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Assessment of sleep quality and daytime sleepiness in a group of elderly people

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Abstract

The objective of the study was to evaluate the quality of sleep and daytime sleepiness of a group of elderly people, checking whether there is an association with physical activity, presence of chronic disease, and Body Mass Index (BMI) and whether there is a correlation with BMI, age and quality of life. This is a cross-sectional and descriptive study. To assess sleep quality, the Pittsburgh Sleep Quality Index (PSQI) was used, the Epworth Sleepiness Scale (ESE) was used to assess daytime sleepiness, and the WHOQOL-BREF was used to assess quality of life. 47 elderly people were evaluated with a median (interquartile range 25-75%) of 66 (62-70) years of age and BMI of 28.58 (26.21-30.44). 74.5% had poor sleep, 61.7% had Normal Daytime Sleepiness and 97.8% classified as having a good quality of life, with emphasis on the domains of social relationships (80%) and self-assessment of quality of life (80%). There was only a statistically significant association between the presence of poor sleep quality and the practice of physical activity. There was no association between the presence of poor sleep quality or sleepiness with BMI and the presence of chronic disease. There was a weak, negative and statistically significant correlation only between sleep quality and quality of life (ρ=-0.466) and age (ρ=-0.297). It is concluded that the elderly had poor sleep quality, normal daytime sleepiness and good general quality of life.

Keywords: Sleep Deprivation. Sleep-Wake Transition Disorders. Elderly Health. Quality of Life.

INTRODUCTION

Aging is part of the natural process of human development and promotes changes throughout the organism[1]. It is a progressive, dynamic and irreversible process, which occurs from birth to death. This process is linked to social, psychological and biological factors, occurring in different ways for each individual, and dependent on several factors that contribute and influence this process, such as lifestyle, socioeconomic conditions and the presence of chronic diseases. In this way, aging becomes unique for each subject, being gradual and slow in some, or accentuated and accelerated in others[2].

The proportion of people aged 65 and over is the fastest growing worldwide. In 2019, it represented 9% of the world's population and the estimate is that by 2050, there will be approximately 1.5 billion people in this age group, representing 16% of the world's population, with 80% of these in developing countries. The forecast is that by 2025, Brazil will be

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the sixth country with the most elderly people in the world[3].

The World Health Organization (WHO) establishes different ages to demarcate the beginning of old age, these differences vary from sixty-five years for developed countries and sixty years for developing countries like Brazil[4] and defines healthy aging as the process of development and maintenance of functional capacity that allows well-being in old age[5].

However, some factors can compromise healthy aging, such as sleep deprivation. This can lead to significant changes in the individual's physical, occupational, cognitive and social functioning, in addition to considerably compromising quality of life[6]. Sleep quality is an important contributor to public health as changes in sleep may be associated with chronic diseases such as cardiovascular diseases, metabolic syndrome, diabetes, cancer, mood disorders, neurodegenerative disorders, and mortality[7]. Therefore, understanding the factors associated with sleep quality is necessary in order to improve sleep quality and, consequently, quality of life.

Furthermore, the aging process causes changes in the quantity and quality of sleep, with a negative impact on the quality of life and these changes disturb the homeostatic balance, affecting psychological function, immune system, performance, behavioral response, performance in daily activities , humor and ability to adapt[8]. This homeostatic imbalance, due to these changes in sleep, leads to the appearance of mental disorders, reduced immunological competence, physical performance and adaptive difficulties, causing an increase in the vulnerability of the elderly organism and putting their lives at risk[9].

Excessive daytime sleepiness, increased number of daytime naps, feelings of restless sleep in the morning, immune suppression, decreased physical capacity, frequent falling and cognitive decline resulting from poor sleep quality are markers of poor quality of physical and mental health and are related to low quality of life[9].

Therefore, it becomes important to identify possible sleep disorders and the presence of sleepiness in the elderly that can interfere with the quality of life of this population. Analyzing the quality of life of elderly people involves understanding how they live and having information that allows them to assess their level of satisfaction according to their needs and the improvements they may need to maintain an adequate level of quality of life[10] and guarantee what is recommended by the World Health Organization in terms of quality of life as "an 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." In this context, sleep plays a crucial role in ensuring this quality[11].

Thus, the objective of the study was to evaluate the quality of sleep and daytime sleepiness of a group of elderly people, verify if there is an association with physical activity, presence of chronic disease, and Body Mass Index (BMI) and if there is a correlation with BMI, age and quality of life.

METHOD

This is a cross-sectional, descriptive study carried out in the municipality of Guarapuava -PR, from March to September 2020, with elderly active participants in the *Ativa Idade* Program (Active Age Program) linked to the Secretariat of Assistance and Social Development of the municipality of Guarapuava – Paraná

The sample was selected by convenience and included elderly people (aged 60 years or over) of both sexes, whether or not practicing physical activity.

The *Ativa Idade* program has 31 groups of elderly people divided throughout the city and the interior of the municipality, totaling around 800 registered, but not all of them regularly participated in the activities. As a result of the interruption of face-to-face activities caused by the COVID-19 pandemic, with the authorization of the person responsible for the program, 60 active elderly people participating in the project's

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remote activities were contacted and were part of a *WhatsApp* group formed from people who had this access. Of these, 47 responded to the questionnaire, corresponding to 78.3% of the elderly active in the program.

Due to the interruption of face-to-face activities caused by the COVID-19 pandemic, the questionnaires were answered via telephone. With the authorization of the person responsible for the program, sixty elderly people participating in the project's remote activities were contacted, who were part of a *WhatsApp* group, of which forty-seven responded to the questionnaire, corresponding to 78.3% of the active elderly people in the program. The main researcher got in touch by phone, initially informed about the Informed Consent Form that was sent via *WhatsApp*, and the entire interview was carried out via phone call.

Individuals with psychiatric disorders, neurological diseases and those unable to respond coherently to the proposed instruments were excluded.

Participants were interviewed using a questionnaire with questions regarding sociodemographic, anthropometric characteristics, lifestyle habits and health conditions. In this case, they were asked whether they performed any type of physical activity, that is, this information was collected through self-report, as well as the presence of any chronic disease.

Sleep quality was assessed using the questionnaire translated into Portuguese – Brazil, Pittsburgh Sleep Quality Index (PSQI), which assesses sleep quality during the last month, providing a measure of sleep quality and classifying patients among good sleepers and bad sleepers. It consists of nineteen questions, grouped into seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disorders, use of sleeping medications and daytime dysfunction; and 5 answered by his roommate, these used for clinical information. Each component scores from 0 to 3 and the responses added together will result in a score ranging from 0 to 21, in which a score closer to 0 (zero) indicates better sleep quality and closer to 21 worse sleep quality. Scores from 1 to 4 are considered good quality of sleep, between 5 and 10 points indicate poor quality of sleep pattern and scores greater than 10 presence of sleep disorder[12].

The Epworth Sleepiness Scale (ESE) was used to assess the occurrence of daytime sleepiness. It consists of a questionnaire regarding the possibility of dozing in daily life situations. There are eight everyday situations and the scale grades the probability of dozing in each situation on a score from 0 (no probability of dozing) to 3 (high probability of dozing). It has a score that ranges from 0 to 24 and scores equal to or greater than 10 are considered the presence of excessive daytime sleepiness[13].

To assess quality of life (QOL), the World Health Organization Questionnaire for Quality of Life (WHOQOL-Bref) was applied. The WHOQOL-bref instrument is the abbreviated version of the WHOQOL-100, developed by the WHO, consisting of twenty-six questions referring to four domains (physical, psychological, social relationships and environment) considering the last two weeks experienced by the respondents. Of the 26 questions, two are general quality of life questions and 24 represent specific questions related to physical aspects (pain and discomfort, energy and fatigue, sleep and rest), psychological aspects (positive feeling, thinking, learning, memory, concentration, self-esteem, image body and appearance), social relationships (personal relationships, sexual activity and social support) and environment (physical safety and security, home environment, financial resources, pollution, noise, traffic, climate, transportation and leisure opportunities)[14]. Each question scores from 1 to 5 and is transformed into a percentage, which will vary from 0 to 100%, with the higher the score, the better the quality of life, and scores lower than 60% indicating elderly people with likely worse quality of life. of life and dissatisfaction with health[15]. The practice of physical activity was assessed through self-report.

Information on body mass and height was collected through self-report, taking into account the last month prior to the interview. From this, the BMI was calculated and classified according to the cutoff points used to assess the nutritional status of elderly people, which consi-

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ders the changes in body composition that occur with aging and are therefore different from those used for adults. The cutoff points for the elderly are: low weight (BMI < 22 kg/m^2), normal weight (BMI between 22 and 27 kg/m^2) and overweight (BMI > 27 kg/m^2)[16].

The present study was approved by the Research Ethics Committee of the *Universidade Estadual do Centro-Oeste* (COMEP-UNICENTRO), under opinion number 3,888,737 of February 28, 2020. All volunteers received information regarding the study and signed the Free and Informed Consent Form.

The data were presented descriptively in absolute and relative frequency tables. Initially, the data were evaluated for normality distribution using the *Shapiro Wilk* test. Due to the assumption of normality not being met, data were presented as median and interquartile ranges 25-75%. To evaluate the association between sleep disorders and the presence of chronic diseases and the practice of physical activity, bivariate analysis was used using the Chi-square test (with *Yates* correction for cases of 2 x 2 tables with 1 degree of freedom) or test *Fisher's* exact (for cases of expected frequencies less than 5), when necessary. To evaluate the correlation between daytime sleepiness, sleep quality and quality of life, BMI and age, the *Spearman* correlation coefficient was used, classified as weak correlation ($\rho = 0.30$), moderate correlation ($\rho = 0.5$) and strong correlation ($\rho = 0.7$)[17]. The significance level adopted was 5% ($P \leq 0.05$). The SPSS 23 program was used for the analyses.

RESULTS

47 elderly people were evaluated, with a median age of 66 years (62-70). The sample characteristics are shown in Table 1.

Table 2 presents the scores obtained in the questionnaires for sleep quality (PSQI) and sleepiness (ESE) and table 3 presents the results of the participants' quality of life.

Table 4 presents the associations between the presence of sleep disorders and sleepiness with the practice of physical activity, BMI and the presence of chronic disease. Only poor sleep quality was associated with physical activity ($P \leq 0.05$).

Table 5 presents the correlation results between sleepiness (ESE) and sleep quality (PSQI) with age, quality of life and BMI. The results showed a statistically significant, negative and weak correlation between sleep quality and the physical, psychological and general domains of quality of life and age. These results showed an effect size of 8.88% of shared variance between sleep quality and age, 12.11% with the physical domain, 10.24% with the psychological domain and 21.71% with the general score of the quality-of-life questionnaire.

Table 1 - Sociodemographic. anthropometric characteristics. lifestyle habits and health conditions of elderly people participating in the *Ativa Idade* Project in Guarapuava-PR, march to september 2020.

Characteristic	Classification	N (%)
Sex	Female	44 (93.6)
	Male	3 (6.4)
Age (years)	60-69	30 (63.8)
	70-79	14 (29.8)
	>80	3 (6.4)
BMI*	Normal	8 (17)
	Overweight	27 (57.5)
	Obesity	12 (25.5)
Marital status	Married	23 (49.0)
	Divorced/Single	8 (17.0)
	Widow	16 (34.0)

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Characteristic	Classification	N (%)
Physical Activity	Yes	40 (85.1)
	No	7 (14.9)
Alcoholism	Yes	12 (25.5)
	No	35 (74.5)
Smoking	Yes	6 (12.8)
	No	36 (76.6)
	Ex-smoker	5 (10.6)
Chronic disease	Yes	36 (76.6)
	No	11 (23.4)
Medications	Yes	36 (76.6)
	No	11 (23.4)

*BMI classification according to WHO (1995)[16]: underweight (BMI < 22 kg/m^2), eutrophy (BMI between 22 and 27 kg/m^2) and overweight (BMI > 27 kg/m^2).

Table 2 - Sleep quality and sleepiness of elderly people participating in the *Ativa Idade* Project in Guarapuava-PR, march to september 2020.

	Median (25-75%)	General Classification	Distribution n (%) in relation to the classification of each questionnaire	Classification
Sleep quality (PSQI)	6 (4.5-8)	Bad	12 (25.5)	Good
			29 (61.7)	Bad
			6 (12.7)	Sleep disorder
			47 (100)	Total
Sleepiness (ESE)	7 (3.5-11)	Normal daytime sleepiness	29 (61.7)	Normal
			18 (38.2)	Excessive
			47 (100)	Total

Table 3 - Quality of life of elderly people participating in the *Ativa Idade* Project in Guarapuava-PR, march to september 2020.

	Domain	per domain %	GENERAL %	General Classification	Distribution n (%) in relation to quality of life classification	Classification
WHOQUOL-BREF	Physical	74.28	74.38	Good quality of life	46 (97.8)	Good
	Psychological	76.67				
	Social Relationships	80			1 (2.2)	Bad
	Environment	72.5				
	Quality of life self-assessment	80			47 (100)	Total

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Table 4 - Association between BMI, physical activity and presence of chronic disease with sleep quality and daytime sleepiness in elderly people participating in the *Ativa Idade* Project in Guarapuava-PR, march to september 2020.

		Sleep Quality (PSQI) n (%)					Daytime Sleepiness (ESE) n (%)			
		Good	Sleep Disorder	Bad	Total	P	Excessive sleepiness	Normal sleepiness	Total	P
IMC	Normal	2 (4.3)	3 (6.4)	3 (6.4)	8 (17.0)	0.5	1 (2.1)	7 (14.9)	8 (17.0)	0.1
	Overweight	7 (14.9)	2 (4.3)	18 (38.3)	27 (57.4)	0.08	12 (25.5)	15 (31.9)	27 (57.4)	0.7
	Obesity	3 (6.4)	1 (2.1)	8 (17.0)	12 (25.5)	0.5	5 (10.6)	7 (14.9)	12 (25.5)	0.4
	Total	12 (25.5)	6 (12.8)	29 (61.7)	47 (100.0)		18 (38.3)	29 (61.7)	47 (100)	
Practice of physical activity	No	0 (0.0)	3 (6.4)	4 (8.5)	7 (14.9)	0.1	2 (4.3)	5 (10.6)	7 (14.9)	0.5
	Yes	12 (25.5)	3 (6.4)	25 (53.2)	40 (85.1)	0.01	16 (34.0)	24 (51.1)	40 (85.1)	0.7
	Total	12 (25.5)	6 (12.8)	29 (61.7)	47 (100)		18 (38.3)	29 (61.7)	47 (100)	
Chronic disease	No	3 (6.4)	0 (0)	8 (17.0)	11 (23.4)	0.1	2 (4.3)	9 (19.1)	11 (23.4)	0.5
	Yes	9 (19.1)	6 (12.8)	21 (44.7)	36 (76.6)	0.08	16 (34.0)	20 (42.6)	36 (76.6)	0.8
	Total	12 (25.5)	6 (12.8)	29 (61.7)	47 (100)		18 (38.3)	29 (61.7)	47 (100)	

Table 5 - Correlation coefficients (ρ) between sleep quality and daytime sleepiness with age, quality of life and BMI in elderly people participating in the *Ativa Idade* Project in Guarapuava-PR, march to september 2020.

	Sleep Quality (PSQI)	Daytime Sleepiness (ESE)
WHOQOL-BREF – Physical Domain	-.348*	-.251
WHOQOL-BREF – Psychological Domain	-.320*	-.038
WHOQOL-BREF General	-.466**	-.202
Age	-.297*	-.020
BMI	.105	.116

*P≤ 0.05 **P ≤ 0.01.

DISCUSSION

This study aimed to evaluate the quality of sleep and daytime sleepiness of a group of elderly people and verify the association with physical activity, presence of chronic disease and BMI. Furthermore, it correlated sleep quality and daytime sleepiness with BMI, age and quality of life. The quality of sleep of the elderly people evaluated is generally poor (74.5%). In the study by Magalhães *et al.* (2017)[18], using the same instruments, when evaluating 128 elderly people, they also found 69.9% of them with poor sleep quality.

These results can be associated with the fact that the sleep-wake rhythm is regulated by two distinct processes: homeostatic and circadian, when they occur properly, there is a good quality of wakefulness during the day and sleep at night[18]. Some environmental parameters act in the adequate regulation of the sleep-wake rhythm, such as exposure to daylight, physical activity, meals at regular times and social interactions[19]. Circadian rhythms, however, become weaker and less responsive to external stimuli with advancing age[20]. Thus, aging is one of the phenomena that affects the regulation of the sleep-wa-

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ke cycle, both in its circadian and homeostatic components and this disorder, according to Nóbrega (2017)[21], is related to an important indicator of health status in the elderly population.

The assessment of daytime sleepiness in the elderly, in general, was normal. Changes in daytime sleepiness may possibly be associated with the presence of a sleep disorder. However, 38.3% of the elderly had a score equal to or greater than 10 points, which indicates excessive daytime sleepiness. In a similar study carried out by Magalhães *et al.* (2017)[18] found daytime sleepiness in 24% of elderly people. It is important to highlight that excessive daytime sleepiness is a secondary symptom of sleep disorders, characterized by difficulty in staying awake during the waking period and, in the health of elderly people, it is related to several adverse effects, such as functional incapacity that compromises activities. of everyday life and increases the risk of falling[22]. Thus, the importance of investigating the quality of sleep of elderly people stands out, in addition to the physical-functional aspects that may be associated with the risk of falling.

An association was only observed between the presence of poor sleep and the practice of physical activity. This contradictory result may be due to the fact that physical activity was assessed only by self-report, without the use of an objective tool for this measurement with standardization of frequency, intensity and type of modality. Therefore, the practices reported may not be sufficient to reach a threshold capable of causing physiological changes in the body that would lead to improved sleep quality.

The literature shows that regular physical activity helps improve sleep quality. According to the study by Alves, Alves and De Melo (2020)[23], with 89 active elderly people, they concluded that active elderly people mostly have a normal sleep pattern and a good disposition to carry out daily activities, thus showing that the practice of physical activities is an important factor for sleep quality.

In this context, as pointed out by Moreno *et al.* (2020)[24], who analyzed several exercise programs on sleep quality and insomnia, identified that exercise programs aimed at improving sleep should preferably be aerobic with low to moderate intensity, lasting approximately 60 minutes and a frequency of three times a week. As for resistance exercises, these should be of low to moderate intensity, but they can also be an alternative to improving sleep quality. This recommendation can then be used in the case of the elderly.

The present study did not show an association between poor sleep quality and the presence of chronic disease or altered BMI and a correlation between sleep quality and BMI was not observed. These results may have occurred due to the small sample and disagree with the findings of other studies such as those by Alves *et al.* (2020)[25], in which they report that people who have an irregular sleep pattern are more likely to have chronic diseases due to metabolic and cardiovascular changes.

These results are also contradictory regarding the relationship between BMI and sleep quality in the elderly, as aging is associated with an increase and changes in the distribution pattern of fat mass, with an increase of 20 to 30% in total body fat and this is associated with a worsening of sleep quality[26]. Disorders caused by changes in sleep/wake schedules cause a series of changes, as they influence appetite, satiety and consequently food intake, favoring excess weight due to a mismatch in the biological clock, damaging the duration and quality of sleep. Staying awake for a long time can lead to hormonal changes and increase caloric intake. Sleep loss also results in tiredness, tending to reduce the level of physical activity and alter basal metabolism[27]. In the study by Da Silva and collaborators (2020)[28], who evaluated the anthropometric factors and sleep quality of 27 elderly people, they concluded that body mass correlated positively and with statistical significance with sleep disorders, which was in disagreement with the present study.

The results showed a negative and significant correlation between sleep quality and quality of life (physical and psychological do-

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mains) and age of the participants, although weak. However, studies show that advancing age contributes to the development of insomnia and nocturnal apnea syndrome. Senescence is associated with a history of sleep problems due to a reduced ability to initiate and maintain sleep. From the fifth decade of life onwards, changes in sleep patterns such as sleep time, long sleep onset latency, short overall sleep duration, fragmented and fragile sleep and reduced amount of non-REM sleep are common[29]. Therefore, even though the results of this research do not demonstrate a strong relationship, it is important to consider sleep when evaluating elderly patients, especially when it comes to quality of life.

The aging process causes changes in the quantity and quality of sleep, with a negative impact on your quality of life, and these changes disturb the homeostatic balance, affecting psychological function, immune system, performance, behavioral response, performance in daily activities, mood and ability to adapt[8]. Uchmanowicz *et al.* (2019)[30] studied the relationship between sleep disorders and quality of life in 100 elderly patients and observed that sleep problems have a significant impact on quality of life, especially in the physical domain.

There is no quality of life if there is no good quality of sleep, as this is fundamental for the body's homeostasis, promoting harmony between the body's psychological and physiological performance[25]. However, in the present study, 97.8% obtained a score above 60 on the WHOQOL-Bref, considered a good quality of life, even with the majority of the sample (74.4%) categorized as having poor sleep or sleep disorders. This result may assume that the elderly person is used to sleeping poorly and believes it is part of the aging process.

Quality of life has a strong correlation with general health and the aging process certainly requires comprehensive attention in all aspects. Aging is a reality in most developed and developing societies, and it is a challenge for all to deal with human longevity, which makes aging an increasingly current and relevant topic from a scientific and public policy point of view.

Thus, evaluating the quality of life of the elderly makes it possible to improve the quality of services provided, select relevant treatment options or modify them, according to what is needed by each individual. We understand, based on the data studied, that sleep is an essential element that undergoes numerous changes resulting from the aging process, changes that affect several aspects of the quality of life of the elderly.

The limitations found throughout this study were the small number of participants and the sample was selected for convenience, which does not allow extrapolating the results to other populations. Furthermore, the absence of an objective assessment tool to identify physical activity level and sleep assessment such as actigraphy or polysomnography. Future studies are suggested with a larger number of elderly people, also addressing specific questionnaires to quantify the physical activity performed and objective assessment of sleep quality, in addition to the application of questionnaires on the risk of falls, since this variable may be associated with a poor functional performance due to poor sleep quality.

CONCLUSION

It is concluded that the elderly in the present study had poor sleep quality, normal daytime sleepiness and a quality of life considered good. Despite not showing an association between the presence of sleep disorders and daytime sleepiness with the presence of chronic disease and altered BMI, changes in sleep quality can favor the development of chronic diseases and weight gain and worse quality of life. This makes evident the need for a careful look and comprehensive assessment by health professionals regarding the health of the

elderly population with regard to sleep quality, aiming to deepen strategies and practices, such as sleep hygiene and physical activity, which can be applied to this population, thus promoting aging that is increasingly accompanied by health and quality of life.

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