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Does Pain and Fatigue Interfere in the Independence of People with Incomplete Spinal Cord Injury?

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Abstract

Objectives: The aim of this study is to determine the impact of pain and fatigue on activities of daily life in subjects with motor-incomplete spinal cord injury (SCI).

Methods: This study included a sample of 74 subjects with motor-incomplete SCI. The sample was divided in two groups according the level of pain in the visual analogue scale (VAS). Also, the sample was divided in two groups by the score of the fatigue severity scale (FSS). We compared the functional independence measurement (FIM) median values between the groups. Normality of data was assessed using the Shapiro-Wilks Test before choosing a non-parametric test. Man Whitney or Median Test was used according to variable's distribution shapes

Results: Significant fatigue was reported in 22 participants (30%), who present a median FIM motor score of 80. Fifty two subjects (70%) did not report fatigue, with a median score of 83. There were no significant differences found among the groups in the FIM motor score (*p* 0.874). Significant pain was reported in 25 participants (34%), who present a median FIM motor score of 80. Forty nine subjects (66%) did not report pain, with a median score of 83. There were no significant differences found among the groups in the FIM motor score (*p* 0.363).

Conclusion: Pain and fatigue are relatively prevalent symptoms in subjects with motor incomplete SCI; however, these symptoms did not interfere with our participant's ability to perform activities of daily living independently.

Keywords: Fatigue; Pain; Spinal cord injury; FIM; Daily life activities

Introduction

Pain and fatigue are two health conditions common in people with neurologic disorders, like Multiple Sclerosis, Parkinson's disease, stroke [1-4], and spinal cord injury (SCI) [5]. They are associated with physical impairment and reduce capacity to participate in daily activities, affecting quality of life [6-9]. In people with Spinal cord injury, both symptoms are frequent and lead to negative health results. Also, pain is a potentially important covariate of fatigue [5,10].

Fatigue is a symptom described as an overwhelming sense of tiredness, lack of energy and feeling of total exhaustion, and has been studied in people with SCI [5,6,10-12]. Fatigue has a negative impact on physical ability, and compromises the ability to participate in daily life activities, thus reducing the quality of life [13]. A study by Fawkes-Kirby [5] fatigue is present in up to 57% of patients with myelopathies and is more common in patients with incomplete injuries, presenting as a symptom that interferes with activity [14]. Similarly, pain is also a common symptom among individuals with disabilities, including SCI [5,9]. After SCI, overall pain rates range from 25% to 96%, and severe pain is reported by 18–63% of individuals [13,15,16]. With regard to physical functioning, pain has been reported to interfere with everyday activity on an average of 16 out of 90 days [17] and has a number of negative consequences including effects on ability to fall asleep (58%), exercise (35%), do household chores (39%), and work outside the home (34%) [18] among persons with SCI. Due to ongoing advances in basic science and locomotor rehabilitation research, there has been an increase in incomplete SCI lesions [19]. Fawkes-Kirby et al. described higher levels of fatigue in this specific population. Although pain and fatigue have received a great deal of attention in the research literature, the impact of these symptoms on activities of daily life (ADLs) in incomplete motor SCI has yet not been study. Therefore, the purpose of this study is to determine the impact of pain and fatigue on ADLs in incomplete motor SCI. We hypothesized that both symptoms would interfere with participant´s ability to perform activities of daily living independently.

Materials and Methods

Design

Transversal cohort.

Participants

Patients with Asia Impairment Scale (AIS) C and D were identified in our database and were contacted and prospectively included for the analysis. Participation in the study was voluntary. Inclusion criteria were: motor incomplete SCI (AIS C or D), aged ≥18 years and at least 12 months of injury evolution with a stable medical condition. All participants included in the study were previously inpatients or outpatients in the SCI rehabilitation program at FLENI Escobar

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Table 1: Demographic Characteristics.

	No Fatigue	Fatigue	*p*-value	No Pain	Pain	*p*-value
Gender, n (%)						
Female	15 (57.7)	11 (42.3)		14 (53.8)	12 (46.2)	
Male	37 (77.1)	11 (22.9)	0.081	35 (72.9)	13 (27.1)	0.098
Age, Year						
Median (IQI)	39 (26.5-56.50	51.5 (35.5-63.7)	0.021*	39 (29-56)	46 (31-69.5)	0.101
Level of Injury; n (%)						
Cervical	26 (68.4)	12 (31.6)		25 (65.8)	13 (34.2)	
Toracic-Lumbar	26 (72.2)	10 (27.8)	0.721	24 (66.7)	12 (33.3)	0.936
ASIA, n (%)						
C	22 (68.8)	10 (31.2)		24 (75)	8 (25)	
D	30 (71.4)	12 (28.6)	0.803	25 (59.5)	17 (40.5)	0.163
Time of injury, months						
Median (IQI)	44.5 (22.2-64.7)	35.5 (19.2-63.5)	0.836	32 (21.5-64.50	52 (24-66)	0.401
Occupation, hours						
Median (IQI)	25 (10.5-40)	15 (0-40)	0.756	27 (11-40)	20 (0-38.5)	0.327
Physical Activity, hours						
Median (IQI)	4 (2.2-6.7)	4.5 (2-6.5)	0.886	4 (2.5-9)	4 (2-5.5)	0.415

N: Number; **%:** Percentage; **IQI:** Interquartil Interval.
Man-Whitney Test or Median Test was used according to distribution groups in continuous variable.
Chi-square Test was used for categorical variables.
*Statistically significant difference at the p<0.05.

Institute between 2007 and 2016. The exclusion criteria were inability to provide informed consent, inability to read and write in Spanish, pre-existing medical conditions, including demyelinising disease, previous SCI, or other neurological system illnesses and trauma, or chronic medical conditions such as diabetes, hypertension, and autoimmune disease.

Every subject had to sign the informed consent for the study. This study was approved by the Ethics Committee of FLENI.

Data collection

All eligible persons were identified and their email addresses and phone numbers were obtained from the FLENI Institution database. Subjects were contacted by telephone or email to agree to participate in the study. After consent was obtained the participants were enrolled in the study. Demographic data and different evaluations were administered by a physical therapist and an occupational therapist with at least 10 years experience in SCI rehabilitation.

Measures

Demographic and injury related data: Variables collected included general demographic information (age, sex, physical activity and hours worked) and injury related information (AIS classification, injury level and time of injury).

Functional independence measurement (FIM): The (FIM) assesses the level of independence of the patients [20,21]. In the present study, the motor score of the FIM was used consisting of thirteen items, scored on a seventh-point scale, varying from total assistance (one) to complete independence (seven) with a maximal score of ninety one [22].

Fatigue (FSS): The FSS is a validated questionnaire administered in these subjects, and has been used to appraise fatigue levels over the past week of the day of the questionnaire [23]. The nine-item FSS is a self-report scale that is used widely to assess disabling fatigue in individuals with neurological disorders. It has been shown to be valid and reliable in SCI population [24]. The FSS assesses the severity of fatigue. The FSS requires respondents to rate each item using a seven-point scale ranging from one (completely disagree) to seven (completely agree). The items were summed and a mean score was calculated. Higher scores indicate a higher severity of fatigue. A cut-off point of four is used to determine significant fatigue [25]. The scale is obtained through a self report questionnaire. A Spanish version of the FSS scale was used [14].

Pain: The Visual Analogue Scale (VAS) from zero (no pain) to ten (extreme pain) was used. This scale measure the average of the intensity global pain reported by the subject over the past week of the day of the questionnaire. A cut-off point of four is used to determine significant pain [26].

Data analysis

Descriptive statistics were calculated to analyze the subject's demographics and clinical characteristics (Table 1). Chi-square Test for categorical or Non-parametric test for continuous outcomes was used to analyze demographics characteristics of the different groups. Normality of data was assessed using the Shapiro-Wilks Test before choosing a non-parametric test. Man Whitney Test or Median Test was used according to variable's distribution shapes.

The sample was divided in two groups according the level of pain in the VAS. Those participants that had a score more or equal 4 were

included in the pain group and those with less 4 were considered as no pain. Also, the sample was divided in two groups by the score of the Fatigue severity scale (FSS). Those participants that present a FSS more or equal 4 were considered as fatigue group, while those participants that present a FSS less 4 were considered as no fatigue group. We compared the FIM median values between the groups. Normality of data was assessed Shapiro-Wilks Test before choosing a non-parametric test. Median Test was used according to variable's distribution shapes. The results were expressed as median and interquartile range. A level of significance of 0.05 was established. All the analysis was calculated in SPSS 21 statistics program.

Results

Participants

A total of 117 patients with AIS C or D SCI were eligible for inclusion, 35 were not available at the time of the study, 7 chose not to participate and one patient died prior to inclusion. Of the 74 participants included for analysis, 65% (n=48) were male; the median age was 44 years (SD=17.02; range: 20-78) and the median time of injury was forty-one months. See Table 1 for additional demographics and AIS characteristic data.

Fatigue

Significant fatigue was reported in 22 participants (30%), who present a median FIM motor score of 80. The mean FSS value for this group was 4.59. Fifty two subjects (70%) did not report fatigue, with a median FIM motor score of 83. The mean FSS value for this group was 2.34. There were no significant differences found among the groups in the FIM motor score (*p* 0.874). See table 2.

Pain

Significant pain was reported in 25 participants (34%), who present a median FIM motor score of 80. The mean pain value for this group was 5.88. Forty nine subjects (66%) did not report pain, with a median FIM motor score of 83. The mean pain value for this group was 0.47. There were no significant differences found among the groups in the FIM motor score (*p* 0.363) (Table 2).

Table 2: Summary of Cases.

	Sample Size n (%)	Variable Mean	FIM Motor Median (range)
Fatige		FSS	
Has Fatigue	22 (30%)	4,59	80 (19-89)
Does not have fatigue	52 (70%)	2,34	83 (13-91)
			p 0.874
Pain		VAS	
Has Pain	25 (34%)	5,88	80 (19-91)
Does not have Pain	49 (66%)	0,47	83 (13-91)
			p 0.363

Note: Values of Median (Range).
Abbreviation: FSS: Fatigue Severity Scale; VAS: Visual Analogue Scale; FIM: Functional Independence Measurement.
*Statistically Significant Difference at the<0.05.

Discussion

To our knowledge this is the first study that analyzes the impact on the functional independence of two symptoms very commonly experienced in subjects with motor incomplete SCI. Our findings did not confirm the hypothesis that pain and fatigue interfere in the ability of motor incomplete SCI subjects to perform independently their activities of daily living. Specifically, we did not find significant differences in the functional independence when we compared the FIM motor in both groups; pain vs. no pain, and fatigue vs. no fatigue.

These findings were consistent with previous studies examining the impact of pain in SCI. Ballinger et. al., [27] used the FIM to examine the functional ability of 89 adult with traumatic tetraplegia and paraplegia and found that shoulder pain was unrelated to the functional limitation. Other study found similar results using the Spinal Cord Independence Measure (SCIM) to examine the functional activity [9]. A difference with these studies, we assessed the intensity of the global pain in motor incomplete SCI (AIS C and D). Sillverskiold and Waters [28] reported that 84 % of the quadriplegics subjects with shoulder pain had either moderate or severe functional disability during the first six months after SCI. However, this study evaluated the functional limitation using not standardized measurements of function.

On the other hand, our results showed that fatigue not modify the functional independence in motor incomplete spinal cord subjects. These findings could be a complement to the limited information that exists in the study of the impact of fatigue in subjects after the spinal cord injury. Previous studies reported that elevated levels of fatigue were associated with significantly reduced in quality of life [7,10].

Alschuler et al. [8] measured the relationship between the pain/fatigue and the physical functioning in SCI subjects, finding that higher pain levels were associated with less physical activity. This research used the Patient-Reported Outcomes Measurement Information System (PROMIS) to measure physical functioning; however this is not a specific functional independence scale.

Related to the prevalence, we found that fatigue and pain are common with 30 % of the sample reporting high fatigue levels and 34 % reporting high pain levels. The prevalence of fatigue in our participants was lower compared with the 57% previously reported by Fawkes-Kirby [5] , nevertheless our sample showed elevated levels of fatigue compared with the able-bodied subjects [7]. The prevalence of pain found was within the parameters reported by Jensen [13].

In our knowledge, this is the first research who studies the pain and the fatigue in these specific SCI group. Both symptoms showed to be frequent and lead to negative health results reducing the quality of life, therefore it is important to take care of them in the rehabilitation programs [5,10,13].

In summary, the presence of significative fatigue and pain in subjects with motor incomplete SCI was unrelated to any of the functional limitation measures. This might be explained in part by the fact that the subjects analyzed have to maintain self-independence regardless the fatigue and the pain. They have to maintain their occupational engagement and physical activity even if they have both symptoms [9,29].

There were limitations in this study. First, the sample size was relative small, particularly in the subgroups with pain and fatigue, which could have influenced the results. Second, fatigue and pain were measured using self-reported instruments, which may lead to

overestimation or underestimation of the incidence. Futures studies would increase the simple size, in order to analyze both symptoms simultaneously and their incidence in functional independence.

Conclusion

Pain and fatigue are relatively prevalent symptoms in persons with motor incomplete SCI; however these symptoms did not interfere with our participant´s ability to perform activities of daily living independently.

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