Coll. Antropol. **35** (2011) 4: 1031–1035
Original scientific paper

Prevalence of Nonspecific Low Back Pain in Schoolchildren in North-Eastern Slovenia

Zmago Turk, Renata Vauhnik and Dušanka Mičetić-Turk

University Medical Centre Maribor, Department of Physical Medicine, Department of Paediatrics, Maribor, Slovenia

A B S T R A C T

The aim of the study was to investigate the prevalence of the nonspecific low back pain (LBP) in a population of schoolchildren in Maribor, north-eastern Slovenia.100 children from an elementary school (age 11–15 y) and 90 children from a secondary school (age 17–18 y) were included in the study and investigated with a structured Watson questionnaire to assess low back pain prevalence, symptom characteristics, psychosocial factors, demographic, and anthropometric items. The data was statistically analysed using the SPSS software. 43% of children from elementary schools and 44% of children from secondary schools experienced back pain which lasted more than one day. No correlations between LBP and anthropometric items were found. Schoolchildren spend approximately 2 hours for learning, 2–3 hours for watching TV and approximately 2 hours for playing or working with the computer. Among important reasons for LBP, 44% of children mentioned carrying a school bag, 28% sitting on school chairs, and 18% intensive sport activity. Clinical examination of cervical, thoracic, and lumbar spine has shown that 12% of primary children and 12% of secondary children have increased cervical lordosis and 15% of primary schoolchildren have increased lumbar lordosis. In 5% of schoolchildren we found mild spinal scoliotic changes. Among our schoolchildren sedentary behaviour and low physical activity dominate. LBP may have an impact on their daily life, therefore it is important to recognise and treat it as soon as possible.

Key words: *low back pain, schoolchildren, prevalence*

Introduction

Back pain in children and adolescents was considered unusual and often a harbinger of a serious organic disease[1]. Recent epidemiologic data have dispelled the statement that low back pain (LBP) occurs only in adults[2–4], and showed that LBP is a frequently occurring health problem in children and adolescents[5–8].

The prevalence in children increases with age[9,10], so that by the age of 14–17 years, 11% to 71% have experienced at least one episode of LBP[11,12]. Recurrences of LBP during childhood occurred in 5% to 19%[13]. This high prevalence is a cause for concern, in particular because of the reported link between LBP in adolescence and chronic LBP in adulthood[14].

Commonly, low back pain is defined as pain and discomfort, localized below the costal margin and above the inferior gluteal folds, with or without leg pain, not attributed to recognisable, known specific pathology[15].

When diagnosing, it is important to consider the child's age, time course, movements which increase or decrease pain, accompanying symptoms/signs, previous injuries and child's sport activities[16,17].

Pain in lumbar spine in a child younger than 4 years is mostly related to an organic cause, especially inflammation or tumour[18], while in children younger than 10 years, discitis and vertebral osteomyelitis are more common. Tumours are more common in this age group. Injuries occur more often in children older than 10 years.

Acute pain occurring after a previous injury results from muscle strain, fracture, and herniated disc or slipped vertebral apophysis.

Chronic back pain may result from Scheuermann's kyphosis or spondyloarthropathies. Flexion spinal movements increase the amount of burden placed on vertebra and vertebral discs due to which pain increases in herni-

Received for publication November 30, 2009

ated disc, slipped vertebral apophysis, and vertebral lesions such as osteomyelitis, discitis and tumours.

Extension movements increase the amount of burden placed on back spinal parts, especially facet joints, pedicles, and pars interartikularis.

If pain occurs during extension movements, we have to consider the possibility of spondylosis or spondylolisthesis, especially if a child is engaged in sport activities which include hyper extension movements, pedicle or lamina injury as well as tumours (osteoid osteoma and osteoblastoma).

The diagnosis of non-specific LBP in adolescence must rule out from a number of organic causes, such as Scheuermann's disease, infections (osteomyelitis and discitis), tumours (sarcomas, leukaemia), spondylolysis, spondylolisthesis, and the rheumatic pathologies[19]. Epidemiological data accumulated during the past two decades suggest that most back pain in children is of non-specific origin[5,9]. Several studies have shown that LBP may limit daily activities in 10% to 40% of adolescents[20,21]. However, the pattern seems to be heterogeneous, with minor functional impairment in the vast majority of adolescents and greater disability in a smaller group[2].

Low back pain could be a common symptom of various clinical entities because it can occur alone or in association with other somatic complaints[22].

Various factors seem to increase the risk for LBP in adolescence, such as family history of LBP, accelerated growth rate, physically demanding occupational activity, smoking and some psychological traits, e.g. depression and somatisation[23]. Hypotheses have also been advanced on the relationships between height, weight, body mass index (BMI), anthropometric factors (poor elasticity of the ischio-cruralis and quadriceps) and LBP, but nothing definite has been demonstrated[24,25].

Research in this field is limited in Slovenia. Therefore, our aim was to investigate the prevalence of LBP in a population of schoolchildren in the city of Maribor and to identify the main associated risk factors.

We hypothesized that the prevalence of the LBP between schoolchildren in Maribor is similar as in other EU countries and associated with low physical activity and high amount of sitting, and determined spinal deviation in children who underwent clinical examination.

Subjects and Methods

Subjects

The present study included schoolchildren from two schools in the city of Maribor, Styria region, Slovenia. Maribor has approximately 150.000 inhabitants. The number of schoolchildren is approximately 24.000 (12.700 primary and 11.300 secondary schoolchildren).

The study included 100 children (4 classes) from an elementary school (age 11–15 y) and 90 (3 classes) from a secondary school (age 17–18 y).

Methods

The study was based on a structured self-report questionnaire (Watson et al.[4]) ascertaining demographic characteristics, school and leisure activities, school bag and furniture, back pain history, common childhood complaints, and psychological factors.

We added an amendment to this questionnaire regarding the physical status and medical data of the children.

Children were measured for height and weight. Medical examination and anthropometric measurement of knees, hips, lower extremities, lumbosacral spine, thoracic and cervical spine, and sagittal mobility were performed in all children. Sagittal mobility of the spine was determined according to the literature[27]. We also checked for sagittal imbalance and operative procedures.

Children answered to the questions and one of the authors completed the questionnaire on LBP occurrence during the previous 3 months (prevalence period), including the intensity and duration of LBP and pain coping behaviour, e.g. reduced daily activity, disturbed sleep at night, or care seeking.

LBP was defined as pain or discomfort in the lower back region, from the lower rib curvature to the lower part of the seat region. Menstrual pain was specifically excluded from attention.

Once the permission to conduct the study had been granted by the school principals and written consent had been given by the pupils' parent/guardian, the questionnaire was completed by physiotherapists or medical doctors (authors).

Results were analysed statistically using the chi-square test for categorical variables and the t-test for numerical variables. Statistical analysis was performed with the SPSS 15.0 software and p-value<0.05 was considered significant.

Results

The overall response rate of the completed questionnaire was 100% (all children responded in the presence of one of the authors).

The anthropometric dimensions of 190 schoolchildren are presented in the Table 1.

This data showed that schoolchildren are normally nourished.

We have established that primary school children are engaged in physical activities 6.4±4.9 hours, spend approximately 2 hours for learning, 2 to 3 hours for watching TV, and approximately 2 hours for playing or working with computer. This indicates that in addition to school activities, which last approximately 6 hours, they spend additional 7 hours sitting which represents a major risk factor for developing back pain. Secondary school children, who are healthy, grow normally, and without increased body weight, also spend around six hours sitting in addition to all other school activities, which is more than 10 hours daily (Table 2).

TABLE 1
ANTHROPOMETRIC DIMENSIONS IN 190 SCHOOLCHILDREN

Anthropometric factors	Elementary school $\overline{X}$±SD		Secondary school $\overline{X}$±SD	
	Males (N=52)	Females (N=48)	Males (N=44)	Females (N=46)
Age (years)	13.4±2.1	13.8±1.7	17.4±0.4	17.6±0.4
Body Height (cm)	162.8±14.6	160.9±9.7	177.1±7.4	167.1±6.7
Body weight (kg)	56.8±14.1	55.1±11.6	69.3±9.4	59.2±6.4
BMI (kg/m^2)	20.8±3.3	21.0±3.5	22.0±2.0	21.0±1.6

TABLE 2
CHARACTERISTICS OF SCHOOLCHILDREN FROM ELEMENTARY AND SECONDARY SCHOOL

Children's activities	Elementary school $\overline{X}$±SD	Secondary school $\overline{X}$±SD	p-value
Time spent TV viewing *per* day (in hours)	1.9±1.3	1.3±0.8	<0.001
Time spent playing or working with computer *per* day (in hours)	1.2±1.1	1.2±1.2	1.000
Time spent for learning *per* day (in hours)	1.5±0.9	1.5±0.8	1.000
Time spent for physical activity *per* week (in hours)	6.4±4.9	7.3±3.6	0.155
Prevalence of LBP:	43%	44%	0.841
no LBP	57 (57%)	50 (56%)	
reporting LBP	43 (43%)	40 (44%)	

TABLE 3
CHARACTERISTICS BETWEEN NO LBP AND REPORTING LBP GROUP

LBP	no LBP (N=107) $\overline{X}$±SD	reporting LBP (N=83) $\overline{X}$±SD	p-value
Time spent TV viewing *per* day (in hours)	1.9±1.2	1.5±0.9	0.012
Time spent playing or working with computer *per* day (in hours)	1.4±1.1	1.3±1.0	0.519
Time spent for learning *per* day (in hours)	1.6±0.7	1.7±0.8	0.360
Time spent for physical activity *per* week (in hours)	6.9±4.1	6.5±4.8	0.537

When comparing the characteristics in LBP and non LBP group we found statistical significant difference only in the time spent watching TV (p=0.012). The group with no LBP watched TV for longer periods of time in comparison with LBP group. Results regarding all other children's activities didn't show any significant difference (Table 3).

Clinical examination of cervical, thoracic, and lumbar spine has shown that 12% of primary children and 20% of secondary children have increased cervical lordosis. The curvature of thoracic spine was within normal range in all schoolchildren, however, in this period there are already some cases of mild spinal scoliotic changes (up to 5% in both groups). Increased lumbar lordosis was found in 15% of primary and 5% of secondary schoolchildren (Figure 1).

Clinical examination of cervical, thoracic, and lumbar spine has shown increased lordosis in 12% of primary school children and 20 % in secondary school children.

Thoracic spine is equally curved in secondary and primary school children. In 15% of primary school children, we diagnosed increased lumbar spine lordosis, while in secondary children in only 5%.

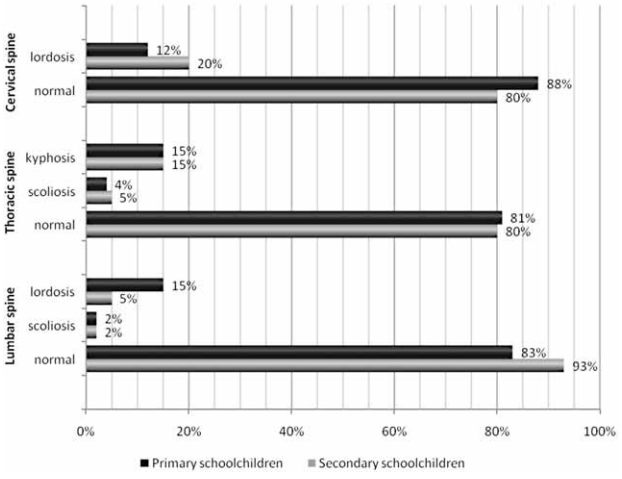

Fig. 1. Results of clinical examination of cervical, thoracic and lumbar spine in primary and secondary schoolchildren.

TABLE 4
QUESTIONNAIRE RESULTS

Situations in which LBP appears	Elementary school		Secondary school		p-value
	(N=100)	%	(N=90)	%	
LBP – carrying school bag	43	43%	40	44%	0.841
LBP sitting on a school chair	28	28%	25	31%	0.973
LBP standing in a queue for 15 min.	29	29%	22	24%	0.479
LBP sitting up in bed from a lying position	9	9%	5	5%	0.364
LBP bending down to put socks on	5	5%	6	6%	0.623
LBP standing up from an armchair	8	8%	5	5%	0.505
LBP running fast	5	5%	5	5%	0.864
LBP during sport activities	20	20%	15	16%	0.554

Analysis of data from the Watson questionnaire has shown that 43% of the interviewed primary and 44% of secondary children experienced back pain which lasted more than a day (Table 4).

Among important reasons, 44% of children mention back pain due to carrying a school bag, 28% due to sitting on school chairs, and 18% due to intensive sport activity.

Discussion

LBP has been studied variously (e.g. prevalence, risk factors, and characteristics) in school age children during the past two decades, with different conclusions drawn according to the study design, sample size geographical area, different age groups, and other factors. There is a general agreement that LBP in schoolchildren is a health problem requiring much more attention and resources[28].

The main aim of our study was to investigate the incidence of LBP in a group of schoolchildren from north--eastern Slovenia. Our results support the evidence that non-specific LBP is common in schoolchildren (43% to 44% in our sample) and are consistent with most previously reported prevalence rates for LBP.

Despite the small sample size, the results indicate that there is an existing back pain problem among Slovene schoolchildren.

The incidence found in our study is higher than in some previous studies, e.g. Olsen et al.[10] reported an incidence of 30%, Balague et al.[11] found an incidence of 27%, Burton et al.[7] report of 11%, and Watson et al.[4] who reported the prevalence of 24% over a one-month period in 1446 English children aged 11 to 14 years. In a similar study, Murphy et al.[29] reported musculoskeletal discomfort and back pain (MSD/BP) prevalence in 22% (neck), 17% (upper back), and 20% (lower back) over a 7-day period and 49% (neck), 30% (upper back), and 36% (lower back) over a one-month period in 679 English children aged 11–14 years.

Our results are in concordance with an Irish study stating an incidence of 41.5% among schoolchildren[30] and studies performed in New Zealand showed that 48%[31] and 58%[32] of children had experienced spinal pain. Overall, 31% of children from this study[32] reported that pain occurred in one part of the back, while 28% stated that pain presented in more than one spinal region. Measured pain was found to be equally prevalent in the low back (35%) and neck (36%) regions.

The definition of LBP in our study also considered the prevalence of pain hindering the performance of activities in everyday life (e.g. sitting on school chairs, carrying a school bag, running fast etc.) and the usual physical activities practised by the schoolchildren.

Gunzburg et al.[33] demonstrated that being transported inactively to school was associated with LBP. In another study, LBP was observed to be positively associated with time spent on watching TV[34]. Our data confirm these findings and we explained these results with the reducing time of watching TV due to reported discomfort and parents' intervention. Our schoolchildren spend 6 hours sitting at school and afterwards approximately 6–7 hours watching TV, playing or working with computer, and doing their homework/learning. We support the opinion[35] that continuous, correctly performed motor activity could prevent LBP as muscular elasticity and strength improves and tolerance to pain probably increases.

We found no correlations between LBP and anthropometric items (height, weight, and BMI). In accordance with the previous studies from this field, we conclude that LBP is common in schoolchildren also in our geographical area. Among our schoolchildren sedentary behaviour and low physical activity dominate. Current physical activity recommendations suggest that school aged children should be daily engaged in a 60-minute or more of moderate to vigorous physical activity which is developmentally appropriate, enjoyable, and involves a variety of activities[36]. Moreover, the recent study by Vidal et al.[37] on postural education program on daily life habits related to LBP in children, shows that children are able to learn healthy daily life habits which might contribute to future prevention of LBP. Because LBP has a marked impact on daily life and may have immediate and long-term consequences for an important number of children, it is important to recognize and treat it as early as possible.

Acknowledgements

We acknowledge the help of the schools/teachers of the elementary school »Bratov Polančič« and secondary school »Prva gimnazija Maribor«. We also thank the children and parents who participated in the study as well as the physiotherapists Z. Strelec and M. Marič for their important contribution to the study. Special thanks for technical support goes to M. Palfy, L. Kolarič and U. Antonič.

REFERENCES

1. MALLESON P, CLINCH J, Curr Opin Rheumatol, 15(5) (2003) 572. — 2. HARREBY M, NYGAARD B, JESSEN T, LARSEN E, STORR-PAULSEN A, LINDAHL A, FISKER I, LAEGAARD E, Eur Spine J, 8(6) (1999) 444. — 3. WEDDERKOPP N, LOBOEUF-YDE C, ANDERSEN LB, FROBERG K, HANSEN HS, Spine, 26(17) (2001) 1879. — 4. WATSON KD, PAPAGEORGIOU AC, JONES GT, SYMMONS DP, SILMAN A, MACFARLANE GJ, Pain, 97 (1–2) (2002) 87. — 5. BALAGUÉ F, NORDIN M, SKOVRON ML, DUTOIT G, YEE A, WALDBURGER M, J Spina Disord, 7 (1994) 374. — 6. DUGGLEBY T, KUMAR S, Disabil Rehabil, 19 (1997) 505. — 7. BURTON AK, CLARKE RD, MCCLUNE TD, TILLOTSON KM, Spine, 21 (1996) 2323. — 8. LEBOEUF YDE C, KYVIK KO, Spine, 23 (1998) 228. — 9. SALMINEN JJ, Acta Paediatr Scand, 1 (1984) 122. — 10. OLSEN TL, ANDERSON RL, DEARWATER SR, KRISKA AM, CAULEY JA, AARON DJ, LAPORTE RE, Am J Public Health, 82 (1992) 606–8. — 11. BALAGUÉ F, TROUSSIER B, SALMINEN JJ, Eur Spine J, 8 (1999) 429. — 12. SKOFFER B, Spine, 32 (2007) 713. — 13. SALMINEN JJ, PANTHI J, TASKO P, Acta Paediatr, 81 (1992) 1035 — 14. HESRBACK L, LEBOEUF YDA C, KYVIK KO, MANNICHE C, Spine, 31(4) (2006) 468. — 15. BURTON AK, BALAGUÉ F, CARDON G, ERIKSEN HR, HENROTIN Y, LAHAD A, LECLERC A, MÜLLER G, VAN DER BEEK AJ, Eur Spine J, 15 Suppl 2 (2006) 136. — 16. BERNSTEIN RM, COZEN H, Am Fam Physicain, 76 (2007) 2669. — 17. FELDMAN DS, STRAIGHT JJ, BADRA M, MOHAIDEEN A, MADAN SS, J Pediatr Orthop, 26(3) (2006) 353. — 18. PAYNE WK 3rd, OGILVIE JW, Pediatr Clin North Am, 43(4) (1996) 899. — 19. FERRARO C, FRASCHINI P, MASIERO S, NEGRINI S, SIMONAZZI P, TADESCHI C, Rachide e Rehabilitazione 2003 (Ed. Gruppo di Studio della Scoliosi e dalle Patologie Vertebrali, Vigerano (PV) 2003). — 20. SKAGGS DL, EARLY SD, D'AMBRA P, TOLO VT, KAY RM, J Pediatr Orthop, 26(3) (2006) 358. — 21. ROTH-ISIGKEIT A, THYEN U, STÖVEN H, SCHWARZENBERG J, SCHMUCKER P, Pediatrics, 115(2) (2005) 152. — 22. BRUN SUNDBLAD GM, SAARTOK T, ENGSTRÖM LMT, Eur J Pain, 11(2) (2007) 171. — 23. FELDMAN DE, SHRIER I, ROSSIGNOL M, ABENHAIM L, Am J Epidemol, 154 (2001) 30. — 24. KOROVESSIS P, KOUREAS G, ZACHARATOS S, PAPAZISIS Z, Spine, 30 (2005) 247. — 25. KUJALA UM, TAIMALA S, ERKINTALO M, SALMINEN JJ, KAPRIO J, Mes sci sport Excerc, 28 (1996) 265. — 26. MASIERO S, CARRARO E, CELIA A, SARTO D, ERMANI M, Acta Paediatrica, 97 (2008) 212. — 27. DURRIGI T, JAJIĆ I, Acta Orthopaedica Iugoslavica, 5 (1974) 101. — 28. BALAGUE F, SKOVRON ML, NORDIN M, DUTOIT G, POL LR, WALDBURGER M, Spine, 20 (1995) 1265. — 29. MURPHY S, PhD Thesis (University of Surrey, 2003). — 30. PRENDEVILLE K, DOCKRELL S, Physiotherapy Ireland, 19(1) (1998) 1. — 31. LEGG SJ, TREVELYAN FC, CARPANTIER MP, FUCHS B, Proceedings of the XV th Treinnial Congress of the International Ergonomics association. (Seul, South Korea, 2003). — 32. TREVELYAN FC, LEGG SJ, Ergonomics, 53(12) (2010) 1455. — 33. GUNZBURG R, BALAGUÉ F, NORDIN M, SZPALSKI M, DUYCK D, BULL D, MÉLOT C, Eur Spine J, 8 (1999) 439. — 34. SJÖLIE AN, Scand J Med Sci Sports, 4 (2004) 352. — 35. ROTH-ISIGKEIT A, THYEN U, STÖVEN H, SCHWARZENBERGER J, SCHMUCKER P, Pediatrics, 115 (2005) 152. — 36. STRONG WB, MALINA RM, BLIMKIE CJ, DANIELS SR, DISHMAN RK, GUTIN B, HERGENROEDER AC, MUST A, NIXON PA, PIVARNIK JM, ROWLAND T, TROST S, TRUDEAU F, J Pediatr, 146 (2005) 732. — 37. VIDAL J, BORRAS PA, ORTEGA FB, CANTALLOPS J, PONSETI X, PALOU P, Int J Sports Med, 32(4) (2011) 303.

Z. Turk

University Medical Centre Maribor, Department of Physical Medicine and Rehabilitation, Ljubljanska ulica 5, 2000 Maribor, Slovenia
e-mail: zmago.turk@ukc-mb.si

PREVALENCIJA NESPECIFIČNE KRIŽOBOLJE U ŠKOLSKE DJECE U SJEVERNO-ISTOČNOJ SLOVENIJI

SAŽETAK

Cilj ovog rada je bio ispitati prevalenciju nespecifične križobolje u populaciji školske djece u Mariboru, sjeverno-istočna Slovenija. 100 osnovnoškolske djece (11–15 god. starosti) i 90 srednješkolske djece (17–18 god. starosti) je sudjelovalo u istraživanju. Upotrebljena je bila Watsonova anketa za ocjenu prevalencije križobolje, karakterističnih simptoma, psihosocialnih, demografskih i antropometrijskih faktora. Podaci su statistično obrađeni SPSS programskim paketom. 43% osnovnoškolaca i 44% srednješkolske omladine ima iskustvo sa križoboljom koja traje više od jednog dana. Korelacije između križobolje i antropometrijskih podataka nismo našli. Školska djeca provode cca. 2 sata učeći, 2–3 sata gledajući TV i cca. 2 sata na računalu. Među važnim uzrocima za križobolju 45% djece navode nošenje školske torbe, 28% sjedenje na školskim stolicama, 20% intenzivnu sportsku aktivnost. Kliničkim pregledom vratne torakalne i lumbarne kralježnice smo u 12% djece ustanovili povećanu vratnu lordozu, u 15% osnovnoškolske djece povećanu lumbarnu lordozu, 5% školske djece ima znakove blagih skoliotičnih promjena. Slaba fizička aktivnost i sjedenje prevladavaju među školskom djecom. Križobolja može utjecati na svakodnevni život, zato ju je potrebno čim prije prepoznati i liječiti.