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Community integration in persons with spinal cord injury participating in team and individual sports

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Introduction. Carrying out the investigation of community integration (CI) seems to be important part of research in rehabilitation in persons with spinal cord injury (SCI). Researchers point out the need for continuing study of the factors which may modifie level of CI in this group. Aim of Study. The main purpose of this study was to assess the CI level in SCI athletes, participating in individual sports (IS), and team sports (TS). The additional purpose was to identify other variables that determine the level of CI. Material and Methods. The study participants (n = 30) were divided due to practiced sport, into two groups: IS (n = 15), and TS (n = 15). Athletes completed measures of CI: Community Integration Questionnaire (CIQ), and demographic questionnaire (containing information about such variables, as: age in the day of study, time elapsed from injury, level of injury, and level of physical activity – measured by number of hours spent for training per week). Results. There were no significant difference between level of CI in SCI athletes participating in IS, and TS. There were significant difference between physical activity level (measured by number of hours spend for training per week) and one of three subscales, that contains to CIQ. Conclusions. The study results confirmed the need to increase level of physical activity in persons with SCI, and extend research about determinants of CI.

KEY WORDS: spinal cord injuries, community integration, team sports, individual sports, physical activity.

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What is already known on this topic?
The CI is related to the effectiveness of the rehabilitation process. There is a need to improve the knowledge about CI in persons with SCI. CI is associated with many factors, as: quality of life, physical activity, gender, type of disability etc., but there are some fields in which CI has not been examined. There is lack of available data on field of IS and TS in persons with SCI, and its association with CI.

Introduction

SCI is considered to be the most serious condition of the musculoskeletal system. It is estimated that 10-83 persons per one million suffer from SCI annually, whereas most countries reported an incidence of 15-30 per million population. Cervical spine injuries (tetraplegia) constitute one half of these injuries and the other half is constituted of thoracic, lumbar and sacrum parts of the spine (paraplegia) [1]. The main distinguished causes of SCI are motor vehicle accidents, falls from height, sports injuries, which concern more men (82%) than women. Due to lack of accurate information on SCI in Poland only the approximate number was provided. It estimated that there are 800 cases annually, and this number is systematically increasing [2].
SCI usually cause permanent disability. The result of SCI, apart the sensorimotor paralysis, is a dysfunction of many

body systems, for instance: respiratory system, circular system, urogenital system [3-6]. The SCI treatment still remains a very demanding task and despite the development of medicine, patients and their families are far from being satisfied with treatment and rehabilitation results [7, 8].

Psychologists who are engaged in work with people with disabilities, had been pointed out, that the long-term psychological consequences of disability, are causing more serious life problems than just damage to the body [9, 10]. The necessity of changing the means of locomotion, and consequently being dependent on a wheelchair involve inter alia difficulties in continuing education, and finding a job [11, 12]. Additionally some authors emphasize that the difficulties in performing typical social roles (employee, husband, father etc.) result in a drop of quality of life in individuals with SCI [12]. The full inclusion and participation of people with disabilities in the physical and psychosocial environment is required, to reach full rehabilitation effects [13]. Because of the lack of adequate knowledge about community participation in persons with SCI, specific interventions to reintegrate this group are limited [14, 15].

CI is complex issue, which involve family and community life. In persons with SCI, CI is *acquiring/resuming age-/gender-/culture-appropriate roles/statuses/activities, including independence/interdependence in decision making, and productive behaviors performed as part of multivariate relationships with family, friends, and others in natural community settings* [16].

Carrying out the examination of CI seems to be unquestionably important part of rehabilitation in persons with SCI. Researchers point out the need for continuing study of the factors which may modifies level of CI [16, 17].

Previous studies indicate that both – physical and social factors – have a major impact on the ability to resume some of their preinjury roles in SCI group [15]. It had been shown that level of social integration depends on either: family support, emotional adjustment, coping style, self--esteem, informational support [18], elapsed time from injury or in less level and severity of injury [9, 10].

Additionally it has been argued, that physical activity is significant factor which co-exist with CI. It is observed that physical activity influences positively on the psychosocial aspects of life in persons with SCI, such as enhancing psychological adaptation to live after the injury and reduction of depression symptoms [19, 20].

Hanson et al. [21] carried out research on social benefits of performing sports activities by people with SCI (n = 48). Results showed that persons actively participating in sports activities obtained better results in four out of five fields of psychological adjustment (physical independency, mobility, occupational status, extent of social integration), than people who do not take physical activity.

Tasiemski et al. [22] found that, there is also comparison between the type of practiced sport and psychological adjustment in SCI. Tasiemski compared athletes involved in IS and TS and noticed, that second group presented better psychological adjustment (life satisfaction and lower anxiety and depression). Same results has been presented by Kennedy et al. [23].

Aim of Study

Accordingly, the primary purpose of the current study, was to extend the research of Tasiemski et al. [22] and asses relationship between type of sport (IS and TS) and level of CI in persons with SCI Additional aim of this study is to assess other factors (level of physical activity, time elapsed from injury, level of injury, age in the day of the study), potentially associated with the level of CI in these group.

Material and Methods

Participants

Participants were recruited from two rehabilitation units in Poland (FAR and SSI START in Poznań). The study involved 30 athletes with SCI. Surveyed participants were divided into two groups. First group was representing TS such as: wheelchair rugby (n = 7), wheelchair basketball (n = 3), boccia (n = 3) and unihockey (n = 2). Second group represented IS: wheelchair racing (n = 4), powerlifting (n = 3), swimming (n = 3), wheelchair fencing (n = 3) and alpine skiing (n = 2).

Measures

1) *A demographic* questionnaire were used to gather personal data such as: gender, date of birth, level of injury, date of injury, present marital status, vocational activity and highest educational achievement.
2) *Community Integration Questionnaire* (CIQ) was originally designed as a measurement of level of CI for individuals with traumatic brain injury [24]. It consists of 15-items measure yields in three domains, such as: Home Integration Scale (HIS), Social Integration Scale (SIS), and Productive

Activities Scale (PAS). Amounts for each of these subscales are calculated on the frequency of engaging in roles and activities. Responses are weighted according to level of independence in performing roles and activities. The score is ranging from 0-29, and higher scores indicating a higher level of participation in community activities, and thereby greater level of CI. Test reliability for the CIQ was reported to be 0.93 for HIS, 0.86 for SIS and 0.83 for PAS. The CIQ has recently been validated for use in persons with SCI [17].

Procedure

All data were collected in telephone survey, by a person instructed in this matter. A person conducting a survey asked questions applying described tools and record respondent's answer. A respondent answered questions contained in questionnaires.

All the measures used in the study were translated from English to Polish by two translators, through the back translation method. All statistical analyses were performed using SPSS 14.0.

Statistical Analysis

All of the demographic data were subjected to descriptive analysis, including their statistical frequency (*n*) and percent (%). The scores from the CIQ scale were presented as arithmetic mean (x) with standard deviation (SD), separately for each of 3 subscales (HIS, SIS, PAS), as well as for total.

Due to the lack of a normal distribution of the variables as well as the presence of heterogeneity of variance, the nonparametric Mann-Whitney U-test was used to assess the differences of CIQ score between IS and TS athletes. Tested variable was total CIQ score and a grouping variable was type of sport discipline (IS or TS).

In order to assess relationship between other factors, as: age on the date of injury, level of injury, time from injury, the number of hours devoted to training a week, that may have with CI, Spearman correlation was done for both groups together (IS and TS). The level of significance was set at 0.05.

Results

The collected demographic data found that the majority of participants were male (n = 27) but division by gender was not taken into account. Participants were ranging in age from 24 to 44 ($\bar{x}$ = 31.3; SD = 5.8) years in IS, and 19 to 40 ($\bar{x}$ = 31.5; SD = 5.3) years in TS. The mean number of years postinjury was 10.7 (SD = 4.9) in IS and 10.3 (SD = 5.7) in TS.

The most commonly represented disabilities in IS were paraplegia (n = 9) and most commonly represented disabilities in TS were tetraplegia (n = 10).

More than half (n = 20) of the participants were single, 24 were employed and 16 held an university degree. All demographic data were presented in Table 1.

Table 1. Demographic characteristics of athletes with disabilities

	IS participants (n = 15)		TS participants (n = 15)	
	n	(%)	*n*	(%)
Level of injury				
Paraplegia	9	60.0	5	33.3
Tetraplegia	6	40.0	10	66.7
Marital status				
Single	9	60.0	11	73.3
Married/with partner	5	33.3	3	20.0
Divorced/separated	1	6.7	1	6.7
Education				
Secondary school	4	26.7	3	20.0
College	3	20.0	4	26.7
University degree	8	53.3	8	53.3
Vocational activity				
Student	1	6.7	2	13.3
Student & employed	2	13.3	0	0.0
Employed	11	73.3	13	86.7
Self-employed	1	6.7	0	0.0

Characteristic of CI

The CIQ score of the athletes with SCI participating in IS, and individuals with SCI participating in TS, was found to be not statistically significant ($Z = -0.125$; $p \geq 0.05$) (Table 2).

Table 2. CIQ average results in individual and team sports

	IS	TS	IS and TS
		$\bar{x}$±SD	
HIS	6.1±1.9	5.8±1.8	5.9±1.8
SIS	10.3±2.1	10.2±2.0	10.3±2.0
PAS	6.3±0.8	6.6±0.7	6,5±0.8
Total score	22.7±3.2	22.3±3.4	22.7±3.2

CI and physical activity (time spending for training per week)

Research results indicated that time spent on physical activity per week in IS ($\bar{x}$ = 9.1; SD = 5.6), and TS ($\bar{x}$ = 9.1; SD = 2.9) was similar. Additionally, in both groups, there was no correlation found between level of physical activity and total score of CIQ, but there was a relationship between level of physical activity and one of three CIQ subscales – PAS (r = 0.41; p = 0.024). There was no significant difference found between CIQ, and other factors: time elapsed from injury (r = –0.17; p = 0.930), level of injury (r = –0.18; p = 0.335), age in the day of the study (r = –0.13; p = 0.466).

What this study adds?

This study was first which has assessed the relationship between the type of sport and the level of CI in persons with SCI. In the studied group there was no relationship found between the CI level and the type of sport practiced. Those study did not confirm the premises of Tasiemski [22] and Kennedy research [23].

Discussion

The literature review indicates the number of study presenting the outcomes of research on CI, and less number of studies which improve specific aspects of CI in persons with SCI [25, 26, 27]. There were two primary purposes of this study: examine differences in CI between type of sport (IS and TS) and assess other factors, as: level of physical activity, time elapsed from injury, level of injury, age in the day of the study, potentially associated with the level of CI in these group. The results of this study haven not confirmed the premises of other authors [22, 23] and there was no significant difference found between CI level in SCI athletes participating in IS and TS. Additionally the findings have not proved differences between level of CI and factors like: level of injury, study age on the day of study, time from injury in the examined group. The only significant relationship were found between the level of physical activity (measured by a number of hours spend for physical activity per week) and one of CIQ subscales – PAS.

However, all conclusions/implications of that study, may be affected by small participants sample (IS = 15; TS = 15), or a variety of disciplines participated by examined athletes. All depicted IS and TS characterize a different specificity of training, the participants practice in different conditions (in gyms, outdoors, on water, on snow), and seasons.

However, as can be seen from the data, the statistically significant differences confirms that the differentiating factor of CI is the level of physical activity taken. It is undeniably important information for the social rehabilitation in persons with SCI. Increasing the level of physical activity may contribute to a higher level of CI.

In comparison to other studies, participants of these study presented a higher level of CI (Table 3).

The explanation of those results may be the difference in age of participants. Participants in Gontkovsky study (mean age in day of study = 42) [17], and Jensen (mean age in day of study = 48.8) study [28] were much older than participants of this study (mean age in day of study = 31.3). Moreover it is important to keep in mind, that mean age

Table 3. The mean values for each subscale of CIQ in comparison to other authors

	SCI participating in IS (own study) (n=15)	SCI participating in TS (own study) (n=15)	Gontkovsky et al. 2009 (n=28)	Jensen et al. 2005 (n=147)	
				(patients with pain)	(patients without pain)
			$\bar{x}$		
HIS	6.1	5.8	3.5	7.0	8.0
SIS	10.3	10.2	6.7	2.2	2.1
PAS	6.3	6.6	1.0	5.2	4.9
Total score	22.7	22.3	11.2	14.4	15.0

of time elapsed from injury, were differentiated in all compared groups. The above assumption is not supported by others authors suggestions on the influence of aging in individuals with a spinal cord injury on subjective quality of life [29], who founded that the quality of life in individuals aging with a SCI has the potential to improve, and remain high and stable over time [29].

Recommendations for future research is to standardized type of presented disciplines, which should be comparable (season, place and intensity, in which they are practiced). Performing further study on the impact of physical activity on CI, to determine what type of physical activity is most conducive to CI, and what amount of time, spent on physical activity is the most optimal for improving the level of CI. It is also important to add that some studies have analyze effects of pre-SCI and post-SCI sport participation on CI and quality of life outcomes [26]. Thus, it can be an additional confounder. Therefore, it seems necessary, to consider this in the next study.

Conclusions

1. Type of sport (IS or TS) does not significantly affect the level of CI.
2. Physical activity level affects the level of CI.
3. The study results confirmed the need to increase level of physical activity in persons with SCI, and extend research about determinants of CI.

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