Low back pain in physically active young adults

Bolečina v križu pri telesno aktivnih mladih odraslih

Maja Bučar Pajek,[1] Mojca Peček Čuk,[2] Jernej Pajek[3]

[1] *Fakulteta za šport, Univerza v Ljubljani, Gortanova 22, 1000 Ljubljana*

[2] *Pedagoška fakulteta, Kardeljeva ploščad 16, 1000 Ljubljana*

[3] *Univerzitetni klinični center Ljubljana, Zaloška 7, 1525 Ljubljana*

Korespondenca/ Correspondence:
Jernej Pajek, Tel.: 041 515 434, Fax: 059 922 924, E-mail: jernej.pajek@mf.uni-lj.si

Ključne besede:
zmanjšana zmožnost, šport, spol, prevalenca, epidemiologija

Key words:
disability, sport, gender, prevalence, epidemiology

Citirajte kot/Cite as:
Zdrav Vestn 2012; 81: 205–17

Prispelo: 11. jan. 2011, Sprejeto: 20. nov. 2011

Izvleček

Izhodišča: Raziskovanje bolečine v križu (BVK) se vse bolj usmerja k mlajšim starostnim skupinam zaradi velike napovedne vrednosti in povezanosti z BVK v kasnejših življenjskih obdobjih. Z raziskavo smo želeli opredeliti prevalenco in dejavnike tveganja BVK v slovenski populaciji mladostnikov, ki jih še ne poznamo.

Metode: V presečno raziskavo smo vključili študente prvih letnikov fakultete za šport (FŠ) in kemijo (FK) Univerze v Ljubljani v letu 2009. Uporabili smo slovenski prevod vprašalnika CPG (*angl.* Chronic Pain Grade). Pri podskupini FŠ smo preučevali povezanost med rezultati vprašalnika in rezultati testov sprejemnega postopka ter opravili ponovno anketiranje po opravljenem 1. semestru.

Rezultati: Vprašalnik je uspešno izpolnilo 283 študentov s povprečno starostjo 19,9 (2,3) let. Vseživljenjska in 6-mesečna prevalenca BVK sta bili 87,3 % (83,1–90,9 %) in 63 % (57,4–68,6 %). Ocena intenzivnosti bolečine je bila 36,6 (16,9), (rang 0–90) od 100 točk, ocena zmanjšane zmožnosti 18 (18,7) (rang 0–83) od 100 točk. Ženske so imele značilno višjo oceno intenzivnosti in zmanjšane zmožnosti kot moški. Tekmovalci poročajo o večjem zmanjšanju zmožnosti kot rekreativci. Multivariatna linearna regresija je pokazala, da sta spol in raven telesne dejavnosti značilna neodvisna napovedna dejavnika ocene intenzivnosti in zmanjšane zmožnosti. BVK ni vplivala na rezultate sprejemnega postopka FŠ. Po prvem semestru v BVK ni bilo pomembnih sprememb pri študentih FŠ.

Zaključki: Ugotavljamo veliko prevalenco BVK zmerne intenzivnosti, ki povzroča manjše zmanjšanje zmožnosti. BVK je hujša pri ženskah in je povezana z ravnijo telesne dejavnosti. Študijske programe bi bilo potrebno dopolniti s poučevanjem o BVK in preventivnih načinih vadbe.

Abstract

Background: Research of low back pain (LBP) has been recently directed towards the younger age groups due to high predictive value for later life. The aim of the study was to assess the prevalence and risk factors for LBP in the Slovene population of young adults, which are yet unknown.

Methods: In this cross-sectional study first-grade students at the Faculty of Sport (FS) and the Faculty of Chemistry (FC), University of Ljubljana, in 2009 were included. The Slovene translation of Chronic Pain Grade questionnaire was implemented. In the FS subgroup the associations between questionnaire results and results of the entrance examination were analyzed and a follow-up questionnaire survey was done after the 1st semester.

Results: The questionnaire was returned by 283 students. Average age was 19.9 (2.3) years. Lifelong and 6-month LBP prevalences were 87.3 % (83.1–90.9 %) and 63 % (57.4–68.6 %), respectively. Average LBP intensity was 36.6 (16.9) (range 0–90) out of 100 points, average disability was 18 (18.7) (range 0–83) out of 100 points. Females had higher intensity and disability scores. Competitors had higher pain disability scores than students engaging in sports at recreational level. Gender and level of physical activity were significant independent predictors of intensity and disability scores at multivariate linear regression. LBP was not associated with entrance test results and there were no important changes in the follow-up after the 1st semester in the FS students.

Conclusions: We found high LBP prevalence, which was of moderate intensity and caused minor disability. LBP was more severe in females and associated with the level of physical activity. Information about LBP and preventive workout programs should be incorporated into study programs.

Introduction

Low back pain (LBP) is a widely prevalent and complex syndrome of regional pain, often cited as a major cause of disability and inability to work.[1] It is estimated that during the course of their lives 70–85 % of individuals will experience low back pain.[2] The commonest presentation of LBP are acute and subacute episodes that last up to three months, but chronic back pain lasting more than 3 months ultimately is more disabling and dispiriting because of the physical impediment it causes and its psychological effects.[3] Despite the earlier observations that the majority of LBP cases spontaneously recover in six weeks, recent reports state that 5–15 % of cases will go on to develop chronic LBP, which is more difficult to treat and the results of treatment are variable.[4] The total recovery from pain or disability due to LBP may be as low as 25 % in the first year after the initial consultation with the physician.[5]

Due to a significant risk of progression into a chronic and disabling disorder the prevalence and risk factors of LBP in the population of young adults should be regarded with special interest. An onset of LBP is expected to occur at the mean age of 30 and peaking in occurrence between the ages of 45 and 60 years [6], however a recent European survey of LBP reported the 6-month prevalence in 17–25 year age group to be similar to older age groups.[7] A special peculiarity with LBP is its association with physical activity. Physical inactivity is supposed to be associated with higher risk for recurrent LBP[8], but there are contradictory results reported regarding the association of LBP with the level of physical activity and physical fitness.[9-11]

There is a number of possible tools and questionnaires to assess LBP. Their overview is presented in Table 1. Von Korff's Chronic Pain Grade (CPG) questionnaire is among the most used ones and it has been successfully implemented for LBP epidemiological research in various surveys.

In this research we implemented the Slovenian translation of a well established LBP questionnaire – von Korff's CPG questionnaire, to establish the prevalence, intensity and disability due to LBP in the sample of physically active young adults. We aimed to examine the association of LBP with the level of physical activity and gender, and to examine the association of LBP with the re-

Table 1: Review of low back pain assessment tools*

Pain dimension	Questionnaire	Description
Pain severity and disability	1. Chronic pain grade questionnaire (von Korff) 2. Body pain scale of SF-36 questionnaire	Both questionnaires measure pain level and disability, including interference with daily activities.
Back specific disability and function	1. Oswestry index 2. Roland-Morris questionnaire	Reflect the level of activity limitation that patients experience as a result of their back pain.
General health status	1. SF-36 questionnaire 2. SF-12 questionnaire 3. Euro QoL questionnaire	A more comprehensive assessment of the patient's health status than 'back-specific' instruments and can reflect the overall impact of the patient's pain on health status and on their role in society.
Work disability	Days off work/days of cut-down work/ work status/ time to return to work	Reflects the extent to which the patients' condition has a negative influence on their usual work role and job.

**Other tools for low back pain assessment used in scientific publications: The McGill Pain Questionnaire, Aberdeen Back Pain scale, and Waddell Disability Index.*[12]
Sources: 1. Von Korff Chronic pain grade: Von Korff M, Ormel J, Keefe F, Dworkin S. Grading the severity of chronic pain. Pain 1992;50:133–49; 2. SF-36 and SF-12 questionnaire: http://www.sf-36.org/tools/sf36.shtml; 3. Oswestry index: Fairbank JC, Pynsent PB, "The Oswestry Disability Index." Spine 2000;25:2940–2952; 4. Roland-Morris questionnaire: Roland MO, Morris RW. A study of the natural history of back pain. Part 1: Development of a reliable and sensitive measure of disability in low back pain. Spine 1983;8:141–144; 5. Euro QoL questionnaire: http://www.euroqol.org/home.html

sults of the entrance exam for the Faculty of Sport student subgroup. Subgroup of subjects was retested 4 months after the first survey to assess the persistence of LBP and its short-term natural course.

Methods

The study was designed as a cross-sectional questionnaire survey with a prospective follow-up in a subgroup of subjects. The study sample consisted of first-year students at the Faculty of Sport (FS) and the Faculty of Chemistry (FC) of the University of Ljubljana in 2009. There were no exclusion criteria applied.

Subjects were included in the study after their informed consent was given and the study was approved by the Faculty of Sport ethical committee. The questionnaire survey was performed during the regular classes of sport gymnastics (at the FS) and physical education (at the FC) at the beginning of the 1st semester. The subgroup of students at the FS was retested with the same questionnaire again at the end of the 1st semester (4 months after the first questionnaire survey).

The questionnaire consisted of the items describing general demographic data (age, gender, study program) and 10 closed-type questions (the subject chooses one of the several possible options). Two items established the presence of LBP anytime in life and in the last 6 months (in the last 4-monts for the follow-up survey in the FS subgroup). The third item defined the subject's sport activity on three levels (no sport activity, activity on recreational and competitive levels). The last part of the questionnaire consisted of 7 items contained in von Korff's CPG questionnaire.[13] This questionnaire is well validated[14-16] and appropriate for prospective follow-up of chronic pain.[17] It was translated into the Slovene language by the help of Berlitz translation office in Ljubljana, Slovenia.

CPG questionnaire consisted of 3 questions about current, worst and average pain intensity in the last 6 (or 4) months. Eleven-point numeric scale (0 to 10 points, 0 – no pain, 10 – the highest intensity of pain possible) is used to grade the answers. The fourth question assessed the number of days lost from the usual activity (such as school, work and housekeeping) due to LBP. Last 3 questions with 11-point scale are dedicated to disability at daily activities, disability at recreation, social and family life and disability at work (Appendix 1). Pain intensity and pain disability scores are calculated as the mean of three questions (questions 1–3 for pain intensity, questions 5–7 for disability) multiplied by 10, they range from 0 to 100. Finally, a combination of pain intensity score and disability score is used to define the pain grade (Appendix 2). Pain grades are divided into 4 hierarchical classes: Grade I, low disability-low intensity; Grade II, low disability-high intensity; Grade III, high disability-moderately limiting; and Grade IV, high disability-severely limiting. In previous studies CPG showed a highly statistically significant and monotonically increasing relationship with unemployment rate, pain-related functional limitations, depression, fair to poor self-rated health, frequent use of opioid analgesics, and frequent pain-related doctor visits both at baseline and at 1-year follow-up[13]. Previous results also indicated that the CPG contains items able to measure each of the three of International Classifications of Functioning Disability and Health outcomes: impairment, activity limitations and participation restrictions.[14]

The Slovene translation of the questionnaire was verified for internal consistency in our sample. This was done by the calculation of the Cronbach's alpha coefficient for the group of 3 questions dealing with pain intensity and 3 questions dealing with disability in the CPG questionnaire. All the returned questionnaires in our sample were used for this calculation.

In the subgroup of FS students the results of entrance examination were available. This examination consists of several motor ability tests (100 and 2400m run, 100m swimming, standing broad jump, obstacle course backwards, bent arm hang)[18]. The entrance exam was performed during the last six months prior to study entry and therefore it was covered by the period examined in the CPG questionnaire. The results of these entrance tests were compared in students

Table 2: Sport activity level and 6-month low back pain prevalence

	No sport activity	Recreational level	Competitive level
No low back pain (n)	3 (27 %)	78 (41 %)	23 (29 %)
With low back pain (n)	8 (73 %)	113 (59 %)	57 (71 %)

(%) – signifies the proportion of subjects in the same column (same level of sport activity)
p = 0.14 for the whole data set and p = 0.06 with no sport activity column excluded

with and without LBP and the correlations in pain intensity and disability scores with these test results were calculated.

Quantitative data is reported using means and standard deviation. Prevalence is reported as percentage with 95 % confidence interval in parentheses. The differences in samples were tested with Mann-Whitney's, Wilcoxon's and χ^2 tests. Correlations were assessed with Spearman's rho test. The significance level was set at $p < 0.05$. Statistical analyses were performed with SPSS application (SPSS Inc., Chicago, USA).

Results

Sample description, demographic data and questionnaire consistency

In this study 283 first-year students were included: 104 students of the FS and 179 students of the FC. At the FC the sample contained 52 % of 346 first-year students, for the FS the sample contained 48 % of 215 first-year students. Average age was 19.9±2.3 years, 42 % were male.

The faculties have uneven gender distribution; at FS there was a male preponderance (58.7 %) and female preponderance at FC (67.6 %). Competitive level of sport activity is more prevalent at FS, since 53.8 % of students practice sport at competitive level as compared to 13.5 % FC students, $p < 0.001$. All students in the FS subsample practice sport at least at the recreational level, no sport activity was declared in 6.2 % FC students, for both faculties combined there are only 11 out of 283 students not declaring any sport activity (3.9 %). Significantly more male than female students practice sport at the competitive level (62.3 % males and 41.9 % females at FS ($p = 0.04$) and 22.8 % males and 9.1 % females at FC, $p = 0.007$).

Table 3: Pain intensity score, disability score and pain grade at different sport activity levels (scores computed by the Chronic Pain Grade – CPG questionnaire)

	Recreational level Mean (SD)	Competitive level Mean (SD)	p
Total sample	n=113	n=57	
Intensity score	36 (18.1)	38.2 (13.9)	0.2
Disability score	16.1 (19.2)	22.6 (17.6)	0.002
Pain grade	1.27 (0.63)	1.39 (0.68	0.28
Faculty of sport	n=25	n=38	
Intensity score	28.8 (14.3)	36.8 (12.4)	0.007
Disability score	11.6 (15.3)	21 (14.4)	0.002
Pain grade	1.16 (0.47)	1.32 (0.66)	0.34
Faculty of chemistry	n=88	n=19	
Intensity score	38.1 (18.6)	41.2 (16.6)	0.41
Disability score	17.3 (20.1)	26 (22.8)	0.08
Pain grade	1.31 (0.67)	1.53 (0.7)	0.11

Internal consistency of the items making up the questionnaire was tested for questions dealing with pain intensity and disability separately. The Cronbach's coefficient α was 0.77 for the questions 1–3 and 0.88 for the questions 5–7, which is well comparable with previous studies.[15,19]

Lifetime and 6-month prevalence of LBP

Lifetime prevalence of LBP was 90.4 % in FS students and 85.5 % in FC students (p=0.23); in the total sample lifetime prevalence was 87.3 % (247 out of 283 students; 95 % CI: 83.1–90.9 %). Six-month LBP prevalence was 63 % for the total sample (178 out of 283 students, 95 % CI: 57.4–68.6 %), in the faculty subgroups the 6-month prevalences were 60.6 % and 64.8 % for FS and FC respectively, p=0.48. No significant differences in LBP prevalence were present in men and women.

There were differences in 6-month LBP prevalence according to the sport activity level of borderline statistical significance (Table 2). There was a trend to higher 6-month LBP prevalence in inactive and competitive level students (p=0.14). When 11 inactive students were excluded from the analysis, the higher prevalence of LBP with competitive sport activity level became statistically borderline significant (p=0.06).

CPG questionnaire: pain intensity and disability scores

The evaluation of CPG questionnaire results according to the level of sport activity was possible in 170 returned questionnaires from students who reported having LBP in the last 6 months and practicing sports at least at the recreational or competitive level. Due to the low number of cases (8 students out of 178), the group of physically inactive students was not included in this analysis. In the remaining 170 students the average pain intensity score was 36.6±16.9 (range 0–90) points, average disability score was 18±18.7 (range 0–83) points and mean pain grade 1.3±0.64 (range 0–4).

Pain intensity scores, disability scores and pain grade according to the level of sport activity and gender are shown in tables 3 and 4. It can be seen that all aspects of pain were more pronounced in competitors and in women, but only some differences were statistically significant.

Independence of the associations of activity level and gender with LBP was tested

Table 4: Pain intensity score, disability score and pain grade according to sex (scores computed by the Chronic Pain Grade – GCP questionnaire)

	Men Mean (SD)	Women Mean (SD)	p
Total sample	n=68	n=102	
Intensity score	33.2(13.2)	39.2(18.5)	0.04
Disability score	13.2(12.9)	21.7 (21.4)	0.05
Pain grade	1.22 (0.51)	1.37 (0.72)	0.14
Faculty of sport	n=39	n=24	
Intensity score	31.5 (11.6)	36.9 (16.1)	0.17
Disability score	12.9 (10)	24.3 (19.6)	0.03
Pain grade	1.18 (0.51)	1.38 (0.71)	0.21
Faculty of chemistry	n=29	n=78	
Intensity score	35.5 (15)	39.8 (19.2)	0.35
Disability score	13.7 (16.2)	20.9 (22)	0.25
Pain grade	1.28 (0.53)	1.37 (0.72)	0.64

with multivariate linear regression model; the results are shown in Table 5. For the disability score there are both sex and sport activity level performing well as statistically significant independent predicting variables, both in the total sample and in the two faculty subsamples. The level of sport activity was an independent predictor of pain intensity in the whole sample and in the FS subgroup. The interaction of gender and physical activity was tested by introducing the product term of the two variables in the multivariate analysis–the product term of gender (male = 0, female = 1) and physical activity (recreational = 0, competitive = 1). The resulting interaction variable was a significant independent predictor of pain intensity (but not disability) showing that female competitors have a higher pain intensity score of 11.6 (p = 0.04).

The results of entrance exam motor ability tests and LBP in FS students

For 100 FS students the results of entrance exam with several motor ability tests were available. There was no statistically significant difference in motor ability results in the students with and without LBP in the last 6 months. The correlations in pain intensity scores and disability scores and motor ability test scores were also calculated, and the correlation was significant only for the bent arm hang test and disability score (r=0.39, p=0.002); note that the correlation was positive.

Follow-up questionnaire survey after the 1st semester in the FS students

The questionnaire response rate was lower after the 1st semester and we only gathered data from 74 FS students (34.4 %). In this subgroup, 13 students (17.6 %) reported new incidence of LBP (the pain was present in the last 4-months, but not before the study entry). Sixteen students (21.6 %) reported pain in the first 6-month period, but not in the last 4-month period. For the whole subgroup examined, LBP was present in 59.5 % at the study entry and 55.4 % during the first semester, p = NS.

Twenty-eight students (37.8 %) reported pain in both periods. In these students the average pain intensity score diminished (37.6 ± 14.3 points in the first period and 31.3 ± 15.5 in semester period, p = 0.03). Disability score did not change significantly (18.5±15.6 points in the first period and 15.2±20 in semester period, p = 0.18). There

Table 5: Multivariate linear regression with low back pain intensity and disability score as dependant variables and level of sport activity, gender and faculty as independent variables.

Sample	Dependant variable	R^2	Sport activity level Beta (95 %CI) p	Gender Beta (95 %CI) p	Faculty Beta (95 %CI) p
Total	Pain intensity score	0.07	7 (1 – 13) p=0.02	6.2 (0.7 – 11.7) p=0.03	5.9 (0 –11.7) p=0.05
	Disability score	0.12	11.7 (5.1 – 18.2) p=0.001	11.3 (5.2 – 17.3) p< 0.001	2.7 (-3.7 – 9.1) p=0.41
Faculty of sport	Pain intensity score	0.16	9.7 (3 – 16.5) p=0,005	7.7 (0.9 –14.5) p=0.03	N/A
	Disability score	0.29	12.7 (5.7 – 19.6) p=0.001	14.4 (7.3 – 21.4) p< 0.001	
Faculty of chemistry	Pain intensity score	0.02	4.4 (-5 – 13.7) p=0.36	5.1 (-2.9 – 13.7) p=0.21	N/A
	Disability score	0.06	10.8 (0.4 – 21.2) p=0.04	9.2 (0.2 – 18.1) p=0.045	

R^2 – model R^2, Beta – beta coefficients of multivariate linear regression, CI–95 % confidence interval, N/A – not applicable, (Beta for sport activity level – change of pain score when moving from recreational to competitive level subgroup; Beta for gender – change of pain score for being female; Beta for faculty – change of pain score when moving from FS to FC subgroup)

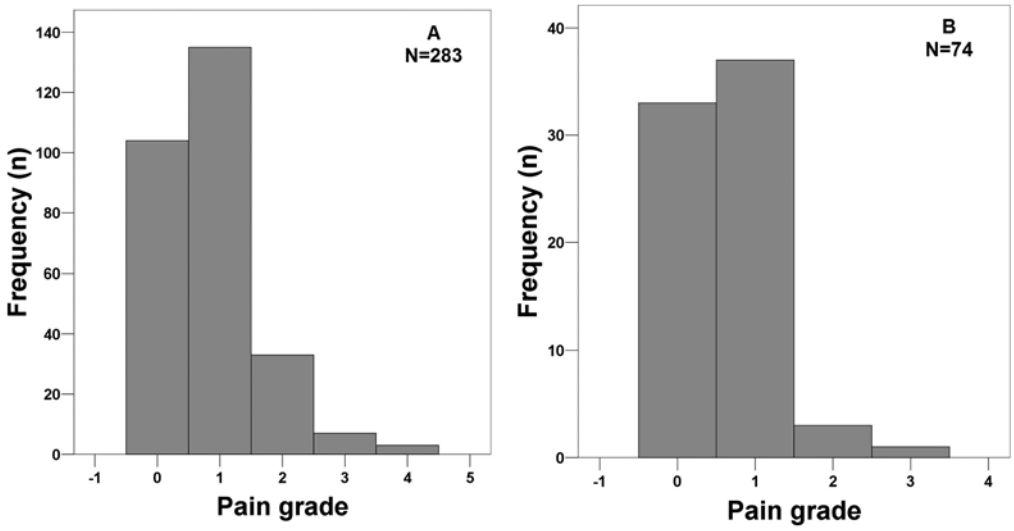

Figure 1: Histogram of student distribution according to pain grade. A – first questionnaire survey, B – second questionnaire survey after the first semester

was no significant change in pain grades (1.2 ± 0.39 and 1.2 ± 0.48, for the first and second period, respectively, p = NS). Histograms of pain grades for the first and second questionnaire survey are shown in Figure 1.

Students, who developed LBP newly in the semester period (N = 13), had the average pain intensity of 27.4 ± 11.9 points. This intensity was not significantly different from the pain intensity in students with LBP in both periods (pain intensity score 31.3 ± 15.5, p = 0.46).

Discussion

In this study we assessed the prevalence of LBP, its intensity and consequent disability in the sample of physically active young adults. As a model sample of this population we evaluated first-year students at two faculties of the University of Ljubljana. The questionnaire results confirm the sample adequacy since there were only 3.9 % of physically inactive students (no sport activity). In the FS subsample most of the students practised sport at the competitive level. Our results show a high LBP prevalence. Up to the age of 20 years most of our students experienced LBP and the six-month prevalence was almost two thirds of students. This prevalence is high even when put into international perspective. Foreign studies report a LBP prevalence in the range of 32–63 % and our results therefore stand at the upper margin of this range (Table 6).

In general, high LBP prevalence in our sample is consistent with the reports of LBP prevalence in adolescent population, which is the age group of 10–19 years according to the WHO definition.[22] The reported prevalence in this age group ranges from 7 % to 72 % including the somewhat higher prevalence in females.[23] LBP prevalence increases with age in the adolescent period and reaches the adult levels at the age of 18 years.[23] The key question is whether LBP incidence in this age group predicts later LBP morbidity in the main working-life period? If this was the case then we could regard our results to be of significant relevance for the health policies, calling for preventive measures with interventions already in the adolescent and young adult age groups.

When LBP was prospectively followed in the short-term period of 10 months in our study (6-month period at the study entry and 4-month follow up) we found the persistence of LBP in 37.8 % of subjects. The results of other studies also show a substantial disposition to recurrence of LBP. In the report of Brennan et al.[20] 77 % of subjects reported their pain as a recurrent one. In the prospective study of general population, LBP persisted as a chronic problem during the 4-year follow-up in 79 % of subjects.[24] The history of LBP is a risk factor for later recurrent pain in the general population[8], in young adult population[25] and even for the longer 8 year follow-up period.[26,27] According to these reports we can acknowledge the predictive value of LBP in adolescent

and young adult age periods for later pain recurrence. It is obvious that the need to implement preventive and corrective measures in our population of physically active young adults therefore becomes very much justified.[7]

When we inspect the pain intensity and disability scores (Table 3) it can be seen that the average pain intensity is moderate (36.6 out of 100 points) and the disability is mild (18 out of 100 points). In compliance with this, we found no association of LBP with the entrance motor ability test results – no influence of LBP on the success at the faculty entrance test was present. The only statistically significant positive correlation (after Bonferroni's correction) was found in the disability score and in bent arm hanging time, which is difficult to explain. The duration of bent arm hanging is mainly dependent on the subject's motivation and much less on the motor abilities or other physical characteristics.[18] Furthermore, our correlation of bent arm hanging time and disability score was strongly influenced by three extreme values, and when excluded, the correlation no longer remains significant.

The associations of LBP with physical activity and gender have also been examined by other studies. Higher prevalence of LBP in women has been reported previously and our results are consistent with these reports.[2,23,28,29] The causes for difference in LBP between genders is poorly understood. In the most part, they can not be explained by differences in socio-economic status, physical activity or smoking [30] and also not by differences in hormone or menstrual influences.[31] Perhaps they are associated with physiological and anatomical differences and differences in psychological factors, such as sensing and reporting of pain.[28]

We found a positive association of physical activity level with LBP. In the whole sample there was a trend towards higher prevalence of LBP in competitive-level compared to recreational-level students, and the disability was significantly higher in competitive-level students. In the FS subgroup both intensity and disability scores were significantly higher with higher level of physical activity. Finally, the level of physical activity was a significant independent predictor of pain intensity and disability in the total sample when controlled for gender and faculty in the multivariate analysis. These results are consistent with other groups which report positive association of LBP with the sport training time[20], the positive association of LBP with high number of weekly training hours[32] and association of more than twice weekly training with LBP in adolescents[28]. Higher risk for LBP was also found in physically inactive subjects, and so it seems that the relation between LBP and physical activity follows the "J" or "U" curve.[8,33] It is suggested that this relation is better expressed in females.[33,34] Our results confirm this finding as is evident from the interaction tests in the multivariate model. The interaction of sex and physical activity was tested by introducing the product term of these two variables in the multivariate analysis and the resulting interaction variable (female competitor) was a significant independent predictor of pain intensity (but not disability) showing that female competitors are the most vulnerable group for LBP intensity.

The cross-sectional nature of our research does not allow us to declare the higher level of sport activity as an independent etiological factor for LBP. It however may be viewed as a predictive factor or marker of risk for the prevalence and burden (higher intensity and disability) of LBP and we may

Table 6: The prevalence of LBP in recent reports

Study	Country, study population, age (years)	Prevalence, N (%)
Goubert et al. (2004)[19]	Belgium, general population, 17–25 years	6-month prevalence: 85/228 (37.3 %)
Brennan et al. (2007)[20]	Ireland, students, 20.9±2.7 years	12-month prevalence: 61/188 (32 %)
Nyland et al. (2003)[21]	Australia, students, 20.3±2.6 years	12-month prevalence: 158/250 (63.2 %)
This study	Slovenia, students, 19.9±2.3 years	6-month prevalence: 178/283 (63 %)

Appendix 1: Slovene translation of CPG questionnaire.

1. Kako bi ocenili svoje bolečine na lestvici od 1 do 10 sedaj, v tem trenutku (pri tem je 0 „brez bolečin“ in 10 pomeni „bolečina hujša ne bi mogla biti“)?
   (0 – brez bolečine, 10 – najhujša možna bolečina).

0	1	2	3	4	5	6	7	8	9	10

2.) V preteklih šestih mesecih, kako močna je bila vaša najhujša bolečina na lestvici od 1 do 10, kjer je 0 „brez bolečin“ in 10 je „bolečina hujša ne bi mogla biti“?
   (0 – brez bolečine, 10 – najhujša možna bolečina).

0	1	2	3	4	5	6	7	8	9	10

3.) V preteklih šestih mesecih, v povprečju, kako močna je bila vaša bolečina na lestvici od 1 do 10, kjer je 0 „brez bolečin“ in 10 je „bolečina hujša ne bi mogla biti“? (To pomeni vaše običajne bolečine v času, ko ste bolečine občutili.)
   (0 – brez bolečine, 10 – najhujša možna bolečina).

0	1	2	3	4	5	6	7	8	9	10

4.) Približno koliko dni v preteklih šestih mesecih zaradi vaših bolečin niste mogli opravljati svojih običajnih dejavnosti (dela, šole ali gospodinjskih opravil)?

0 – 6 dni	7 – 14 dni	15 – 30 dni	31 dni ali več

5.) V preteklih šestih mesecih, koliko so bolečine vplivale na vaše vsakodnevne aktivnosti na lestvici od 1 do 10, kjer 0 pomeni „niso vplivale“ in 10 pomeni „aktivnosti nisem mogel opravljati“?
   (0 – niso vplivale, 10 – aktivnosti ni bilo moč opravljati)

0	1	2	3	4	5	6	7	8	9	10

6.) V preteklih šestih mesecih, koliko je ta bolečina vplivala na vašo sposobnost sodelovanja pri rekreativnih, družabnih in družinskih aktivnostih, kjer 0 pomeni „brez sprememb“ in 10 pomeni „ogromna sprememba“?
   (0 – brez sprememb, 10 – ogromna sprememba)

0	1	2	3	4	5	6	7	8	9	10

7.) V preteklih šestih mesecih, koliko je ta bolečina vplivala na vašo sposobnost opravljanja dela (vključno z gospodinjskimi opravili), kjer 0 pomeni „brez sprememb“ in 10 pomeni „ogromna sprememba“?
   (0 – brez sprememb, 10 – ogromna sprememba)

0	1	2	3	4	5	6	7	8	9	10

Appendix 2a: The estimate of intensity, reduced capacity and grade of pain calculated from responses to the CPG (Chronic Pain Grade) questionnaire – Slovene translation.

Ocena intenzivnosti bolečine: od 0 – 100 z uporabo odgovorov na vprašanja 1–3

Enačba za izračun: [(vpr.1 + vpr. 2 + vpr. 3) / 3] x 10

Ocena zmanjšane zmožnosti: od 0 – 100 z uporabo odgovorov na vprašanja 5–7

Enačba za izračun: [(vpr.5 + vpr. 6 + vpr. 7) / 3] x 10

Stopnja zmanjšane zmožnosti: stopnje od 0 do 6, izračunane kot seštevek pretvorjene ocene zmanjšane zmožnosti in pretvorbe vprašanja 4

Pretvorba ocene zmanjšane zmožnosti:

0–29	0
30–49	1
50–69	2
70 +	3

Pretvorba odgovora na vprašanje 4:

0–6 dni	0
7–14 dni	1
15–30 dni	2
31 + dni	3

Razred bolečine

Razred 0	Ocena intenzivnosti = 0 in stopnja zmanjšane zmožnosti = 0
Razred 1	Ocena intenzivnosti < 50 in stopnja zmanjšane zmožnosti < 3
Razred 2	Ocena intenzivnosti >= 50 in stopnja zmanjšane zmožnosti < 3
Razred 3	Stopnja zmanjšane zmožnosti = 3 ali 4, ne glede na intenzivnost
Razred 4	Stopnja zmanjšane zmožnosti = 5 ali 6, ne glede na intenzivnost

similarly infer for female gender. An additional limitation of our research is the way of data acquisition, with the subjects rating the intensity of pain, disability and level of physical activity by themselves while more objective measures were not used. Next, the follow-up period of 4 months for the second interview in the FS subgroup is shorter than the first 6-month period. Although period lengths are not largely discrepant, a possible difference in pain prevalence due to different durations of observation periods cannot be fully excluded. It is also important to note that the study sample was of narrow age span and limited to a single social group (students); therefore, a free extrapolation of findings to the whole population of young adults is not possible.

Finally, several implications of our findings for preventive and interventional measures should be mentioned. It is known that subjects suffering from LBP can be effecti-

Appendix 2b. Calculation of pain intensity score, disability score and pain grade from the CPG (»Chronic Pain Grade«) questionnaire

Pain intensity: a 0–100 score derived from questions 1–3, calculated as follows:

Mean (question 1 + question 2 + question 3) ×10

Disability score: a 0–100 score derived from questions 5–7, calculated as follows

Mean (question 5 + question 6 + question 7) ×10

Disability points: a score from 0–6 derived from the disability score re-coded plus question 4 recoded

Recoding for disability score:

0–29	0
30–49	1
50–69	2
70 +	3

Recoding for question 4:

0–6 days	0
7–14 days	1
15–30 days	2
31 + days	3

Chronic pain grade classification:

Grade 0	Pain intensity = 0 and disability points = 0
Grade 1	Pain intensity < 50 and disability points < 3
Grade 2	Pain intensity >= 50 and disability points < 3
Grade 3	Disability points = 3 or 4, regardless of pain intensity
Grade 4	Disability points = 5 or 6, regardless of pain intensity

vely helped by an appropriate information and access to written resources about LBP, since this intervention was shown not to be substantially inferior to physiotherapy or chiropractic intervention.[35] Student population may be rather ignorant about LBP and students would often want access to more information about this problem.[20] Furthermore, the efficacy of special trunk stabilizing or Pilates exercises has been proven in several studies on athletes and others.[36-39] Therefore, additional implication of our results is that when giving advice to patients with LBP problem caution is required when suggesting increased physical activity, if it does not include trunk stabilizing exercises. We regard the study program at the FS and physical education classes on other faculties as a great opportunity to inform students about LBP and to master at least some basic exercise programs for prevention and alleviation of LBP. In this regard, coaching the

students with the use of trunk stabilizing techniques and exercises seems the best way for making them to develop a habit of preventive behavior for later life. In view of a large social burden due to LBP in the working population and a significant predictive value of LBP in the young adult population this opportunity should not be missed in the future. The knowledge and exercises for LBP prevention should be introduced to physically active young adults and adolescents during the organized training process in clubs and recreational facilities. Appropriate education of FS students should be of primary importance in view of their main role as future physical education teachers in schools and sport clubs.

Conclusions

In this study Slovene translation of CPG questionnaire was successfully implemented to assess the prevalence of LBP, its intensity and consequent disability in a sample of physically active young adults, composed of students of the FS and FC. High lifetime and 6-month LBP prevalences were found, with a moderate intensity of pain and mild disability. A significantly higher burden of pain was found in females and in students with higher levels of sport activity. The study process of the first semester at FS did not modify the prevalence of LBP. Due to significant predictive value of LBP for recurrence later in life, the established high prevalence of LBP and the association with physical activity level, we propose introduction of preventive measures such as appropriate information and exercise programs in high-school and university study process.

References

1. Deyo RA, Weinstein JN. Primary care–Low back pain. N Engl J Med 2001; 344: 363–70.
2. Andersson GBJ. Epidemiological features of chronic low-back pain. Lancet 1999; 354: 581–5.
3. Ehrlich GE. Low back pain. Bulletin of the World Health Organization 2003; 81: 671–6.
4. Liddle SD, Baxter GD, Gracey JH. Exercise and chronic low back pain: what works? Pain 2004; 107: 176–90.
5. Croft PR, Macfarlane GJ, Papageorgiou AC, Thomas E, Silman AJ. Outcome of low back pain in general practice: a prospective study. BMJ 1998; 316: 1356–9.
6. Bratton RL. Assessment and management of acute low back pain. Am Fam Physician 1999; 60: 2299–306.
7. Leboeuf-Yde C, Kyvik KO. At what age does low back pain become a common problem? A study of 29,424 individuals aged 12–41 years. Spine (Phila Pa 1976) 1998; 23: 228–34.
8. Thomas E, Silman AJ, Croft PR, Papageorgiou AC, Jayson MIV, Macfarlane GJ. Predicting who develops chronic low back pain in primary care: a prospective study. BMJ 1999; 318: 1662–7.
9. Jacob T, Baras M, Zeev A, Epstein L. Physical activities and low back pain: A community-based study. Med Sci Sports Exerc 2004; 36: 9–15.
10. Croft PR, Papageorgiou AC, Thomas E, Macfarlane GJ, Silman AJ. Short-term physical risk factors for new episodes of low back pain. Prospective evidence from the South Manchester Back Pain Study. Spine (Phila Pa 1976) 1999; 24: 1556–61.
11. Harreby M, Hesselsoe G, Kjer J, Neergaard K. Low back pain and physical exercise in leisure time in 38-year-old men and women: a 25-year prospective cohort study of 640 school children. Eur Spine J 1997; 6: 181–6.
12. Kopec JA, Esdaile JM. Spine Update-functional disability scales for back pain. Spine 1995; 20: 1943–9.
13. Von Korff M, Ormel J, Keefe F, Dworkin S. Grading the severity of chronic pain. Pain 1992; 50: 133–49.
14. Dixon D, Pollard B, Johnston M. What does the chronic pain grade questionnaire measure? Pain 2007; 130: 249–53.
15. Smith BH, Penny KI, Purves AM, Munro C, Wilson B, Grimshaw J, et al. The Chronic Pain Grade questionnaire: Validation and reliability in postal research. Pain 1997; 71: 141–7.
16. Von Korff M, Jensen MP, Karoly P. Assessing global pain severity by self-report in clinical and health services research. Spine 2000; 25: 3140–51.
17. Elliott AM, Smith BH, Smith WC, Chambers WA. Changes in chronic pain severity over time: the Chronic Pain Grade as a valid measure. Pain 2000; 88: 303–8.
18. Bučar Pajek M. Dejavniki uspešnosti programa akrobatike za študentke na Fakulteti za šport. Ljubljana: University of Ljubljana; 2003.
19. Goubert L, Crombez G, De Bourdeaudhuij I. Low back pain, disability and back pain myths in a community sample: prevalence and interrelationships Eur J Pain 2004; 8: 385–94.

20. Brennan G, Shafat A, Mac Donncha C, Vekins C. Lower back pain in physically demanding college academic programs: a questionnaire based study. BMC Musculoskelet Disord 2007; 8: 67.
21. Nyland LJ, Grimmer KA. Is undergraduate physiotherapy study a risk factor for low back pain? A prevalence study of LBP in physiotherapy students. BMC Musculoskeletal Disorders 2003; 4.
22. Goodburn EA, Ross DA. A picture of health: a review and annotated bibliography of the health of young people in developing countries. Geneva: World Health Organisation and UNICEF; 1995.
23. Jeffries LJ, Milanese SF, Grimmer-Somers KA. Epidemiology of adolescent spinal pain–A systematic overview of the research literature. Spine 2007; 32: 2630–7.
24. Elliott AM, Smith BH, Hannaford PC, Smith WC, Chambers WA. The course of chronic pain in the community: results of a 4-year follow-up study. Pain 2002; 99: 299–307.
25. Hestbaek L, Larsen K, Weidick F, Leboeuf-Yde C. Low back pain in military recruits in relation to social background and previous low back pain. A cross-sectional and prospective observational survey. BMC Musculoskeletal Disorders 2005; 6.
26. Hestbaek L, Leboeuf-Yde C, Kyvik KO. Is comorbidity in adolescence a predictor for adult low back pain? A prospective study of a young population. BMC MusculoskeletDisorders 2006; 7.
27. Hestbaek L, Leboeuf-Yde C, Kyvik KO, Manniche C. The course of low back pain from adolescence to adulthood–Eight-year follow-up of 9600 twins. Spine 2006; 31: 468–72.
28. Kovacs FM, Gestoso M, del Real MTG, Lopez J, Mufraggi N, Mendez JI. Risk factors for non-specific low back pain in schoolchildren and their parents: a population based study. Pain 2003; 103: 259–68.
29. Strowbridge NF. Gender differences in the cause of low back pain in British soldiers. J R Army Med Corps 2005; 151: 69–72.
30. Schneider S, Randoll D, Buchner M. Why do women have back pain more than men? A representative prevalence study in the federal republic of Germany. Clin J Pain 2006; 22: 738–47.
31. Brynhildsen JO, Hammar J, Hammar ML. Does the menstrual cycle and use of oral contraceptives influence the risk of low back pain? A prospective study among female soccer players. Scand J Med Sci Sports 1997; 7: 348–53.
32. McMeeken J, Tully E, Stillman B, Nattrass C, Bygott IL, Story I. The experience of back pain in young Australians. Man Ther 2001; 6: 213–20.
33. Heneweer H, Vanhees L, Picavet HS. Physical activity and low back pain: a U-shaped relation? Pain 2009; 143: 21–5.
34. Mattila VM, Saarni L, Parkkari J, Koivusilta L, Rimpela A. Predictors of low back pain hospitalization—a prospective follow-up of 57,408 adolescents. Pain 2008; 139: 209–17.
35. Cherkin DC, Deyo RA, Battie M, Street J, Barlow W. A comparison of physical therapy, chiropractic manipulation, and provision of an educational booklet for the treatment of patients with low back pain. New England Journal of Medicine 1998; 339: 1021–9.
36. Bučar Pajek M, Pajek J. Lower back pain and the possible role of pilates in artistic gymnastics. Science of Gymnastics Journal 2009; 1: 51–7.
37. Rydeard R, Leger A, Smith D. Pilates-based therapeutic exercise: Effect on subjects with nonspecific chronic low back pain and functional disability: A randomized controlled trial. J Orthop Sports Phys Ther 2006; 36: 472–84.
38. Donzelli S, Di Domenica E, Cova AM, Galletti R, Giunta N. Two different techniques in the rehabilitation treatment of low back pain: a randomized controlled trial. Eura Medicophys Italy 2006: 205–10.
39. Gladwell V, Head S, Haggar M, Beneke R. Does a program of Pilates improve chronic non-specific low back pain? J Sport Rehabil 2006; 15: 338–50.