Factors Affecting Poststroke Sleep Disorders

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Objective: The aim of this study is to evaluate the sleep quality of stroke patients, to present the influencing factors, and thus to provide more effective rehabilitation in hospitals' inpatient clinics. *Materials and Methods:* Twenty-three stroke patients who received inpatient treatment at Bolu Physical Therapy and Rehabilitation Hospital were retrospectively evaluated in the study. Educational background, occupation, body mass index, symptom duration, etiology, dominant hemisphere, affected hemisphere, comorbid diseases, and Brunnstrom recovery stages (9), Pittsburgh Sleep Quality Index (PSQI) score, Beck Depression Inventory (BDI) score, and Functional Independence Measure score were assessed. *Results:* In multivariate linear regression analysis, we found that BDI score ($P = .030$) and comorbid diseases ($P = .040$) had the highest effect on change in PSQI. *Conclusions:* Depression and comorbid diseases were the most effective factors on poststroke sleep disorder in patients who underwent neurological rehabilitation and they should be managed to increase the efficacy of the neurological rehabilitation. **Key Words:** Sleep quality—stroke—depression—comorbidity—rehabilitation.

Introduction

Stroke is a range of clinical conditions that occur suddenly due to a loss of motor control related to cerebral vascular occlusion or rupture of the cerebral veins, and can lead to coma, sensation disorder, balance disorder, loss of speech, cognitive function, and visual disorders.[1] Among adult diseases, it ranks first in terms of frequency and significance and globally is the most common and severe neurological problem. In the United States and in other western countries, stroke is the second most common cause of death following cardiac diseases. With regard to gender, among males, stroke is the third most common cause of death following cardiac diseases and lung cancer, and the second most common cause of death in females.[2] Poststroke sleep disorders are common with 20%-78% of patients affected.[3-5] In poststroke patients, the following disorders can be observed: sleep-disordered breathing, insomnia, hypersomnia, parasomnia, circadian rhythm, and periodic limb movement disorders. In stroke patients, sleep disorders were found to be associated with physical disability, anxiety, depression, fatigue, dementia, the use of psychotropic drugs, lesion location, complications of illness, such as heart problems, infections, epileptic seizures, fever, and external factors such as noise, light, and the monitoring of hospitalized patients.[3,5-8] In daily practice, decreased active participation, due to daytime sleepiness, in rehabilitation applications, is a common problem for physical medicine and rehabilitation physicians. It is a condition in which sleep rhythm is hard to regulate, requiring medical treatment and other therapies. The aim of this study is to evaluate the sleep quality of stroke patients, to present the influencing factors, and thus to provide more effective rehabilitation at rehabilitation hospitals' inpatient clinics.

Materials and Methods

Participants

Twenty-three stroke patients (9 females, 14 males) who received inpatient treatment at Bolu Physical Therapy and

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Rehabilitation Hospital between January 2014 and June 2014 were retrospectively evaluated in the study. Included in the study were patients who were above 18 years of age, had good cognitive functions, and had stroke for the first time. Patients who experienced recurrent stroke or other central nervous system diseases, aphasia, and inexplicable dysarthria were excluded from the study. The patients' sociodemographic features, age, gender, educational background, occupation, body mass index (BMI), symptom duration, etiology, dominant hemisphere, affected hemisphere, comorbid diseases, and Brunnstrom recovery stages[9] were evaluated.

Assessment of Sleep Quality

A subjective assessment of sleep was conducted using the Pittsburgh Sleep Quality Index (PSQI). The PSQI is a questionnaire used to assess sleep quality through 19 questions and 7 components: subjective sleep quality, latency, duration, efficiency, sleep disorders, use of sleep medication, and daytime dysfunction. The scores of all the components are added to obtain a value between 0 and 21, in which scores higher than 5 indicate poor sleep quality.[10,11]

Assessment of Depression

A screening instrument, Beck Depression Inventory (BDI), was used[12] for psychosocial status. The BDI is a 21-item self-report rating inventory, presented in a multiple-choice format that purports to measure characteristic attitudes and symptoms of depression. It includes issues such as hopelessness and irritability, cognitions such as guilt or feelings of being punished, as well as physical symptoms such as fatigue, weight loss, and lack of interest in sex. To determine the severity of depression, the standard cutoff values used were as follows: 0-9, no depression; 10-18, mild depression; 19-29, moderate depression; and 30 or higher, severe depression.

Assessment of Physical Status

Clinical evaluation was obtained using the Functional Independence Measure (FIM) instrument, which contains 18 items covering 6 domains of functioning: activities of daily living, sphincter control, transfers, locomotion, communication, and social cognition. The score on each item ranges from 1 (dependent on total assistance) to 7 (complete independence).[13,14]

Statistical Analysis

SPSS for Windows 11.5 software (IBM Corporation, Armonk, NY, USA) was used for data analysis. The appropriate distribution of continuous and discrete numerical variables was determined using the Shapiro–Wilk test. Descriptive statistics were presented as mean ± standard deviation (SD) or median (minimum–maximum) for continuous and discrete numerical variables, the number of the case, and (%) for nominal variables.

The significance of the median PSQI score difference between groups was evaluated by using the Mann–Whitney *U*-test. The presence of significant relationships between continuous and discrete numerical variables was investigated using the Spearman correlation test. The most determinant factor on the PSQI score variation was investigated by using the multivariate linear regression analysis. All variables with a P value less than .10 in univariate statistical analysis were included as potential risk factors in the multivariate linear regression model regression coefficients, and the 95% confidence intervals (CIs) of each variable were calculated. Logarithmic transformation was performed in regression analysis due to the inappropriate PSQI score distribution.

The results were regarded as statistically significant ($P < .05$).

Results

A total of 23 patients (9 females, 14 males) were evaluated in the present study. The patients' demographic features, BMI, symptom duration, etiology, dominant hemisphere, affected hemisphere, comorbidities, and Brunnstrom recovery stages are presented in Table 1.

The mean PSQI score was 5.2 (SD 4.5); the mean BDI score was 12.3 (SD 11.10). Also, the mean total FIM score was 95.4 (SD 19.31). (Table 2).

According to PSQI scores, 39.1% of the patients had poststroke sleep disorders. Furthermore, according to Beck depression levels, 47.8% of the patients had multilevel depression (Table 3).

Correlation coefficients and significance levels between PSQI values and age, educational background, BMI, symptom duration, Brunnstrom stage, and FIM total and subscale scores, respectively, were measured, and there was no significant correlation ($P > .05$) (Table 4).

Also, significant changes in PSQI values were evaluated with regard to other demographic and clinical features of patients. There was no significant difference in median PSQI values with respect to gender, educational background, employment status, etiology, hemiplegic side, presence of comorbidity, and dominant involvement ($P > .05$) (Table 5).

As a result of univariate analysis, all potential risk factors that could affect PSQI scores significantly were analyzed in multivariate linear regression analysis, and the most determinant risk factors, were identified. All the variables with a P value less than .10 in the univariate statistical analysis were considered as potential risk factors. In multivariate linear regression analysis, we found that BDI score and comorbid diseases had the highest effect on change in PSQI. PSQI level increased with BDI score ($B = .035$, 95% CI: .004-.066, $P = .030$). PSQI level was higher in patients with comorbidities than in patients without