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The effect of fatigue on the level of participation in a physiotherapy program of elderly acute stroke patients.

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Abstract

Aim: The aim of this study was to investigate the effect of fatigue on the level of participation in a physiotherapy program of elderly acute stroke patients.
Methods: The study included a total of 50 acute stroke patients aged ≥ 65 years (32 females and 18 males with a mean age of 75.14 ± 6.25 years). The level of functional independence of the patients was evaluated before the treatment program and on the day of discharge using the Functional Independence Measure (FIM) and the difference between the two FIM values was calculated to provide the delta-FIM value. Following each treatment session, the level of participation in the physiotherapy program was evaluated with the Pittsburgh Rehabilitation Participation Scale and the level of fatigue with the Barrow Neurological Institute Fatigue Scale, and mean points were calculated for these scales.
Results: The mean points of the Barrow Neurological Institute Fatigue Scale were 28.58 ± 16.57 and the mean points of Item 11 of the same scale were 5.57 ± 2.75. The mean delta-FIM value was determined as 12.7 ± 17.98 and the mean Pittsburgh Rehabilitation Participation Scale points were 4.46 ± 1.00. A statistically significant negative correlation was determined between the Pittsburgh Rehabilitation Participation Scale and the Barrow Neurological Institute Fatigue Scale (r: -0.338, p<0.05). No statistically significant relationship was determined between the Pittsburgh Rehabilitation Participation Scale and the Functional Independence Measure (p>0.05).
Conclusions: The results of the study determined that elderly acute stroke patients with a high level of fatigue had low levels of participation in the physiotherapy program.

Keywords: Stroke, Elderly, Fatigue, Participation, Physiotherapy.

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Introduction

According to the World Health Organisation (WHO), stroke is a clinical syndrome characterised by symptoms of focal cerebral function loss and the level of the findings, with no apparent cause other than vascular [1]. Following a stroke, a series of problems may be experienced involving sensory, motor and cognitive functions and psychosocial functions [2,3]. Fatigue is a frequently seen and persistent symptom after stroke [4]. Studies on this subject have reported the prevalence of fatigue to be 23%-75% after stroke [5]. As fatigue is related to physical and mental energy loss, rehabilitation studies are oriented to the difficulties experienced and the impaired function loss of the patient [6]. In the first 3 months after stroke, patients have been shown to have complaints of higher levels of fatigue compared to healthy individuals of the same age and gender [7]. It has been reported that patients who feel they have completely recovered have a tendency to show fatigue compared to those who have completely recovered [8]. Fatigue in elderly stroke patients has greater negative effects on recovery and these effects last longer [6].

Fatigue in stroke patients is thought to be related to several factors [9]. It is known that this can be the result of reduced energy capacity, the need for increased energy when walking, the level of disability, sleep problems, nutrition, comorbidities, medications and psychological factors [10].

With reduced participation in activity in patients with a high level of fatigue, limitations are defined as the level of difference in daily living activities which are affected in a 1-year period [11-14]. Consequently, patients become dependent in both basic and assisted daily living activities [6].

Fatigue can be limited by a physiotherapy program and this can affect the rehabilitation process and the regaining of functions lost after a stroke [6,15].

Fatigue seen in the acute phase affects full participation in rehabilitation and in the long term (18 months), physical health

is impaired [16,17]. Acute phase fatigue may be an independent risk factor for activity limitations within the following 18 months. The evaluation of fatigue is extremely important taking into consideration the recovery process and the continuing rehabilitation process. Acute stage recovery is of vital importance. In this context, better rehabilitation results can be obtained with effective treatments related to fatigue in both the acute and chronic stages [18].

It has been shown in literature that fatigue is seen from the acute stage onwards and is a frequently experienced problem. Studies on the subject have reported that fatigue could be caused by several factors and there is a need for more detailed studies. There seem to be insufficient studies on how participation in rehabilitation programs is affected by fatigue experienced by acute stroke patients. There is a need for more research on this subject to be able to plan better physiotherapy programs and to increase the gains obtained in the acute period.

The aim of this study was to investigate how fatigue in elderly acute stroke patients affected participation in a physiotherapy program.

Materials and Methods

Sample

The study included 50 patients aged 65-86 years who were being followed up for a diagnosis of acute stroke in the Neurology Clinic of Suleyman Demirel University Training and Research Hospital. Approval for the study was granted by the University Medical Faculty Clinical Research Ethics Committee. Informed consent was obtained from all the study participants. The study was applied in compliance with the principles of the Declaration of Helsinki.

The patients included in the study were aged ≥ 65 years, were being followed up for a diagnosis of acute stroke, were medically stable and had a Glasgow Coma Score (GCS) of ≥ 9. Patients with a severe level of aphasia or who were illiterate were excluded from the study.

Instruments

A record was made of the physical and demographic data and the length of hospital stay of the patients. The level of fatigue of each patient was evaluated before treatment and on the day of discharge using the Barrow Neurological Institute Fatigue Scale (BNI-FS) and the level of participation in the physiotherapy program was evaluated after every treatment session using the Pittsburgh Rehabilitation Participation Scale (PRPS).

The barrow neurological institute fatigue scale (BNI-FS)

The BNI-FS consists of 10 items which are rated on a 7-point scale. The scale ranges from 0-1 (rarely a problem), 2-3 (occasional problem, but not frequent), 4-5 (frequent problem) and 6-7 (a problem most of the time). Patients are asked to characterize their level of fatigue since their injury by choosing a number that best describes their response. Item 11 asks the patient to circle their overall level of fatigue since their injury on a scale from 0 (no problem) to 10 (severe problem) In this study the total BNI-FS score and item 11 score are used. A high score for both total and item 11 indicates a higher level of fatigue. It has been shown that this scale can be used clinically and reliably in individuals with acute neurological disease [19].

Pittsburgh rehabilitation participation scale

Participation in the PRPS is assessed on a 6-point Likert-type scale (none=1, poor=2, fair=3, good=4, very good=5, excellent=6) reflecting the therapists' observations of patient participation. Mean PRPS scores predicted rehabilitation outcome, as measured by change in motor Functional Independence Measure (FIM). The strength of this association did not change in a multivariate model that controlled for age, gender, race, impairment group, medical comorbidity count, length of stay, and admission FIM. Patient participation during acute inpatient rehabilitation can be easily and reliably measured, and PRPS scores predict functional outcome. It has been validated in patients undergoing inpatient rehabilitation, including those with stroke [20].

The functional independence measure (FIM)

The FIM was developed in 1983 by the American Medical Rehabilitation Congress and the American Physical Therapy and Rehabilitation Academy [21]. The adaptation of the scale to a Turkish population has been proved to be valid and reliable for patient groups that have stroke and spinal cord injuries [22]. The FIM has a total of 18 items in 2 main sections of motor functions (13 items) and cognitive functions (5 items). The evaluation is made over 7 points and the total FIM points can range from 18-126. Higher points indicate a higher level of independence. The delta-FIM value was calculated from the repeated measurements before and after treatment, as the difference in the values from before treatment to the values obtained on the day of discharge.

Physiotherapy application

Neurophysiological approaches appropriate to the functional status of the patient were applied twice a day. Patients' treatment program was followed/continued in accordance with the functional level (mobilisation in bed, sitting, balance in sitting, transfer activities, standing, balance in standing, walking, staring, daily living activities).

Statistical analysis

Statistical analysis was done using the SPSS 20.0 pocket program. Continuous variables were expressed as mean and standard deviation while categorical variables were expressed as number and percentage. Correlations between outcome measures were calculated with Pearson correlation analysis. Statistical significance was considered as $p<0.05$.

Results

The 50 patients included in the study comprised 32 (64%) females and 18 (36%) males with a mean age of 75.14 ± 6.25 years. The mean length of stay was 7.02 ± 4.53 days. When the socio-economic status of the patients was examined, 16% were employed before the stroke, 64% were not employed and 20% were retired.

Table 1. *Sociodemographic and Socio-Economic Characteristics of Individuals.*

	n	%
Gender		
Female	32	64
Male	18	36
Upper Limb Dominance		
Right	47	94
Left	3	6
Marital Status		
Married	34	68
Single	16	32
Education Level		
Illiterate	20	40
Primary School	26	52
Secondary School	3	6
High School	1	2
Working Status Before Stroke		
Employed	8	16
Retired	10	20
Housewife	32	64
Support at Home		
Yes	38	76
No	12	24
Living Conditions Before Stroke		
Alone	9	18
With Family	40	80
Nursing Home	1	2
Economic Situation		
Enough	40	80
Insufficient	10	20

The majority of the patients were married (68%), had a primary school level of education (52%), were able to receive support at home (76%), lived with their family (80%) and had an adequate economic status (80%). The socio-economic characteristics are shown in Table 1.

In the evaluation of the clinical characteristics of the patients, it was determined that 84% were being followed up for a diagnosis of hemiparesis and the right side was affected in 48%. The clinical characteristics of the patients are shown in Table 2.

Table 2. *Clinical Characteristics of Individuals.*

	n	%
Clinical Condition		
Hemiplegia	8	16
Hemiparesis	42	84
Affected Body Side		
Right	24	48
Left	26	52
Dysphagia		
Yes	6	12
No	44	88
Dysarthria		
Yes	9	18
No	41	82
Visual Problems		
YeS	8	16
No	42	84
Sensory Problems		
Yes	4	8
No	46	92
Urinary Problems		
Yes	8	16
No	42	84
Shoulder subluxation		
Yes	1	2
No	49	98
Psychosocial problems		
Yes	4	8
No	46	92
Pulmonary problems		
Yes	5	10
No	45	90

When the risk factors of the patients were evaluated, 4% were cigarette smokers, 4% had hyperlipidaemia, 66% had

hypertension, 32% had diabetes mellitus, 30% had cardiac disorders, 6% had experienced a trans-ischaemic attack, 2% had a family history and 32% had a personal history of stroke.

According to the mean BNI-FS points, 98% of the patients were determined to have experienced fatigue-related problems in treatment. Of these, 16% experienced fatigue occasionally, 38% sometimes and 32% often. Fatigue was found to be the greatest problem by 12%. Fatigue was seen to be at a moderate and/or severe level in 70% of the patients. According to the PRPS mean points, the participation of the patients was determined as nil-moderate in 26% and good-excellent in 74% of the patients. According to the FIM scores, 80% of the patients before treatment and 88% of the patients after treatment were found to have a moderate level of motor independence and were in the range of full independence with help.

Both before and after treatment, 98% of the patients were found to have a moderate level of cognitive independence and were in the range of full independence with help. The mean BNI-FS points were determined as 28.58 ± 16.57 and the mean points of Item 11 of the same scale were 5.57 ± 2.75. The mean delta-FIM value was determined as 12.7 ± 17.98 and the mean PRPS points were 4.46 ± 1.00 (Table 3).

Table 3. *BNI Fatigue Scale, Δ FIM and PRPS Scores.*

	Median (min-max)	X ± SD
BNI-FS (total)	27.5 (0-66)	28.58 ± 16.57
BNI-FS (item 11)	5.5 (0-10)	5.57 ± 2.75
Δ FIM	5 (-34-63)	12.7 ± 17.98
PRPS	4.45 (2-6)	4.46 ± 1.00

BNI-FS: Barrow Neurological Institute Fatigue Scale; Δ FIM: Δ Functional Independence Measurement; PRPS: Pittsburgh Rehabilitation Participation Scale

A statistically significant negative correlation was determined between the PRPS and the final measurement points of the BNI-FS (r: -0.338, $p<0.05$). No statistically significant relationship was determined between the PRPS and the FIM (r: 0.223, $p>0.05$) (Table 4).

Discussion

In this study that investigated the effect of fatigue on the level of participation in a physiotherapy program of elderly acute stroke patients, it was seen that stroke patients with high levels of fatigue had low levels of participation in the physiotherapy program.

Fatigue is a frequently encountered problem in several neurological diseases such as multiple sclerosis, Parkinson's disease, myasthenia gravis, traumatic brain damage and stroke [23]. In literature, fatigue has been shown to be a common symptom seen after stroke [15,24,25]. Complaints of fatigue have been reported in 40% of stroke patients following the acute period [26]. Similarly, Brodtmann et al. reported that half of patients experienced fatigue following stroke [27].

Table 4. *Relationship Between BNI-FS, Δ FIM and PRPS.*

		BNI-FS (total)	BNI-FS (item 11)	Δ FIM	PRPS
BNI-FS (total)	r	1.000	0.557	0.257	-0.338
	p		0.000**	0.082	0.016*
BNI-FS (item 11)	r		1.000	0.254	-0.247
	p			0.085	0.083
Δ FIM	r			1.000	0.223
	P				0.115
PRPS	r				1.000
	p				

BNI-FS: Barrow Neurological Institute Fatigue Scale; Δ FIM: Δ Functional Independence Measurement; PRPS: Pittsburgh Rehabilitation Participation Scale; *p<0.01; **p<0.05

In the current study of stroke patients, 98% reported problems related to fatigue. Of these patients, 32% reported experiencing fatigue-related problems frequently and 12% stated that fatigue was among the greatest problems. These results obtained in the current study were seen to support findings in literature.

During the stay in hospital after a stroke, patients are active in limited periods and spend most of the time in bed [28,29]. An intensive physiotherapy program in the early post-stroke period facilitates the regaining of functions [30]. There is also a greater positive effect on the recovery process of active participation in a rehabilitation program [31,32]. At the same time, active participation increases the level of patient satisfaction [33]. Paolucci et al. evaluated levels of participation with the PRPS in both the early and late periods of patients being treated for stroke or orthopaedic problems and reported the low rate of participation of 33.88% of patients. The researchers showed that there was a correlation between the level of participation at both stages and the efficacy of the treatment including daily living activities and mobility [34]. In another study which used the same measurement scale, it was reported that participation of hospitalised patients was generally low, and this directly affected clinical results and prolonged the length of stay in hospital [35].

In the current study, the physiotherapy program was designed in such a way as to achieve active participation (verbal directions, correct and sufficient manual assistance etc.). The participation levels of 74% of the patients were seen to be in the good-excellent range. These results are thought to be related to correct treatment strategies applied in the physiotherapy program every day, unlike previous studies.

Fatigue seen in neurological diseases can cause an increase in disability level and reduce quality of life [23]. Fatigue identified after a stroke can have a negative effect on

physiotherapy sessions and lead to functional losses such as loss of balance and falls [15,25]. In the fatigue scale used in the study by Yönt et al. [24]., the highest mean score was reported to have been obtained in the item "when I am tired, my motivation decreases". In another study, a high level of fatigue was seen to reduce the participation of stroke patients in rehabilitation. Yang et al. [32]. reported that there was a correlation between a low level of participation and functional dependence, cognitive damage and a severe level of fatigue and it was stated that it was necessary to monitor these factors during the rehabilitation process.

Previous studies have shown that complaints related to fatigue in stroke patients continue in the long term and can limit the physiotherapy sessions [15,36]. Ingles et al. reported that this process could extend up to 13 months and when there is accompanying functional deficiency, 40% of patients viewed fatigue as the worst or one of the worst symptoms [37]. Similarly, there has been shown to be a correlation between reduced activity participation and the fatigue levels of stroke patients observed between 6 and 12 months [38].

In the current study, a negative correlation was determined between the level of fatigue and participation in the physiotherapy program. Patients with high levels of fatigue were seen to have low levels of participation. These results are consistent with previous findings in literature. This situation suggests that fatigue is a significant indicator of physiotherapy program.

In the current study, 80% of the patients before treatment and 88% of the patients after treatment were found to have a moderate level of motor independence within the range of full independence with help. Both before and after treatment, 98% of the patients were found to have a moderate level of cognitive independence and were in the range of full independence with help. No correlation was determined between the level of functional independence and participation in the physiotherapy program. This result was in contrast to previous findings in literature and can be explained by the fact that as both the motor and cognitive independence levels of the stroke patients were predominantly of a moderate level, they were within the range of complete independence with help.

Although there are studies in literature showing that exercise increased fatigue in stroke patients, there are also studies showing that exercise decreased fatigue [26,39,40]. In this context, it can be considered that by taking the level of fatigue of the patient into consideration in the physiotherapy program, fatigue can be reduced, participation can be increased, and recovery can be accelerated with the prepared exercise program.

In conclusion, the evaluation of fatigue and participation in the acute period following stroke and defining appropriate treatment strategies are extremely important for both the rehabilitation process and recovery. Although physiotherapists and the patient's family want the patient to be independent as soon as possible, the efficacy of participation and factors affecting participation must not be ignored. Physiotherapy programs should be designed to focus on active participation and to minimise factors such as fatigue which have a negative effect on participation.

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