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ORIGINAL ARTICLE

DISTURBANCE OF SLEEP IN DIABETIC INDIVIDUALS WITHOUT ULCERATION AND DIABETIC INDIVIDUALS WITH ULCERATION ON FOOT

DISTÚRBIO DO SONO EM INDIVÍDUOS DIABÉTICOS SEM ULCERAÇÃO E INDIVÍDUOS DIABÉTICOS COM ULCERAÇÃO NO PÉ

DISTURBIO DEL SUEÑO EN INDIVIDUOS DIABÉTICOS SIN ULCERACIÓN E INDIVIDUOS DIABÉTICOS CON ULCERACIÓN EN EL PIE

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ABSTRACT

Objective: to evaluate the impact of sleep disorder in diabetic individuals with and without foot ulceration. **Method:** this is a clinical, descriptive, prospective and controlled study with 100 adult diabetic patients, 50 of them without ulceration (control group) and 50 with foot ulceration (study group). The Pittsburgh Sleep Quality Index instrument was used. **Results:** mean scores for the instrument components (possible variation, 0-3) for the study versus control groups were subjective sleep quality, 2.12 versus 1.08; sleep latency, 1.62 versus 1.2; duration of sleep, 1.44 versus 1.00; usual sleep efficiency, 1.54 versus 0.68; sleep disturbance, 1.36 versus 1.06; use of sleeping medication, 1.34 versus 0.76; and daytime sleepiness and disturbances during the day, 1.58 versus 1.62. **Conclusion:** both groups had high mean scores characterized by poor sleep quality, but the diabetic patient with ulcerated feet had poor sleep quality. **Descriptors:** Diabetes Mellitus; Diabetic Foot; Quality of Life; Sleep; Nursing Care.

RESUMO

Objetivo: avaliar o impacto do distúrbio de sono em pessoas diabéticas com e sem ulceração no pé. **Método:** estudo clínico, descritivo, prospectivo e controlado, com 100 pacientes diabéticos adultos, 50 sem ulceração (grupo controle) e 50 com ulceração no pé (grupo estudo). Utilizou-se o instrumento Índice de Qualidade do Sono de Pittsburgh. **Resultados:** os escores médios referentes aos componentes do instrumento (variação possível, 0-3) para os grupos de estudo versus controle foram: qualidade subjetiva do sono, 2,12 versus 1,08; latência do sono, 1,62 versus 1,2; duração do sono, 1,44 versus 1,00; eficiência habitual do sono, 1,54 versus 0,68; distúrbio do sono, 1,36 versus 1,06; uso de medicamento para dormir, 1,34 versus 0,76; e sonolência diurna e distúrbios durante o dia, 1,58 versus 1,62. **Conclusão:** ambos os grupos tiveram altos escores médios, caracterizando má qualidade do sono, porém o paciente diabético com pé ulcerado apresentou pior qualidade do sono. **Descritores:** Diabetes Mellitus; Pé Diabético; Qualidade de Vida; Sono; Cuidados de Enfermagem.

RESUMEN

Objetivo: evaluar el impacto del disturbio del sueño en personas diabéticas con y sin ulceración en el pie. **Método:** estudio clínico, descriptivo, prospectivo y controlado, con 100 pacientes diabéticos adultos, 50 sin ulceración (grupo control) y 50 con ulceración en el pie (grupo estudio). Se utilizó el instrumento Índice de Calidad del Sueño de Pittsburgh. **Resultados:** el puntaje medio referente a los componentes del instrumento (variación posible, 0-3) para los grupos estudio versus control fueron: calidad subjetiva del sueño, 2,12 versus 1,08; latencia del sueño, 1,62 versus 1,2; duración del sueño, 1,44 versus 1,00; eficiencia habitual del sueño, 1,54 versus 0,68; disturbio del sueño, 1,36 versus 1,06; uso de medicamento para dormir, 1,34 versus 0,76; y somnolencia diurna y disturbios durante el día, 1,58 versus 1,62. **Conclusión:** ambos grupos tuvieron alto puntaje medio, caracterizando mala calidad del sueño, sin embargo, el paciente diabético con pie ulcerado presentó peor calidad del sueño. **Descriptores:** Diabetes Mellitus; Pie diabético; Calidad de Vida; Sueño; Cuidados de Enfermería.

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INTRODUCTION

Diabetes mellitus is defined as a syndrome of multiple etiology due to the lack or incapacity of insulin to adequately exercise its effects in the body.¹ Diabetes mellitus is responsible for the morbidity and mortality of a large part of the Brazilian and world population, reaching people of the most varied stages of the life cycle. However, it is known that a great part of its complications could be avoided with preventive measures, which can be done through health programs for the control of diabetes mellitus or its acute and chronic complications.²⁻³

In Brazil, wounds are a serious problem for public health due to a large number of people with chronic and degenerative diseases. However, there is no record of the number of individuals with wounds. It is estimated that 15% of patients with diabetes mellitus will develop at least one-foot injury throughout life.⁴

Diabetes mellitus among other chronic conditions is considered a public health problem due to its high morbidity and mortality, with a significant loss of quality of life.⁵ The discovery of new factors that may trigger diabetes mellitus, the relation between altered metabolism glucose and reduced sleep hours are currently under investigation.⁶ The quality of sleep reported by the individual and their impact on the daily life of healthy or sick people has become one of the main focuses of attention of the researchers, since the sleep is a physiological and behavioral process essential for the proper functioning of the body that can lead the patient to present changes in the quality of life.⁷

Knowledge of sleep quality has come to be considered an important clinical artifice for the identification of health problems,⁷ since sleep disorders can be associated with fatigue, mood changes, quality of life and reduced tolerance to pain.⁸ The difficulty in maintaining the sleep pattern for diabetics may mean more than fatigue on the next day, as it interferes with metabolic control, glucocorticoid production and glycemia, and the onset of insulin resistance. Intrinsic and extrinsic sleep disorders, to a certain extent, alter the quality of life of the diabetic and play an important role in the quality of sleep.⁶

It is believed that diabetic patients with foot ulcers have a greater difficulty falling asleep and remaining asleep than other clinical patients, since this condition is often associated with other comorbidities, such as vascular diseases and hypertension.

Therefore, hospitalization and other changes at the place of sleep may precipitate sleep disorders in these patients and exacerbate the damage caused by chronic diseases.⁹

When considering that diabetic patients, with or without foot ulceration, have sleep-related disorders and that this topic has been little explored by researchers, there is a need for a study that provides objective data about sleep quality, enabling nurses to effective strategies for the qualification of nursing care.

OBJECTIVE

- To evaluate the impact of sleep disorder in people with diabetes mellitus with and without foot ulceration.

MÉTHOD

This is a clinical, primary, descriptive, analytical, prospective and controlled study carried out at the Center for Assistance and Nursing Education (NAEFE) at the Samuel Libânio Clinical Hospital, at the Basic Health Unit of the Colina de Santa Bárbara neighborhood, and at the Basic Health Units São João, after approval by the Research Ethics Committee of the Faculty of Health Sciences "Dr. José Antônio Garcia Coutinho", under the opinion (CAAE) number 262,788.

The study included 100 diabetic patients, 50 of them were in the control group (patients without ulcer) and 50 were in the study group (patients with foot ulceration). Inclusion criteria in the control group were: age above 18 years old, diabetes mellitus type 1 and 2, the absence of ulcer. Patients older than 18 years old, with diabetes mellitus type 1 and 2 and with foot ulcer were included in the study group. The exclusion criteria for both groups were: patients with a mixed ulcer, arterial and venous, and patients who were not diagnosed as diabetic.

The data collection was performed between April 2014 and February 2015 by the researchers, in a room previously prepared, ensuring the comfort and tranquility of the patient for the emission of the answers.

Two instruments were used to collect data from the research: a questionnaire for the collection of sociodemographic data and the Pittsburgh Sleep Quality Index (PSQI) instrument.

PSQI measures the subjective quality of sleep and the occurrence of its disturbances. This instrument was developed and validated, presenting a sensitivity of 89.6% and a specificity of 86.5%. When translated and validated in Portuguese, it maintained its high

sensitivity of 80%. However, it had a slightly lower specificity of 68.8%.¹⁰

The PSQI contains ten questions, with open questions from one to four and half-open questions from five to ten. The questions are divided into seven components: 1) subjective quality of sleep; 2) sleep latency; 3) duration of sleep; 4) habitual sleep efficiency; 5) sleep disorders; 6) use of sleeping pills; and 7) daytime sleepiness and disorders during the day.¹⁰ This instrument is accompanied by the scoring instructions for each of its components. Its maximum score is 21 points. Scores higher than five indicate poor sleep quality. The overall score is determined by the sum of the scores on the seven components, each component receives a score between zero and three points.¹⁰

Data analysis was performed in the SPSS program, version 15.0. The Chi-Square test for Independence and the nonparametric Mann-Whitney test were used. For all statistical

tests, significance levels of 5% (P <0.05) were considered.

RESULTS

Table 1 shows that most of the participants in the study group were elderly people, mean age of 68 years old; 31 (62%) patients were female; 35 (70%) were unemployed; 44 (88%) were illiterate; 45 (90%) had type 2 diabetes mellitus; 41 (82%) were smokers; and 40 (80%) did not do physical activities. Regarding the control group, most patients were elderly people, with mean age of 67 years old; 40 (80%) patients were female; 28 (56%) were retired; 41 (82%) were illiterate; 47 (94%) had type 2 diabetes mellitus; 47 (94%) were smokers; and 47 (94%) did not practice physical activity. All variables presented significant differences between groups.

Table 1. Demographic characteristics of patients with non-ulcerated diabetes and diabetic subjects with ulcerated feet. Pouso Alegre (MG), Brazil, 2014/2015.

Variables	Study Group (n = 50)		Control Group (n = 50)		p-value
	N	%	N	%	
Age group					
20 - 40 years old	11	22.0	8	16.0	0.023*
41 - 59 years old	5	10.0	2	4.0	
Over 60 years old	34	68.0	40	80.0	
Average ± Standard deviation	68 ± 0.978		67 ± 0.988		
Gender					
Female	31	62.0	40	80.0	0.020*
Male	19	38.0	10	20.0	
Occupation					
Retired	5	10.0	28	56.0	0.013*
Unemployed	35	70.0	18	36.0	
Employed	10	20.0	4	8.0	
Education level					
Illiterate	44	88.0	41	82	0.045*
Complete Elementary school	3	6.0	3	6.0	
Incomplete Elementary School	2	4.0	2	4.0	
Incomplete High School	1	2.0	4	8.0	
Diabetes Type					
Type 1	5	10.0	11	22.0	0.049*
Type 2	45	90.0	39	78.0	
Smoker					
Yes	41	82.0	47	94.0	0.003*
No	9	18.0	3	6.00	
Practicing physical activities					
Yes	10	20.0	3	6.0	0.003*
No	40	80.0	47	94.0	

Qui-Square Test for Independence, * P <0.05

In Table 2, it can be observed that 45 (90%) patients in the control group usually collect between 21 and 23 hours and take to sleep between 16 to 30 minutes; 30 (60%) wake up in the morning between 5 and 6 o'clock and 45 (90%) sleep between 6 and 7 o'clock. As for

the study group, 45 (90%) go to sleep between 21 and 23 hours and they delay sleeping in 31 to 60 minutes; 30 (60%) wake up in the morning between 5 and 6 hours, and 45 (90%) sleep between 6 and 7 hours.

Table 2. Patient´s Responses to Open Questions on the Pittsburgh Sleep Quality Index (PSQI). Pouso Alegre (MG), Brasil, 2014/2015.

Open Questions	Control Group (n=50)		Study Group (n=50)		p-value
	N	%	N	%	
What time did you go to bed?					
Between 7:00 p.m. and 9:00 p.m.	5	10	2	4	0.015*
Between 9:00 p.m. and 11:00 p.m.	45	90	45	90	
Between 11:00 p.m. and 1:00 p.m.	0	0	3	6	
Between 1:00 a.m. and 3:00 a.m.	0	0	0	0	
Total	50	100	50	100	
How long did you take (in minutes) to sleep?					
Up to 15 minutes	5	10	7	14	0.019*
16-30 minutes	40	80	3	6	
31 to 60 minutes	5	10	40	80	
Less than 60 minutes	0	0	0	0	
Total	50	100	50	100	
What time did you wake up in the morning?					
Between 3:00 and 4:00 p.m.	0	0	0	0	0.013*
Between 4:00 a.m. and 5:00 p.m.	0	0	0	0	
Between 5:00 a.m. and 6:00 p.m.	30	60	40	80	
Between 6:00 a.m. and 7:00 p.m.	20	40	10	20	
After 7:00 a.m.	0	0	0	0	
Total	50	100	50	100	
How many hours did you sleep per night?					
1 to 2 hours	0	0	0	0	*0.015
3 to 4 hours	0	0	0	0	
4 to 5 hours	5	10	0	0	
5 to 6 hours	5	10	45	90	
6 to 7 hours	45	90	5	10	
Total	50	100	50	100	

Mann-Whitney Tests. *P < 0.05

In Table 3, we observed the responses of patients in the control group: for 30 (60%) participants in the research, sleep is a pleasure; 45 (90%) said they take a nap during

the day and 12 (24%) take a nap intentionally. As for the study group, sleep is a pleasure for 48 (90%) patients, 48 (96%) take a nap during the day and 10 (20%) take a nap intentionally.

Table 3. Patients' responses to closed questions regarding sleep deprivation in the Pittsburgh Sleep Quality Index (PSQI). Pouso Alegre (MG), Brazil, 2014/2015.

Closed Questions	Control Group (n=50)		Study Group (n=50)		p-value
	N	%	N	%	
What does sleep mean for you?					
Pleasure	30	60	05	10	0.021*
Need	20	40	45	90	
Total	50	100	50	100	
Do you take naps?					
Yes	45	90	48	96	0.019*
No	05	10	02	04	
Total	50	100	50	100	
If you answered yes, do you take a nap intentionally?					
Yes	12	24	10	20	0.020*
No	38	76	40	80	
Total	50	100	50	100	

Mann-Whitney Tests. *P < 0.05

In Table 4, we can observe that the mean PSQI total score in the control group was 7.40 and in the study group it was 10.68, indicating that most of the patients in both groups were in the bad category quality of sleep.

Comparing the results between the two groups, it was observed that the patients in the study group had poor sleep quality, with a significant difference between the groups.

Table 4. Total Pittsburgh Sleep Quality Index (PSQI) scores for both groups. Pouso Alegre (MG), Brazil, 2014/2015.

Total scores	Control Group (n=50)	Study Group (n=50)	p-value
Average	7,40	10,68	0,0001*
Median	7,00	10,50	
Standard Deviation	3,796	4,542	

Testes de Mann-Whitney. *P < 0.05.

Table 5 shows the mean scores for the PSQI components and the comparison between the study and control groups. In the control group, the averages related to the components were: subjective sleep quality 1.08; sleep latency 1.2; duration of sleep 1.00; habitual sleep efficiency 0.68; sleep disturbance 1.06; use of sleeping medication 0.76; and daytime somnolence and disorders during the day, 1.62. Regarding the Study group, the mean scores for the components were: subjective sleep quality 2.12; sleep latency 1.62;

duration of sleep 1.44; usual efficiency of 1.54; sleep disturbance 1.36; use of sleeping medication 1.34; and daytime somnolence and disorders during the day, 1.58. These findings enable to verify that most patients in both groups underwent changes in the components, characterizing poor sleep quality. Comparing the results between the two groups, it was observed that the patients in the study group had higher scores on the components of the instrument, configuring worse sleep quality in relation to the control group.

Table 5. Scores for the components of the Pittsburgh Sleep Quality Index in both groups. Pouso Alegre (MG), Brazil, 2014/2015.

Instrument components	Control Group (n=50)	Study Group (n=50)	p-value
Subjective sleep quality			
Average	1.08	2.12	0.018*
Medium	1.00	2.00	
Standard deviation	0.601	2.980	
Sleep latency			
Average	1.20	1.62	0.049*
Medium	1.00	1.50	
Standard deviation	1.178	0.901	
Duration of sleep			
Average	1.00	1.44	0.013*
Medium	1.00	1.00	
Standard deviation	0.926	0.787	
Habitual sleep efficiency			
Average	0.68	1.54	0.001*
Medium	0.00	1.50	
Standard deviation	0.978	0.908	
Sleep Disorder			
Average	1.06	1.36	0.032*
Medium	1.00	1.00	
Standard deviation	0.424	0.875	
Use of sleeping pills			
Average	0.76	1.34	0.007*
Medium	0.00	1.00	
Standard deviation	1.302	0.776	
Daytime sleepiness and disturbances during the day			
Average	1.62	1.58	0.045*
Medium	2.00	2.00	
Standard deviation	1.067	0.785	

Mann-Whitney Tests. *p < 0.05.

DISCUSSION

In this century, the elderly population in Brazil has been growing faster than any other age group, which draws the attention of several researchers to the characteristics of these individuals, many of whom have chronic diseases, such as hypertension, diabetes mellitus, cardiovascular, among others. Old age is presented differently for each individual since it is a heterogeneous

process. Also, it brings changes in the habitual sleep pattern, being the most common complaint among the elderly with chronic diseases, and a change in the quality of life of these individuals as consequence.¹¹⁻³

In this study, in both groups, there was a predominance of the female gender, 35 (70%) patients in the study group were unmarried and 32 (64%) were widowers; 35 (70%) of the patients in the study group were

unemployed and 28 (56%) patients in the control group were retired. Most individuals in both groups were illiterate, had type 2 diabetes mellitus, were smokers and did no physical activity. These results coincide with those of several studies.^{1,3-4,6,8,14-17}

Diabetic foot is a chronic complication of diabetes mellitus, characterized by infection, ulceration, and destruction of the deep tissues associated with neurological abnormalities and various degrees of peripheral vascular disease in the lower limbs. This condition has a great social and economic repercussion, due to amputations that generate incapacities for work, absenteeism to work, the high cost associated with its control or treatment, and its acute and chronic complications.¹⁷ When the individual is elderly, all these situations may worsen and lead to difficulty in self-care, poor sleep quality and a drop in quality of life.

The low level of education is certainly a negative factor for the need for self-care of elderly individuals, especially those with chronic diseases since they have to deal with sometimes complex drugs, dressings, and diets. On the other hand, the whole dynamics of life can be different when they have a high level of education, such as more job opportunities and a higher salary. There must be a certain amount of intellectual capacity for the mind to receive, record, analyze and apply new information and in special cases, such as illiteracy, it is necessary to make adaptations during the implementation of health education.¹⁷

Another factor unfavourable to diabetics is the use of cigarettes, which increases fat concentration at the abdominal level, reduces insulin sensitivity and raises glucose concentration too much, generating a deficiency in healing. Smoking should be avoided; 95% of all foot amputations occur in smokers, being a traumatic procedure that could be avoided. As previously mentioned, foot ulcer causes suffering, resulting in changes in style and quality of life and sleep, hindering for individuals to exercise their social, leisure and family activities, as well as causing absenteeism at work and even loss of labor functions in productive age.¹⁸⁻²¹

Physical activity positively interferes with sleep quality. For older diabetics, physical exercise has been shown to be beneficial in sleep problems related to circadian rhythm disturbance, so regular physical activity seems to result in increased depth and duration of sleep.²²

Regarding the quality of sleep evaluation done in this study, we had the result that the total score of the Pittsburgh Sleep Quality Index presented the mean in the study group of 10.68 and in the control group of 7.40. The mean scores for the components of the Pittsburgh Sleep Quality Index were between 0.68 and 2.12; both groups presented high scores (above 5), which means that the majority of patients in both groups investigated had poor sleep quality. Comparing the results between the two groups, the group of diabetic patients with ulcerated feet had poor sleep quality.

In a study investigating the incidence of sleep in people with chronic leg ulcers in which 52 patients participated, 69% of patients reported a change in sleep pattern, 88% reported that they woke up at least once during the night. The results suggest that most patients with leg ulcers have altered sleep quality either as a direct consequence of wound pain or because of treatment-related problems or psychological problems associated with the wound. This has important implications for the quality of life of the patient and also for the healing process.¹⁴

In another study, in which the authors evaluated sleep quality in patients with diabetes and ulcerated feet, 36 (36%) patients were found to have a Pittsburgh Sleep Quality Index score of less than 5, meaning the good quality of sleep and 64 (64%) had poor sleep quality. The frequency of bedtime was between 21 and 23 hours in 53 (53%) patients; 63 (63%) presented the delay to start sleep from 31 to 60 minutes; 53 (53%) woke up after 4 to 5 hours of sleep; 41 (41%) slept on average 4 to 5 hours a night; and 60 (60%) patients considered sleep as a necessity. The authors concluded that most of the patients studied with venous ulcers presented poor sleep pattern quality.²³

Changes in the pattern of sleep and rest in the diabetic elderly have repercussions on the psychological function, immune system, performance, behavioral response, mood and adaptive ability. Complaints about shortening of nocturnal sleep, early awakening in the morning, difficulty initiating or maintaining sleep, daytime sleepiness, increased naps, cognitive impairment and daytime performance are common.²⁴

In a study in which the authors analyzed the fragility and sleep disorders in an elderly population, it is revealed that the majority of the elderly (66.3%) dozed during the day, on average 56.49 minutes. Approximately 10.4% of the elderly used sleeping

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medication; 47.6% woke up early; 32.1% had difficulty maintaining sleep; 37.0% on initiating sleep; 31.4% presented non-restorative sleep and 68.5% reported having some sleep disorder.²⁵

The nap can be planned or not. Intentional naps can occur due to any drowsiness or lifestyle changes that allow sleeping during the day, as is the case, for example, in the post-retirement period. Unintentional naps during the day are more related to pathological conditions. Recent findings indicate that the presence of comorbidities is highly associated with the likelihood of an older person reporting unplanned regular naps.²⁶⁻⁷ As for the habit of napping, that is, having periods of sleep during the day in the question number 10 of the Pittsburgh Sleep Quality Index, most study participants consider sleep as a necessity and not as a pleasure; nap during the day and feel that nap is a necessity. Most patients slept 4 to 6 hours a night.

An adult needs approximately seven hours of sleep and this number tends to be reduced with the aging process. It should be noted that the number of hours from one individual to another may vary, as some people may feel rested after a reduced number of hours of sleep.²⁶ Thus, when the components of the Pittsburgh Sleep Quality Index, in the overall score, they are assessed conjointly, one can understand the association between them, since a person who has slept less than five hours a night and taken more than thirty minutes to sleep is considered to have poor sleep quality and, consequently, they may experience drowsiness during the day and feel the need to take a nap.

To assess whether sleep quality is adequate, one should determine its pattern. To do this, healthcare professionals should investigate patients' routines to determine the time they go to sleep, the time it takes them to fall asleep, the length of sleep, the number of times they wake up at night, how long lead to a return to sleep and the time they take up.²⁷⁻³⁰ As a result of poor sleep quality, there is a need for a nap during the day, which may be a necessity for some, but at the same time, it can cause disturbances in nocturnal sleep.

The findings of this investigation reinforce the relevance of the subject since there are no specific instruments for the evaluation of the sleep of people with wounds. On the other hand, the results allow health professionals to expand their knowledge about the factors that make sleep difficult in the search for effective

interventions to improve the sleep pattern of diabetic patients with foot ulceration.

CONCLUSION

The presence of an ulcer in the foot contributed to worsening the sleep pattern of diabetic patients. It can also be observed that the patients in this study in both groups presented poor sleep quality, and in diabetics, with the ulcerated foot, the quality of the sleep pattern was worse. Therefore, this research reaffirms the need for attention to the health of diabetic patients with the ulcerated foot as holistic, universalized and redirected, seeking to identify, in the context of health services, whether in hospitals, outpatient clinics, and home care, among others, the presence of alterations in the sleep pattern. It is also important to identify the primary care needs and the caregiver's knowledge to deal with patients' disabilities.

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