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THE IMPACT OF SPORTS ACTIVITIES ON QUALITY OF LIFE OF PERSONS WITH A SPINAL CORD INJURY

VPLIV ŠPORTNIH AKTIVNOSTI NA KAKOVOST ŽIVLJENJA OSEB S POŠKODBO HRBTENJAČE

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ABSTRACT

Objectives. Studying the quality of life of people with a spinal cord injury is of great importance as it allows the monitoring of both functioning and adaptation to disability. The aim of this study was to determine the difference between persons with a spinal cord injury involved in sports activities and those not involved in sports activities in relation to their quality of life and the presence of secondary health conditions (pressure ulcers, urinary infections, muscle spasms, osteoporosis, pain, kidney problems-infections, calculosis and poor circulation).

Methods. The study included a total of 44 participants with spinal cord injury-paraplegia of both genders; 26 of them were athletes and 18 were not athletes. The athletes were training actively for the last two years, minimally 2-3 times per week. A specially designed questionnaire, medical documentation and the Spinal Cord Injury Quality of Life Questionnaire (SCI QL-23) were used for research purposes. Chi-square test was used to analyze the differences between the groups, while multiple analysis of variance (MANOVA) was used to determine the differences between the sets of variables.

Results. Among the participants, the athletes perceived higher quality of life than the non-athletes (male gender $p<0.001$ and female gender $p<0.05$). Regarding secondary health conditions, the athletes reported the presence of less pain ($p=0.034$) and a subjective feeling of better circulation ($p=0.023$).

Conclusion. The implementation of sports activities significantly improves quality of life in the population of people with spinal cord injury-paraplegia. However, sports activities only partially affect secondary health conditions.

Keywords:
spinal cord injury, sports activities, quality of life, secondary health conditions

IZVLEČEK

Izhodišče. *Študij kakovosti življenja oseb s poškodbo hrbtenjače je pomemben, ker omogoča spremljanje delovanja in prilagajanje na invalidnost. Cilj te raziskave je bil ugotoviti razlike v kakovosti življenja in prisotnost sekundarnih zdravstvenih stanj (preležanin, okužb sečil, mišičnih krčev, osteoporoze, bolečin, težav z ledvicami - okužbe, calculosis in slabe prekrvavitve) med osebami s poškodbo hrbtenjače, vključenimi v športne aktivnosti, in tistimi, ki v športne aktivnosti niso vključene.*

Metode. *V raziskavi je sodelovalo 44 udeležencev s poškodbo hrbtenjače - s paraplegijo - obeh spolov; od tega je bilo 26 športnikov, 18 pa ne. Športniki so aktivno vadili v zadnjih dveh letih minimalno dva- do trikrat na teden. Posebej oblikovan vprašalnik, medicinska dokumentacija in vprašalnik 'Spinal Cord Injury Quality of Life Questionnaire' (SCI QL-23) so bili uporabljeni v raziskovalne namene. Test hi-kvadrat smo uporabili za analizo razlik med skupinami, medtem ko je bila uporabljena multipla analiza variance (MANOVA), da se določijo razlike med kompleti spremenljivk.*

Rezultati. *Udeleženci športniki dosegajo višjo kakovost življenja kot nešportniki (moškega spola $p<0,001$ in ženskega spola $p<0,05$). Ko gre za sekundarna zdravstvena stanja, imajo športniki manj bolečin ($p=0,034$) in subjektivni občutek boljšega obtoka ($p=0,023$).*

Zaključek. *Izvajanje športne dejavnosti pomembno vpliva na zvišanje kakovosti življenja v populaciji ljudi s poškodbo hrbtenjače - s paraplegijo, vendar športne aktivnosti le delno vplivajo na sekundarna zdravstvena stanja.*

Ključne besede:
poškodbe hrbtenjače, športne aktivnosti, kakovost življenja, sekundarna zdravstvena stanja

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1 INTRODUCTION

Spinal cord injury (SCI) is one of the most severe forms of disability, both from the physical aspect as well as from the psychological, social and professional aspects (1). From 10.4 to 83.0 new SCI cases per million inhabitants are recorded each year worldwide (2). Based on the available data, the incidence in Western Europe amounts to 6 new cases per million per year for non-traumatic SCI (3) and 16 new cases per million for traumatic SCI (4). During rehabilitation, in addition to a number of therapeutic procedures, it is important to educate patients on the need for a lifelong care of their activity limitations and the maintainance of the optimal state of health (5, 6).

Secondary health conditions have been defined as: physical or psychological health conditions that are influenced directly or indirectly by the presence of a disability or an underlying physical impairment (7-9). The most common secondary health conditions in SCI are: pain, bowel and bladder regulation problems, muscle spasms, fatigue, esophageal symptom and osteoporosis (9). In addition, pressure ulcers, urinary infections, kidney problems (infections, calculosis) and poor circulation are often present in persons with SCI (1, 10).

The inclusion of persons with SCI in social and recreational activities is one of the aspects of a long-term rehabilitation plan (11, 12). Sports activities are implemented both during (13, 14) and after rehabilitation (15) in order to improve strength, aerobic fitness, and physical functioning (16); in addition, sports activities have positive effects on psychological well-being (17).

Studying the quality of life (QoL) in persons with a spinal cord injury is very important as it allows the monitoring of functioning and adaptation to disability. Persons with a spinal cord injury have a lower QoL than the general population (18, 19). There are two main concepts in the assessment of QoL. The objective approach is based on one's characteristics that can be objectively measured by an external appraiser, whereas the focal point of the subjective approach is on the person's emotional or cognitive assessment of the congruence (20). The quality of life of persons with SCI can be evaluated with the Quality of Life Profile: Physical and Sensory Disabilities Version (QOLP-PSD) (20, 21), the Perceived Quality of Life Scale (PQOL) (22-24), the Quality of Life Scale (QOLS) (25). Moreover, the tools designed for the assessment of QoL in general population can be used, such as the World Health Organization Quality of Life-BREF scale (WHOQOL-BREF) (18, 26, 27), the Short Form (SF-36) (28, 29), the Satisfaction with Life Scale (SWLS) (30, 31), the Quality of Well-being Scale (QWB) (20, 30) and others (32, 33). The existing research suggests that the completeness of injury and social interaction (hobbies, spending time with friends, sports) can affect the level of quality of life of persons with SCI (34), as well as the level of SCI, education and employment (27, 35). The impact of sports activities on quality of life is assessed in the healthy population (36, 37) as well as in persons with SCI (32, 38).

We hypothesized that persons with SCI involved in sport activities would report higher quality of life according to The Spinal Cord Injury Quality of Life Questionnaire (SCI QL-23) (39), and less secondary health conditions (pressure ulcers, urinary infections, muscle spasms, osteoporosis, pain, kidney problems-infections, calculosis and poor circulation) in comparison to the non-sporting SCI population. The aim of the research is to determine the difference between athletes and non-athletes in relation to the given research variables.

2 MATERIALS AND METHODS

The research was conducted in 2013 at the Home for Adult Persons with Disabilities in Belgrade, Association of paraplegics and quadriplegics "Dunav" in Belgrade, Athletic club "Pogledi" from Belgrade, Wheelchairs basketball club "Dunav" from Belgrade, Table tennis club of persons with disabilities Belgrade "STIB" and Sports and Recreational Association "Sve je moguće" from Belgrade.

2.1 Participants

From the total of 80 available participants with SCI of both genders, aged 20-60 years, who have signed the agreement to participate in this study, only 44 participants fulfilled the criteria of the study. The criteria were: a minimum of 2 years since the spinal cord lesions, spinal cord injury at the level of the thoracic, lumbar or sacral region (paraplegia), and, if athletes, training actively for the last two years, minimally 2-3 times per week. The sample was divided into two groups. The first group included 26 participants actively involved in sports (athletes), whereas the second group consisted of 18 participants not involved in sports (non-athletes).

2.2 Instruments

Two questionnaires were used in this study, one for the collection of general information and characteristics related to SCI, and one for quality of life assessment – The Spinal Cord Injury Quality of Life Questionnaire (SCI QL-23) (39). The first was designed for this survey in order to collect data on the gender, age, time since spinal cord injury, type of sports that a person does and the frequency of training. The participants were also given a list of common secondary health conditions associated with SCI in this questionnaire (pressure ulcers, urinary infections, muscle spasms, osteoporosis, pain, kidney problems-infections, calculosis and poor circulation), and were asked to confirm their presence or absence.

The completeness of spinal cord injury according to ASIA impairment scale (American Association Impairment scale) (40, 41) was taken from the medical records of the participants.

2.2.1 The SCI QL-23

The SCI QL-23 is a self-report questionnaire derived from a battery of general and specific questionnaires applied in the studies of the quality of life of persons with a spinal cord injury (39). SCI QL-23 consists of 23 statements/questions, which include: functioning (FUNC), mood (MOOD, DEPR. scale), loss of independence experience (PROB-problems reinjury), and overall rating of life situations (GQOL-global quality of life).

Functioning (FUNC) refers to functional limitations in mobility, body care, movement and social interaction. It contains ten items in the form of statements that describe the possible conditions of persons with SCI within these areas. Questions are pre-designed and of proper weight (in accordance with the weighting of Sickness Impact Profile-SIP) system (42). A participant needs to mark only those items with which she or he agrees. Each confirmed item carries a certain value. The key test-results are ranged on the scale from 0-100; a lower score represents a better result.

The mood (MOOD, DEPR. scale) includes 6 items related to the presence of depressive feelings and bad mood. Each item has four levels of answers provided. A participant marks the answer that best describes him or her. The key test-results are ranged on the scale from 0 to 100; a lower score represents a better result.

The experience of independence loss (PROB-problems reinjury) refers to the assessment of the perception of physical dependence, complications and social stigma related to the specificity of injury. It includes 6 items with four levels of answers offered. The participants were asked to circle the answer to each specific item (given in the form of questions) that best describes how they feel. The key test-results are ranged on the scale 0-100; a lower score represents a better result.

The overall rating of life situations (GQOL-global quality of life) contained a single question, and the participants had to choose an answer on the scale 1-7. The key test-result is graduated on the scale 0-100; a higher score represents a better result (34, 35, 43-45).

2.2.2 Translation

After receiving a permission and the original test in the English language, it was necessary to make a cultural adaptation into the Serbian language. First, the given version was translated by two independent translators. Following the adjustment of both versions, the questionnaire was translated from Serbian back to English by a person whose native language is English and who was not familiar with the questionnaire. After the bilingual adaptation by the expert, the final version was used on the sample of 20 persons with SCI not included in the present study. This pilot study was realized in order to test the understanding of questions and to clarify potential dilemmas (46).

2.3 Statistical Analysis

The basic methodological principle of this research is based on the comparison of results between the participants with SCI-paraplegia who are involved in sports activities and the participants who are not involved in sports activities, with the aim of determining the differences between the given research variables. Basic measures of central tendency of the results were represented by arithmetic mean ($\bar{x}$) and standard deviation (SD). The differences between the individual groups were tested by the χ^2– test. Multiple analysis of variance (MANOVA) was used to determine the differences between the sets of the variables between the experimental and control group, while Bonferroni criterion was used to test the differences between the pairs of individual variables. We used Pearson correlationto determine the power of predictors on global quality of life (GQOL). Statistical analysis was carried out by software package Excel 2003 (Microsoft®Office Excel 2003) and SPSS Win 17.0.

2.4 Ethical Notes

The research was realized in accordance with the terms of the "Declaration of Helsinki for recommendations guiding physicians in biomedical research involving human subjects" (http://www.cirp.org/library/ethics/helsinki/), with the approval and consent of the Ethics Committee of the Faculty of Sport and Physical Education, University of Belgrade.

3 RESULTS

This study included a total sample of 44 participants. Of these, 59.1% were involved in sports, and 40.9% of participants were not involved in sports activities. All subjects had paraplegia; 25 of them had the injury of the thoracic spine, whereas 19 participants had the lumbar spine injury. There was no difference between groups in relation to the completeness of the spinal cord injury (χ^2=2.27, p=0.132) and in relation to gender (χ^2=1.45, p=0.228). Male participants from the group of athletes and the group of non-athletes differed by age (35.9±6.5 vs. 48.8±7 years respectively, p=0.000) and by the time after injury (14.2±6.7 vs. 22.5±8.8 years respectively, p=0.005). There was no difference between female participants from the group of athletes and the

group of non-athletes in relation to their age (43.2±8.5 vs. 43.4±13.2 years respectively), or in relation to the time after injury (19.8±0.5 vs. 24.5±16.7 years respectively, p=0.461) (Table 1).

Table 1. The characteristics of the participants, both athletes and non-athletes.

Parameters	Athletes	Non-athletes	
Level of injury, n (%)			
Thoracic	15 (57.7%)	10 (55.6%)	
Lumbar	11 (42.3%)	8 (44.4%)	
ASIA*, n (%)			
A (complete)	16 (61.5%)	11 (61.1%)	χ^2 test
B (incomplete)	4 (15.4%)	3 (16.7%)	χ^2=2.27
C (incomplete)	6 (23.1%)	4 (22.2%)	p=0.132
Sex, n (%)			
Male	19 (73.1%)	13 (72.2%)	χ^2 test
Female	7 (26.9%)	5 (27.8%)	χ^2=1.45
Total	26 (100%)	18 (100%)	p=0.228
Age, $\bar{x}$±SD (years)			MANOVA
Male	35.9±6.5	48.8±7	**p=0.000**
Female	43.2±8.5	43.4±13.2	p=0.978
Time after injury $\bar{x}$±SD (years)			
Male	14.2±6.7	22.5±8.8	**p=0.005**
Female	19.8±0.5	24.5±16.7	p=0.461

*ASIA – American Spinal Injury Association

The participants involved in sports (athletes) have been practising sports activities for 9.4±4.5 years (Table 2), with shorter or longer breaks; however, they were training minimally 2-3 times per week during the last two years continuously, and that we considered relevant for this research. When it comes to the secondary health conditions (Table 3), most of the participants from both groups reported urinary tract infections (69.2% vs. 66.7% respectively), but athletes had significantly less pain (p=0.034) and a subjective feeling of poor circulation (p=0.023), while the presence of pressure ulcers was at the border of statistical significance (p=0.057).

Table 4 shows the SCI QL-23 results. The participation in sports activities had a significant impact on the results of all four subtests, both in relation to male (p=0.000) and female gender (FUNC p=0.000, MOOD p=0.000, PROB p=0.006 and GQOL p=0.000). The participants who were athletes had achieved their best results in the area of mood (MOOD), both in relation to male and female gender (7.72±9.47 vs. 7.41±7.63 respectively), but they had also achieved high values on the subtest of Global Quality of Life-GQOL (80.56±15.96 vs. 83.33±16.67 respectively).

Table 2. The type of sport, number of training sessions on a weekly basis and years of training of athletes with SCI.

Parameters	Male	Female	Total
Type of sport, n (%)			
Athletics	7 (26.9%)	-	7 (26.9%)
Basketball wheelchair	9 (34.6%)	-	9 (34.6%)
Shooting	-	3 (11.5%)	3 (11.5%)
Bicycling	1 (3.8%)	-	1 (3.8%)
Archery	1 (3.8%)	2 (7.7%)	3 (11.5%)
Table tennis	-	2 (7.7%)	2 (7.7%)
Body building	1 (3.8%)	-	1 (3.8%)
Total	19 (73.1%)	7 (26.9%)	26 (100%)
Number of training sessions/weekly, n (%)			
2-3 x (basketball wheelchair, table tennis, bicycling)	10 (38.4%)	2 (7.7%)	12 (46.1%)
4-5 x (archery, shooting)	1 (3.8%)	5 (19.2%)	6 (23.1%)
6-7 x (body building)	1 (3.8%)	-	1 (3.8%)
8-12 x (athletics)	7 (26.9%)	-	7 (26.9%)
Total	19 (73.1%)	7 (26.9%)	26 (100%)
Years of training (Total)	9.2±5	9.9±3.1	9.4±4.5

Table 3. The presence of secondary health conditions in persons with SCI who are involved in sports acticities in comparison to those who are not involved in sports activities.

Parameters	Athletes	Non-athletes	MANOVA
SHC*, n (%)			
Pressure ulcers	7 (26.9%)	10 (55.6%)	**p=0.057**
Urinary infections	18 (69.2%)	12 (66.7%)	p=0.862
Muscle spasms	8 (30.8%)	5 (27.8%)	p=0.835
Osteoporosis	1 (3.8%)	2 (11.1%)	p=0.359
Pain	3 (11.5%)	7 (38.9%)	**p=0.034**
Kidney problems (infections, calculosis)	3 (11.5%)	4 (22.2%)	p=0.352
Poor circulation	1 (3.8%)	5 (27.8%)	**p=0.023**

*Secondary health conditions

The greatest difference between the ranges of values of athletes compared to non-athletes was on the test PROB (31.79±18.87 vs. 67.59±18.68 respectively) for male participants and on the test FUNC (10.95±10.03 vs. 61.28±5.12 respectively) for female participants. As there

Table 4. SCI QL-23 results of the participants who are involved in sports activities, compared to those who are not involved in sports activities.

Parameters	Athletes	Non-athletes	MANOVA
FUNC, x̄±SD (the lower the better)			
Male	10.40±10.84	45±15.79	p=0.000
Female	10.95±10.03	61.28±5.12	p=0.000
MOOD, x̄±SD (the lower the better)			
Male	7.72±9.47	36.57±26.67	p=0.000
Female	7.41±7.63	58.33±12.73	p=0.000
PROB, x̄±SD (the lower the better)			
Male	31.79±18.87	67.59±18.68	p=0.000
Female	30.56±22.85	73.61±18.16	p=0.006
GQOL, x̄±SD (the lower the better)			
Male	80.56±15.96	48.61±19.79	p=0.000
Female	83.33±16.67	33.33±11.78	p=0.000

is a significant difference between male participants from the group of athletes and the group of non-athletes in relation to their age and the time after injury, using Pearson's correlation coefficient, we have presented their impact on GQOL, as well as the impact of the secondary health conditionson GQOL (Table 5).

Table 5. GQOL in relation to variables: age, time after injury and secondary health conditions.

	Athletes				Non-athletes			
	Male		Female		Male		Female	
Variables	r	P-level	r	P-level	r	P-level	r	P-level
Age	-0.325	NS	-0.702	NS	-0.028	NS	-0.043	NS
Time of injury	-0.342	NS	-0.219	NS	-0.008	NS	0.151	NS
Pressure ulcers	-0.186	NS	-0.447	NS	0.070	NS	0.707	NS
Urinary infections	-0.377	NS	-0.447	NS	-0.211	NS	-	.
Muscle spasms	0.246	NS	0.707	NS	-0.284	NS	-	-
Osteo-porosis	-	-	-0.447	NS	-	-	0.000	NS
Pain	-0.211	NS	-	-	0.041	NS	0.707	NS
Kidney problems (infections, calculosis)	**-0.545**	**0.019***	-	-	-0.122	NS	0.000	NS
Poor circulation	0.042	0.042	-	-	0.220	NS	0.000	NS

r=Pearson's correlation coefficient
*P<0.05
NS=not significant

4 DISCUSSION

In our study, a significantly higher quality of life of persons with SCI engaged in sports activities, as compared to those who did not do any sports, was found, which is consistent with other research (13, 29, 47, 48). In another study, in which the test SCI QL-23 was used as well (19), persons with paraplegia had an average value score of 44.07±29.11 in the given area of functioning (FUNC), while our participants who were non-athletes had a lower score (a lower score means a better performance), in terms of both genders (45±15.79 vs. 61.28±5.12 respectively). However, the participants who were doing sport in our research had a significantly lower score in the given area, for both genders (10.40±10.84 vs. 10.95±10.03 respectively). This means that the involvement in sports activities had a significant effect on the improvement in the area of functioning.

It is known that persons with SCI suffer from depression and have negative mood (9, 49), as also evidenced in our study, on the subtest MOOD (Table 4). However, the biggest difference between SCI athletes and non-athletes is found exactly in this subtest, as expected, since it is known that physical activity affects the improvement of mood in this population as well (17, 23, 50). However, it should be noted that male non-athletes in our study had similar results to the ones in recently published studies (19, 45), but female non-athletes had significantly worse results. Kreuter et al. (35) indicated the relation of some socio-demographic characteristics and depressive feelings in persons with SCI, which could be potentially important factors and a possible explanation for this result.

The results of the third subtest (PROB) indicate a level of difficulty, i.e. problems of persons with SCI which concern the feelings of inability to walk free and the necessary assistance, as well as problems integrating into the environment and problems with defecation and pain (Table 4). Previously published studies from 2012 (34) and 2014 (19, 45) presented a better score compared to our results pertaining to the non-athletic participants (the average of 13.1-46.1% for male participants and 23.3-59.6% for female participants). However, sports,

whether practiced individually (eg. athletics, shooting, archery and body building in our research) or in groups (wheelchair basketball and table tennis), significantly reduces the above mentioned problems and difficulties that accompany SCI. This can be seen from the results of athletes on this subtest that are nearly two times better than the ones from the aforementioned research.

Comparing the results of the fourth subscales (GQOL) with the results from other studies (35, 45), we have found that our participants not involved in sports had GQOL lower for an average 27.9%-37.4% in comparison to the participants from Australia and Sweden, as well as in comparison to the participants from Iran. When complemented by the fact that the groups from those countries were heterogeneous (persons with paraplegia and persons with tetraplegia), this result shows that the personal feeling of quality of life of our participants is at a significantly lower level. In Sweden and Australia, according to a given study, one of the strongest predictors of quality of life was participation in social activities and productive life in the community. However, our participants who are athletes perceived quality of life as significantly higher than the participants from the afore mentioned research (that is, 56.4% more than participants from Australia and 45.5% more than participants from Sweden), which means that the inclusion of persons with spinal cord injuries into society through sport contributes significantly to better quality of life in our country, too. In addition, other studies show a variation in the results of quality of life in relation to the given state (27).

In relation to secondary health conditions, the implementation of sports activities contributed to the decrease of pain and subjective feeling better circulation. Studies conducted by Norrbrink et al. (51), Martin Ginis et al. (23) and van der Scheer et al. (52) also indicated a positive effect of exerciseon the reduction of musculoskeletal and neuropathic pain. The majority of our participants (a total of 68.2%) had an urinary infection, which is consistent with the data from other studies (10, 53). Pressure ulcers, in our study, as the second most common secondary health conditions, occurred in 38.6% of the participants, while in other studies this frequency varied between 21.1 and 41.8% (54, 55). The SCI athletes in our study reported less presence of pressure ulcers, which is not negligible, since the difference was at the border of statistical significance (Table 3). It is known that inactivity affects the formation of pressure ulcers in persons with SCI (56), which supports the results of our research.

Numerous studies show that persons who are older and have a longer period after injury (duration effect) suffer more from secondary conditions or symptoms (chronic pain, pressure ulcers, bladder problems, spasms, etc.) that may affect their perception of quality of life (9). However, we found that among our participants almost no predictor had no power effect on GQOL, including the age, time of injury and secondary health conditions. A study from 2012 (31) showed that persons with SCI, regardless of their age and the time passed after injury, had the potential to improve their overall QoL, or some domains of QoL. It is interesting that the only association between the predictor and GQOL was found in male athletes, and was related to kidney problems. Possible reasons should be sought in the fact that athletes have a higher degree of perspiration during training and competing, which leads to a greater flow of fluid through the kidneys after hydration. This information should be the subject of future research in the area of sports for persons with SCI. The first limitation of our study is that all the data were obtained exclusively by means of self-reporting (secondary health conditions and QoL), which means that they could be biased and under the influence of forgetting. Next, the sample of the participants was relatively small, further limiting a detailed analysis of the differences between the groups. The limiting factor of our study is certainly the nonhomogeneousness of the group of the participants involved in sports activities in relation to the type, intensity and frequency of sports training. First of all, we were guided by the well-known fact that doing sports affects the motivation and the 'fighting spirit,' the important factors for both overcoming of disability and perception of QoL. However, some studies indicate that a higher frequency of training (29) and certain combination of aerobic and strength exercises (24) affect the QoL, pain, stress and depression. Thus, our study indicates the need for further research on the effects of certain types of sports activities (systematized in relation to the exercise type, intensity and frequency of training) on different QoL domains and secondary health conditions. In addition, future studies should include other factors that may affect the quality of life of athletes and non-athletes with SCI, such as the marital status, financial status, occupation, place of residence, social assistance, employment, physical and social barriers, and more.

5 CONCLUSION

Athletes with SCI perceive a significantly higher quality of life, according to SCI QL-23, in terms of the functioning, mood, problems related to the loss of independence and the overall rating in life situations, when compared to non-athletes with SCI. Pertaining to the secondary health conditions, sports activities affect the presence or absence of pain and the subjective feeling of poor circulation.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

ETHICAL APPROVAL

The research was realized in accordance with the terms of the "Declaration of Helsinki for recommendations guiding physicians in biomedical research involving human subjects" (http://www.cirp.org/library/ethics/helsinki/), with the approval and consent of the Ethics Committee of the Faculty of Sport and Physical Education, University of Belgrade.

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