Short Communication

Sleep Quality among Older Adults in Brazil during the Coronavirus Disease 2019 Pandemic: The Role of Physical Activity

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Abstract

Objectives To assess sleep quality and sleepiness among older adults after social distancing during the coronavirus disease 2019 (COVID-19) pandemic and its association with physical activity.

Materials and Methods The present cross-sectional study included a sample of 290 Brazilians aged ≥ 60 years. Subjective sleep quality and sleepiness were assessed using the Mini-Sleep Questionnaire (MSQ) and the Epworth Sleepiness Scale (ESS).

Results Of the 290 participants, 29.7% reported worsening sleep quality during the pandemic, with a mean $\pm$ standard deviation (SD) MSQ score of 31.6 ± 8.8. Worsening of the perceived sleep quality during the pandemic and previous COVID-19 diagnoses were associated with higher MSQ scores ($p < 0.001$ and $p = 0.013$ respectively). Physical inactivity was not associated with sleep quality but was associated with sleepiness ($p = 0.030$).

Conclusion It is important to develop strategies that encourage physical activity, among other modifiable health factors, to help improve sleepiness among older adults.

Keywords
► sleep
► sleepiness
► physical activity
► COVID
► aging

Introduction

In 2019, the social isolation caused by the coronavirus disease 2019 (COVID-19) significantly impacted the mental and physical health of elderly individuals in Brazil.[1] Social distancing and home isolation led to consequences that changed individual routines, causing anxiety and loss of reference, limiting autonomy, and altering participation in physical activities.[2]

The literature has reported that the worldwide pandemic and social isolation led to high levels of stress, which significantly compromised sleep quality (higher sleep latency, insomnia, night consciousness); in other words, social distancing was a determining factor in worsening the sleep quality among older adults.[3,4] In a research performed during the COVID-19 pandemic, Lipert et al.[5] reported that 64% of 1,959 adults aged > 18 years experienced worsened sleep quality during the pandemic. Factors such as staying at home, working remotely, restricting outdoor activities and social interactions, and managing the imminent risk of infection from the causative virus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), were decisive in this scenario.[6] Other research has confirmed that isolation,[7] anxiety, and female sex contributed to worsening sleep quality during the "lockdown" periods.[8,9]

In a study involving individuals ≥ 50 years old, Cordeiro et al.[10] reported that 29% of the subjects experienced worsened sleep quality, and male sex and older age were significant predictors of more sleep complaints. These findings contrast with those of previous studies, such as the one by Islam et al.,[9] in which female sex was decisive.

In a research by Kim et al.[11], 20.0% of the sample (715 adults in total, aged between 23 and 91 years) perceived worsening sleep quality during the pandemic, impaired physical capacity, and perceived stress and symptoms of anxiety and depression were highly prevalent and significantly associated.

Psychological factors such as depression and anxiety have also been reported to be predictors of poor sleep quality. In a study from Italy[8] involving 1,515 adults (with a mean age of 42 years) during the COVID-19 lockdown, 42.2% of those who experienced psychological problems also reported problems with sleep.

Data infer that quarantine altered the life habits of older adults, compromising engagement in physical activity,[12] which has been identified as a predictor of improved sleep quality.[6,13] Thus, the objective of the present study was to analyze sleep quality and sleepiness among older adults during social distancing imposed by the COVID-19 pandemic and its association with physical activity.

Materials and Methods

A cross-sectional study was performed using a convenience sample of 290 older adults (aged ≥ 60 years) from 61 Brazilian cities. Based on previous studies[10,11] that reported that between 20% and 29% of older adults experienced poor sleep quality or deterioration of sleep quality during the pandemic, the sample size was estimated considering a prevalence of 25% in older adults with sleep problems, a sampling error of 5%, and a 95% confidence level. As such, the minimum sample size was calculated to be of 289 subjects.

Participants were recruited from several sources. First, the research team announced the recruitment of volunteers on their social media platforms and sent invitations to other research groups in the university to share their personal and professional networks. Additionally, invitations were sent to institutions and groups that offer quality lifting exercises to older individuals, such as courses, physical activities, and leisure. All volunteers who fulfilled the inclusion criteria and agreed to provide informed consent were eligible to participate. The inclusion criteria were as follows: age ≥ 60 years; presenting with proper neurological and cognitive ability to respond to the questionnaire; and the ability to respond to the questionnaire using a computer or mobile device with internet access.

The present study was approved by the Research Ethics Committee of Universidade Estadual de Campinas (Unicamp, in Portuguese), Brazil (Study protocol number, 40651920.3.0000.5404); informed written consent was obtained online.

Data were collected between February and June 2021. Using the Google Forms platform, the participants filled out a self-administered online questionnaire addressing basic sociodemographic variables (such as age, sex, and years of schooling), COVID-19 diagnosis, and the current frequency of physical activity (during the pandemic: how many times per week the practice occurred), besides the type of each activity reported (if any). For the present analysis, we only considered yes (currently practicing) and no (not currently practicing) answers.

The aspects of sleep habits included current sleep quality, sleepiness, and whether there was a self-perception of worsening sleep quality during the pandemic. Sleep quality was assessed using the Mini-Sleep Questionnaire (MSQ),[14] a scale based on 10 questions, with a maximum score of 70 points, and higher scores representing worse sleep quality. The level of sleepiness was measured using the Epworth Sleepiness Scale (ESS),[15] which addresses the probability of falling asleep in eight different situations that most individuals engage in during their daily lives: sitting and reading; watching television; sitting in a public place without activities, such as waiting rooms, cinemas, theaters, and churches; as a passenger in a car, train, or subway; walking for one hour without stopping; lying down to rest in the afternoon; sitting and talking with someone; sitting after a meal without alcoholic beverages; and in a motor vehicle stopped for a few minutes in traffic. The probability of falling asleep was rated from 0 to 3 (never to high chance of falling asleep), for a total of 24 points.

Statistical Analysis

For the descriptive analysis, the MSQ score is expressed as mean $\pm$ standard deviation (SD) value, and the differences across groups of covariates were compared using the Student t-test. Because data regarding the ESS score did not adhere to a normal distribution (according to the Shapiro–Wilk test), it is expressed as median and interquartile range (IQR) values, and the Mann–Whitney U test was used to compare differences.

To analyze factors associated with sleep quality and sleepiness, a Poisson regression (log-linear) was used, considering the MSQ and ESS scores as dependent variables in models 1 and 2 respectively. Poisson regression may provide more appropriate alternatives to analyze whole counts because they tend to be non-normally distributed and highly positively skewed; moreover, the use of traditional linear regressions with nontransformed data has several shortcomings.[16] A multiple model with all covariates was performed using stepwise backward selection, and the variables that were maintained in the adjusted model were those that were significant or contributed to the estimates, such as the odds ratio (OR). The sleepiness model was additionally adjusted for the MSQ score because sleep quality can directly affect daytime sleepiness. The exponential value of β was used to calculate the OR and corresponding 95% confidence interval (95%CI); differences with $p < 0.05$ were considered to be statically significant. An Omnibus test was performed ($p < 0.001$ in both models), revealing that all independent variables collectively improved the models compared with the model with only the intercept. All tests were performed

using IBM SPSS Statistics for Windows, version 22.0.1 (IBM Corp., Armonk, NY, United States).

Results

Among the 290 participants, 70.3% were aged between 60 and 69 years, and 72.4% were female. The general characteristics of the study sample are summarized in ►Table 1.

Regarding sleep characteristics, 29.7% of the participants reported worsening sleep quality during the pandemic. The mean MSQ score was of 31.6, and no differences were observed in relation to sex, age group, years of schooling, or physical activity. Individuals with previous COVID-19 diagnoses exhibited worse sleep quality (mean MSQ: 34.3 ± 6.8) than those who did not (mean MSQ: 31.3 ± 9.0), although statistically, the difference was marginal ($p = 0.051$). Those who reported perceived worsening sleep quality during the pandemic exhibited higher mean MSQ scores (33.45 ± 8.64) than those who reported that sleep quality was better or the same (30.76 ± 8.84) ($p = 0.018$).

Regarding sleepiness, the median ESS score was of 6, and participants aged ≥ 70 years presented a lower median score (5 [IQR 4]) than younger subjects (6 [IQR 5.5]) ($p = 0.012$). None of the other covariables exhibited differences regarding ESS scores.

Table 1 Characteristics of the study sample ($n = 290$).

Variable	n	%
Age group (in years)		
60–69	204	70.3
≥ 70	86	29.7
Sex		
Female	210	72.4
Male	80	27.6
Years of schooling		
0–8	79	27.2
≥ 9	211	72.8
Previous COVID-19 diagnoses		
No	265	91.4
Yes	25	8.6
Current practice of physical activity		
Yes	171	59.0
No	119	41.0
Perceived sleep quality during the pandemic		
Same or better than before	204	70.3
Worse than before	86	29.7
Mini-Sleep Questionnaire (MSQ) score: mean($\pm$ SD)	31.6($\pm$8.8)	
Epworth Sleepiness Scale (ESS) score: median (IQR)	6 (3–9)	

Abbreviations: COVID-19, coronavirus disease 2019; IQR, interquartile range; SD, standard deviation.

The factors associated with worse sleep quality and those associated with greater sleepiness among older adults in the multiple regression models are summarized in ►Table 2. Worsening of perceived sleep quality during the pandemic was associated with higher MSQ scores ($p < 0.001$), as well as reporting previous COVID-19 diagnoses ($p = 0.013$). Physical inactivity was associated with sleepiness among older adults ($p = 0.030$), as well as reporting previous COVID-19 diagnoses ($p = 0.002$) and higher MSQ scores ($p < 0.001$).

Discussion

The results of the present study revealed the generally poor sleep quality of older adults, which, as expected, was worse among those with an increased perception of worse sleep quality during the pandemic, as well as in those with previous COVID-19 diagnoses.

These results corroborate those of previous reports from different countries and with patients in different age ranges, such as studies conducted in Israel (age range: 60 to 92 years),[7] Bangladesh (age range: 18 to 75 years),[9] the United States (age range: 23 to 91 years),[11] and Japan (age range: 20 to 86 years),[13] which also reported worsening sleep quality during the pandemic. More comprehensive research, such as the international cross-sectional study by Mandelkorn et al.,[17] which analyzed the sleep quality of 2,562 adults with a mean age of 45.18 ± 14.46 years from 49 countries, reported that 40% of the sample revealed a decrease in sleep quality during the pandemic.

Our findings revealed that most older participants engaged in physical activity during social isolation, and walking was the most practiced activity, with a frequency of four times per week (data not shown). However, it is important to note that our data collection occurred in the second year of the pandemic, when the lockdown was already suspended and public facilities, such as parks, were reopened (conditioned to the use of face masks). In addition, we did not ask whether the weekly frequency was preserved or whether the time spent devoted to activities decreased during the pandemic. Previous studies[17,18] have reported that physical activity decreased as time spent sitting increased.

In the present study, the perception of sleep quality worsened during the pandemic, and it was associated with previous diagnoses of COVID-19. Many questions remain unanswered, and some studies[19,20] have already described the long-term consequences experienced by individuals infected with SARS-CoV-2, which reinforces our findings. Huang et al.[19] conducted a survey in Wuhan, China, among individuals with a mean age of 57.0 years who had been discharged 6 months previously. The authors[19] found that, after COVID-19, individuals experienced muscle weakness in addition to difficulty sleeping (26% [437/1655]). However, studies remain insufficient in fully describing post-COVID consequences.[21]

Several studies, such as those by Sepúlveda-Loyola et al.,[12] mentioned physical inactivity and poor sleep quality in their narrative review of 41 articles ($n = 20,069$

Table 2 Results of the Poisson regression models adjusted for sleep quality and sleepiness among older adults during the COVID-19 pandemic.

	Sleep Quality		Sleepiness	
Variable	OR (95%CI)	p-value	OR (95%CI)	p-value
Years of schooling				
0 to 8 years	1.00	–	1.00	–
≥ 9 years	0.99 (0.94–1.04)	0.807	1.09 (0.98–1.21)	0.097
Sex				
Female	1.00	–	–	–
Male	0.97 (0.92–1.01)	0.174	–	–
Current practice of physical activity				
Yes	1.00	–	1.00	–
No	0.98 (0.94–1.03)	0.539	1.10 (1.01–1.21)	**0.030**
Perceived sleep quality during the pandemic				
Same or better than before	1.00	–	–	–
Worse than before	1.08 (1.04–1.14)	< **0.001**	–	–
Previous COVID-19 diagnoses				
No	1.00	–	1.00	–
Yes	1.09 (1.02–1.17)	**0.013**	0.97 (0.92–1.01)	0.17

Abbreviations: 95%CI, 95% confidence interval; COVID-19, coronavirus disease 2019; OR, odds ratio.
Notes: Sleep quality was assessed through the score on the Mini-Sleep Questionnaire (MSQ), and sleepiness, through the score on the Epworth Sleepiness Scale (ESS). The sleepiness model was additionally adjusted for the MSQ score.

individuals) from Asia, Europe, and the United States. An increase in sleep disorders during the pandemic was associated with a greater decrease in physical activity, reducing the probability of an individual meeting the guidelines for the recommended amount of time engaged in physical activity.[18] The World Health Organization (WHO) recommends that elderly individuals perform at least 150 to 300 minutes of moderate aerobic physical activity or at least 75 to 150 minutes of vigorous-intensity aerobic physical activity.[22]

In the present study, physical activity was not directly associated with sleep quality, but it was a protective factor against sleepiness; more specifically, elderly individuals who actively engaged in physical activity were less likely to nap during the day, exhibited less sleepiness during the day, and, consequently, experienced better nighttime sleep. Sleepiness was also associated with high MSQ scores. In a study involving a sample of the Brazilian population, Monteiro et al.[23] reported that older adults who walked were less likely to take daytime naps, and that irregular napping had an unfavorable effect, impacting nighttime sleep. The authors[23] also noted the deleterious effect of long-term napping and the benefits of shorter-term naps. In the present study, we did not query the participants regarding the number of hours spent napping.

The present investigation had some limitations; as such, our results should be interpreted with caution. First, the present was a cross-sectional study with a convenience sample of older adults; therefore, we cannot address causality. The online questionnaire limited the sample to volunteers with internet access and a higher level of schooling than the national average; as such, the results may not be representative of older adults with different characteristics. In addition, as noted previously, the present study was conducted after the suspension of the lockdown period; therefore, it was already possible to engage in outdoor activities, which may have weakened our results, especially regarding the lack of an association between sleep quality and physical activity. However, we have reported important results regarding the negative association between physical activity and sleepiness, which could be another important positive point to recommend physical activity to older adults beyond all other well-known health benefits.

Conclusion

In conclusion, sleep quality was worse among older adults with an increased perception of worsened sleep quality during the pandemic, as well as among those with previous COVID-19 diagnoses, and physical activity was associated with a lower sleepiness score. Because the problem of low sleep quality lacks new solutions, the results of the present study suggest that developing public policies to encourage physical activity, among other modifiable health factors, could help improve sleepiness among older adults. During periods of social isolation, such the recent COVID-19 pandemic, it is important to propose solutions that involve society and government at the federal, state, and municipal levels, especially for this segment of the population, which tends to be neglected in times of crisis.

Conflict of Interests
The authors have no conflict of interests to declare.

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