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ORIGINAL ARTICLE

Evaluation of quality of life, sleep, and sleepiness in dental students during active learning and remote emergency learning

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ABSTRACT

Objective: This study aimed to evaluate the quality of life (QoL), quality of sleep, and sleepiness index in undergraduate dentistry students between their active learning (AL) and emergency remote learning (ERL) due to social distancing imposed during the COVID-19 pandemic.
Methods: Information was collected using the Medical Outcomes Study 36-item Short-Form Health Survey (SF-36-BR), Epworth Sleepiness Scale (ESS-BR), and Pittsburgh Sleep Quality Index (PSQI-BR) questionnaires administered before and during the COVID-19 pandemic. A comparison regarding the type of education, demographic factors, academic performance, PSQI-BR, ESS-BR, and SF-36-BR between the groups was performed, considering a significance level of 0.05.
Results: A total of 55 students were from AL, while 45 students were from ERL. The sample consisted of 74 women and 26 men aged 21–30 years. The academic coefficient of these students ranged from 7 to 8 points (AL= 38.2% and ERL= 57.8%). In addition, a large proportion of the students reported having no failures (AL=60% and ERL= 66.7%). Regarding QoL, the students presented a greater impairment in functional capacity, followed by limitations in social aspects, general health perception, body pain, and vitality. According to the ESS-BR scores (p = 0.04), the students presented a lower quality of sleep.
Conclusion: Dentistry students had the worst QoL panoramas and poor relative sleep quality before and during the COVID-19 pandemic. Furthermore, QoL instruments were reliable for quantifying health-related QoL in AL and ERL.

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INTRODUCTION

Due to the COVID-19 pandemic, social distancing measures were imposed to control the spread of the new coronavirus, the etiological agent of the disease. In education, face-to-face educational activities have migrated to a remote model, giving rise to emergency remote learning (ERL) to maintain school and university schedules[1,2].

Admission to higher education can generate behavioral changes and the acquisition of harmful habits on the part of students, which are often associated with the overload of studies and daily stress. Stress in these students can generate increased levels of depression, anxiety and irritation, and inappropriate use of alcohol and other drugs, directly affecting the individual's quality of life (QoL)[3-6].

According to the World Health Organization (WHO), QoL is defined as "an individual's perception of his or her position in life, in the context of the culture and value system in which he or she lives and in relation to his or her goals, expectations, standards, and concerns". It is a multidimensional, broad, complex, and subjective concept that includes positive and negative qualities, physical and psychological aspects, health, independence, social relationships, beliefs, and environmental factors of the individual[7,8].

Sleep quality also changes during academic life. It restores energy and physiological, cognitive, psychological, and immunological functions, positively and negatively impacting an individual's life. Thus, daytime sleepiness is commonly found in the academic environment due to strict curricular schedules and sleep deprivation. Sleep deprivation can negatively affect the health of these young people, in addition to compromising their attention, problem-solving capacity, memory, and academic performance coefficient[9-11].

It is considered extremely important to assess the new standards acquired concerning QoL, sleep, and stress, and whether these factors influence students' academic performance[12]. Owing to the recent and unplanned nature of ERL, its consequences on the physical and mental well-being of students and teachers are not yet fully understood. It becomes mandatory that investigations be conducted to compare the results obtained on the education system before and during the pandemic. Thus, this study aimed to compare the QoL, sleep, and sleepiness of dentistry students during active learning (AL) and ERL since few studies have evaluated these conditions.

METHODS

To improve the quality of the scientific writing of the study, we used the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist[13].

Ethical approval and study design

This cross-sectional study was approved by the Ethics Committee on Human Research of the Federal University of Alfenas (UNIFAL-MG; CAAE 12543219.1.0000.5142). The questionnaires were administered during two distinct periods. The first application occurred before the COVID-19 pandemic, between July 2019 and March 2020. Data were collected in an academic environment through interviews, where participants read and responded to each question and its alternatives on the questionnaire. The second application occurred during the COVID-19 pandemic from April 2021 to October 2021. Data were collected virtually through interviews using the Google Meet Platform. Student participation was voluntary and anonymous. All participants provided their signatures on the informed consent form.

The sample consisted of 110 dental students at UNIFAL-MG, with seven students from AL and three from ERL excluded because they were under 21 years of age. As a result, the total number of students analyzed was 100, comprising 55 AL students and 45 ERL students.

It is worth noting that this study was conducted during two distinct periods. The first study was conducted to assess the impact of the academic environment on students' quality of life, sleep and sleepiness conditions, and its results were published previously[12]. Considering the COVID-19 pandemic and the subsequent restructuring of the teaching model, we opted to assess the impact of the two teaching modalities on the conditions mentioned above among dental students at UNIFAL-MG.

Application of the questionnaire and calibration of researchers

Three independent and calibrated researchers (LSC, FIDC and ICSD) (final kappa: LSC = 0.86-0.91; FIDC = 0.87-0.92; ICSD = 0.88-0.92) applied the questionnaires[14].

Applied Questionnaires

The questionnaires were culturally adapted and validated in Portuguese.

SF-36 Health Survey (SF-36-BR)

The Medical Outcomes Study 36-item Short-Form Health Survey (SF-36)[15] is a questionnaire used to measure QoL in various situations. It consists of 36 questions and is divided into 8 items: Functional capacity, Physical limitation, Body pain, General perception of health, Vitality, Limitation by social aspects, Limitation by emotional aspects, and Mental health. The evaluation is based on scores ranging from 0 to 100 points[16].

Pittsburgh Sleep Quality Index (PSQI-BR)

To assess sleep quality, the PSQI-BR was chosen because it has questions that are easy to interpret, classifying the participants into "good sleepers" and "bad sleepers"[17]. The factors evaluated were quality of sleep, duration of sleep, time to sleep, sleep efficiency, presence of daytime sleepiness, daytime disturbances, and need for sleep medication. Each item is categorized

between 0 and 3 points, with 0 points being "very good" and 3 points being "very bad", and at the end, you get a score ranging from 0 to 21 points[18].

Epworth Sleepiness Scale (ESS-BR)

In addition to sleep quality, we evaluated the degree of sleepiness of individuals while performing daily tasks using the Epworth Sleepiness Scale (ESS)[19]. The score ranges from 0 to 24, with scores above 10 being diagnostically suggestive of excessive daytime sleepiness[20].

Statistical Analysis

The data were analyzed using the statistical program JAMOVI 2.0. The chi-square test, Fisher's exact test, Mann-Whitney test, Test T, and Pearson's correlation coefficient were used. An alpha value of 0.05 was adopted in the bivariate analyzes among AL, ERL, demographic factors, SF-36-BR, PSQI-BR, and ESS-BR questionnaires.

RESULTS

The sample consisted of 100 dentistry students, 74% women and 26% men, aged between 21 and 30 years (94%). Table 1 shows the association between AL, ERL, and the demographic characteristics of the students. The sample was primarily composed of students in their last year of dental school. Regarding the number of failures, it was possible to identify that 66% of students reported having no failures.

Table 2 presents the mean values of the domains of the SF-36-BR between the two groups of students. Vitality (AL= 30 and ERL = 35), Limitation by emotional aspects (AL= - and ERL = 33.3), and Mental health (AL = 48 and ERL = 48). The bivariate analysis between SF-36 and teaching modality (AL and REL) showed statistically significant differences for functional capacity (AL = 91.9 ± 12.8 and ERL = 86.2 ± 15.8; p= 0.01) and limitation by social aspects domains (AL = 46.1 ± 24.3 and ERL = 58.3 ± 25.1; p = 0.01). Similarly, the domains of bodily pain (AL = 57.5 ± 26.8 and ERL= 68.0 ± 23.6; p = 0.03), general health perception (AL = 50.7 ± 19.2 and ERL = 58.0 ± 17.1; p = 0.04), and vitality (AL = 34.1 ± 20.5 and ERL = 43.2 ± 21.4; p = 0.03) showed negative impacts on students' QoL before and during the COVID-19 pandemic.

Table 1 — Demographic characteristics and performance of active learning and emergency remote learning of UNIFAL-MG dentistry students.

Variable		AL	ERL	p-value
Sex; n (%)	Female	39 (70.9)	35 (77.8)	0.43*
	Male	16 (29.1)	10 (22.2)	
Age (years)	21 - 30	50 (90.9)	44 (97.8)	0.21†
	31 - 40	5 (9.1)	1 (2.2)	
Year of study; n (%)	1st	4 (7.3)	5 (11.1)	< 0.001†
	2nd	2 (3.6)	18 (40.0)	
	3rd	9 (16.4)	2 (4.4)	
	4th	17 (30.9)	16 (35.6)	
	5th	23 (41.8)	4 (8.9)	
Failed at exams	Yes	22 (40.0)	15 (33.3)	0.49*
	No	33 (60.0)	30 (66.7)	
Number of fails	None	33 (60.0)	30 (66.7)	0.71†
	1 - 4	16 (29.1)	12 (26.7)	
	≥ 5	6 (10.9)	3 (6.7)	
Academic Coefficient	< 7	16 (29.1)	10 (22.2)	0.14†
	7 - 8	21 (38.2)	26 (57.8)	
	> 8	18 (32.7)	9 (20.0)	

AL = Active learning; ERL = Emergency remote learning; *Chi-square test. †Fisher's Exact Test.

Table 3 presents the mean values of the domains of the PSQI-BR, ESS-BR between the two groups of students. The results of the ESS-BR questionnaire showed differences between the types of teaching (AL= 12.6 ± 5.33 and ERL = 10.4 ± 5.48; p = 0.04). There was no significant association between teaching modalities, according to the PSQI-BR questionnaires.

A positive correlation was identified when comparing the association between ESE and PSQI (p = 0.001, r = 0.474), indicating that the relative sleep quality of these students directly influenced the daytime sleepiness index.

DISCUSSION

The entire society needed to reorganize because of the COVID-19 pandemic. In this sense, the Brazilian dental education system, which was traditionally presential, also needed to adhere to ERL. The central theme of this study was to verify whether this change in teaching modality affected dentistry students in a Brazilian institution in terms of QoL, sleep impact, and sleepiness.

The abrupt change from face-to-face education to ERL negatively influenced the health panoramas of the research participants, as observed through the

Table 2 — Bivariate analysis of active learning and emergency remote learning according to the mean values of the SF-36 domains.

SF-36 questionnaire	Type of study	n	Min.	1st Q	3rd Q	Max.	Median	Mean	SD	p-value*
Functional capacity	AL	55	45.0	82.5	100	100	100	91.9	12.8	0.01
	ERL	45	45.0	80.0	100	100	90.0	86.2	15.8	
Physical limitation	AL	55	-	100	100	100	75.0	58.2	38.5	0.89
	ERL	45		100	100	100	50.0	55.6	41.9	
Body pain	AL	55	10.0	41.0	79.0	100	51.0	57.5	26.8	0.03
	ERL	45	10.0	52.0	84.0	100	64.0	68.0	23.6	
General health perception	AL	55	15.0	37.0	66.0	87.0	50.0	50.7	19.2	0.04
	ERL	45	15.0	47.0	72.0	87.0	57.0	58.0	17.1	
Vitality	AL	55	-	17.5	47.5	80.0	30.0	34.1	20.5	0.03
	ERL	45	10.0	25.0	65.0	90.0	35.0	43.2	21.4	
Limitation by social aspects	AL	55	-	25.0	62.5	100	37.5	46.1	24.3	0.01
	ERL	45	12.5	37.5	75.0	100	50.0	58.3	25.1	
Limitation by emotional aspects	AL	55	-	-	50.0	100	-	28.5	37.1	0.21
	ERL	45	100		100	100	33.3	40.7	44.3	
Mental health	AL	55	16.0	34.0	62.0	84.0	48.0	47.9	18.7	0.48
	ERL	45	12.0	36.0	72.0	100	48.0	51.3	21.1	

Q = quartile; AL= Active learning; ERL= Emergency remote learning; SD= Standard deviation. *Mann-Whitney test.

Table 3 — Bivariate analysis of active learning and emergency remote learning according to the mean values of the PSQI-BR, and ESS-BR questionnaire.

	Type of study	n	Mean	SD	p-value
PSQI-BR questionnaire	AL	55	8.35	3.58	0.60
	ERL	45	8.71	3.40	
ESS-BR questionnaire	AL	55	12.6	5.33	0.04
	ERL	45	10.4	5.48	

AL= Active learning; ERL= Emergency remote learning; SD= Standard deviation. Student's t test.

"functional capacity" dimension. These results differ from those of Paro[21] and Viana and Sampaio[22], who used the SF-36-BR to measure QoL. Possibly, the main justification for a negative AL score resides in the activities inherent to dentistry or its inadequate practice, such as inadequate ergonomic posture between clinical appointments and the transport of excessively heavy instruments and materials by students among different clinics and laboratories of the university. Similarly, Lins et al.[23] showed results compatible with the ERL, which presented inadequate study environments for most students. Moreover, the dimension "vitality" was one of the domains surveyed that showed the worst QoL, obtaining the worst scores in AL and ERL, respectively 30 and 35 points. Similar results were seen in Paro and Bittencourt[21], when they observed worse QoL in the vitality domain, especially among final-year students – also observed in this research. This occurrence may be related to the fact that this is a full-time course, which generates an overload of tasks, resulting in students' tiredness and exhaustion. Although this overload of activities has not been observed in the ERL, Elsalem et al.[24] found changes in habits among students, such as increased consumption of unhealthy foods and drinks, reduced hours of sleep, and practice of physical activities, explaining the drop in the "vitality" item.

The item "social aspects" also obtained a poor result regarding QoL, along with the "General health perception" dimension, showing the worst scores. To the best of our knowledge, there are no similar results in the literature. Such divergence can be justified by the current pandemic context, where students are in social isolation and a state of great apprehension due to the uncertainty of the future.

The COVID-19 pandemic scenario may explain the findings because the ERL was necessary to ensure that the academic year was not interrupted. This migration in education has led to prolonged exposure of students to computer and smartphone screens. The uncertainty of course completion can also explain the results with finalist students. Therefore, concern among university students was multicausal, leading to a drop in QoL, depression, anxiety, poor sleep quality (QoS), and stress[25].

Higher education was also affected by the COVID-19 pandemic, as shown by Alves et al.[26], in which psychological distress and health concerns were identified. Many students had symptoms of emotional distress (anxiety and depression), found it difficult to focus on household chores, and even adapt to the demands of assessment activities with curricular and

methodological changes, resulting in worse academic performance[26,27]. In our research, anxiety and external concerns were reported by some participants, which contributed to the lack of concentration and discouragement regarding the study.

College students are a risk group regarding QoL and QoS because sleep habits and patterns are modified to meet the course's curricular and extracurricular demands. Although our results did not show significant differences in the students' QoS and sleepiness index, Paro and Bittencourt[21] pointed out that the low time allocated to sleep was harmful to QoL. Thus, it is necessary to create mechanisms to improve the QoL and QoS of this population to form healthy and capable professionals, able to face the most diverse situations and not only with good academic performance[11].

Heterogeneity in the population distribution regarding the study periods between the teachings, limited financial and physical resources, and the lack of studies that evaluated QoL between AL and ERL can be indicated as partial limitations of the study or for discussing data. Despite this, statistical differences between the variables investigated were observed, suggesting the importance of more comparative studies between QoL in the academic environment and remote teaching.

CONCLUSION

Dentistry students had the worst QoL panoramas and poor relative sleep quality before and after the COVID-19 pandemic. Furthermore, QoL instruments were reliable for quantifying health-related QoL in AL and ERL.

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