How sleep quality and anxiety can affect students who wish to study medicine - an objective assessment

Como a qualidade do sono e a ansiedade podem afetar estudantes que desejam cursar medicina - uma avaliação objetiva

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ABSTRACT: *Introduction:* The entrance exam for admission to a medical school requires great performance and dedication of the student. In addition to competitiveness, this period generates a lot of stress and deprivation of self-care. Sleep disorders and high levels of anxiety can impact physical, emotional, and mental performance, reducing the quality of life and strongly influencing decision-making. *Objective:* To analyze sleep quality and the anxiety level of young people during the preparatory phase for entering medical school. *Methods:* Cross-sectional descriptive research of candidates for a medical degree in Curitiba, PR. A socio-demographic questionnaire, the Pittsburgh Sleep Quality Index (PSQI), and the Beck Anxiety Inventory (BAI) were used. Descriptive statistics applied Student's t-test, chi-squared test, Mann-Whitney test, Kruskal-Wallis, and variance analysis. *Results:* Sample with 470 pre-university students, women (81.9%), between 18 and 20 years (82.2%). Sleep disorders (PSQI>10) were detected in 48.1% of the students and evidence of severe anxiety in 49.1% (BAI). There were no significant differences in anxiety levels between the morning, afternoon, and night class schedules (p>5%), but 60.8% of the students who presented with a sleep disorder took their classes during the afternoon class schedule. Males had significantly more sleep disorders (64.7%) when compared to females (44.4%). However, women showed the highest levels of anxiety, with severe anxiety present in 55% of them. About 19.4% of these young people used sleeping medications 3 or more times a week; 22.2% had a history of illicit drug use and 7.4% still do so. Only 5.3% of the sample did not present any difficulty in keeping themselves enthused in recent weeks.

Conclusion: Sleep disorder indicators were predominant in the afternoon class schedule and in men, while signs of severe anxiety were more evident in women, without interference from the class schedule time.

Keywords: Sleep deprivation; Circadian rhythm; Sleep-wake disorders; Students.

RESUMO: *Introdução:* O vestibular para ingresso em uma faculdade de medicina exige grande desempenho e dedicação do aluno. Além de competitividade, esse período gera muito estresse e privação de autocuidado. Os distúrbios do sono e níveis elevados de ansiedade podem impactar no desempenho físico, emocional e mental, reduzindo a qualidade de vida e influenciando fortemente na tomada de decisões. *Objetivo:* Analisar qualidade de sono e nível de ansiedade de jovens durante fase preparatória para ingresso no curso de medicina. *Métodos:* Pesquisa descritiva transversal com candidatos à vaga para graduação em medicina, em Curitiba-PR. Foram utilizados questionário sócio-demográfico, Índice de Qualidade do Sono de Pittsburgh (IQSP) e Inventário de Ansiedade Beck (BAI). Aplicada estatística descritiva, teste t de Student, teste qui-quadrado, teste de Mann-Whitney, Kruskal-Wallis e análise de variância. *Resultados:* Amostra com 470 pré-universitários, mulheres (81,9%), entre 18 a 20 anos (82,2%). Distúrbios de sono (IQSP>10) foram detectados em 48,1% dos estudantes e indícios de ansiedade grave em 49,1% (BAI). Não houve diferença significativa dos níveis de ansiedade entre os turnos manhã, tarde e noite (p>5%), porém 60,8% dos estudantes que apresentaram distúrbio do sono estudavam no turno

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vespertino. O sexo masculino apresentou significativamente mais distúrbio do sono (64,7%) quando comparado ao sexo feminino (44,4%). Contudo, as mulheres mostraram os maiores níveis de ansiedade, com ansiedade grave presente em 55% delas. Cerca de 19,4% desses jovens usavam medicamentos para dormir 3 ou mais vezes na semana; 22,2% apresentavam histórico de uso de drogas ilícitas e 7,4% faziam uso. Apenas 5,3% da amostra não apresentaram nenhuma dificuldade ao se manter entusiasmado nas últimas semanas. *Conclusão:* Indicadores de distúrbio do sono tiveram predomínio nos turnos da tarde e nos homens, enquanto indícios de ansiedade grave foi mais evidente em mulheres, sem interferência do turno de estudo.

Palavras-chave: Privação do sono; Ritmo circadiano; Transtornos do sono; Vigília; Estudantes.

INTRODUCTION

Sleep plays an important role in the physical, mental, and psychological health of individuals[1]. Sleep disorders provide a vicious cycle of poor quality of sleep and anxiety, with a decrease in the quality of life[2].

Anxiety traits or states vary in intensity, duration, circumstances, and repercussions, being influenced by biological, psychological, physical, social, and environmental factors. They may manifest as fear, self-esteem problems, low mood, difficulty in insertion and social engagement, functional deficiency, substance dependence (alcohol and drugs), and, in extreme situations, even suicide[3].

Changes in sleep can cause significant cognitive impairment, such as difficulty in fixing and maintaining attention, memory loss, decreased strategic planning capacity, mild motor impairment, difficulty controlling impulses, and clouded reasoning[4]. These changes, in addition to causing an increase in the risk of accidents at work and automobile accidents, also result in losses in the performance of studies, at work, in family, and social relationships[5].

Preparations for selection processes for medical courses are extremely competitive and stressful. During this period, many young people undergo high mental demands, restriction of social and family life, increased time in front of screens, and reading of study material. The lack of ability to reconcile these activities can cause sleep deprivation and imbalance in the sleep-wake cycle synchronization process, creating conflict situations and causing symptoms such as fatigue, difficulty sleeping at night, visual fatigue, decreased mental performance, poor motor performance, loss of appetite and irritability[6].

Considering the greater vulnerability of this population of students to sleep disorders and their repercussions, seeking a better understanding of this subject in the context of preparation for medical graduation/professionalization is necessary. This investigation was aimed at identifying sleep quality and anxiety indexes of young adults during the preparation phase for the medical entrance exam in the city of Curitiba, PR, with a comparative focus between class schedule time and sex. The right questions were: do women have a higher level of anxiety than men? Does the class schedule timing influence the level of sleep quality? Does studying at night impair the wakefulness sleep cycle? Does sleep deprivation start before you even go to college?

METHODS

A cross-sectional descriptive study to analyze sleep quality and anxiety indexes of pre-university medical students enrolled in a preparatory course of the private school system in Curitiba, PR, from August to November of 2017. The project was approved by the Ethics Committee (opinion 2,115,662) and followed Resolution 466/2012.

The sample calculation estimated 377 participants (95% CI), and the possible volunteers were personally approached by the researchers, during the breaks between classes, and invited to participate through a social network after being properly informed about the research.

Pre-university medical students over 18 years old were included by voluntary participation and complete response to the questionnaire via Google Forms. Students undergoing treatment for sleep disorders and incomplete questionnaires were excluded. Sociodemographic data included age, gender, bedtime and waking time most days of the week, daily class schedule time, whether living with family or alone.

Sleep quality was determined using the Pittsburgh Sleep Quality Index (PSQI), whose questionnaire has 10 open and semi-open questions that form seven components: 1) subjective sleep quality; 2) sleep latency; 3) sleep duration; 4) habitual sleep efficiency; 5) sleep disorders; 6) use of sleeping medication; 7) daytime sleepiness and disturbances during the day. Each item has specific scores, with 21 points being the maximum score. Scores higher than five indicate poor sleep quality.

The Beck Anxiety Inventory (BAI) was the instrument used to measure the intensity of anxiety symptoms. It consists of 21 questions and the score ranges from 0 to 63. In the classification, the score of 0-7 indicates minimum; 8-15 indicates mild; 16-25 indicates moderate; 26-63 indicates severe[7].

To evaluate the differences between BAI and PSQI scores, nonparametric tests were used, and the Mann-Whitney test was used to compare the different sexes and Kruskal-Wallis to compare the different class schedule times. Statistical analyses were performed with the GraphPad Prism statistical package, considered level of significance of 5% ($\alpha = 0.05$).

RESULTS

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The study involved 470 candidates for the medical course, 385 (81.9%) women and 85 (18.1%) men, in the average age group of 18 to 20 years old (82.2%). Of this total, 280 (59.6%) studied in the morning, 143 (30.4%) in the afternoon and 47 (10%) at night, with 335 (71.3%) taking more than fifteen minutes to sleep, and 205 (43.6%) slept more than 6 hours per night.

Sleep was considered ineffective by 346 (73.6%) of the students and 91 (19.4%) took sleeping pills three or more times a week during the month prior to the survey. The Pittsburgh Sleep Quality Index (PSQI) showed 223 (47.4%) students with poor sleep quality and 226 (48.1%) with a sleep disturbance pattern.

There was a difference in sleep quality standards (PSQI) between the class schedule time (Table 1) and sex (Table 2). About 65 (13.8%) students noticed movements of kicking or shaking their legs once or twice a week and 60 (12.8%) three or more times a week. It is noteworthy that 104 (22.2%) declared that they had already used some illicit drug and 35 (7.4%) still do so.

Approximately 316 (67.3%) students reported difficulty staying awake one or more times during the week and 278 (59.1%) complained of problems with maintaining their enthusiasm three or more times in a week, during the month previous to the search. And only 25 (5.3%) students did not have any difficulty in maintaining enthusiasm.

Table 1- Comparison between the pattern of sleep from the Pittsburgh Sleep Quality Index and the class schedule time

Class Schedule Time	Good sleep quality index no. (%)	Poor sleep quality index no. (%)	Index indicative of sleep disorder no. (%)	p-Value*
Morning	18 (6.4%)	144 (51.4%)	118 (42.1%)	
Afternoon	2 (1.4%)	54 (37.8%)	87 (60.8%)	0,0018
Night	1 (2.1%)	25 (53.2%)	21 (44.7%)	

*p-Value obtained by chi-squared test

Table 2- Comparison between the pattern of sleep from the Pittsburgh Sleep Quality Index and sex.

Sex	Good sleep quality index No. (%)	Poor sleep quality index No. (%)	Index indicative of sleep disorder No. (%)	p-Value*
Female	19 (4.9%)	195 (50.6%)	171 (44.4%)	
Male	2 (0.4%)	28 (32.9%)	55 (64.7%)	0,003

*p-Value obtained by chi-squared test

The Beck Anxiety Inventory (BAI) showed that 42 (8.9%) students had a minimum level of anxiety; 95 (20.2%) light level; 102 (21.7%) moderate level, 231 (49.1%) serious level. Table 3 shows the distribution by genders and anxiety levels. 169 (35.9%) students revealed a severe inability to relax, 118 (30.6%) women and 55 (64.7%) men. The inability to relax moderately affects 171 (31%) students, distributed among 146 (37.9%) women versus 25 (29.4%) men.

Fear that the worst could seriously happen occurred in 198 (42.1%) students, moderate nervousness in 155 (32.9%) and severe in 197 (41.9%). Fear of losing severe control was reported by 58 (68.4%) men and 84 (21.8%) women.

There was a difference in BAI between the sexes (Table 3), demonstrating that anxiety is more prevalent in females. The relationship between PSQI and BAI (Table 4) was also significant ($p<0.05$), however, the comparison of BAI with the class schedule time showed no significance ($p= 0.603$).

Table 3 - Comparison between the Beck Anxiety Index and sex.

Sex	Minimal intensity symptoms of anxiety No. (%)	Mild intensity symptoms of anxiety No. (%)	Moderate intensity symptoms of anxiety No. (%)	Severe intensity symptoms of anxiety No. (%)	p-Value*
Female	20 (5.2%)	64 (16.6%)	89 (23.1%)	212 (55.1%)	< 0,00001
Male	22 (25.9%)	31 (36.5%)	13 (15.3%)	19 (22.,3%)	

*p-Value obtained by chi-squared test

Table 4 - Comparison between the Beck Anxiety Index and the Pittsburgh Sleep Quality Index

	Minimal intensity symptoms of anxiety No. (%)	Mild intensity symptoms of anxiety No. (%)	Moderate intensity symptoms of anxiety No. (%)	Severe intensity symptoms of anxiety No. (%)	p-Value*
Good sleep quality index	5 (23.8%)	4 (19%)	3 (14.2%)	9 (42.8%)	
Poor sleep quality index	14 (6.3%)	48 (21.5%)	58 (26%)	103 (46.2%)	
Sleep disorder index	23 (10.1%)	43 (19%)	41 (18.1%)	119 (52.6%)	0,049

*p-Value obtained by chi-squared test

There was a significant difference between the sexes in the medians obtained in the BAI (male 13 (0-59) vs. female 28 (0-63) p<0,001) and in the PSQI (male 9 (1-18) vs female 11 (1-20) p<0,001), using the Mann-Whitney Test.

DISCUSSION

Sleep deprivation and anxiety levels influence decision-making and quality of life. Research reveals that, in the Brazilian academic environment, sleep loss affects more than 50% of the students[8,] reaching up to 100% in the health sector[9].

The selection process for entering a higher education network is a singular event, which causes major changes in life to the applicant depending on the result. To obtain approval in the entrance exam, the student changes the entire daily, food and sleep routine to be able to manage the studies, but there is often no time for self-care[10]. Thus, factors arise such as nervousness, anxiety, fear of losing control, worry, fear of failure, competitiveness, low self-esteem, pressure, isolation, and social withdrawal. In this study, in the week prior to the answering of the questionnaire, 68.2% (n=58) of men and 21.8% (n=84) of women were afraid of severely losing control.

In the present study, low sleep quality and high anxiety rates were similar to those found in medical students[11]. The average sleep duration in most of the sample was between four and six hours, and 71.3% of the students took more than fifteen minutes to sleep. As a possible reflex, the PSQI analysis showed 223 students (47.4%) with poor sleep quality and 226 (48.1%) with a sleep disorder pattern. In contrast to this, there was a disagreement between the quality of sleep and the perception of its effectiveness, which supposes inadequacies in sleep hygiene[9].

Another worrying finding was the search for temporary relief in sleep medication, detected in 19.4% of the sample, three times or more in the last week prior to the questionnaire. In addition, 22.2% had already used an illicit substance and 7.4% still do so. These findings reflect the misuse of strategies to relieve stress and tension[12] and

are opposed to the results found by Marques[13].

Sleep disorders occurred in all the class schedule times, however, the demands of the afternoon class schedule caused worse damage to this population. Possibly, this group has a pattern of morning sleep, that is, when they return from school, they continue to study until dawn, sleep late, and wake up late. A study with resident physicians and medical students pointed out a possible influence of the use of screens and of the blue light of the electronic devices in the sleep-wake cycle[14].

Sleep quality is directly linked to sleep rhythmicity, so the jet-lag effect caused by the disregarding of the organization of sleep schedules can influence cognitive and motor performance[14]. When comparing sleep quality with sex, men proportionally showed a greater incidence of sleep disorder than women. It appears that this group has greater difficulties in maintaining a regular routine, in addition to the fear of failure being more widespread in the male imagination, given the sexist social organization[15].

Chronic sleep deprivation is related to excessive daytime sleepiness (especially if there is a frequent night reading practice)[16] and in approximately one-third of the present sample it was observed. Severe inability to relax was also reported by about a third of the sample and it affected women more.

A severe anxiety index was found in about half of the sample. The relationships were statistically relevant between sex and BAI, and the evidence of severe anxiety was manifested in 55% of women and 22.3% of men. On the other hand, anxiety at a minimum level was more prevalent in men (25%) than women (5%). No statistically significant differences were found between BAI and class schedule time. It is interesting to note that in a study by Paro et al, men value their physical and psychological symptoms less than women[17], which justifies the fact that among the domains evaluated in this study, the female perspective was also more critical, determining the higher prevalence of anxiety symptoms among women.

The loss of enthusiasm on three or more days of the week during the month before the questionnaire was reported by 59% of the students and only 5% had no difficulty in staying enthusiastic. From this and the poor

quality of sleep and high levels of anxiety found, this population is more vulnerable to burnout disorders and depression. According to Coelho and Reimão[8] the worse the quality of sleep, the higher the levels of depression, as well as the relationship between the presence of anxiety trait levels and depression.

Among the limitations of this study, a cross-sectional design, single institution, absence of a control group, and a large sample difference between the sexes, factors that may compromise the result are worth mentioning. The use of self-completed instruments can be biased with an exaggerated response or minimized by the individual who completes them. The data are restricted to this context and no similar studies were found in this audience for comparison. However, the exploration of this theme contributes with knowledge about the health of the contemporary youth, their fears and anxiety, and alerts of changes in sleep and self-medication of candidates for health professionals.

These disorders and their effects need to be recognized and addressed to avoid maintaining or developing bad habits among future students, residents, and physicians[14]. Research with university students indicates that poor sleep quality is related to mental disorders such as stress, anxiety, depression, and risky behavior for alcohol and drug use[18]. Therefore, support and guidance services to students on coping with stress, prevention of drug use and abuse, development of socio-emotional skills are fundamental[19].

The prevalence of anxiety symptoms in medical students can reach 85.6%[20], while 50% of them may present excessive daytime sleepiness[21]. Considering that the future academic environment can aggravate stress, anxiety, and sleep disorders, greater attention to the mental health of these students is necessary[22]. Also, facilitating access of students to therapies that develop strategies of self-care, management of time, and the quality of life[23].

CONCLUSION

Indicators of severe anxiety were more evident in women and without interference from the class schedule time. Sleep disorders were predominant in the afternoon class schedule in men and accompanied by significant use of medication 3 or more times a week to get to sleep. Educational actions are necessary to minimize health risks, quality of life, and performance in studies.

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