18 (94.74%) were mild cases (AHI: 5.00-14.99) and 1 (5.26%) was moderate (AHI: 15.00-29.99).

Discussion

In our study, 1 in 10 health science students (nursing, medicine, dentistry, and psychology) with EDS had OSA, resulting in a prevalence of 10.21% (95%CI: 5.86-14.56). This figure, taking into account the margin of error and the confidence interval, is similar to what has been documented in similar studies. For example, Costa *et al.,*[14] in a study conducted in Brazil on 64 medical students, reported an OSA prevalence of 6.25% (95% CI: 0.32-12.18) as per the type III polysomnography test. However, when the diagnosis was based on the results of the type IV polysomnography test, the prevalence was lower (4.69%), which is highly predictable given that type IV polysomnography test is less sensitive as it evaluates fewer variables.[28]

Notwithstanding the above, the frequency of OSA in our study is higher than the 1.69% (95%CI: 0.00-4.98) reported by Suzuki *et al.*[15] in 59 medical students in Japan, but it is worth noting that in their study, if the subgroup of students with EDS (n=33) is analyzed, as in the present study, the prevalence would increase to 3.03% (95%CI: 0.05-6.01). These differences are most likely related to the demographic profile of the students, the subgroups of analysis, and the disparity between studies in the instruments used for screening EDS cases.[29] For example, unlike our study and that by Suzuki *et al.*,[15] Costa *et al.*[14] only report information on the prevalence of OSA in the total sample and not for the subgroup of students with EDS, considering that a higher frequency of OSA in students with EDS is very likely.[30]

Unfortunately, evidence on the prevalence of OSA among university students is scarce, so a more in-depth discussion of our findings is not possible. In this regard, after a review of the relevant literature, our team only identified the two studies mentioned above.[14,15]

The strengths of the present study include its sample size (much larger than those reported in the two similar studies found in the literature) and the objective assessment of OSA (respiratory polygraphy), which allowed a more accurate estimation of the prevalence of this sleep disorder in university health science students with EDS.[22,30] However, the study has the limitations inherent to a descriptive evaluation. In addition, the sample was overrepresented by medical students. Given these circumstances, we recommend that upcoming studies on the subject use larger samples and probability sampling methods to avoid this participation bias.[30,31] Also, it should be considered that the prevalence of EDS in the present study is overestimated since respiratory polygraphy was only performed in students scoring >10 on the ESS, as it was more likely to identify cases of OSA in students with high scores on this scale.[29,32] Therefore, it is possible that these findings are relevant only to students with high ESS scores.

Conclusion

In the present study, conducted at a public university in Santa Marta, one in ten health science students with EDS had OSA. Moreover, the observed prevalence of OSA is higher than what has been reported in the scarce literature addressing this issue in this population. Subsequent studies, both within the country and worldwide, should have a larger number of participants to identify the predictors of OSA in health science students with EDS.

Conflicts of interest

None stated by the authors.

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