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Quality of sleep and use of medication to sleep before and during the COVID-19 pandemic

Qualidade do sono e uso de medicamentos para dormir antes e durante a pandemia da COVID-19

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Summary

Objective: To assess sleep quality, and the use of medication to sleep before and during the pandemic. Methods: Cross-sectional study, with descriptive analysis, with absolute and relative frequency of the variables used, followed by their 95% confidence intervals. The Pearson's chi-square test was applied to compare groups. Results: In total, 1683 individuals were evaluated in 2019 and 2021. In both periods, the majority of participants were female. Before the pandemic, there was a prevalence of respondents aged 60 and over. After the pandemic this age group represented the minority. Sleep quality was better in the pandemic compared to pre-pandemic for both sexes, regardless of education level or fair, good, or very good health perception. When compared between groups, fewer individuals used medication to sleep during

the pandemic, but the frequency of use was higher in those who reported using these medications. Conclusion: There was an improvement in sleep quality and a decrease in the use of medication to sleep during the pandemic.

Keywords: Sleep quality, medication adherence, COVID-19, pandemics.

Resumo

Objetivo: Avaliar a qualidade do sono, o uso de medicamentos para dormir antes e durante a pandemia. Métodos: Estudo transversal, de análises descritivas, com frequência absoluta e relativa das variáveis utilizadas, seguidas de seus intervalos de confiança de 95%. O teste de qui-quadrado de Pearson foi aplicado para comparação entre grupos. Resultados: Foram avaliados 1683 indivíduos, no ano de 2019 e em 2021. Em ambos os períodos o predomínio foi feminino. Antes da pandemia, havia prevalência de entrevistados com 60 anos ou mais. Após a pandemia estes representaram a minoria. A qualidade do sono foi melhor na pandemia comparado ao pré-pandemia para ambos os sexos, independentemente do nível de escolaridade e para quem relatou percepção de saúde regular, boa ou muito boa. Quando comparado entre grupos, o uso de medicamentos para dormir foi menor na pandemia, porém durante a pandemia, a frequência de uso foi maior. Conclusão: Verificou-se melhora da qualidade do sono e diminuição no uso de medicamentos para dormir durante a pandemia.

Palavras-chave: qualidade do sono, uso de medicamentos, COVID-19, pandemias.

Introduction

Sleep is an essential phenomenon for survival, with the primary function of body and mental restoration, and having several physiological effects, including the processing of different types of memories that occur during the day¹. These factors make sleep a complex biological process, and a biological requirement for human life, mediated by neural and hormonal interactions, which alternate periods of wakefulness, acting as a restorer of organic functions, and an essential condition for the growth, learning, and functioning of the organism².

The perception of sleep quality is directly related to quality of life³. Psychological, social, and environmental alterations can disturb the quality of sleep, which can consequently change the quality of life⁴. Stress and anxiety are considered

risk factors for insomnia and for changes in sleep patterns, resulting in a relationship between difficulty sleeping and the use of medication to sleep⁵.

Treatment of sleep disorders such as insomnia may be initiated by behavioral therapy such as cognitive-behavioral therapy, pharmacological treatment, or both. The drugs most commonly used in cases of insomnia are hypnotics, anxiolytics, and sedative antidepressants, with benzodiazepines being the most widely recommended in acute cases which require an immediate reduction in symptoms⁶.

The emergence of the COVID-19 pandemic, caused by SARS-CoV-2, required the introduction of certain measures to protect against and combat this virus. Social distancing was implemented around the world with the aim of reducing the spread of the virus, but this strategy had some impacts on the health of the population, with short and long-term consequences in all dimensions of life, such as at work, in social relationships, quality of life, mental health, and aspects related to sleep quality^{7,8}.

In this sense, the objective of the current article was to evaluate the quality of sleep and the use of medication to sleep, during the COVID-19 pandemic, in the adult and older population of a municipality in Santa Catarina.

Materials and methods

Data were collected from two cross-sectional, population-based studies carried out in the municipality of Criciúma, located in the south of Santa Catarina, before (year 2019) and during the COVID-19 pandemic (2020-21). The estimated population of the city of Criciúma is 219,393 people, with a Human Development Index (HDI) of 0.788⁸.

The first study, entitled "Health of the Criciúmeno population", was carried out between March and December 2019, and the second, entitled "Mental Covid", was carried out between October 2020 and January 2021. The sampling process took place in two stages based on data from the 2010 Demographic Census⁹. The first stage focused on the random selection of census tracts, and the second stage on the selection of households. In the study carried out before the pandemic, 77 of the 306 census tracts in Criciúma were randomly selected. The number of households was sampled proportionally to the size of the sector, and visits were made to 618 systematically selected households within the census tracts. All adults in the selected households were invited to participate in the survey, resulting in a total of 820 individuals interviewed. The sampling process for "Mental Covid" was very similar to that used in "Health of the Criciúmeno population": a total of 60 census sectors were

drawn, the number of households was sampled proportionally to the size of the sector, in a total of 607 households systematically selected in the census tracts. All adults residing in the selected households were invited to participate, resulting in 863 individuals included in this study.

In both studies, interviews were carried out by previously trained professionals, and in “Mental Covid”, all interviewers wore protective equipment during field work to avoid infection/transmission of SARS-CoV-2.

The target population of these studies consisted of individuals aged 18 or over residing in the urban area of the city. Individuals unable to answer the questionnaire for physical or cognitive reasons were excluded from the study.

The outcomes studied were sleep quality and use of sleep medication. Sleep quality was assessed using the question: “How do you consider the quality of your sleep?” with the response options: very good, good, fair, poor, very poor. For analysis purposes, the variable was dichotomized into “very good/good” and “fair/poor/very poor”. Two questions were used to characterize the use of medication to sleep: “Do you take medication to sleep?” (yes/no) and “During the past month, how many times have you taken medication to sleep?”, with the response options: never during the last month / less than once a week / once or twice a week / three or more times a week.

The sociodemographic variables analyzed were: sex (male, female); age range (18 to 39 years, 40 to 59 years, \geq 60 years), skin color (white, black, yellow, brown, indigenous), marital status (single, married, separated, widowed), and schooling (0-4 years, 5-8 years, 9-11 years, 12 years or more). The participants were also asked about their self-perceived health (very good/good/fair/poor/very poor).

Descriptive analyses were performed, showing the absolute and relative frequency of the variables used, as well as their respective 95% confidence intervals (95%CI). Pearson's chi-square test was applied for comparisons between groups. A value of $p < 0.05$ was adopted to indicate a statistically significant difference. All analyses were performed using STATA software version 17.0.

The project was approved by the Research Ethics Committee of the University of Extremo-Sul Catarinense, under approval number 3.084.521. All participants who agreed to take part in the study signed the Free and Informed Consent Form.

Results

A total of 1683 individuals were evaluated, 820 in 2019 and 863 in 2021, representing a response rate of 86.1% and 75.0%, respectively. In both samples, the majority of participants were female (63.8% and 58.4% respectively) and white (80.7% and 83.2%, respectively). Before the COVID-19 pandemic, respondents were mostly aged 60 years or older (45.0%), while after the pandemic this age group represented the minority of the sample interviewed (29.7%). In both periods, the highest percentage was of married people (60.4% *versus* 55.9%). Considering the variable level of education, measured in years of study, both periods presented similar percentages, with a more expressive increase in the category of 12 years or more of study (13.9% *versus* 23.0%). When asked about how they perceive their health, there was an increase in the perception of the category very good/good (pre-pandemic: 49.6% and during: 75.1%), and, consequently, a reduction in the perception of fair and poor/very poor (Table 1).

Table 1. Sociodemographic characteristics of adults and older adults. Criciúma, Santa Catarina. 2019 and 2020.

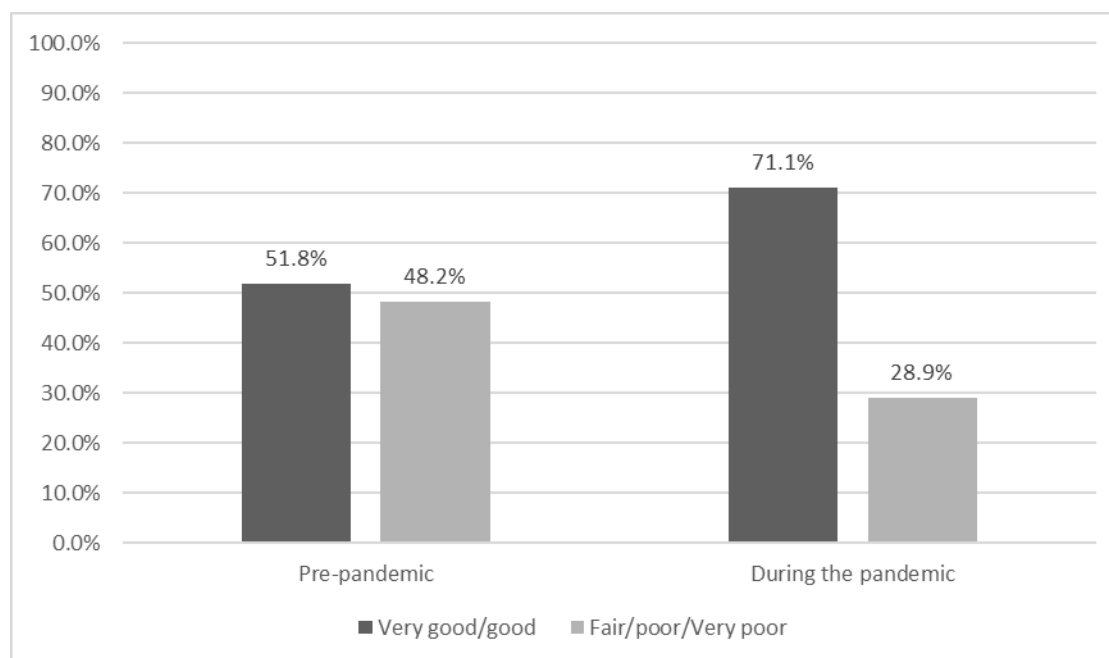
	Pre – pandemic (N=820)		During the pandemic (N=863)	
	n (%)	95%CI	n (%)	95%CI
Sex				
Male	297 (36.2)	32.9 - 39.4	359 (41.6)	38.5 – 45.0
Female	523 (63.8)	60.6 – 67.1	504 (58.4)	55.0 – 61.5
Age Range				
18 to 39 years	188 (23.7)	20.9 – 26.6	284 (32.9)	29.9 – 36.2
40 to 59 years	243 (31.3)	28.3 – 34.5	323 (37.4)	34.0 – 40.4
≥ 60 years	369 (45.0)	41.7 – 48.3	256 (29.7)	26.8 – 32.9
Skin color				
White	660 (80.7)	77.9 – 83.4	716 (83.2)	80.5 – 85.8
Black/brown/indigenous/yellow	158 (19.3)	16.6 – 22.1	145 (16.8)	14.2 – 19.5
Marital status				
Single	147 (17.9)	15.4 – 20.6	252 (29.2)	26.2 – 32.1
Married	495 (60.4)	57.1 – 63.7	482 (55.9)	52.5 – 59.2
Separated/widowed	178 (21.7)	18.7 – 24.4	129 (14.9)	12.6 – 17.5
Schooling (years)				
0 - 4	219 (26.7)	23.9 – 29.7	186 (21.6)	18.7 – 24.2
5 - 8	220 (26.9)	23.7 – 29.9	213 (24.7)	21.8 – 27.7

9 - 11	266 (32.5)	29.4 – 35.5	265 (30.7)	27.5 – 33.8
12 or more	114 (13.9)	11.5 – 16.3	198 (23.0)	20.5 – 26.1
Perception of health				
Very good/ good	406 (49.6)	46.1 – 53.0	647 (75.1)	72.4 – 78.0
Fair	300 (36.7)	33.3 – 40.0	172 (20.0)	17.3 – 22.6
Poor/ very poor	112 (13.7)	11.5 – 16.2	43 (5.0)	3.5 – 6.5

Source: Prepared by the authors.

Regarding the quality of sleep evaluated before and during the pandemic, in general, there was an improvement between the two periods (Figure 1). Before the pandemic, 51.8% (95%CI 48.3 – 55.4) reported very good or good sleep quality, while during the pandemic very good or good sleep quality was reported by 71.1% (95%CI 68.1 – 74.2) of respondents.

Figure 1 – Quality of sleep before and during the COVID-19 pandemic of the population of the city of Criciúma (2020).



Source: Prepared by the authors.

Table 2 shows the association between sleep quality according to sociodemographic and health perception variables in the two periods (pre and during the pandemic). In 2019, 56.6% of males reported very good/good sleep quality compared to 77.4% during the pandemic. This improvement was also observed in females, who went from 49.1% to 66.7%. In general, all levels of schooling showed

improvement in sleep quality during the pandemic, with a significant difference for this period ($p= 0.026$). Regarding health perception, in both evaluated periods, there was a significant association with better sleep quality for those who reported very good, good, or fair health perception. On the other hand, those who reported poor or very poor health perception presented worse sleep quality ($p<0.001$). The variables skin color, marital status, and age group did not show significant differences with sleep quality (Table 2).

Table 2. Sleep quality according to sociodemographic characteristics of the adult and older sample. 2021. Criciúma, Santa Catarina. 2019 and 2020.

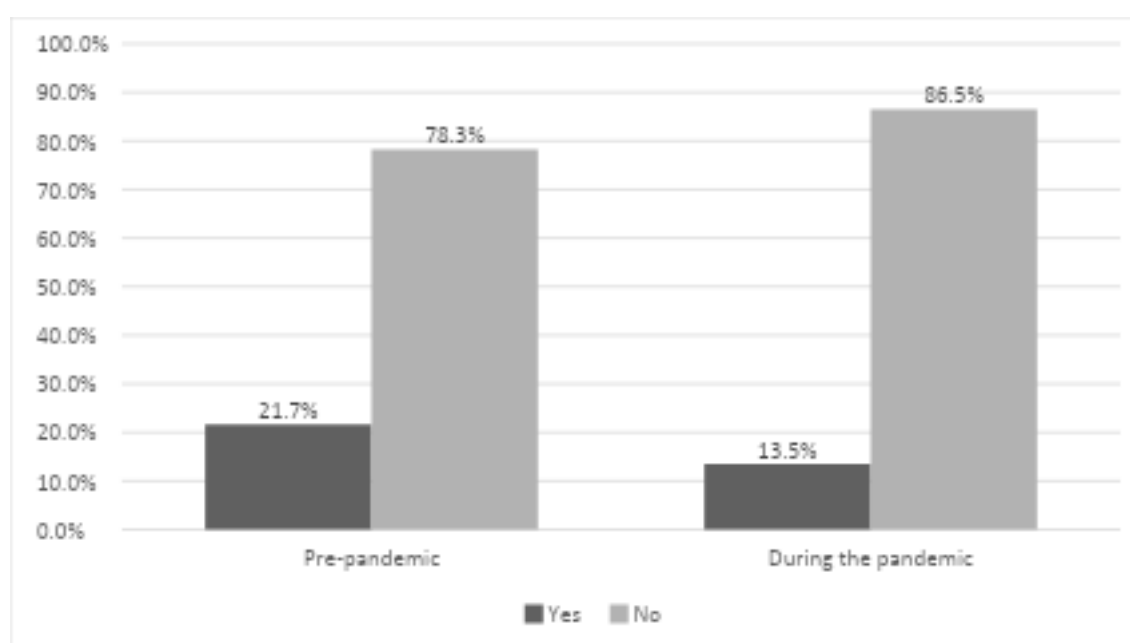
	Pre – pandemic			During the pandemic		
	Sleep quality					
	Very good/good	Fair/poor/ Very poor	p-value	Very good/good	Fair/ poor/ Very poor	p-value
Sex			0.041			0.001
Male	168 (56.6)	129 (43.4)		278 (77.4)	81 (22.6)	
Female	257 (49.1)	266 (50.9)		336 (66.7)	168 (33.3)	
Age Range						0.360
18 to 39 years	101 (52.1)	93 (47.9)	0.715	211 (74.3)	73 (25.7)	
40 to 59 years	128 (49.8)	129 (50.2)		225 (69.7)	98 (30.3)	
≥ 60 years	196 (53.1)	173 (46.9)		178 (69.5)	78 (30.5)	
Skin color			0.711			0.421
White	345 (52.3)	315 (47.7)		506 (70.7)	210 (29.3)	
Black/brown/indigenous/yellow	80 (50.6)	78 (49.4)		108 (74.5)	37 (25.5)	
Schooling (years)			0.337			0.026
0 - 4	109 (49.8)	110 (50.2)		118 (63.4)	68 (36.6)	
5 - 8	111 (50.5)	109 (49.5)		164 (76.6)	50 (23.4)	
9 - 11	136 (51.1)	130 (48.9)		94 (73.2)	71 (26.8)	
12 or more	68 (59.6)	46 (40.4)		138 (69.7)	60 (30.3)	
Marital status			0.135			0.180
Single	82 (55.8)	65 (44.2)		182 (72.2)	70 (27.8)	
Married	262 (52.9)	233 (47.1)		349 (72.4)	133 (27.6)	
Separated/widowed	81 (45.5)	97 (54.5)		83 (64.3)	46 (35.7)	
Perception of health			<0.001			<0.001
Very good/ good	260 (64.0)	146 (36.0)	1	507 (78.4)	140 (21.6)	
Fair	125 (41.7)	175 (58.3)		93 (54.1)	79 (45.9)	

Poor/very poor	40 (35.7)	72 (64.3)	13 (30.2)	30 (69.8)
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Source: Prepared by the authors.

Figure 2 shows the percentage of use of medication to sleep reported by respondents before and during the COVID-19 pandemic. In 2019, 21.7% (95%CI 19.2 – 24.7) of individuals were using medication to sleep, while in 2021, 13.5% reported their use (95%CI 11.4 – 15.8).

Figure 2 – Use of medication to sleep before and during the COVID-19 pandemic in the population of the city of Criciúma (2020).



Source: Prepared by the authors.

Table 3 presents the association between the use of medication to sleep before and during the COVID-19 pandemic and sociodemographic characteristics. The use of medication to sleep was higher in women than men in both periods, but decreased in the pandemic period in both sexes. It is noted that there was a statistically significant decrease in the use of these drugs in relation to all variables studied, with the exception of the skin color variable, which also decreased, but the p value was borderline. It should be noted that, in both periods, the prevalence of the use of medication to sleep was higher in females, in older individuals, with less schooling (0-4 years), without a partner, and with a worse perception of health.

Table 3. Use of medication to sleep according to the sociodemographic characteristics of the adult and elderly sample. Criciúma, Santa Catarina. 2019 and 2020.

	Use of medication to sleep			
	Pre – pandemic		During the pandemic	
	Yes	p-value	Yes	p-value
Sex		0.011		<0.001
Male	50 (16.9)		28 (7.8)	
Female	128 (24.5)		88 (17.5)	
Age Range		<0.001		<0.001
18 to 39 years	11 (5.7)		10 (3.5)	
40 to 59 years	63 (24.5)		57 (17.6)	
≥ 60 years	104 (28.2)		49 (19.1)	
Skin color		0.451		0.059
White	146 (22.1)		102 (14.3)	
Black/brown/indigenous/yellow	30 (19.1)		12 (8.3)	
Schooling (years)		<0.001		<0.001
0 - 4	70 (32.0)		45 (24.2)	
5 - 8	49 (22.4)		36 (16.8)	
9 - 11	47 (17.7)		17 (6.4)	
12 or more	12 (10.5)		18 (9.1)	
Marital status		0.005		<0.001
Single	18 (12.3)		19 (7.5)	
Married	112 (22.6)		60 (12.5)	
Separated/widowed	48 (27.0)		37 (28.7)	
Perception of health		<0.001		<0.001
Very good/ good	46 (11.4)		46 (7.1)	
Fair	79 (26.3)		52 (30.2)	
Poor/ very poor	52 (46.4)		18 (41.9)	

Source: Prepared by the authors.

Among individuals who reported taking medication to sleep, there was an increase in the frequency of use, with 78.1% (95%CI 71.9 – 82.3) taking medication three or more times a week before the pandemic, and 89% during the pandemic (95%CI 83.1 – 94.1) (data not shown in table).

Sleep duration was also assessed in both periods, with the category “inadequate sleep duration” reported by 52.4% of respondents before the pandemic, while during the pandemic this value was 56.8%, however this difference was not statistically significant (data not shown in table).

Discussion

Our results characterize sleep quality and the use of medication to sleep in residents of southern Brazil, before and during the COVID-19 pandemic. It was evident that the pre-pandemic population was mostly composed of older adults (people over 60 years old), women, and married people. However, during the pandemic, there was a change in the age profile of respondents, with a predominance of adults, a fact that can be explained by the restrictions imposed by the COVID-19 control measures, which allowed many people to develop their work and studies remotely, remaining in their homes, and thus enabling them to be contacted for the interview.

In general, infectious disease epidemics affect not only the physical health of patients, but also the psychological health and well-being of the quarantined uninfected population ¹¹. The emergence of sleep disturbances in response to major stressful events, including natural disasters (e.g., wildfires, earthquakes, floods) or wartime, has been previously documented ^{12, 13}. Unlike these events, which are usually very localized, the new coronavirus pandemic was a global crisis that produced unprecedented changes in the lives of individuals. For many people, it generated stress, anxiety, and significant concerns about health, social isolation, employment, and finances, in addition to the challenge of reconciling work and family obligations. It is likely that such a major stressful life event also disrupted sleep and circadian rhythms, at a time when healthy sleep is particularly important to adaptively deal with this crisis and uncertainty about the future ¹⁴.

A cross-sectional study prepared by the Oswaldo Cruz Foundation (Fiocruz) in partnership with other higher education institutions, with a sample of 45,161 people, applied in 2020, aimed to establish the factors that affect self-rated health of Brazilians

during the COVID-19 pandemic. The researchers found that worsening sleep problems showed an important association with the outcome: 16.3% reported worsening sleep problems and were five times more likely to report worsening health status when compared to people without alterations in sleep quality; 28.8% started having sleep problems during the pandemic and were three times more likely to report worsening health¹⁵. This result was different from what was seen in our study; in the period before the pandemic, 56.6% of men reported good sleep quality, while during the pandemic this prevalence increased to 77.4%, similar to what was observed among women (49.1% to 66.7%), which indicates that there was an improvement in sleep quality during the pandemic in both sexes.

On the other hand, corroborating our findings, a survey carried out with a population sample from 67 countries (2,724 participants) identified that, among individuals with pre-existing insomnia disorder, 25-28% of cases reported clinically significant improvements in the quality of sleep during the pandemic, suggesting that changes in sleep in response to the pandemic stressor are not uniform across individuals. Although the reasons for this are probably multifaceted, this improvement in sleep quality could be explained by the reduction in social and occupational pressure and the attenuation of negative mood states¹⁶.

Another justification for the improvement in sleep quality can be explained by the gain in time generated, not wasting time commuting, less working hours, and less time spent in purchases, meaning more organization for other external activities, greater exposure to daylight, and more exercise than usual, factors that are beneficial to sleep quality. In addition, there was more opportunity to develop sleep and work schedules more in line with the individual's endogenous day and night rhythm^{17,18}.

An increase in the prevalence of individuals with a very good/good perception of health was also observed in our study, with a consequent reduction in the fair/poor perception, which can be explained in part by the improvement in sleep quality, since both are interrelated. Sleep satisfaction is strongly associated with quality of life. This is, in part, due to the physiological functions of sleep, such as its multifactorial influence on the body in memory consolidation, metabolism restoration, and thermoregulation, which help maintain well-being⁴. In the older population, poor sleep quality seems to be more relevant and correlated with harm to daily life. In a study that evaluated self-perceived health and sleep, a positive association was found between a "fair" health rating and "poor" sleep quality¹⁹.

When evaluating the use of medication to sleep before and during the pandemic, a decrease in the prevalence of use of these drugs was found between the two periods studied (21.7% took medication to sleep in 2019 while in 2021 this value was only 13.5%). However, when analyzing the group that reported using these drugs, an increase in the frequency of use was observed; before the pandemic 78.1% (95%CI 71.9 - 82.3) took them three or more times a week, and during the pandemic, 89.0% (95%CI 83.1 – 94.1) used these drugs with this frequency. A multicenter survey of 22,330 adults from the general population (mean age = 41.9 years, range 18 to 95; 65.6% women) from 13 countries and four continents, conducted from May to August 2020, found significant variability in reported use of medication to sleep between countries; with respect to regular use, the lowest rates were among respondents from Jinlin-China (1.7%), France (3.4%), Italy (4.0%), Austria (4.1%), and the United Kingdom (4.7%), and the highest rates were in the USA (21.3%), Poland (13.3%), Norway (12.8%), Brazil (10.9%), and Finland (10.2%). The study pointed out that 84.0% of the sample did not use medication to sleep or reported using medication less than once a month, 8.0% used them less than one to two days a week, and 8% reported regular use (3- 7 nights a week)²⁰.

In a cohort conducted with information from one of the largest commercial health insurance databases in the US, during the period from January 1, 2018 to March 31, 2021, which aimed to assess sex differences in trends in prescribing benzodiazepines, Z-hypnotics, and serotonergics (selective serotonin reuptake inhibitors [SSRIs] and serotonin norepinephrine reuptake inhibitors [SNRIs]), which are commonly prescribed for anxiety, insomnia, and depression, an increase in prescriptions of benzodiazepines was observed from January 2020 to April 2020 among women, a period that coincides with the first wave of COVID-19, as well as an increase in the prescription of Z - hypnotics and SSRIs and SNRIs for most of 2020 during the first and second waves of COVID-19. The authors suggest that these findings indicate that mitigation measures, including social isolation and stay-at-home orders, may have negatively affected mental health, particularly among women ²¹.

One of the limitations of the study is the fact that sleep quality and medication use were self-reported; however, self-reporting is one of the most commonly used forms to collect this information in epidemiological studies ^{22- 24}. The lack of information about the drugs used is also pointed out. As strengths of the study, it is important to emphasize that there were two population-based surveys carried out with the same

target population. In addition, data collection for both studies was carried out in person, which can be considered a differential when compared to the majority of studies carried out in the pandemic scenario.

Conclusion

In conclusion, the present study pointed to an improvement in sleep quality and a decrease in the use of medication to sleep during the COVID-19 pandemic. Sleep quality was better in the pandemic period compared to the pre-pandemic period for both sexes, for all levels of education and for those who reported fair, good, or very good health perception. The prevalence of individuals using medication to sleep was lower during the pandemic period, but the frequency of use was higher.

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