POST-STROKE FATIGUE

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SUMMARY – Post-stroke fatigue is still a relatively unexplored, often neglected condition. The fatigue often manifests as physical and mental lack of energy, and many patients mention fatigue as one of the most difficult sequels to which they have to adjust. Our aim was to assess the fatigue in 35 three-month post-stroke patients and its relation to personal and stroke-related factors, and to compare them with 35 age- and sex-matched healthy control subjects. The main outcome measures for the fatigue were Fatigue Severity Scale (FSS) and Multidimensional Fatigue Inventory (MFI-20). Barthel index was used for functional status assessment, while anxiety and depressive symptoms were evaluated using Hospital Anxiety and Depression Scale (HADS). Study results showed fatigue to be frequent (45%) and often severe. Post-stroke patients showed higher values of general fatigue dimensions, physical fatigue and reduced activity. The number of subjects reporting fatigue problems on the FSS and MFI-20 scales was significantly greater in the stroke group (16/35; 45%) than in the control group (4/35; 11%; χ^2=12.5; P<0.001). Considering associations between fatigue and Barthel index score, age, sex, HADS-A (anxiety) and HADS-D (depression) scores, statistically significant associations were recorded between fatigue and anxiety (P=0.01) and depression symptoms (P=0.02). Global fatigue showed positive correlation with Barthel index score too (P=0.01). Multivariate analysis showed that anxiety and depression symptoms could predict post-stroke fatigue (adjusted R^2=0.556; P<0.05). Clinical trials and follow-up studies to find an effective treatment for patients with post-stroke fatigue are warranted.

Key words: *Fatigue; Stroke; Severity of Illness Index; Questionnaires*

Introduction

Fatigue is the awareness of a decreased capacity for physical or mental activity due to an imbalance in the availability, utilization or restoration of resources needed to perform activity[1]. Although fatigue is rather common among patients with chronic neurological problems, post-stroke fatigue is still a relatively unexplored condition and often neglected.

The causes of post-stroke fatigue seem to be multifactorial. It has been hypothesized that fatigue after stroke results from a combination of organic brain lesion-functional impairment and psychosocial stress related to adjustment to a new life situation and recovery process[1-3]. Some studies reveal that fatigue symptoms and emotional problems often coexist[1,2,7-11], but some of them support the idea that the pathogenesis of fatigue could be independent from emotional disturbances, especially depression[3-6]. The same situation occurs with motor deficit. There are some studies that found positive correlation between fatigue symptoms and mood disturbances [4-6,9], whereas others found negative or no correlation[3,8,10,11]. A 2-year follow-up study showed post-stroke fatigue to be also an important predictor of functional limitations, dependency, institutionalization and death late after stroke[6]. It is well known that in the acute phase, post-stroke fa-

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tigue could interfere with the rehabilitation process and have negative impact on patient recovery[1-11]. All previous studies were conducted by mailing questionnaires to stroke patients, so it is possible that the results were influenced by caregivers or family members. Therefore, we wanted to test patients directly without any influence.

Our aim was to assess the frequency and characteristics of fatigue in three-month post-stroke patients and its relation to personal and stroke-related factors.

Patients and Methods

As known from the available literature, our study was the first to assess fatigue by neurologists. Between February 1 and March 31, 2008, all stroke patients hospitalized at our Department three months before testing and having completed physiotherapy at a rehabilitation center were asked to present for testing. Inclusion criteria were first-ever stroke confirmed by computed tomography three months before testing and having been hospitalized at our Department three months before testing in December 2007 and January 2008. Exclusion criteria were as follows: recurrent stroke or major medical illness, alcohol abuse, decreased level of consciousness, and dysphasia or severe cognitive impairment. Thirty-five patients (15 women and 20 men) fulfilled study criteria and were willing to come and participate in the study. We compared them with 35 age- and sex-matched healthy controls. Barthel index (BI) was used for functional status assessment. Anxiety and depressive symptoms were evaluated using the Hospital Anxiety and Depression Scale (HADS). The first main outcome measure for fatigue was the Fatigue Severity Scale (FSS). It assesses the impact of fatigue on daily life; it consists of 9 statements about fatigue scored on a 7-point scale, ranging from 1 to 7. Total score is the mean of the 9 item scores. Fatigue was scored as present if the FSS score was above 4. If above 4, it indicates a moderate to high impact of fatigue on daily living[12]. The second scale for fatigue was the Multidimensional Fatigue Inventory (MFI-20), which covers 5 dimensions of fatigue: general fatigue, physical fatigue, mental fatigue, reduced motivation and reduced activity, and global fatigue (sum of MFI scores)[13]. The validity of FSS and MFI-20 scales for stroke patients was evaluated[12,13]. Statistical analysis was performed by the SigmaStat (Version 2.0) software. Descriptive statistics was used for demographic data. Comparisons between groups were done by the Student's t-test and analysis of variance (for continuous variables), or with χ^2 statistics (for categorical variables). Correlation was assessed using the Spearman rank-order correlation coefficient. Forward stepwise regression analysis was performed to determine which variables were independent predictors of fatigue. The level of significance was set at $P<0.05$.

Results

Patient and control group age ranged from 29 to 82 (61.8±14.2) years and from 30 to 77 (61.2±12.0) years, respectively. Considering risk factors, hypertension and hyperlipidemia were most common, recorded in 97% and 87% of study patients. The majority of patients (96%) had mild disability (mean BI score 94.5), 40% had depressive symptoms (mean HADS-D score 8.3±2.0) and 37% suffered from anxiety symptoms (mean HADS-A score 8.4 ± 1.9). Post-stroke fatigue (mean score 4.1) was recorded in 45% (16/35) and severe fatigue in 30% of study patients. Fatigue without any other depressive and anxiety symptoms other than fatigue was present in 30%, while 30% patients with fatigue reported it to be their worst symptom.

The number of subjects reporting fatigue problems on the FSS and MFI-20 scales was significantly greater in the stroke group (16/35; 45%) than in the control group (4/35; 11%; $\chi^2=12.5$; $P<0.001$). Considering associations between fatigue (FSS and all MFI-20 scores) and BI score, age, sex, HADS-A and HADS-D scores, statistically significant associations were found between fatigue and anxiety symptoms ($P=0.01$) and depression symptoms ($P=0.02$). Global fatigue and FSS score showed negative correlation with BI score ($P<0.05$). Positive correlation was also found between FSS and MFI-20 scores ($P<0.05$), as expected. Multivariate analysis showed that anxiety symptoms and depression symptoms could predict post-stroke fatigue (adjusted $R^2=0.556$; $P<0.05$) (Table 1). There was no correlation of fatigue with age and sex. Statistically significant differences were found between stroke patients (higher scores) and control subjects in dimensions of general fatigue ($P=0.03$), physical fatigue ($P<0.001$) and reduced activity ($P=0.002$).

Table 1. Multivariate regression analysis

	Beta	*P*
BI score	-0.006	0.52
HADS-A score	9.809	0.002
HADS-D score	-7.222	0.016

BI = Barthel Activities of Daily Living index; HADS = Hospital Anxiety and Depression Scale (A = Anxiety, D = Depression)

Discussion

The main advantage of this study was the method of personal contact on answering the questionnaire in contrast to the previous mostly mailed ones[1-11]. That means that our results are more authentic than the results from previous studies, which could have been influenced by their close relatives.

Fatigue is essentially subjective, however, when it is clinically significant, it may often manifest as both physical and mental lack of energy, thus impairing the quality of life. Many patients report fatigue as one of the most difficult sequels to which to adjust[1-5]. Previous studies indicated post-stroke fatigue to develop in 39%-69% of patients, the percentage increasing with time from onset[1-9]. Our results on 45% of post-stroke fatigue patients are in this range, but could be even higher in the forthcoming period. Therefore, fatigue has to be followed-up. Most of our patients had good recovery after stroke. The mean BI score was rather high. We know from previous studies that patients with good physical recovery after stroke reported much more fatigue and emotional problems, which could limit their resuming previous activities. It could be due to their greater expectations of returning to normal because of their lower level of disability. In our study, we found negative correlation between BI (functional status) and global fatigue in MFI-20 and with FSS score, as in a previous study[4]. Although some studies[6,7] did find correlation between sex, age and fatigue, it was not the case in our study.

We found that emotional problems were strongly related to fatigue. Our results on depression symptoms as the strongest predictor of post-stroke fatigue are consistent with other studies on the issue[1-11]. Concerning anxiety symptoms, other studies did not find such correlations and predictability as we did[1-11]. In our study, 30% of patients experienced fatigue problems but did not have any other emotional problems; therefore, as suggested in other studies[2-7], these should be considered as a manifestation of distinct post-stroke sequels.

In some studies, several other treatment methods other than tablets have been suggested for fatigue, e.g., improving the mechanisms of coping with stress, ensuring adequate daytime rest and exercise, and promoting adequate nighttime sleep by developing good sleep hygiene habits[1-11]. With better understanding of the factors that influence post-stroke fatigue, we could find the best combination of the possible behavioral, psychological or medical treatments. The limitation of our study was a relatively small sample size for a more detailed analysis of the influence of the examined factors on the outcomes measured. In conclusion, more attention should be paid to post-stroke fatigue, which is frequent and often severe. Better understanding of the physiological mechanisms underlying post-stroke fatigue is crucial to find efficient and specific therapeutic treatments on time. In different disease or medical conditions, probably different mechanisms cause the fatigue. The emotional problems are the strongest predictors of experiencing post-stroke fatigue. Clinical trials to find an effective treatment for patients with post-stroke fatigue are warranted. Further intervention and follow-up studies in a great number of patients are needed.

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Sažetak

UMOR NAKON MOŽDANOG UDARA

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Umor nakon moždanog udara je još uvijek relativno neistraženo i često zanemarivano stanje. Često se manifestira kao fizički i mentalni manjak energije, a mnogi bolesnici kažu da im je to najteža posljedica moždanog udara s kojom se moraju nositi. Cilj istraživanja bio je procijeniti prisutnost umora kod 35 bolesnika 3 mjeseca nakon akutnog moždanog udara, odnos s osobnim čimbenicima i onima vezanim uz moždani udar, te ih usporediti s 35 zdravih osoba podjednake dobi i spola kao kontrolnom skupinom. Za mjerenje umora rabili smo Ljestvicu težine umora (FSS) i Multidimenzionalnu ljestvicu umora (MFI-20). Barthelov indeks rabili smo za procjenu funkcionalnog statusa, a Bolničku ljestvicu za anksioznost i depresiju (HADS) za prisutnost anksioznih i depresivnih simptoma. Rezultati su pokazali da je umor čest (45%) i nerijetko težak. Bolesnici koji su imali moždani udar pokazali su više vrijednosti (bili su umorniji) u području općeg i fizičkog umora te smanjene aktivnosti. Broj osoba koje su umorne bio je veći u skupini bolesnika s moždanim udarom (16/35; 45%) nego u kontrolnoj skupini (4/35; 11%; χ^2=12,5; P<0,001). Što se tiče povezanosti umora s ispitivanim čimbenicima, utvrđena je značajna povezanost s anksioznim simptomima (P=0,01) i depresivnim simptomima (P=0,02). Ukupni umor bio je u korelaciji i s Barthelovim indeksom (P=0,01). Multivarijantnom analizom je otkriveno da anksiozni i depresivni simptomi mogu predvidjeti pojavu umora nakon moždanog udara (adj R^2=0,556; P<0,05). Potrebne su daljnje kliničke studije i praćenje radi pronalaska učinkovitog liječenja bolesnika s umorom nakon moždanog udara.

Ključne riječi: *Umor; Moždani udar; Težina bolesti, određivanje; Upitnici*