Avens Publishing Group
J Neurol Psychol
February 2020 Vol.:8, Issue:1

Open Access Research Article

Journal of Neurology and Psychology

High Levels of Excessive Daytime Sleepiness among Medical Students is Associated with Worst Quality of Life, and it is Higher among Female Students

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Submission: December 14, 2019
Accepted: January 30, 2020
Published: February 04, 2020

Keywords: Quality of life; Students; Medical; Education; Medical; Sleep deprivation; Stress; Psychological; Burnout

Abstract

Objective: This study aimed to analyze quality of life and excessive daytime sleepiness of medical students and to correlate it with possible conditioning factors such as gender, habits and year of attendance at the Medical School.

Methods: The study was cross-sectional, using self-administered questionnaires to all medical students. Questionnaires included sample profile, the World Health Organization Quality of Life assessment (WHOQOL-bref) and the Epworth Sleepiness Scale (ESS). 1.3. Results: The sample covered 266 students, 62% of which were female. Excessive daytime sleepiness according to the ESS was found in 66% of the sample. An inverse correlation of sleepiness and quality of life was found (r=-0.338; p<0.001). Sleepiness was greater among women (p=0.011), but had no correlation to the year of attendance of the students. No differences were found in WHOQOL-bref total score regarding gender or year of attendance. Students with healthier habits, more specifically with regular physical activity and without regular use of alcohol had higher scores on WHOQOL-bref total score (p<0.001 and 0.015, respectively).

Conclusion: Excessive daytime sleepiness was present in a considerable part of the medical students, especially amongst women. Healthier habits and regular physical activity were associated with greater quality of life. Future studies, prospectively collecting information, could bring greater reliability concerning the impact of the course would on quality of life and sleepiness, with special emphasis on gender differences.

Introduction

During their course, undergraduate students of Medicine face countless stress factors which can have serious consequences on their health [1]. From the second half of the 20th century on, major advances have occurred in different areas of Medicine, and each year thousands of new publications are released. This makes university courses complex, curricular contents extensive, and related workload demanding. In search of good professional qualifications, students are urged to tackle a series of supplementary activities such as research, academic monitoring, internships, and other strenuous activities they are subjected to, in terms of work hours and performance. In addition, behaviors, skills, and mature attitudes are required from students throughout their learning processes. Therefore, medical career studies require impressive levels of dedication, from the highly competitive entrance exams, through the graduation challenges, to medical specialization which requires lengthy shifts, study and working hours [1]. Therefore, the academic overload faced by medical student routines directly influences their quality of life. The concept of quality of life is not new: Aristotle (384-322 BC) described happiness as a virtuous activity of the soul, a final goal that encompasses the totality of one´s life. Hippocrates (460-377 BC) asserted that balance provides a healthy body, which is directly connected with the environment [2]. The idea also appears in ancient Chinese philosophy, which defines that quality of life can be achieved when the positive and negative forces, represented by the concepts of Yin and Yang, are in balance. Thus, the concept has roots in both Western and Eastern culture [2]. The term quality of life was used in the United States after World War II for describing the acquisition of goods. Later, this notion was extended in order to measure the economic development of a society, comparing different regions through economic indicators such as per capita income and gross domestic product. Subsequently, the concept began to denote social development through education, health, housing and transportation, among other parameters [3]. Given the inherent complexity of the definition of quality of life, in 1995 the World Health Organization brought together experts from around the world and identified quality of life as: "the individual's perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" [4], and six domains were identified: physical, psychological, level of independence, social relations, environment and religious beliefs [4-6]. Quality of life has emerged as a new goal to be achieved, beyond cure, control of diseases or the extension of life [7]. Too many activities and requirements in Medicine courses prevent students from having time to exercise, to take care of their health, to enjoy time with their family and friends or to develop other interests, with impacts on their quality of life. Stressful factors, such as great demands on learning, a large amount of new information, lack of time for social activities and coping with patients' illnesses and sometimes deaths, may contribute to the onset of depressive symptoms in students [8]. Some studies have shown that medical students present average anxiety levels above the overall population levels, and their depression scores can increase during the first year of medical school [9,10]. Problems such as substance abuse, self-mutilation and suicide were also reported to be possible consequences of the routine of university students

ISSN: 2332-3469

Table 1: Socio-demographic profile and habits of the students of Jundiai School of Medicine according to year of attendance and the total sample.

VARIABLE	1st year	2nd year	3rd year	4th year	5th year	6th year	TOTAL
Participating students, n (%)	41 (53.2%)	52(72.2%)	51 (73.9%)	45 (60.0%)	50 (75.7%)	27(38.5%)	266 (62.0%)
Male, n (%)	18 (43.9%)	17 (32.6%)	26 (50.9%)	12 (26.6%)	22 (44.0%)	7 (25.9%)	102 (38.0%)
Age (years), mean (SD)	21.1 (2.6)	21.7 (2,9)	21.4 (2,6)	23.5 (1.6)	25.3 (2.8)	25.8 (1.3)	23.2 (2.8%)
Unhealthy habits, n (%)	19 (46.3%)	35 (67.3%)	30 (58.8%)	25 (55.5%)	26 (52.2%)	17 (62.9%)	152 (57.1%)
Regular practice of physical activity, n (%)	33 (80.4%)	37 (71.1%)	39 (76.4%)	28 (62.2%)	36 (72.0%)	17 (62.9%)	190 (71.0%)
Smokers, n (%)	2 (4.8%)	1 (1.9%)	8 (15.6%)	6 (13.3%)	1 (2.0%)	0	17 (6.3%)
Usual intake of alcoholic beverages, n (%)	28 (68.2%)	37 (71.1%)	38 (74.5%)	32 (71.1%)	33 (66.0%)	25 (92.5%)	193 (72.5%)
Usual intake of caffeine stimulants, n (%)	2 (4.9%)	4 (7.7%)	12 (23.5%)	3 (6.7%)	10 (20.0%)	3 (11.1%)	34 (12.8%)

Data are presented as means (SD) and for categorical values as the number of cases, and percentage (%)
Note: SD=Standard deviation; "Unhealthy habits" were considered globally as either smoking, having regular heavy use of alcohol or caffeine stimulants or being sedentary.

Table 2: Determinants of the WHOQOL-bref and ESS scores of Jundiai School of Medicine students (n=266).

	WHOQOL-bref Total score		WHOQOL-bref Physical Domain		WHOQOL-bref Psychological Domain		WHOQOL-bref Social Relationship Domain		WHOQOL-bref Environment Domain		ESS	
	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p
Year of attendance		0.97		0.13		0.89	-0.123 (-0.384--0.009)	0.040		0.87		0.87
Male gender		0.17		0.47		0.26		0.52		0.16	-0.179 (-2.79--0.479)	0.16
Unhealthy habits	-0.275 (-1.14--0.462)	<0.001	-0.150 (-0.864--0.096)	0.015	-0.220 (-1.04--0.303)	<0.001	-0.191 (-1.59--0.364)	0.002	-0.187 (-1.23--0.267)	0.003		0.003
Regular practice of physical activity	0.232 (0.368-1.13)	<0.001	0.175 (0.187-1.06)	0.005	0.170 (0.161-1.00)	0.007	0.169 (0.267-1.65)	0.007	0.165 (0.188-1.28)	0.009		0.009
Smoking		0.81		0.76		0.29		0.82		0.82		0.82
Usual intake of alcoholic beverages	-.0142 (-0.836--0.091)	0.015	-0.221 (-1.21--0.367)	<0.001		0.13		0.09	-0.144 (-1.18--0.112)	0.018	0.191 (0.689-3.10)	0.018
Usual intake of caffeine stimulants		0.63		0.36		0.63		0.28		0.35		0.35

One Way ANOVA considering year of attendance, gender, unhealthy habits, Regular practice of physical activity, smoking, usual intake of alcoholic beverages and caffeine stimulants.
Note: WHOQOL-bref: World Health Organization Questionnaire for Quality of Life - Brief Form; ESS: Epworth Sleepiness Scale; "Unhealthy habits" were considered globally as either smoking, having regular heavy use of alcohol or caffeine stimulants or being sedentary.

[11]. In this context, among the deleterious effects of the routine of medical students, poor quality of sleep stands out. Medical students constitute a group susceptible to sleep deprivation [12], a condition that can directly affect their learning capacities, their health and their quality of life. Students inserted in such an academic lifestyle often end up altering their patterns of sleep-wake cycles [13], and they hardly have any good sleep hygiene due to their habit of studying or having leisure time at night, among other factors [14]. Attention should be drawn to the fact that students, during the process of learning the medical profession, often neglect themselves. The type of medical learning process that leaves no room for reflection about the human being inside the doctor undermines that professional's future [15]. Therefore, it is important to learn about quality of life of these students in order to reduce stress levels and contribute to the formation of better professionals, with impacts on the doctor-patient relationship and with greater effectiveness and competence when serving the population [16].

Hence, the present study aimed to analyze the quality of life and excessive daytime sleepiness of undergraduate students from Jundiai School of Medicine This study also aimed to correlate these variables with possible conditioning factors such as gender, habits and year of attendance.

Materials and Methods

Subjects

All Jundiai School of Medicine students were eligible to participate. The Local Ethics Committee approved all procedures before enrollment in the study.

Design

Cross-sectional descriptive study. The study sample consisted of all undergraduate students of Jundiai School of Medicine, regularly enrolled from the first to the last year of the medical course (6 years total), who voluntarily wished to participate in the study and signed

ISSN: 2332-3469

the informed consent form. Data collection was carried out during regular academic activities, always in the beginning of the class period in the same month. Students who refused to participate in the survey were excluded from the study, as well as students who were absent on the days of data collection.

Measurements

A self-administered questionnaire was provided by the same applicants M.A.M and C.C.P., with information regarding: gender, age, year of attendance and questions related to habits, physical activity and eating patterns. To evaluate quality of life, the World Health Organization Questionnaire for Quality of Life - Brief Form (WHOQOL-bref), was used [6]. This questionnaire contains 26 questions, distributed in four domains: physical, psychological, social and environmental relations. For the evaluation of daytime sleepiness, the Epworth Sleepiness Scale (ESS) was used [17]. The ESS is a widely used scale and assesses excessive daytime sleepiness; it contains eight situations such as the chance of napping while sitting or reading, and napping while watching television, among others. The score is marked by the student according to the following instructions: 0 corresponds to "do not ever doze"; 1 corresponds to "small chance of dozing"; 2 corresponds to "moderate chance of dozing"; and 3 corresponds to "high chance of dozing". The score indicated by the student in all situations investigated is summed up. Overall scores from zero to nine points indicate absence of sleepiness; scores from 10 and 16 points indicate mild sleepiness; scores from 17 to 20 points indicate moderate sleepiness; scores from 21 to 24 points indicate severe somnolence [17]. For all instruments, language used was Brazilian Portuguese.

Statistical analysis

For continuous variables normality was tested using the Kolmogorov-Smirnov test. To compare participants among the groups, we used independent samples Student's T-test for quantitative variables (as normality was attended), and chi-square test for categorical variables followed by One Way ANOVA to evaluate potential influence of year of attendance, sex, healthy habits, physical activity, alcohol and stimulants use. For correlations, the Sperman's correlation test was used. The level of significance was set at 0.05. The software Statistical Package for the Social Sciences (SPSS) version 20.0 was used to perform statistical analyses.

Results

The sample included 266 medical students (62.0% of attending students).Their average age was 23.2±2.8 years old, and 62% were female. Among these students, 71% declared themselves to be regular practitioners of physical activity, 6.3% were smokers, 72.5% made regular use of alcoholic beverages, 57% considered their health habits unhealthy and 12.8% referred using caffeine stimulants regularly (Table 1).

According to the ESS, excessive daytime sleepiness (scores above 9) was found in 66% of the students, and 14% of the students had moderate to severe sleepiness (scores above 16). There was a negative correlation of ESS and WHOQOL-bref total (r=-0.338; p<0.001), that is, the greatest the daytime sleepiness, the worst the quality of life. Similar results were found for each of the WHOQOL-bref domains: physical (r=-0.395; p<0.001), psychological (r=-0.179; p=0.003), social relationships (r=-0.129; p=0.035), and environment (r=-0.247; p<0.001). ESS scores were greater among women (p=0.006)and amongst those that stated having regular use of alcoholic beverages (p=0.002) (Table 2). No difference was found according to year of attendance and other habits for the ESS scores. No difference was found in WHOQOL-bref total score regarding year of attendance and gender. WHOQOL-breftotal score was lower in students that considered themselves as having unhealthy habits (considered globally as either smoking, having regular heavy use of alcohol or caffeine stimulants or being sedentary)(p<0.001). More specifically, WHOQOL-breftotal score was lower in those having regular use of alcohol (0.015) and greater in those who practiced regular physical activity (p<0.001). Similar results were found for the relationship of the WHOQOL-bref domains (physical, psychological, social relationships and environment) with gender, unhealthy habits, practice of physical activity, smoking, and for usual intake of caffeine stimulants. No relationship was found for WHOQOL-bref psychological and social relationships domains and usual intake of alcoholic beverages, but it was found for the physical domain (p<0.001) - an inverse relationship, similarly to the total score. Finally, in the social relationships domain there was a difference according to the attending year (p=0.004), with decreasing values from the first year to the last year. Students that considered that their eating habits got worse after they started attending medical school had lower scores on WHOQOL-bref total score (p=0.018), but no difference was found in ESS scores.

Discussion

Students of Jundiai School of Medicine had high prevalence of inappropriate sleepiness, reported by 66% of the sample. There was a significant difference between genders, with higher sleepiness scores among women. No differences were found according to year of attendance. There was an inverse correlation between inappropriate daytime sleepiness and quality of life specially its physical and environment domains. On the other hand, students with healthier habits and with regular physical activity had better quality of life. Finally, there were a few differences in WHOQOL-bref social relationships domain among the years, with decreasing values from the first to the last years. The WHOQOL is a widely used instrument in scientific research. In a 2010 cross-sectional study carried out with 370 medical students from the city of Recife in Brazil, there was a decrease in the WHOQOL-bref psychological domain among students closer to concluding their medical course, when compared to students beginning it [10]. In the present study, however, a trend was found only in the social relationships domain. In this sample of medical students, 71%reported to practice regular physical activity. The inclusion of physical activity in the curriculum of Jundiai School of Medicine in the first two years of the course, as well as related facilities provided, allowing training of various modalities, might have had an impact on that percentage. Since regular physical activity was related to higher WHOQOL-bref scores (p<0.001), the habit of regularly practicing physical activities could contribute to maintaining WHOQOL-bref scores even in those difficult last years of the course. However, this hypothesis was not tested due to the cross-sectional design of the present study. The correlation of physical activities with quality of life in our study is in agreement with the literature. In a systematic

ISSN: 2332-3469

review, higher levels of physical activity were associated with better perception of quality of life both in healthy adults and in individuals with different health conditions [18]. Similarly, in a study in Brazil, active individuals had higher WHOQOL-bref scores in the physical, psychological and environmental domains [19]. Intervention studies with a high number of participants (n=1089) during 12 months and extended for 12 more months also pointed to similar results, with improvement in quality of life in the intervention group [20]. When considering the several factors potentially associated with quality of life, it was also verified that students who stated more healthy habits presented higher scores in the WHOQOL-bref scores compared to those who affirmed inappropriate habits ($p<0.001$). Based on the definition of the World Health Organization, that quality of life is "the individual's perception of their position in life, in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" [5], this data could be considered one possible evidence of the reliability of the instrument used to measure quality of life among medical students, as it uses the individuals own perception on their reality.

The present study shows, through ESS, inappropriate daytime sleepiness in 66% the students of Jundiai School of Medicine, far above the average of epidemiological studies in Brazilians. As an illustration, studies in adult populations the prevalence of inappropriate daytime sleepiness was 22% [21], and 19% [22]. Our results of high prevalence of inappropriate daytime sleepiness are in accordance with other studies with medical students. Excessive daytime sleepiness in was found in 52% of 276 students (academics and residents) and the average scores in the ESS were 11 [12]. In all attendance years the levels of sleepiness were high, on average above the cutoff of 9, without differences amongst the years. One possible explanation for that could be that different factors contributed to sleepiness across the years. Concerning the genders, in our study women presented higher levels of daytime sleepiness ($p=0.011$).

Once our population of students is young (23 years, on average) it could be hypothesized that the high rates of excessive daytime sleepiness observed could be due to be sleep deprivation. As contributing factor for that, we can mention extensive workload of the medical course, with full-time activities and night shifts, extracurricular activities, a high requirement for study, preference of night hours for leisure time and others. It is also noted that sleep deprivation in medical students, internship students and even physicians is often seen as inherent in the profession itself, or even as a symbol of dedication to the profession. It is known, however, that sleep is a fundamental biological function in the consolidation of memory and learning, binocular vision, thermoregulation, conservation and restoration of energy and of the energy metabolism [23]. For such processes to occur, however, there must be a good sleep quality [24]. People who sleep poorly tend to have more morbidities, shorter life expectancy and premature aging [25]. In addition, in sleep deprivation, symptoms such as malaise, irritation, fatigue, impaired agility and mental efficiency can be observed. Excessive daytime sleepiness can affect the performance of most of the individual's cognitive domains in the long or short term, resulting in impairment of attention, concentration and operational memory [26]. Sleep deprivation in medical students, may momentarily increase productivity in both studies and care. However, it can lead to decreased productivity, cognitive deficits, as well as to precipitate some psychiatric disorders. Therefore, sleep deprivation can compromise general health and quality of life [24]. Among the implications on cognitive performance is the increase in errors in activities that demand attention [27], which can translate into a risk imposed on the medical students themselves, the individuals in their immediate learning environment, and the patients cared for. Therefore, the present study reaffirms the possible impact of sleep impairment on quality of life through the inverse correlation between scores obtained through the WHOQOL-bref and ESS($r = -0.338$).

As complementary observations, a minority of the students (6.3%) reported the use of tobacco, but a considerable portion (72.5%) made customary use of alcoholic beverages. These data are in line with other studies that evidence alcohol abuse among health students [28-30].

The present study has several limitations that should be taken into account. Some students did not participate, especially in the last years of the course. This was due to difficulties in data collection, especially with regards to students in the last two years of the course that have activities at different times and places. Another important limitation is the cross-sectional nature of the study. We used a validated Brazilian Portuguese version of the questionnaires the World Health Organization Quality of Life assessment (WHOQOL-bref) and the Epworth Sleepiness Scale (ESS). For other variables such as gender, year of attendance, regular physical activities, smoking, regular use of alcoholic beverages or stimulants and "unhealthy habits" we did not use a validated scale and therefore the results of these variables should be interpreted taking into consideration these limitations. Future studies, prospectively collecting information, could bring greater reliability concerning the impact of the course would on quality of life and sleepiness, with special emphasis on gender differences for sleepiness that was evidenced in our study. Other variables that could influence quality of life and sleepiness, such as affective disorders and cognitive deficits, as well as sleeping and food habits could be also more thoroughly explored in future studies.

Finally, continuing studies which may contribute with data on the reality of medical students should be granted. Such studies may direct faculties to seek strategies for both curricular reforms and intervention programs in the physical, mental health and sleep hygiene of students, as well as to opening space for discussion on the subject as well as raising students' awareness of the subject. Such measures can minimize the wear and tear suffered before the diploma. It is worth highlighting intervention studies with positive results on psychological distress and quality of life [31]. Among coping strategies, valuing interpersonal relationships and everyday phenomena, balancing between study and leisure, organizing time, health care, s and sleep, practicing physical activity, religiosity, working the personality itself to deal with adverse situations and seeking psychological assistance should be investigated as potential sources for improvements in quality of life [16].

The earlier the medical student reflects on his own life and quality of life, the better the student can contribute to the quality of life of patients. Furthermore, the medical school must have this concern, both in the elaboration of its curricular plan and in promoting psychological and pedagogical support for the student to deal with needs in academic and professional life.

ISSN: 2332-3469

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