Original Article

Factors Related to the Recovery of Functional Autonomy of the Elderly Following Hip Fractures

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Abstract

Background: Hip fracture in the elderly population is a common global public health problem which may lead to loss of functionality and autonomy in daily life activities.
Early mobilization and early onset of walking has been reported to significantly reduce post-operative complications and increase autonomy level. However, the literature does not identify specifically which factors are associated with the reduction of mobility and the recovery of autonomy of patients post-operatively.
Objective: The main aim of this study is to identify key factors associated with speedy recovery and functional autonomy of the elderly following hip fractures after 6 weeks in a rehabilitation center.
Methodology: This was prospective cohort study. 102 patients over the age of 65 with hip fractures (intertrochanteric or hypocephalic) were recruited at the 'HARMONIA' rehabilitation center, Thessaloniki, Northern Greece. The validified Greek version of Functional Independence Measurement (FIM) tool was used as measurement tool to assess the factors contributing to the recovery of functional autonomy.in its validified Greek version.
Results: The average overall scores of functional independence after 6 weeks of hospitalization at the rehabilitation center were 77.26 with an average age of 81.25 years. The lowest averages of the Functional Independence Measurement (FIM) were observed in the motor domain i.e. in bathing (self-care) with an average FIM of 3.61, lower body clothing of 3.7, bladder control of 3.7, bath (mobility) of 3.89 and stairs of 3.8. With regards to the cognitive domain, problem solving scored 4.09 and social interaction 4.3.
Conclusions: The risk factors associated with the poor recovery in functional autonomy of the elderly with hip fractures are older age and low levels of motor and cognitive ability.

Key Words: Hip fracture, elderly, recovery, mobility, functional autonomy, functional independence, contributing factors, physical therapy

Introduction

Hip fractures are a common global public health problem and a significant challenge for both health systems and societies alike due to high mortality, co-morbidity and disability rates (Peeters et al., 2016). These are the most common serious injuries to the elderly often leading to reduced mobility and loss of independence (Haywood et al., 2017).

Hip fractures lead to loss of functionality and many patients do not reach autonomy in daily life activities (Auais, Eilayyan & Mayo, 2012; Beaupre et al., 2013; Hansson et al., 2015). Many patients fail to return to previous functional levels (Morri et al., 2017) and disability may result even in those without motor deficit prior to fracture (Mathew, Hsu & Young, 2013).

For this reason, early mobilization and encouragement to stand from the post surgery day should also be initiated. In addition, early onset of walking has been reported to significantly reduce post-operative complications such as prolonged patient hospitalization. Moreover, in the long-term, these initiatives increase autonomy level and decrease morbidity and mortality (Iakovidis et al., 2016; Morri et al., 2017). However, the literature does not identify specifically which factors are associated with the reduction of mobility and the recovery of autonomy of patients post-operatively.

Few studies have looked at this in detail, but have several limitations, i.e. some are retrospective, with a small sample size, examining only patient data available during hospitalization. Yet, some prospective studies indicate that factors such as age, fracture type, presence and severity of a cognitive deficit, functional capacity and associated conditions may affect the recovery of autonomy of patients (Wei, Hu & Wang, 2001; Tanner et al., 2010; Allen et al., 2012; Falsarella et al., 2014; Córcoles-Jiménez et al.,2015; Crilly, Kloseck & Mequanint, 2016; Morri et al.,2017).

In this light, the purpose of this study is to record factors that may be associated with the reduction in functional capacity of patients with hip fractures, evaluating both their motor and cognitive abilities, following of a 6-week rehabilitation program in a private rehabilitation center.

Methodology

Sample: A prospective cohort study was conducted at the Thessaloniki "HARMONIA" recovery and rehabilitation center from June 1st to August 31st, 2019. The inclusion criteria for participation in the study were all patients with intertrochanteric or hypocephalic hip fractures over 65 years of age. Patients with incidental fractures and hip pathology and patients who were not allowed to load the affected lower limb because of a potential poorer outcome, were excluded.

Initially, a total of 120 patients with hip fractures entered the investigation period. Of these, 6 subjects were rejected, i.e. 1 with a synthetic fracture, 1 with a pathological fracture and 4 who were prohibited from charging the affected side. Subsequently, 114 patients were included in the study, 12 of whom were released early from the survey due to personal reasons, 10 were discharged earlier and 2 were readmitted to hospital. Hence, of the original 120 sample, 102 cases were included for analysis.

Rehabilitation Program: The patients followed a recovery program consisted of physical therapy, occupational therapy and hydrotherapy. The physical therapy sessions were 5 times per week for 30-45 minutes, focusing on training for moving, walking, maintaining balance, and potentiating of the main muscle groups of the legs. Occupational therapy treatment was delivered 3 times per week for 30 minutes and included training in daily life activities and cognitive skills training. Finally, hydrotherapy sessions started in the third week after removal of the surgical stitches for patients without cognitive or severe pathological problems. Hydrotherapy treatments were provided 3 times per week for 30 minutes each with lower limb, balance and gait training exercises.

Factor Measurement Tool: One of the commonly used parameters to assess the factors contributing to the recovery of functional autonomy of the elderly with hip fractures is the Functional Independence Measurement (FIM) scale, which assesses patients' ability to perform specific tasks (Jeremic et al., 2013). The FIM scale (Table 1 and 2) comprises of 18 elements covering 6 areas (self-care, sphincter control, transfers, locomotion, communication and social cognition). The first 4 sectors relate to the motor domain, while the remaining 2, with the cognitive domain. Each element is ranges from 1 (full dependence) to 7 (full independence) (Table 3 and 4). Overall, the lower sum score that a person can achieve is 18 and the maximum is 126. The higher the score, the greater the functional independence (Graham et al., 2014).

Statistical Analysis: All statistical analyses were carried out using version 0.6 of the PSPP. All continuous data were presented as averages whereas discontinuous data were expressed in

frequencies. In addition, all variables followed a normal distribution, and the Pearson factor was used for the correlation between variables.

Results

The average age of the patients was 81.3 years of age with a range of 67-93 years, with 22 men and 80 women. The average overall score of the FIM scale after the 6 weeks in the rehabilitation center was 77.26 (Table 5). This means that the average patient had not achieved full functional independence at the time of leaving the rehabilitation center as the maximum score of the scale is 126 (full independence) and minimum 18 (full dependence) according to Graham et al. (2014).

Table 1: Functional Independence Measurement (FIM), motor domain (Tesio et al, 2002).

A. MOTOR DOMAIN			
Self-Care	**Sphincter Control**	**Transfers**	**Locomotion**
Food	Bladder control	Bed, Chair, Wheelchair	Walking, Wheelchair
Grooming	Bowel control	Toilet	Stairs
Bathing		Bathroom	
Dressing (upper half)			
Dressing (lower half)			
Toilet			

Table 2: Functional Independence Measurement (FIM), cognitive domain (Tesio et al, 2002).

B. COGNITIVE DOMAIN	
Communication	**Social Cognition**
Comprehension	Social interaction
Expression	Problem solving
	Memory

Table 3: Functional Independence Measurement (FIM) score, motor domain (Tesio et al, 2002).

MOBILITY SCORES		
7	Complete independence, timely and safely	Without help
6	Modified independence (device)	
5	With supervision (Patient 100%)	With help
4	Minimal Help (Patient 75%)	
3	Moderate Help (Patient 50%)	
2	Maximum Help (Patient 25%)	
1	Complete Help (Patient <25%)	

Table 4: Functional Independence Measurement (FIM) score, cognitive domain (Uniform Data System for Medical Rehabilitation, 2013).

COGNITIVE SCORES		
7	Complete independence, timely and safely	Without help
6	Modified independence (unaided device or self-correction of mistakes)	
5	With supervision, Stimulation Prepardness (Patient >90%)	With help
4	Minimal motivation (Patient 75% to 90%)	
3	Moderate motivation (Patient 50% to 74%)	
2	Maximum stimulation (Patient 25% to 49%)	
1	Complete Help (Patient <25%)	

Table 5: Averages of the variables and the overall score of the Functional Independence Measurement (FIM).

VARIABLE	N	AVERAGE
Food	102	5.14
Grooming	102	4.32
bathing	102	3.61
Dressing (upper half)	102	4.46
Dressing (lower half)	102	3.70
Toilet	102	4.00
Bladder control	102	3.70
Bowel control	102	4.73
Bed, Chair, Wheelchair	102	4.69
Toilet mobility	102	4.25
Bathroom mobility	102	3.89
Walking, Wheelchair	102	4.74
Stairs	102	3.80
Comprehension	102	4.49
Expression	102	4.75
Social interaction	102	4.33
Problem solving	102	4.09
Memory	102	4.59
Overall FIM	102	77.26

Table 6: Association of age with overall Functional Independence Measurement (FIM) scores.

		Age	Overall FIM
Age	Pearson correlation	1.00	-.87
	Sig. (2-tailed)		.000
	N	102	102
Overall FIM	Pearson correlation	-.87	1.00
	Sig. (2-tailed)	.000	
	N	102	102

Chart 1: Dispersion diagram linking age to overall Functional Independence Measurement (FIM) scores.

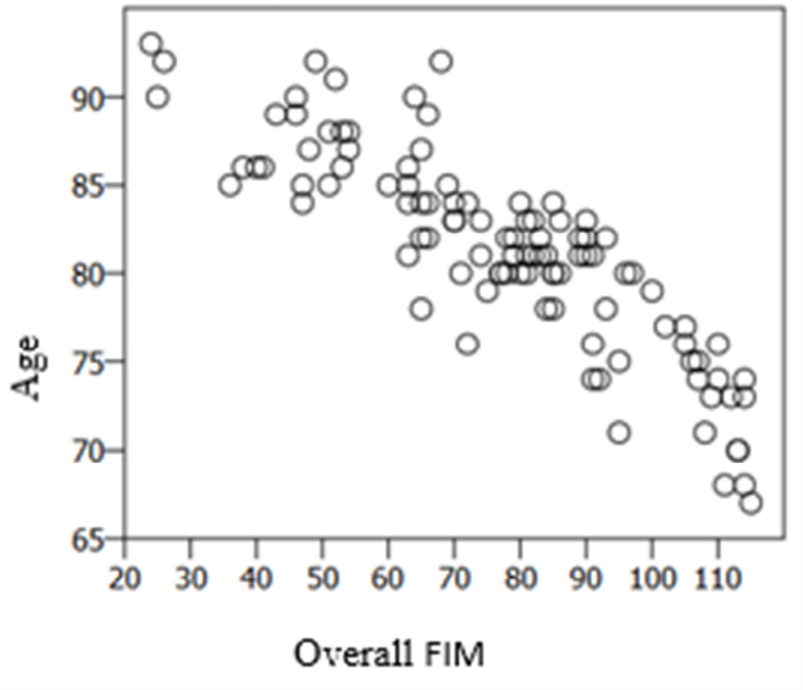
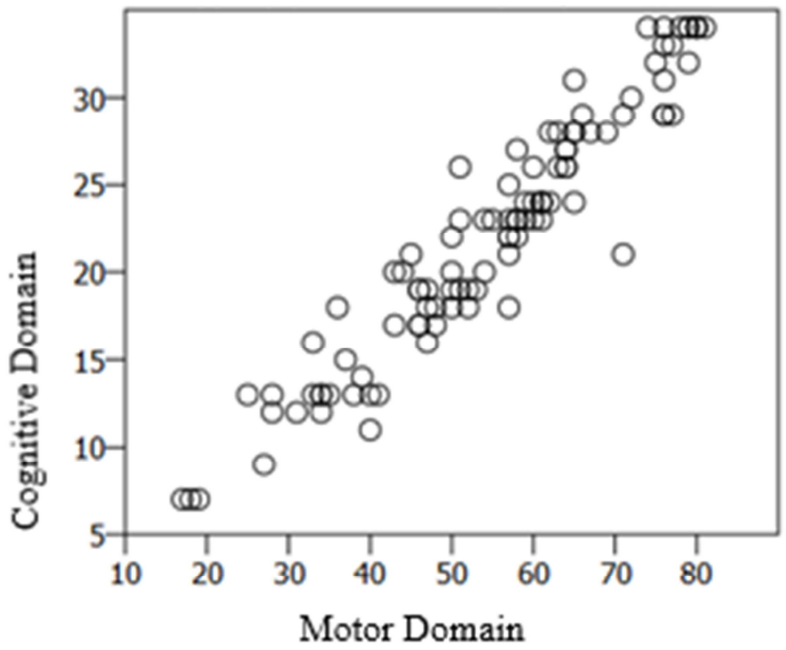


Table 7: Association of motor with cognitive domain.

		Cognitive Domain	Motor Domain
Cognitive Domain	Pearson correlation	1.00	.95
	Sig. (2-tailed)		.000
	N	102	102
Motor Domain	Pearson correlation	.95	1.00
	Sig. (2-tailed)	.000	
	N	102	102

Chart 2: Dispersion diagram of correlation between motor and cognitive domains.



The individual variables on the FIM scale that received the lowest score in the motor section were bathing, and mobility with an average FIM scale of 3.61 and 3.89 and an incidence of 31.37% and 33.33% respectively, the lower body dressing of 3.70 and 31.33 7% , bladder control 3.70 and 22.55%, stairs 3.80 and 30.39%, and from the cognitive domain, social interaction 4.33 and 27.45% and the problem solving 4.09 and 25.49%. The results of the associations according to the Pearson factor show that there is a very strong negative linear relationship between age and the overall FIM score at $p<0.05$ (Table 6 and Graph 1). There is also a very strong positive linear relationship between the motor and cognitive domains at $p<0.05$ (Table 7 and Graph 2).

Discussion

Restoring functional autonomy of the elderly after a hip fracture is a difficult achievement for patients over a 6-week period. This is consistent with the existing literature (Tarazona-Santabalbina et al., 2001; Beaupre et al., 2013; Haywood et al., 2017; Iakovidis et al. 2017; Morri et al., 2018). Yet, age adversely affects the recovery of functional autonomy of the elderly. As age increases, the degree of recovery in patients' functional mobility is slower (Young, et al. 2010; Di Monaco et al., 2012; Marcus et al., 2012; Falsarella et al., 2014).

Low motor and cognitive levels severely restrict patients' abilities to perform daily activities and these areas seem to influence each other. Therefore, the greater degree of motor capabilities, the higher the cognitive domain and vice-versa (Young, Xiong & Pruzek, 2011). However, some studies have indicated that in the case of dementia, due to the subconscious patient's procedural memory remaining intact, the degree of regaining the motor function of these patients is not significantly affected (Morghen et al., 2011).

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