Incidence and Types of Sleep Disorders in Patients with Stroke

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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).

Stoke 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 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).
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 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 answers 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 $\chi^2$ 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-
ininess 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=0.0833). 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 analyzed patients narcolepsy was present (p<0.0001). Of the total number of analyzed patients narcolepsy was present in 49.5% of respondents. Test of proportions was found that the proportion of patients who have this problem (p=0.833). The 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 hemisphere. Sleep Apnea and snoring are the most common types of SD in patients with stroke.