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RESEARCH ARTICLE

THE RELATIONSHIP BETWEEN INSOMNIA AND MENTAL DISORDERS AMONG MEDICAL STUDENTS IN MÉXICO

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ABSTRACT

Determining the relationship between insomnia and developing mental symptoms is the objective of this study. Its method consisted of a cross-sectional design study, in which a survey of medical students belonging to the International Federation of Medical Student Associations of Mexico (IFMSA) was conducted. The instrument was validated with Cronbach's alpha coefficient = 0.92. The presence of symptoms related to insomnia, sleep quality and mental disorders were evaluated. Data analysis was carried out through descriptive and inferential statistics, with a power level of $p < 0.05$. Out of 4,576 medical students, a sample was obtained by simple randomization with a total of 401 students (42.89% men, 57.11% women) who participated in 48 medical schools. The three most prevalent symptoms found in students were: 25.19% of major depressive disorder (MDD), 18.95% of generalized anxiety disorder (GAD), and 13.22% of obsessive-compulsive disorder (OCD). Results showed that symptoms of GAD and social phobia (SAD) presented the highest correlation with insomnia. MDD was associated with poor sleep quality (RN = 14.78 95% CI: 1.97-111.04). Therefore, medical students run the risk of incurring on mental disorders if there are disturbances in their sleep. In that case, pedagogical interventions will be required to treat this problem.

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INTRODUCTION

According to the World Health Organization (WHO), mental health is a state of well-being in which people become aware of their own abilities, cope with the stresses of everyday life, are able to work productively, and are ready to contribute within their community (WHO, 2005). Unfortunately, recent investigations have led to the conclusion that mental disorders will represent the leading cause of deaths in men and the second leading cause in women aged 15 to 29 by 2030 (WHO, 2014). Other sources show even more troubling indicators, such as 800,000 cases of depression in men over the age of 18, and 2,500,000 in women, of which only 6.1 and 7.9% (respectively) received antidepressant treatment (Bello, Puentes-Rosas, Medina-Mora & Lozano, 2005). Given the former, it is important to analyze the pervasiveness of mental disorders in the general population, as their mental health can be equally upset regardless of race, culture, or socioeconomic status (Juil & Nemeroff, 2012).

On the other hand, insomnia is defined as the self-perception of unrefreshing sleep, sleeping problems, or waking up too early. This issue is present in 33% of adults (Winkelman, 2015). Symptoms of insomnia can also become an independent risk factor for suicide attempts and depression. Neuropsychological tests reveal deficits in cognitive processes, including working memory and attention shifting, that are not simply the consequence of impaired alertness (Winkelman, 2015). Insomnia is recognized as a growing public health concern, and socioeconomic implications that affect the development of comorbid medical and psychiatric disorders. (Cheng, 2015) (Winkelman, 2015). In China, for example, deficient and insufficient sleep seems to have a negative correlation with the quality of life (and specifically health) of elderly patients (Pan, 2017). Consequently, restful sleep is not only a key factor for health, but also for good quality of life. The WHO's Mental Health Gap Program (mhGAP) (2008) mentions that about 50% of mental disorders start before the age of 14. In the specific case of attention deficit hyperactivity disorder (ADHD), reports indicate a 2 to 3 times higher

prevalence of sleep problems in children than in other populations. The presence of sleep problems in children with ADHD has been the subject of study, due to the way in which they influence school performance (Choi *et al.*, 2010). Furthermore, a study by Kessler and Wang (2008) discovered that the detection and treatment of mental disorders in children and adolescents will decrease morbidity and mortality in adulthood. However, Dyrbye *et al.* (2007) concluded that medical students are more likely to present stress disorders and depression when compared to other children and young adults. Studies on sleep disturbances in undergraduate medical students share an interest in the relationship between sleep abnormalities and mental health (Azad *et al.*, 2015). Sleeping difficulties have been linked to an increase in depression and anxiety (Azad *et al.*, 2015). Poor sleep quality has also been reported in college students (Velez *et al.*, 2013) (Alsaggaf *et al.*, 2016); as a result, their mental health deteriorates (Matamura *et al.*, 2014) and their academic performance declines. In Mexico specifically, the first years of medical education involve purely academic activities, with classes starting at 7:00 and sometimes extending to 18:00. Consequently, there is a high percentage of student complaints regarding sleep (Tafoya, 2013), which ends up affecting the development and normal functioning of their cognitive and intellectual capabilities (Borquez, 2011).

In spite of all the aforementioned data, there is still a lack of objective information regarding medical students, who are considered more likely to present symptoms related to mental disorders due to sleep disturbances (Tafoya, 2013). The aim of this study (and its results) is to design new strategies to improve their sleep quality and thus favorably impact their academic performance. The former is achievable, given that a study showed that behavior therapy by email improved sleep quality and reduced the prevalence of students' symptoms (Trockel *et al.*, 2011). This study seeks to answer the following question: what is the relationship between insomnia and symptoms of mental disorders in medical students? The hypothesis states that there is a positive relationship between those two elements. Its demonstration will be the goal of this research.

METHODS

The present study is descriptive and cross-sectional. Information was collected by means of an electronic survey (Google® Forms), which was distributed through social networks so that students could participate on a voluntary basis. The population consisted of 4,576 medical students belonging to 48 schools within the International Federation of Medical Students Associations (IFMSA), México. Informed consent was obtained from all participants. Average response time was 20 to 30 minutes. The minimum sample size calculation was performed in Epi Info® version 7.1.5 with a result of 354 (95% power level). The sample's inclusion criteria considered the following: that students were enrolled in a medical career, in any of its modalities and degrees, from first semester up to social service, in any Higher Education Institution in Mexico. The exclusion criteria sorted out individuals under the age of 18, or that failed to fill the instrument in its entirety. The instrument was also designed to evaluate dependent and independent variables (mental disorders and sleep quality, respectively), and was approved by the Ethics and Research Committee of the Central Hospital of

the State and the Faculty of Medicine and Biomedical Sciences of the Autonomous University of Chihuahua.

The instrument was validated with Cronbach's Alpha coefficient = 0.92 and a standardized Cronbach's Alpha of 0.93. The following aspects were also considered:

- Sociodemographic data: sex, age, semester, socioeconomic level, number of siblings and parents' marital status.
- Sleep quality, adapted from data used by the Pittsburgh SleepQualityIndex (PSQI) (Buysse, Reynolds, Monk, Berman y Kupfer, 1989). In this section, 6 items were included with a Likert-type scale with values of 0-4 (never-always), which evaluated the time participants remain asleep, subjective quality of sleep, presence of insomnia or daytime sleepiness, frequency with which they wake up at night and its effects on their daily activities. A high score indicates poor sleep quality. A standardized total value = 8 points was taken into account in order to consider poor sleep quality.
- Assessment of the presence of symptoms according to the Diagnostic and Statistical Manual of Mental Disorders, DSM-5® (2014). Using a total of 77 variables with Likert-type response, an algorithm was created to detect the presence of any of these conditions and the evaluation of the following disorders:
 - Generalized anxiety disorder (GAD), which integrated eight variables and four evaluated anxiety situations. One of them was conditioned to measure its impact through four additional variables (1 dichotomous and 3 variables with values from 0-4). A standardized score ≥ 10 that integrates the sum of the impact values was considered as a probable diagnosis.
 - Separation anxiety disorder (SAD), consisting of 7 variables: 1 dichotomous variable and 6 more with a score of 0-4. A standardized score ≥ 16 , which, due to the sum of each variable, was considered as a probable diagnosis.
 - Behavioral disorder (CD), consisting of 11 variables with values from 0 to 4. If three or more variables had values of 3 or 4, they were considered as a possible diagnosis.
 - attention deficit hyperactivity disorder (ADHD) with attention deficit disorder (ADD) or hyperactivity disorder (HTN), consisting of 13 variables, divided into 2 areas:
 - Attention deficit component (6 variables with values from 0-4).
 - Hyperactivity component (6 variables with values from 0-4). If the student had values of 3 or 4 in five or more one-component variables, and symptoms began before age 17, they were considered as possible diagnoses. If he presented criteria for both components, it was labelled as ADHD.
 - Major Depressive Disorder (MDD). It consists of 11 variables divided into 3 sections:
- Presence of sadness, irritability or anhedonia (3 dichotomous variables).

- Impact on daily life activities (6 variables with values from 0-4). Variables with values of 3 or 4 points were considered.
- Thoughts, ideas or attempts of suicide (2 variables with scores from 0 to 4). Variables with values ≥ 2 were taken into account. A result of 6 or more positive variables were considered as a probable diagnosis.
 - Post-traumatic stress disorder (PTSD). The existence of any emotional trauma was considered through 8 dichotomous items. The presence of any of them conditions the evaluation of the impact caused by this disorder through 4 more items with scores of 0-4. The sum of the results of the impact variables ≥ 10 was considered as a probable diagnosis.
 - Social phobia disorder (SAD). Eight variables were included: 1 dichotomous variable and 7 variables with values from 0-4. A score ≥ 24 , resulting from the sum of all variables, was considered as a possible diagnosis.
 - obsessive compulsive disorder (OCD), consisting of 7 variables: 2 dichotomous variables that assess the presence of obsessions in case both were affirmative.

RESULTS

A total of 401 students were studied; 172 (42.89%) of them were men with a mean age of 20.98 (SD = 2.08) and 229 (57.11%) were women with a mean age of 20.78 \pm 1.95. The distribution of students by academic level is shown in Table 1. It is important to note that 86.03% report poor quality of sleep. Of the total sample, 56.86% presented with symptoms, but did not meet the criteria for having any mental disorder according to DSM-5®. However, 20.45% of the students had at least one symptom associated to a mental disorder, 10.22% to two mental disorders, 6.23% to three disorders, 4.49% to four disorders, 0.75% to five, 0.75% to six and only 0.25% to seven. The most common disorders were MDD, with 25.19% of students presenting with symptoms, GAD with 18.95%, and OCD with 13.22%. No significant differences were found between the participants' genders ($p = 0.065$). In the frequency distribution of mental symptoms, TGA took the first place with 7-8 symptoms (27.7%), followed by ADD with 4-6 symptoms (18.5%). Meanwhile, SAD presented with 4 to 6 symptoms in 18% of the population. Symptoms related to poor quality of sleep proved to be amongst the most predominant. People with symptoms related to MDD reported suicidal thoughts and intentions. Analysis by school year showed that the sixth and fourth semesters represented the highest school levels of suicidal thinking with 14 and 11 students, respectively. Other results highlight the correlation between insomnia and symptoms of mental disorders. The most important of these disorders were GAD, ADHD, and SAD. Significant gender differences regarding the prevalence of mental disorders were also observed; MDD ($p = 0.004$), GAD ($p = 0.05$), SAD ($p = 0.016$) and PTSD ($p = 0.022$) were more widespread in women. No significant differences were found for the other disorders. As for the linear regression results, the presence of MDD is the variable that best predicts poor sleep quality. (RR = 14.78, 95% CI: 1.97-111.04).

DISCUSSION AND CONCLUSION

These results show widespread symptoms of MDD and GAD, which echoes the research done by other authors who studied the presence of these disorders in medical students (Dyrbye *et al.*, 2007). The frequency analysis shows that most students display high rates of poor sleep quality through a variety of symptoms, with GAD and depression being the most common signs of deterioration in their mental health (Matamura *et al.*, 2014). Other statistically noteworthy disorders such as insomnia, ADHD and SAD manifest visible correlations to each other. Poor sleep quality did not vary significantly ($p = 0.246$) between men and women. Insomnia and the symptoms of GAD, ADHD and SAD also exhibited correlation. Depressive disorder turned out to be the variable that best predicts sleep disorder. These results coincide with Azad's *et al.* study, which concluded that sleeping difficulties have led to an increase in depression and anxiety levels in the population (2015). Some authors consider the former can affect people's cognitive and intellectual abilities, as well as their academic performance (Borquez, 2011, Azad *et al.*, 2015).

This study benefitted greatly from being a multi-center investigation, with a sizable sample and validity of its results as its main strengths. However, the lack of a more in-depth analysis of aspects promoting poor quality of sleep was its biggest shortcoming. Finally, this study opens up opportunities to replicate its methodology on other students, which would elucidate the relationship between academic load, type of classes and the symptomatology of sleep and mental disorders. Poor quality of sleep represents a growing issue among medical students.

More studies are required to see how this affects this specific population's school performance. In addition, mental disorders such as MDD, GAD, ADHD and SAD were detected to alarming degrees. This study intends to create strategies for the improvement of academic programs and to publicize the benefits of good quality of sleep. This study may be applied to any university, even in schools and colleges outside the health industry. Finally, this cross-sectional study, with the application of its respective instrument, will provide relevant results.

Key points

- Poor sleep quality represents a growing problem among medical students.
- Further studies are needed to see how this affects the school performance of this specific population. In addition, mental disorders such as MDD, GAD, ADHD and SAD were detected to alarming degrees.
- This study provides information for the creation of strategies to help decrease the academic burden of students and to raise awareness of the benefits of good quality sleep.
- This study can be applied to any university, including schools and colleges outside the healthcare industry.

Abbreviations

IFMSA: International Federation of Medical Student Associations in Mexico

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