



Leisure time physical activity of people with chronic spinal cord injuries

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ARTICLE INFO

Keywords:

Spinal cord injury
Physical activity
Rehabilitation
Health promotion
People with disabilities

ABSTRACT

Objective: The aim of this study was to evaluate the nature of LTPA performed by patients with incomplete spinal cord injury a minimum of 12 months after injury. Therefore, the study investigates the impact of injury location on the form and frequency of LTPA, time between injury and commencement of LTPA, motivations to undertake such physical activity, as well as factors which reduce participation.

Patient and methods: The study included 75 patients aged 18–60. The number of patients according to injury location was as follows: 25 cervical (C = 25), 25 thoracic (Th = 25) and 25 lumbar (L = 25) spine injuries. Data concerning injury type and location was obtained from the patients' medical records and included results of clinical examinations and neuroimaging. To evaluate LTPA, a custom questionnaire was designed, and functional mobility assessments were obtained with the Barthel Index (BI).

Results: The study demonstrated that LTPA participation among examined SCI patients declined. At the time of the study, more than half of the patients (65%) declared participation in physical activity, mainly in the form of individually performed exercises. However, the frequency of LTPA was significantly lower compared with the period prior to injury (59% of persons). Engagement in LTPA was determined based on functional mobility, and the latter was measured with BI ($r = 0.42$, $p < 0.001$). More than half of the subjects (60%) were physically active within the first three years post injury. Exercising sessions occurred usually 3 to 5 times per week (40%). The motivating factors for committing to LTPA primarily included subjects' independent decisions (35%), followed by encouragement from another disabled person (20%). Barriers preventing from LTPA were related to architecture and transportation, and they accounted for 58% of cases where no LTPA was performed.

Conclusions: Spinal cord injury negatively impacts LTPA by reducing its frequency. Functional mobility of patients with spinal cord injury determines their participation levels in LTPA. The first three years after injury is the period during which engagement and commitment to LTPA is developed.

1. Introduction

Leisure Time Physical Activity (LTPA) of patients with spinal cord injury (SCI) positively impacts muscle performance, improves coronary-respiratory functions, enhances metabolism, and regulates body mass mainly by reducing the adipose tissue [1]. SCI in obvious ways impedes natural physical activity of patients. Reduced motor capabilities, therefore, make patients prone to suffer especially from disorders in the above-mentioned areas [2–4]. Furthermore, lack of physical activity in these patients increases the risk of incurring bedsores, osteoporosis and articular contractions [5]. It is worth mentioning that regular physical activity is a natural complement of comprehensive physiotherapy treatments provided at rehabilitation centers [6]. In addition, this type of functional mobilization helps to overcome mental, social and architectural barriers [7]. Participation in physical exercise creates opportunities to meet other disabled as well as healthy persons, socialize with

people and exchange experiences, but it also fosters the development of positive self-image [8,9].

Gainforth et al. [10] studied patients with SCI and found that on the one hand regular physical activity reduces pain intensity and instances of depression, and it furthermore enhances functional independence of patients thus improving their quality of life. Studies by Scelza et al. [11] and Rauch et al. [12] suggest that physical activity performed by paraplegic patients lowers the risk of bedsores, pneumonia, periarticular ossification, urinary infections and consequently reduces the number of potential hospitalizations. Martin Ginis et al. [13] and Hicks et al. [14] demonstrated that performing physical activity promotes social integration and positively impacts the wellbeing of SCI patients.

Despite the above-presented positive effects of physical activity on SCI patients, research by Scelza et al. [11] and Martin et al. [15] shows that few SCI patients regularly engage in activities that require physical exercise.

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2. Patient and methods

2.1. Patients

The study included patients with incomplete spinal cord injury treated between the years 2009 and 2015 at Wiktor Dega Orthopaedic & Rehabilitation Clinical Hospital in Poznań due to paresis or paraparesis. The subjects were 18 to 60-year-olds who had experienced injuries at least 12 months earlier. Incomplete SCI was diagnosed by a physician by examining patients' sensory and motor impairments using the classification criteria of the American Spinal Injury Association (ASIA) [16]. The data on age and injury dates were obtained from patients' medical records. From 122 patients hospitalised at the time, 75 persons qualified for the study, and this group was composed of 25 cervical (C = 25), 25 thoracic (Th = 25), and 25 lumbar (L = 25) SCI patients. All patients hospitalized at the Rehabilitation Clinic had access to educational assistance provided by the Foundation for Active Rehabilitation. The content it offered concentrated on the role LTPA plays in the lives of people with SCI.

2.2. Research questions

We attempted to answer the following research questions:

- 1 How often do SCI patients commit to LTPA?
- 2 How has LTPA frequency changed compared with periods before injury?
- 3 Do patients with SCI prefer organized physical activities in an individual or group form?
- 4 In what time after injury do patients start actively participating in LTPA?
- 5 What factors contribute to the lack of LTPA among people with SCI?
- 6 What influences the decision to engage in and commit to participating in LTPA?

2.3. Assessment of LTPA

Next, we obtained information from the patients about their LTPA. The custom questionnaire helped investigate the nature of LTPA. Among others, questions covered the form of performed physical activity (individual and/or group exercise), LTPA discipline (general workout, mastering wheelchair technique on various surfaces and distances, powerlifting, hand-biking, wheelchair rugby, wheelchair volleyball, wheelchair basketball and others) and factors motivating regular exercise. Relevant publications [2,17–20] show that individuals with SCI prefer the above-listed sports, so the disciplines were included in our questionnaire. Subjects were asked to compare their LTPA frequency in the month preceding the study with frequency prior to injury and then to report on how much time elapsed between their injury and first LTPA.

The Barthel Index (BI) was used to evaluate subjects' function. The applied measure examines a patient's independence in performing daily activities. The maximum score is 100 and denotes complete

independence, whereas the lowest score of 0 describes an individual who is fully dependent on others [11].

2.4. Bioethical Committee

The research project was submitted to the Bioethical Committee of the University of Medical Sciences in Poznań and received the Committee's approval (Resolution No. 728/14).

2.5. Statistical analysis

Statistical data were collated using the PQStat statistical package and Microsoft Excel 2000 spreadsheet.

Differences between values occurring in the ordinal scale were evaluated with non-parametric tests, and the Kruskal-Wallis test was applied to compare a few groups of unrelated variables. To evaluate the relationship between variables on the nominal scale, the non-parametric chi square test for non-categorical data (RxC) was used.

The criterion of $p < 0.05$ was assumed to be statistically significant.

Correlations between parameters were measured with Spearman's rank correlation coefficient. The following scale of correlation strength was adopted: $|r| < 0.3$ – no correlation; $0.3 < |r| < 0.7$ – moderate correlation; $0.7 < |r| < 1$ – strong correlation; $|r| = 1$ – perfect correlation.

3. Results

The average age at the time of study was similar in every subgroup and amounted to 34 years, whereas the average time from injury to examination under the study was 7 years, irrespective of injury location. The majority of the subjects were men (76%). The average point value on the Bartle scale was 61 points which indicates moderate dependence on third persons in day-to-day activities.

Detailed characteristics of particular subgroups are presented in Table 1.

The studies revealed a decrease in LTPA frequency regardless of injury location. In general, more than half of the subjects stated in questionnaires that they participated in LTPA less often than before their injury. The reported change in LTPA frequency before and after injury is presented in Table 2.

As many as 65% of the subjects reported participation in some type of physical activity within a month before the study. The compared groups (C, Th, L) did not differ significantly with respect to the number of patients physically active or inactive during leisure time (Table 3).

The studied groups did not differ much as to the preferred form of LTPA (individual or group) either. The majority indicated engagement in individually performed physical activities (Table 4). The LTPA disciplines reported by the subjects are presented in Fig. 1.

Regardless of injury location, the first three years post injury is the period when patients engage and commit to LTPA. Detailed data are presented in Table 5.

In most cases, committing to LTPA is a subject's independent

Table 1
Characteristics of SCI patients participating in the study.

	C		Th		L		Total	
	x (SD)	n (%)	x (SD)	n (%)	x (SD)	n (%)	x (SD)	n (%)
Current age (years)	35.4 ± 9.3		34.2 ± 9.5		33.4 ± 9.7		34.3 ± 9.6	
Age at injury (years)	28.5 ± 9.5		26.5 ± 10.4		26.4 ± 9.1		27.16 ± 9.7	
Time since injury (in years)	6.9 ± 3.9		7.6 ± 4.9		7.0 ± 4.2		7.2 ± 4.3	
Sex								
Female		2 (8%)		8 (32%)		8 (32%)		18 (24%)
Male		23 (92%)		17 (68%)		17 (68%)		57 (76%)
Barthel Index	47.4 ± 22.1		59.2 ± 20.7		78.4 ± 15.2		61.7 ± 23.2	

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