

Prevalence of sleep pattern impairment post Covid-19

Prevalência de padrão de sono prejudicado pós Covid-19

Prevalencia del deterioro del patrón del sueño post Covid-19

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ABSTRACT

At the end of 2019, a pandemic brought remarkable variations in the corporal and cerebral health of individuals. The states of lockdown cause people and especially youngsters vary their methods of connecting with people and studying. Stating that youth bring with emotional, cultural, and social variations, it is significant to recognize how this pandemic could further increase these states. **Objective:** Get to know the prevalence of post-COVID 19 sleep pattern deterioration in nursing students of Technical University of Ambato cohort October 2022 – March 2023. **Methodology:** Data was collected from a statistically sample of 275 students through an online questionnaire. Sociodemographic information was gathered and two instruments were used for validation: the insomnia severity index and the Epworth sleepiness scale. **Results:** It is shown that 83.64% of the individuals showed at least one mild sleep disturbance. 76.4% of the evaluated individuals presented some insomnia problems and 57.1% have sleepiness problems during the day. A statistically linked correlation was defined among the results of the two questionnaires and women have a slight tendency to experience sleepiness compared to men. **Conclusion:** The results and the information suggest that sleep disorders are generated by a poor framework of students 'schedule. Despite this, lockdown may be a severe factor for the condition that could generate other disorders.

Keywords: Sleep quality, COVID-19, insomnia, sleepiness.

RESUMO

No final de 2019, iniciou-se uma pandemia que trouxe consigo importantes mudanças na saúde física e mental dos seres humanos. Os estados de confinamento fazem com que as pessoas, especialmente os jovens, mudem seus métodos de relacionamento e estudo. Considerando que a juventude traz consigo mudanças emocionais, culturais e sociais, é importante saber como essa pandemia pode aprofundá-las ainda mais. **Objetivo:** Conhecer a prevalência de deterioração do padrão de sono em alunos de Enfermagem da UTA pós-COVID-19 no ano letivo de outubro de 2022 a março de 2023. **Metodologia:** Recolheram-se dados de uma amostra probabilística de 275 alunos através de um questionário online. Aqui, informações sociodemográficas foram coletadas e dois instrumentos validados foram usados: o índice de gravidade da insônia e a escala de sonolência de Epworth. **Resultados:** Mostra-se que 83,64% dos participantes apresentaram pelo menos um distúrbio leve do sono. 76,4% dos alunos avaliados apresentaram algum problema de insônia e 57,1% têm problemas de sonolência diurna. Foi identificada uma correlação estatisticamente significativa entre os resultados desses dois questionários e que as mulheres têm uma leve tendência a sentir sonolência em relação aos homens. **Conclusão:** Os resultados e a literatura sugerem que os distúrbios do sono são gerados pela má organização do tempo dos alunos. Apesar disso, o confinamento pode ser um agravante dessa condição, podendo desencadear outros transtornos.

Palabras clave: Qualidade do sono, COVID-19, insônia, sonolência.

RESUMEN

A finales del año 2019 empezó una pandemia que trajo consigo cambios importantes en la salud física y mental del ser humano. Los estados de confinamiento hacen que las personas y en especial los jóvenes cambien sus métodos de relacionarse y de estudiar. Considerando que la juventud trae consigo cambios emocionales, culturales y sociales es importante conocer como esta pandemia pudo ahondar aún más en ellos. **Objetivo:** Conocer la prevalencia del deterioro del patrón del sueño en estudiantes de la carrera de Enfermería de la UTA post-COVID-19 en el ciclo académico octubre 2022 – marzo 2023. **Metodología:** Se recopilaron datos de una muestra probabilística de 275 estudiantes a través de un cuestionario en línea. Aquí se recopiló información sociodemográfica y se usaron dos instrumentos validados: el índice de severidad del insomnio y la escala de somnolencia de Epworth. **Resultados:** Se muestra que el 83.64% de los participantes presentó al menos una alteración leve del sueño. El 76.4% de los estudiantes evaluados presentaron algún problema de insomnio y el 57.1% tiene problemas de somnolencia diurna. Se identificó una correlación estadísticamente significativa entre los resultados de estos dos cuestionarios y que las mujeres tienen una leve tendencia a experimentar somnolencia en comparación con los hombres. **Conclusión:** Los resultados y la literatura sugieren que los trastornos del sueño se generan por una mala organización del tiempo de los estudiantes. A pesar de ello, el confinamiento podría ser un agravante a esta condición, que puede desencadenar otros trastornos.

Palabras-chave: Calidad del sueño, COVID-19, insomnio, somnolencia.

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This study confirms that young people have changes in their sleep patterns that may have been affected by confinement and the COVID-19 pandemic.

Originality/value:

It is one of the few studies applied to university students in Ecuador. It allows us to evaluate the effects that the pandemic could have had on sleep patterns considered normal.

INTRODUCTION

Over December 2019 in Wuhan, China, it was discovered a new virus called SARS-CoV-2 that produced a disease called COVID-19. This illness cause respiratory infections that also affects cardiovascular system and generates decompensation (Medina-Ortiz et al., 2020). This virus got expanded worldwide provoking a sanitary emergency, that is the reason why World Health Organization (WHO) declared as pandemic. In order to stop the expansion it was recommended to constantly wash hands, use face mask and physical distance (Talahua et al., 2021).

However, hospitals services all over the world were overloaded and government decided to stablish partial or total lockdowns. This situation produced significant changes in private and public services and the education system was not the exception. Human beings need social contact and got a relation with the environment, all the situations generate behavioral and mental changes.

The exposure to stressful conditions related to lockdown or fear of be infected had a high impact on the mental health of the residents. As mentioned, (Iñiguez Jiménez et al., 2021) there was a greater use of electronic devices and the relation was mainly done remotely. When there is a dependence on technology and the use of the Internet sources, it is possible to experience adverse behavioral symptoms such as anxiety, depression and alterations in the sleep pattern (Telles & Voos, 2021). The magnitude of suffering from problems in the sleep pattern are a substantial but silent problem. Sleep includes a period of rest through which the human body enters a state of unconsciousness for a certain time, helping to restore physical and psychological utilities, to keep beneficial health and perform better during the day. Therefore, without having resting properly, the body and mind enter a process of low energy that has direct consequences on thinking and the performance of different activities (Yu et al., 2020).

According to (Lima et al., 2020) it is expected that in the planet more than 30% of children and teenagers get sleep disorders and around 40% of teenagers have few hours of rest and are tired after waking up. This can cause the presence of various pathologies such as insomnia or drowsiness, which severely affect individuals sleep quality (Angeli et al., 2021). People contaminated with COVID-19 have registered great struggle in initiating or staying slept. This could unchain the appearance of disorders such as insomnia, which could be a sequel left by the contamination with this virus. Research done shows a variety of psychosocial consequences and psychological symptoms, between which modifications in the sleep pattern highlight (Diz-Ferreira et al., 2021).

This motivated the expansion of research around the world, with China being one of the first nations that tried to detect and moderate the effects of the disease. In the study done by (Yu et al., 2020) there was a high dominance of sleep disorders in Hong Kong individuals during the COVID-19 pandemic. In their results they referenced that more than half of the sample presented modifications in the quality of sleep, insomnia or excessive daytime sleepiness. Similarly, review research (Pataka et al., 2021) stated in their searches that 30% to 35% of the general population and health professionals present sleep disorders. Nevertheless, patients hospitalized for the expansion of COVID-19 suffer bigger problems with reference to their sleep quality. They also mentioned that women had greater sleep problems compared to men. As mentioned in the study of (Telles & Voos, 2021), women, youth, and health personnel were the most disturbed due to the stressors related to COVID-19. An affectation in their normal sleep patterns of 34% was evidenced, which generated insomnia in this study individuals, since when suffering alterations as rushed as the pandemic, loneliness and even the expansion of the virus, the sleep cycle is modified fluctuating the person sleep cycle.

In Latin America there are statistics that points out that in Peru there is a fact of impaired sleep in the population (Lovón Cueva & Chegne Cortez, 2021). These are not exactly connected to contamination or issues in their corporal health, but are linked to the stress generated by public isolation, which leads to their concern for their overall health. In the same way, in the research done by (Vargas Diego; Gerena Luis; Uscátegui Lina, 2022) performed on young medical learners from Colombia, 68.21% of the applicants categorized themselves as poor sleepers, 58.96% had insomnia and 51.45% were diagnosed from daytime sleepiness in some grade.

There are some research done in Ecuador about the adverse effects that pandemic of COVID-19 has generated, showing that stress derives in sleep problems such as insomnia and stay long hours gotten up at night (Ramírez et al., 2020). According to a study done by (Iñiguez Jiménez et al., 2021) done in Quito, in a sample of 118 college students, almost 85% evidenced sleep problems during the pandemic. The study presented by (Cruz Montesinos et al, 2021) showed that young people are the most affected population with major problems with sleeping compared with children. The presence of stressful factors such as isolation and changing lifestyles before the pandemic were the reasons. The big disorder was in the sleep cycle accompanied with insomnia, that repercusses in sleep quality and school work.

In this context, it was recognized that young people are a proper population to suffer the effects of COVID-19 connected to mental health. This conducted the development of the present research that pursuit to determine if young people suffered sleep deterioration after the period of lock down or confinement. To determine which was the most common

affection that could provide data on the changes in sleep patterns. The study group were students of the nursing career of the Technical University of Ambato, Ecuador, of the academic cycle October 2022 - March 2023.

METHODS

Level or type of Research

The current research is descriptive, since it describes data and features of the studied population, without carrying out any interference (Alban et al., 2020). It also has cross-sectional research, since the assessment was given at a certain period of time, opposite to the longitudinal sample that implies supervising over time (Arias González & Covinos Gallardo, 2021). It was based on a quantitative approach because the collection and analysis of information use numerical quantities, counting and statistics to establish performance patterns of the college population of the research (Sánchez et al., 2021). Finally, the kind of research selected was a case of study using a demonstrative sample, although it does not allow the results to be universal, represents a precedent for the generation of upcoming findings (Alban et al., 2020).

Population and Sample

The study participants enrolled were students of the Nursing career of the Technical University of Ambato from the first to the seventh semester. A simple random sampling was done giving a total population of 275 students obtained with a confidence level of 95% and a margin of error of 5%. The principal sociodemographic information of the sample is described in Table 1.

Table 1. Participants' sociodemographic features.

Variable	n	%
Sex		
Female	229	83.3
Male	46	16.7
Age		
17 – 18	16	5.8
19 – 20	124	45.1
21 – 22	87	31.6
23 or more	48	17.5
Marital Status		
Single	258	93.8
Married	13	4.7
Widowed	4	1.5
Study Semester		
First	43	15.6
Second	51	18.5
Third	40	14.5
Fourth	32	11.6
Fifth	34	12.4
Sixth	44	16.0
Seventh	31	11.3
Children		
No	243	88.4
Yes	32	11.6

Source: Own elaboration with research data.

Inclusion

Nursing students that are legally enrolled in the corresponding semester and consent themselves to be part of this study.

Excluded

Nursing interns in hospitals and students who do not consent to be part of the study.

This research was developed under ethic parameters described in Declaration of Helsinki Ethical Principles for medical research involving human subjects, previous a consent to be part of this study. The participants on this research fulfill

ethical principles of confidentiality, autonomy and respect.

Data collection plan

The data collection plan was done through a survey done in the free online tool Google Forms. This survey presents sociodemographic interrogations, two validated instruments and a concluding question. Within the data, aspects such as sex, semester, age, marital status and whether or not they have children were taken into account. The first questionnaire is the insomnia severity index (ISI Insomnia Severity Index), which measures the incidence of insomnia and disorders when sleeping (Ortíz, 2021). This involves 5 items in which it shows 4 choices valued from 1 to 4, in order to show the value obtained through the addition of these giving a score starting from 0 to 28. Low values denote lack of insomnia and high values point out the opposite. This questionnaire got a Cronbach's Alpha of 0.771, which is within the preference level (0.7 to 0.9).

The Spanish version of the Epworth questionnaire (ESS Epworth sleepiness scale) was also applied, which assesses the presence of sleepiness in adults by doing certain activities (Lapin et al., 2018). It has a score from 0 to 3, where it is contemplated whether or not there is sleep during one of the actions, which by adding the selected answers will provide a total of 1 to 6 points if sleep is normal, from 7 to 8 average sleepiness and 9 to 24 in the case of pathological drowsiness. This scale had a Cronbach's Alpha of 0.806 and similarly has the acceptable range of reliability that authorizes its use. In addition, the investigators considered developing one more request because none of the mentioned questionnaires¹ includes one of the variables that the research needs, such as the time of using of technological means.

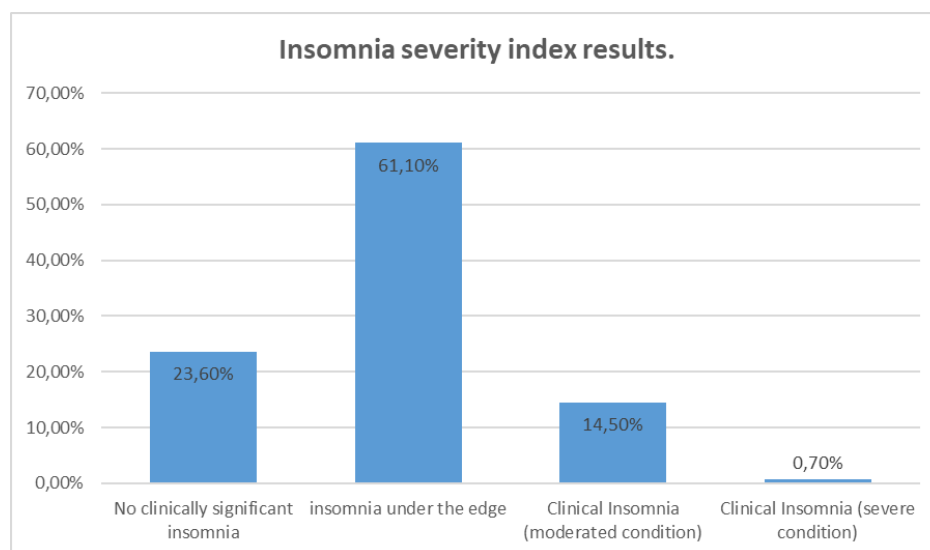
Data Analysis

This research used Microsoft Excel to save the data obtained. Therefore, the statistical program SPSS on its version 24.0 to do the analysis of the data corresponding to the results of the questionnaires. The presentations of the results were done under categories

RESULTS

After applying ISI questionnaire, the selected sample showed the results presented in Figure 1. It is evidenced that 61.1% has insomnia under the pathology, which means a beginning of the pathology, but at a reduced level, while 14,5% already presents a moderate rate of insomnia at severe. The quarter part of the sample does not show any insomnia problems and a minimum part showed severe insomnia.

Figure 1. Insomnia severity index results.



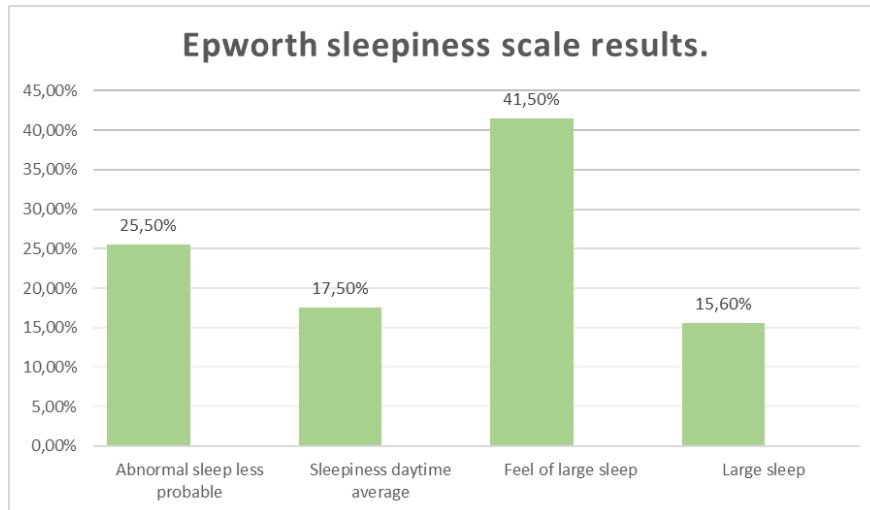
Source: Own elaboration with research data.

¹ The following link has the free access to the applied questionnaire:

https://docs.google.com/forms/d/e/1FAIpQLSehoZKADAIoyw03hIDKAeDBJzmWPPQQpKFjDDkirEd4bPBwMg/viewform?usp=sf_link

Figure 2 demonstrates the percentages got on the Epworth scale, which shows that 41.5% of the individuals could present a high level of daytime sleepiness and 17.5% have a level of sleepiness considered normal. The study keeps the tendency of the prior test, a quarter do not seem to have drowsiness problems, nevertheless, there is concern that approximately 15% have a highlighted condition. The outcomes show that 57% of the participants have daytime sleep, which may change into deficient concentration and inadequate performance in the early hours of the day.

Figure 2. Epworth sleepiness scale results.



Source: Own elaboration with research data.

When executing a correlational investigation of the validated tests and the sociodemographic variables, what is presented in Table 2 was gotten. There is a hard statistically significant correlation among the Epworth scale and the insomnia index, with a reliability level above 99%. This shows that those individuals who have a prevalence of one disorder are also susceptible to suffer from the other. Despite this, there is a low correlation of 0.389, therefore the outcomes could be generalized with caution. Including the sociodemographic variables, there was only a statistically significant correlation among the Epworth scale and gender, with a value of $-.187$. This value is moderately small and points out an inversely proportional connection that defines a greater tendency towards this situation on women.

Table 2 No parametric correlations Results. (Rho de Spearman)

Statistics		ISI Test	Epworth scale	Sex	Children	Get couple	Use of technology as hobby in leisure activities
ISI	Rho	1.000	.389**	-.018	-.058	-.059	.053
	Sig.	.	.000	.768	.341	.329	.380
Epworth	Rho	.389**	1.000	-.187**	.018	.081	.009
scale	Sig.	.000	.	.002	.770	.179	.876

Source: Own elaboration with research data.

A final interrogation linked to the prolonged use of technological devices for leisure activities was added to the questionnaire. Since (Shimray & Ramaiah, 2019) points out that the world average is about seven hours of daily use, it was recognized four hours (excluding academic activities) is a referential value that can specify excessive use. Contrary to what was expected, there was no substantial connection was found among the devices and the instruments used.

Based on the data collected, Table 3 evidences the link among the results of the two instruments used in a better way. It stands out when examining the members who have insomnia under the edge, 71.9% also present reasonable drowsiness and 58.1% severe drowsiness. This can be deduced by connecting that those people with soft problems sleeping the next day will have moderate or severe sleepiness in high quantities. Likewise, when evaluating those people with

moderate clinical insomnia, they are more likely to have severe (32.6%) and moderate (13.2%) sleepiness. Ongoing with this tendency, 44.3% of people who do not have problems falling asleep do not show sleepiness problems. Finally, for cases of severe insomnia and drowsiness, it is not probable to do an analysis because there are very few reported cases.

Table 3 Contingency table of the ISI y Epworth variables

		ISI Test			
		No clinically significant insomnia	Insomnia under the edge	Clinical insomnia (moderated)	Clinical insomnia (severe)
Epworth	Less probable impaired sleep	44.3%	48.6%	7.1%	0%
	Daytime sleepiness Average	29.3%	56.3%	12.5%	2.1%
Test	Show overly sleep	14.0%	71.9%	13.2%	0.9%
	Has overly sleep	9.3%	58.1%	32.6%	0%
Total		23.6%	61.1%	14.5%	0.7%

Source: Own elaboration with research data.

DISCUSSION

The effects that the COVID-19 pandemic has and will have effects on the human being that cannot be fully defined yet. These affectations have infected people of all ages, in (Ramos et al., 2022) a rise in long-lasting insomnia and anxiety in older adults can be evidenced. According to (Satashia et al., 2022) those individuals who were infected with COVID-19 presented severe insomnia more frequently, compared to healthy people. However, as the cited bibliography showed, there is a high incidence in the young population, which motivated this study (Kokou-Kpolou et al., 2020; Pataka et al., 2021; Yu et al., 2020). There was an elevated predominance of insomnia, among other disorders, in college students during the lockdown period, as they are at high risk of suffering sleep difficulties.

In addition, proper stress conditions typical of the professions of the health fields intensify the risk of suffering from insomnia, fatigue and stress (Sagherian et al., 2020). This may be aggravated when there is the existence of other influences such as anxiety or anguish, which were not part of this analysis. Even the excessive use of technology can cause variations in sleep patterns, as cited (Shimray & Ramaiah, 2019). However, this was not straight established in our study, but it is reflected that it can be further studied in upcoming work.

Despite almost three years since the start of the pandemic, it is not possible to know with conviction how isolation and quarantine have affected sleep patterns. Some similar studies show that mental health was deteriorated during this period (Brooks et al., 2020; Cénat et al., 2021). Few people considered sleep disorders a problem and did not associate it with the pandemic crisis. Biologically, it is known that increased physiological arousal produces activation of the hypothalamus-pituitary-adrenal axis, which directly influences the capability to sleep (Griffin et al., 2020). According to our report, 83.64% of the applicants presented sleeping troubles, that is, insomnia below the threshold and at least moderate sleepiness. This is linked to the research done by (Angeli et al., 2021), where it was found that 68.1% of the study contestants had sleep disorders. A study did in Peru (Arteaga Poma, 2021) also showed that 91% of the participants presented insufficient sleep quality.

According to our research, 76.4% of the students evaluated evidenced some insomnia issues (below the threshold, moderate or severe), which is consistent with 58% of (Fila-Witecka et al., 2022) (2021). Data showed an additional 18.4% to the current study, which could be interpreted as a post-pandemic aggravation that still needs to be examined. The ISI index works effectively in the detection and discrimination of various symptoms of insomnia, but it cannot be used as a decisive diagnosis. As mentioned, (Ortiz, 2021) this test offers subjective results of sleep patterns, so timely management by a specialist doctor is vital. Stated that this population already showed symptoms of sleep disorders in 2019 (Sivertsen et al., 2019) (pre-pandemic), it looks to be a condition that holds some independence from other factors, but could get worse.

When performing the correlational analysis of the results of the questionnaires with the sociodemographic variables, only an implication was gotten between the Epworth scale and gender (with a low correlation of 0.12). This is consistent with the study by (Ortiz, 2021) applied to students of the Gimbernat University Nursing School. Meanwhile demonstrating that 73.5% of the students suffered from some type of daytime sleepiness, they did not acquire any correlation with the

sociodemographic variables. According to (Boesl et al., 2021), 6.5% of the participants presented severe excessive daytime sleepiness, with an incidence in women. This is also stable with our study where women had a slight trend to sleepiness compared to men.

This looks to have a medical reason as indicated (Deshpande et al., 2022), since examining post-covid patients it was determined that the virus migrates from the olfactory bulb to the hypothalamus, which disturbs orexin neurons. It is plausible that the SARS-CoV-2 virus causes clinical somnolence, which requires further monitoring by scientists and doctors in the future. In 2021 at the Andrés Bello University of Chile (Guerrero G. et al., 2021), 86.3% of the students stated having a sleep disorder during the COVID-19 pandemic, even if they were not in total quarantine. The majority were women and approximately 21% used drugs to be able to sleep adequately.

There is a criteria that mentions that traveling to educational institutes includes time that students can use to have more sleeping hours of (Ortíz, 2021). This could be a palliative measure to decrease student sleepiness in the early hours of the morning. Though, virtual conditions do not assure that students attend appropriately and that with this drowsiness is reduced. In the study by (Ortíz, 2021) mentioned that changes in sleep patterns could have happened due to a compensation of hours, since young people do not sleep at the regular time due to a poor scheduled time. They also reported that approximately 30% of students present regular post-covid tobacco habit. This is also seen in (Fila-Witecka et al., 2022), where 70% of people reported a growth in alcohol ingestion due to the pandemic and this had an impact on sleep variations.

CONCLUSIONS

The evidence establish in this study covers the research objective and shows that there are variations in normal sleep patterns in the youthful people. Virtual education and quarantine can alter the activities and customs of students, who see their connections with their colleagues modified. This has a direct influence on mental health and is exposed in the sleep quality. The results show parallel with other research done recently, so it can be concluded that there is a tendency that is not limited by geographical area. Despite this, this field of study is still recent and it is necessary to extend the knowledge of all the variables and circumstances that can disturb normal sleep patterns. Finally, new research questions appear: Did virtual education change the study habits and activities of students eventually or permanently? If there is a new period of quarantine, will there be changes in the sleep patterns of the students?

Among the limitations is the research design (study case), since the specific conditions of this university could be distinctive in other institutes. In the nursing faculty there is a superior number of women, which did not allow for homogeneity in the sample by sex and this could show a tendency that cannot be seen as simple. Another aspect to consider is the cross-sectional approach of the investigation, since the answers could have been partially conditioned and biased. Perhaps, if the questionnaire is applied at later, where the virus has been eradicated or different conditions exist, the results may vary, which should be verified with more studies. Despite this, (Kalamara et al., 2022) a 6-month longitudinal study was done and it was verified that time had no effect on the ESS scale. This is reliable with what was earlier presented, since data prior to COVID-19 had a similar trend to the one we found.

An inherent limitation of this research is the COVID-19 pandemic disease itself and the effects it generates on human beings on their physical and mental welfare, which are not fully known to date. Future investigation is encouraged to perform an additional precise assessment of sleep domains as the association between sleep quality and the effects of the pandemic appears to be more complicated. Other variables that were not used in this report should be contemplated, such as fatigue, stress, depression, drug use, tobacco, and alcohol. We reassure other researchers to endure studying the effects that the pandemic could have had on human behavior, both in the didactic and specialized fields.

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	A1	A2
A. theoretical and conceptual foundations and problematization:	50%	50%
B. data research and statistical analysis:	40%	60%
C. elaboration of figures and tables:	50%	50%
D. drafting, reviewing and writing of the text:	60%	40%
E. selection of bibliographical references	50%	50%
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