

ORIGINAL PAPER

Incidence and Types of Sleep Disorders in Patients with Stroke

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Introduction. Sleep disorders (SD) after stroke (stroke) are common occurrences, and most often in sleep apnea, insomnia and daytime sleepiness. **Goals.** Research goals were to determine the types of SD and their frequency in patients with stroke in relation to the type of stroke and side of lesion. **Materials and methods.** The study analyzed 200 patients with acute stroke hospitalized in the Clinic of Neurology, University Clinical Centre Tuzla in the period from 1st August 2007 to 1st June 2008. All patients have confirmed the existence of stroke by computerized tomography. SD was verified according to the General Curriculum of sleep, the Berlin questionnaire and Epworth scale. Stroke, by type, were divided into hemorrhagic and ischemic, and the localization of the stroke to right and left cerebral hemispheres. **Results.** Of the total number of respondents, 78% had SD. Very serious level of SD had 42% of respondents, 20% moderate, and 16% of medium-severe degree. There was no statistically significant differences in the frequency of SD among patients with ischemic and hemorrhagic stroke (76.8%: 82.5%, $p=0.58$). In relation to the side of lesion there was more patient with SD and stroke in the right cerebral hemisphere, but there were no statistically significant differences (39.5%: 33%, $p=0.1$). According Epworth scale sleep apnea and snoring was present in 86%, daytime sleepiness in 49.5% and narcolepsy 0.5%. **Conclusions.** Sleep disturbance as a neuropsychological disorder has a significant incidence in the acute phase of stroke. SD is slightly more common in hemorrhagic stroke and stroke in the right hemisphere. Sleep Apnea and snoring are the most common types of SD in patients with stroke. **KEY WORDS:** SLEEP DISORDER, STROKE

occurs in 70-85% of cases, and develops due to the inability of supply to brain tissue oxygen and glucose due to the blockage of vessel. If there is hemorrhage within the brain mass, there is intracerebral hemorrhage, which accounts for 15-20% of stroke cases (3).

SD is frequent companion of stroke, both ischemic and hemorrhagic ones. In patients with stroke the most common SD are sleep apnea, insomnia and daytime sleepiness and can be easily identified. SD is often undervalued situation and unjustifiably ignored in the diagnosis and treatment (4). These disorders, when they occur, further reducing the functionality and significantly affect the reduction in quality of life for these patients. It was reported that people who snore loudly have 67% higher risk for stroke and 34% risk for heart disease compared to people who do not snore. The presence of quiet snoring does not pose a high risk for heart disease and stroke (5). Retrospective studies suggest that disturbed sleep and sleep apnea is associated with increased prevalence of stroke (6). Obstructive apnea is very common condition in patients with stroke and found in more than half of patients with stroke (7). Link between obstructive apnea and stroke is complex and there are more common risk factors. There are numerous mechanisms by which the state of obstructive apnea contributes to increased risk of stroke. Obstructive apnea is a risk factor for hypertension, atrial fibrillation and diabetes, which in turn are risk factors for stroke (8).

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1. INTRODUCTION

Sleep is defined as a periodic and temporary interruption of alertness in which the motor inactivation is almost complete, an awareness of the surrounding is maximally reduced, and increased is reactivity and reflex irritability threshold (1). Sleep Disorders (SD) occurs in all age groups and significantly affect the quality of life of people. The most common SD is insomnia, and

it is considered that 30% of the population suffers from insomnia. Also, it is considered that there is high prevalence of SD, but also, it is rarely diagnosed (2).

Stroke is defined as a state of acute disorder of cerebral circulation with transient or permanent brain dysfunction. The basic division of stroke is according to the type of pathological process, whereby we differ hemorrhagic and ischemic stroke. Ischemic stroke

2. GOALS

Research goals were to determine the types of SD and their frequency in patients with stroke in relation to the type of stroke and side of lesion.

3. MATERIAL AND METHODS

The study analyzed 200 patients with acute stroke hospitalized in the Clinic of Neurology, University Clinical Centre Tuzla in the period from 1st August 2007 to 1st June 2008. All patients have confirmed the existence of stroke by computerized tomography. SD was verified by the General Curriculum of sleep (9), the Berlin Questionnaire (10) and Epvort scale (11). Stroke by type was divided into hemorrhagic and ischemic, and the localization on his right and left cerebral hemispheres.

3.1. Questionnaires

A general questionnaire about sleep

A general questionnaire on sleep was adapted from the general questionnaire on sleep and wakefulness with the assessment Stanford University, which is used in sleep-disorders center, New Jersey, United States. This questionnaire evaluated the following data: sociodemographic (name, age, sex, and occupation), data on sleep patterns, social habits before going to sleep, daytime sleepiness, social history, chronic somatic diseases and medical information (9). The questionnaire has a total of 46 questions. The scale is completed by the examiner by marking offered answers to questions with “yes” or “no.”

The Berlin questionnaire

The Berlin questionnaire includes 10 questions about the risk factors for apnea in sleep, including snoring, waking drowsiness or fatigue, obesity and hypertension (10). The scale was completed by the examiner by the circled answers.

Epvort scale

Epvort scale is designed to identify problems of drowsiness and sleep. It consists of 4 parts, which are analyzed: drowsiness during daily activities, sleep apnea/snoring, narcolepsy and other sleep behaviors (twitches and tingling of limbs during sleep, teeth grinding, walking and talking in his sleep). Scoring and analysis was carried out according to the enclosed key. Ranking of an-

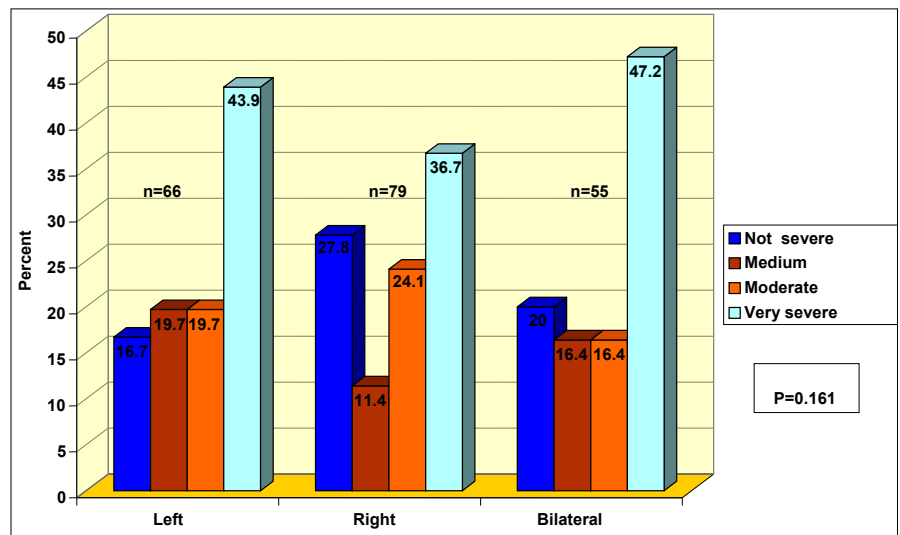


FIGURE 1. Distribution of patients according to their degree of sleep problems and side of lesion

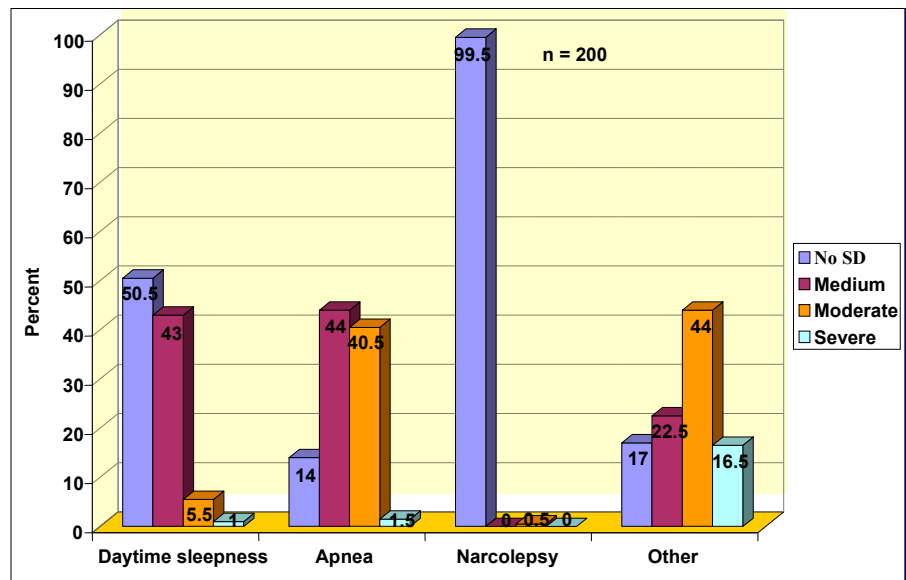


FIGURE 2. Distribution of patients according to types of sleep disorders by Epvort scale

swers is done as follows: 0 = never, 1 = rarely 2 = sometimes 3 = often 4 = usually (11). The scale is completed by the examiner.

3.2. Statistical analysis

Descriptive data were statistically analyzed using the χ^2 test (chi-square test) and test of proportions. When testing statistical hypotheses as significant was considered the level of $p < 0.05$. All calculations were conducted using the program for statistical data processing Arcus Quickstat Biomedical. The study was approved by the Ethics Committee of the University Clinical Centre Tuzla.

4. RESULTS

This prospective study found that 78% of patients had SD. Very serious level of SD had 42% of respondents, 20%

moderately severe and 16% of medium-severe degree. In 22% of respondents there were no symptoms of SD.

In patients with ischemic stroke 76.8% of patients had SD, and 82.5% of patients with hemorrhagic stroke. There was no statistically significant differences in the frequency of SD between patients with ischemic and hemorrhagic stroke (76.8%: 82.5%, $p = 0.58$).

In relation to the side of lesion 33% of patients had a stroke in the left hemisphere, and in the right 39.5%, in both hemispheres stroke had 27% of patients. It has been statistically determined that the frequency of SD in patients with stroke does not depend on the lesion side ($\chi^2 = 1.98$, $P = 0.161$) (Figure 1).

Analyzing the SD by Epvort scale the results showed that daytime sleep-

iness was present in 49.5% of respondents. Test of proportions found that the proportion of patients who have daytime sleepiness are not significantly different from the proportions of patients who have this problem ($p=0.833$). Sleep apnea and snoring was present in 86% of patients. Test of proportions was found that the proportion of patients who have sleep apnea and snoring was significantly higher than the proportion of patients who do not have apnea ($p<0.0001$). Of the total number of analyzed patients narcolepsy was present in 0.5% of respondents. Other SD, which included periodic limb movements, restless leg syndrome, teeth grinding, walk or talk during sleep had 82.5% of respondents (Figure 2).

5. DISCUSSION

Structural lesions in the brain, such as stroke, trauma and other can result in refractory SD (12). Patients with stroke, primarily ischemic, can suffer from several types of SD and its manifestations may depend on the specific neurological deficits (13). SD is present in 30% of the general population. Despite the high prevalence SD is considered to be rarely diagnosed (2).

In the study, Wierzbicki et al. analyzed 43 patients with stroke. SD in the above study has been reported in 35 patients. In left hemisphere lesions had 19 patients, 16 in right, while other patients had lesions in both hemispheres. The results of this study are similar to ours and show that side of lesion has no association with SD (14).

In the study of Elwood et al. tested were 1986 subjects, and was shown that it is 50% higher risk of stroke in patients in whom there was a form of SD (11). According to a prospective study of 152 patients with acute ischemic stroke, by Bassetti et al. confirmed that patients with acute ischemic stroke have high frequency of sleep disorders (72%), and in many cases sleep disorders preceding stroke and transient ischemic attack (6).

The research results by Bilwise et al. showed significant frequency of daytime sleepiness in patients with stroke (15). In the study by Cassels was also followed the presence of daytime sleepiness as an independent risk factor for stroke. Epworth scale was used for day-

time sleepiness, which confirmed the presence of this problem in more lenient level of 47% of patients, while in 9% of patients reported heavier degree of daytime sleepiness (16). This study indicates, together with other studies, that there is 4.5 times higher risk of stroke in those individuals who have a more severe level of daytime sleepiness, whereas the risk decreased significantly, to 2.6 times, with people who have mild forms of a given problem.

The narcolepsy affects about 1:2000 of the population in the USA, and in Japan 1:600. Patients with less severe forms of the disease, often remain undiagnosed (17). Scammell et al. presented the case of a young man who had a secondary narcolepsy after an extensive stroke in the hypothalamus (18).

Elwood et al. in their research analyzed the SD after stroke, following the presence of periodic limb movements in sleep, the presence of restless legs syndrome, burksism, and snoring. The study was conducted over ten years in 107 patients with stroke, aged 55-69 years. The study used the questionnaire on sleep patterns, and who meet the partners of the respondents. More than a third of respondents reported at least one symptom of SD (15).

According to the present results SD have a high incidence in patients with stroke and thorough assessment of health status of patients with stroke involves an analysis of SD. The contribution of our study is that the SD are partially confirmed the results of previous research and we are at the forefront of exploring the region pointed to the importance of SD as neurologic disorders in patients with stroke.

The main shortcomings of our study were: 1) data on the sleep of subjects before the occurrence of stroke have taken a history from the subjects or their families, rather than specific tests for SD, 2) control test by computerized tomography of the brain is not made to all respondents.

6. CONCLUSION

Sleep disorder (SD) as a neuropsychological disorder has a significant incidence in the acute phase of stroke. SD is more common in hemorrhagic stroke and stroke in the right hemi-

sphere. Sleep Apnea and snoring are the most common types of SD in patients with stroke.

REFERENCES

1. Iłanković N. Spavanje i poremećaji spavanja. U: Kecmanović D. Psihijatrija, tom II. Beograd-Zagreb; Medicinska knjiga. 1989: 1142-1176.
2. Kostić V. Spavanje i poremećaji spavanja. U: Kostić V. Neurologija za studente medicine, Beograd: Libri edicorum. 2007: 185-189.
3. Dimitrijević J. Vaskularna oboljenja nervnog sistema. U: Kantardžić DŽ. (urednik). Klinička neurologija, Izdanje, Sarajevo: Svjetlost. 2001: 263-292.
4. Silverberg DS, Oksenberg A, Iaina A. Sleep related breathing disorders are common contributing factors of the production of essential hypertension but are neglected, underdiagnosed and undertreated. *Am J Hypertens*. 1997;10: 1319-1325.
5. Dunai A, Keszei A, Kopp M, Shapiro C, Mucsi I, Novak M. Loud snoring associated with higher stroke and heart disease risk. *Sleep*. 2008; 31(03): 411-416.
6. Elwood P, Hack M, Pickering J H, Gallacher J. Sleep disturbance, stroke, and heart disease event: evidence from the Caerphilly cohort. *J Epid Comm Health*. 2006; 60: 69-73.
7. Brown DL. Sleep disorders and stroke. *Sem Neurol*. 2006; 26(1): 117-122.
8. Leng PH, Mosharraf-Hossain AK, Chan YH, Tan WC. The clinical predictors of hypertension and sleepiness in an Asian population with sleep-disorders breathing. *Ann Acad Med Singapore*. 2006; 35(1): 5-6.
9. Douglass AB, Bornstein R, Nino-Murcia G, Keenan S, Miles L, Zarcone VP, Guilleminault C, Dement WC. The Sleep Disorders Questionnaire. *Sleep*. 1994; 17(2): 160-167.
10. Netzer CM, Clark K, Strohl KP. Using the Berlin Questionnaire to identify patients at risk for the sleep apnea syndrome. *Ann Intern Med*. 1999; 13: 485-491.
11. Johns MW. A new method for measuring daytime sleepiness, The Epworth Sleepiness Scale. *Sleep*. 1991; 14: 540-545.
12. Mumenthaler M, Heinrich M. Sleep and disturbances of sleep. U: Mumenthaler M, Heinrich M. *Neurology, IV revised*, Stuttgart, New York: Thieme. 2006: 563-574.
13. Harbison J, Ford G, James O, Gibson G. Nasal continuous positive airway pressure for sleep apnea following stroke. *Eur Respir J*. 2002; 19(6): 1216-1217.
14. Wierzbicka A, Rola R, Wichniak A, Ryglewicz D, Jernajczyk W. The incidence of sleep apnea in patients with stroke or transient ischemic attack. Department of Clinical Neurophysiology, Institute of Psychiatry and Neurology, Warsaw, Poland. 2001.
15. Bliwise D, Rye D, Bhupesh D, Gurecki P. Greater daytime sleepiness in subcortical stroke relative to Parkinson's disease and Alzheimer's disease. *J Ger Psych Neurol*. 2002; 15(2): 61-67.
16. Cassels C. Daytime sleepiness an independent risk factor for stroke. American Association International Stroke Conference. [www. Medscape.com/viewarticle](http://www.Medscape.com/viewarticle). 2006: 570532.
17. Hodoba D. Poremećaj spavanja i budnost i njihovo liječenje. *Medicus*. 2002; 11(2): 193-205.
18. Scammell TE, Nishino S, Mignot E, Saper CB. Narcolepsy and low CSF orexin (hypocretin) concentration after a diencephalic stroke. *Neurology*. 2001; 56: 1751-1753.