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Determination of pain intensity risk factors among school children with nonspecific low back pain

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A Study Design
B Data Collection
C Statistical Analysis
D Data Interpretation
E Manuscript Preparation
F Literature Search
G Funds Collection

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Summary

Background: Low back pain (LBP) is a common disease among people under the age of 20. To the best of our knowledge few studies have been carried out on LBP among school children in Turkey, and none of them studied the correlation between pain intensity and related variables with LBP.

Material/Methods: This cross-sectional study was carried out to investigate the risk factors and their correlations with pain intensity among 222 school children (106 girls and 116 boys) aged 10–18 years in the city of Denizli. A self-reported questionnaire was used to collect the data. The regression tree method (RTM) was used to determine the risk factors by using the STATISTICA program package. Pain intensity was the outcome variable, and 8 independent variables (body mass index (BMI), sex, regular exercise habit, studying posture, transportation to/from school, duration of studying, bag handling, and type of bed) were used to detect their effect on pain intensity.

Results: The results showed that pain intensity is significantly affected by 4 independent variables: duration of studying, type of bed, transportation to/from school, and BMI. The overall mean and standard deviation of pain intensity was 2.58±0.86 (minimum=1, maximum=5).

Conclusions: Results from the literature, as well as our study, show that taking parents' and teachers' concerns seriously is of vital importance. Our results indicate that parents and teachers should be informed about duration of studying, type of bed, transportation and obesity as risk factors predicting NLBP in school children.

key words: **nonspecific low back pain • pain intensity • regression tree method • school children**

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Background

LBP affects up to 80% of the population at some time during their lives [1]. Although LBP has generally been believed to be uncommon before the age of 20, the prevalence of LBP among school children and adolescents has been reported to be high in different parts of the world, mostly in Western countries, where it varies from 10–40%. The NHANES II (National Health and Nutrition Examination Survey Series) reported the onset of LBP before the age of 20 in 11% of the general population [2]. LBP prevalence rates were found to be 28–31% in 2 studies carried out on school children in Kuwait and Tunisia. These studies show that the prevalence of LBP in children is high, equaling that of adults by the end of the growth period [3,4].

LBP has a significant economic impact on individuals, society, and quality of life. Many studies have analyzed the risk factors associated with LBP in children and adolescents to describe risk factors profiles [3,5–8]. To our knowledge there have been no reports on NLBP and related factors among school children in Turkey. The aim of this study was to investigate possible factors associated with pain intensity among Turkish school children with NLBP, aged 10-18 years, and to determine the relationship between related factors and pain intensity using the regression tree method.

Material and Methods

This study was conducted on school children aged 10–18 years in the city of Denizli, located in the western part of Turkey. Out of 88 primary and high schools in the city, fifth and eleventh grade classes were selected from each of 10 schools (8 governmental and 2 private), using a simple random sampling method. All the schools had both male and female students.

The city Department of Education gave written permission, and all parents of students gave informed consent.

The exclusion criteria were having any kind of musculoskeletal, rheumatic, orthopedic, somatic or psychiatric disorders. All of the exclusion criteria were considered to define NLBP more clearly because we studied nonspecific low back pain.

In the sampled schools, 624 children were interviewed in total and 292 (46.8%) were reported as having NLBP. After excluding the students who displayed the aforementioned disorders, 222 students (116 girls and 106 boys) were studied to discover risk factors related to NLBP.

The visual analog scale (VAS) [9] was used for measuring the intensity of pain. The VAS is designed to present to the respondent a rating scale with minimum constraints.

This scale, shown below, was reported as the number of cm. from left of line, with range 0–10:

No pain 10 cm. Highest pain

The interviewers used in the study were selected from the final year students in the Physical Therapy School of Pamukkale University. All interviewers were informed about and trained in study procedures before beginning the interviews.

Table 1. Descriptive statistics of risk factors related pain intensity [Number (%) and (Mean ±SD)].

Risk Factors	Category	Mean ±SD (n=222)
BMI* (kg/m^2)		19.84 ± 3.20
		Number (%)
Sex	Girl	106 (47.7)
	Boy	116 (52.3)
Regular exercise habit at least three times a week	Yes	92 (41.4)
	No	130 (58.6)
Studying posture**	On table	181 (81.5)
	On ground	37 (16.7)
	Lying in bed	4 (1.8)
Transportation to/from school	School bus	59 (26.6)
	Public transportation	44 (19.8)
	On food	119 (53.6)
Duration of studying	1 hour and less	57 (25.7)
	1–3 hours	103 (46.4)
	4–5 hours	56 (25.2)
	5 hours and more	6 (2.7)
Bag handling	Yes	209 (94.1)
	No	13 (5.9)
Type of bed	Wool	38 (17.1)
	Cotton (tricot)	75 (33.8)
	Ergonomic (orthopaedic)	109 (49.1)

* BMI – Body Mass Index; ** Studying posture description: Sitting on chair and studying on a table; sitting on ground without chair and table; lying in prone or supine position in a bed.

The dependent variable was pain intensity measured in cm, and the independent variables were "BMI", "sex", "regular exercise habit", "studying posture", "transportation to/from school", "duration of studying", "bag handling" and "type of bed" (see also Table 1). The participants were asked to select 1 of the following studying postures: (1) sitting on chair and studying on a table, (2) sitting on ground without chair and table, and (3) lying in prone or supine position on a bed.

The questionnaire

All school children completed the questionnaire during school time under the supervision of interviewers. Two methods of enquiry about NLBP were used, namely "a direct question" and "a pre-shaded manikin question":

1. "Have you ever had low back pain? (Look at the drawing)"
2. "Have you experienced pain in the shaded area which lasted for 1 week, a month, or longer?"

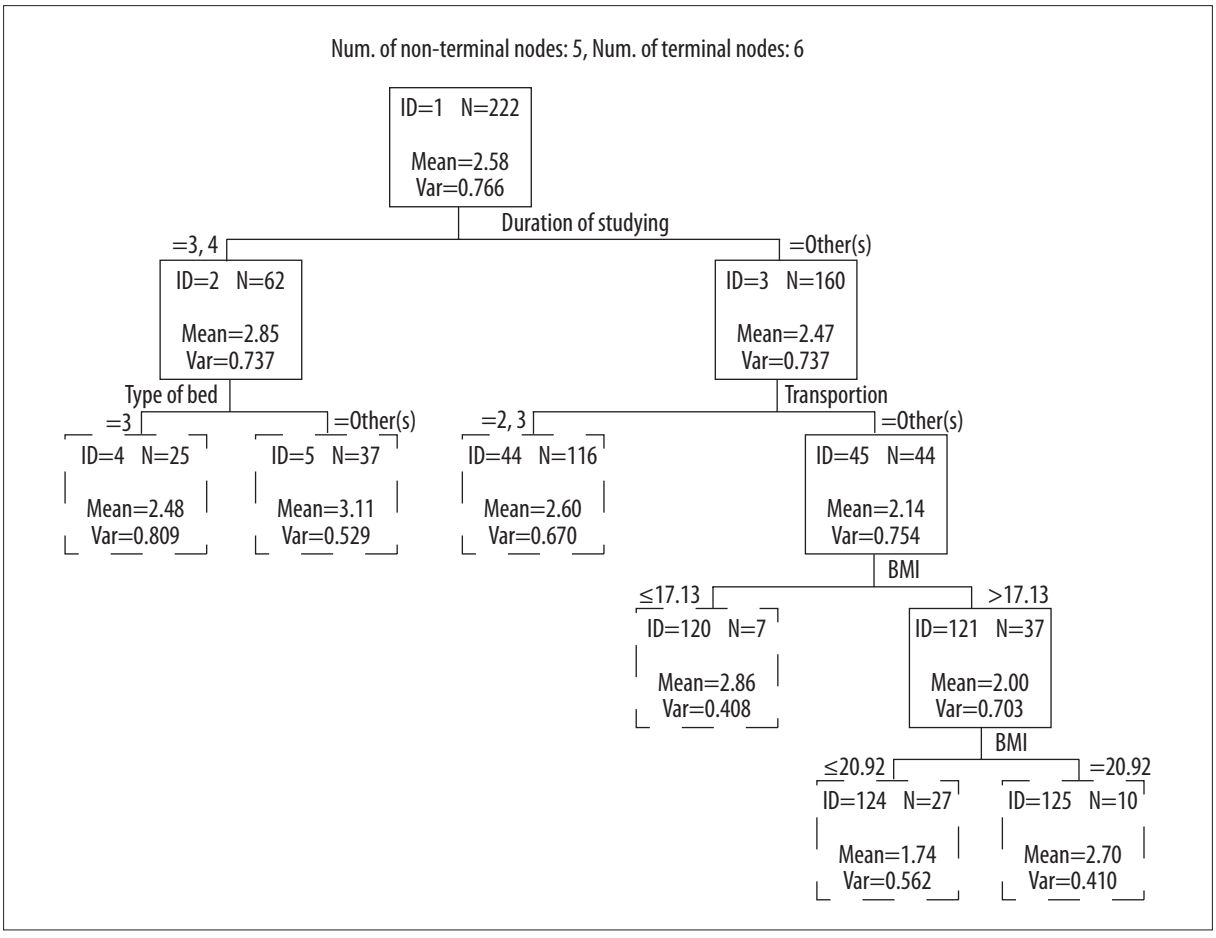

Figure 1. Regression tree diagram. ID: Identification code. Var: Variance. Mean: The mean of pain intensity. BMI: Body Mass Index. The numbers above the squares are categorization indicators. For example, for duration of study: 3 and 4 indicate 4 hours or more during the study period, other(s) mean less than four hours. Type of bed: 3 indicates an orthopaedic bed and other(s): wool, cotton bed. Transportation: 2 indicates public transportation, 3 means on foot and other(s): school bus.

Students who answered both of the questions as "yes" were classified as having LBP, and pain intensity was recorded. The questionnaire contained 22 questions.

Statistical analysis

The regression tree method (RTM) was used to determine risk factors that may affect pain intensity. RTM is a tree-based model, and is more useful than traditional statistical methods when a data set is large and when there are many variables. Moreover, the RTM takes into consideration interactions among variables, and is not affected by high correlations between risk factors. There is no assumption about distribution shapes of risk factors, but outcome variable should be numeric [10,11].

In RTM the association between risk factors (x) and outcome variable (y) (pain intensity, in this study) are examined by a schematic representation. The main idea of RTM is to obtain homogeneous subgroups. Homogeneous groups are constituted according to the adequate cut-off values of the risk factors. At the beginning, all individuals are collected in 1 group called a "root node". Homogeneous groups that come into being based on recursive binary splitting are termed "terminal node" [12]. The homogeneous group means that this group is sufficiently homogeneous and cannot be split any more. Splitting continues until the tree reaches maximum size, and then passing the selection of adequate tree structure stage, called "pruning". The maximum tree is not used for every data set because of its overfit structure. After pruning, the tree is termed an optimal tree. In the optimal tree, the values that take place in the terminal nodes give the mean and variance of that group [13].

Results

The descriptive statistics are shown (Table 1) as mean ±SD and as frequencies and percentages. The overall mean and standard deviation of pain intensity was 2.58±0.86 (minimum=1, maximum=5).

Among the risk factors used in this study, duration of studying, type of bed, transportation to/from school, and BMI score were found to have a significant effect on pain intensity, while sex, studying posture, regular exercise habit, and bag handling were not significant (Figure 1).

As will be seen from Figure 1, 6 homogeneous groups are defined by the RTM according to pain intensity, with an increasing order. These are as follows:

Group (ID=124): Studies less than 4 hours, uses school bus for transportation and has 17.13< BMI <20.9 (mean pain score=1.74). **This group is the lowest risk group among all 6 groups, giving the lowest mean.**

Group (ID=4): Studies more than 4 hours and sleeps on orthopedic bed (mean pain score=2.48).

Group (ID=44): Studies less than 4 hours and uses public transportation or walks to/from school (mean pain score=2.60).

Group (ID=125): Studies less than 4 hours, uses school buses for transportation and has BMI >20.9 (mean pain score=2.70)

Group (ID=120): Studies less than 4 hours, uses school buses for transportation and has BMI <17.13 (mean pain score=2.86).

Group (ID=5): studies more than 4 hours and sleeps on wool or cotton beds (mean pain score=3.11). **This group is the highest risk group among the 6 groups, giving the highest mean.**

Discussion

It has become clear that a high prevalence of LBP occurs not only in adults, but also in children/adolescents [3]. More recently, cross-sectional and longitudinal studies have focused on NLBP in children [2,3].

The prevalence has been reported to vary from 10% to 40% in the literature, but the authors found it to be 46.7% in their previous cross-sectional study of 624 school children/adolescents 10–18 years old [14].

Among the 8 risk factors included in the study, 4 were found to be important regarding pain intensity in children with NLBP. These factors are as follows:

1. Transportation to/from school: Prista et al found that school children walking >30 min per day to and from school are associated with an increased risk factor of LBP [15]. They also showed that long distance walking to/from the school might lead to muscle fatigue resulting in back pain. In our study, the transportation to/from school had an important effect on LBP.
2. BMI: The BMI score was also a significant risk factor affecting pain intensity in our study. This was an expected result. As is well known, increased BMI score increases pain intensity in subjects with low back pain.
3. Type of bed: Jacobson et al. in 2002 [16] reported that an experimental bedding system (Ameri-spring) reduced back pain and improved the quality of sleep. In our study we found also a significant relationship between the type of bed and low back pain intensity. This shows that quality of sleep is a very important factor affecting pain intensity for subjects who suffer from low back pain.
4. Duration of studying: We also found a significant relationship between duration of studying and NLBP intensity.

Korovessis et al. in 2004 [17] reported that dorsal pain increased with increasing backpack weight among children. We found no significant relation between bag handling and NLBP in our study.

Lee and Chiou found that "poor sitting habit" were statistically associated with LBP [18]. In our study, studying posture was not found to be an important factor.

We also found that the sex of the children was not an important factor in NLBP intensity.

Conclusions

Results from the literature, as well as our study, show that taking parents' and teachers' concerns seriously is of vital importance. Therefore, health care providers should evaluate school children carefully and make accurate observations in terms of risk factors, including duration of studying, type of bed, transportation to/from school, and obesity, to predict any severe musculoskeletal problems, especially NLBP. Finally, physical factors and musculoskeletal risk factors are especially important in terms of NLBP in school children. Further studies are needed to investigate psychosocial risk factors and their relationships with NLBP in school children.

References:

1. National Back Pain Association. Annual Report 1991 and 1993.
2. Gunzburg R, Balaque F, Nordin M et al: Low back pain in a population of school children. Eur Spine J, 1999; 8: 439–43
3. Shehab DK, Al-Jarallah KF: Non-specific low back pain in Kuwaiti children and adolescents: associated factors. J Adolesc Health, 2005; 36: 32–35
4. Bejia I, Abid N, Salem KB et al: Low back pain in a cohort of 622 Tunisian schoolchildren and adolescents: An epidemiological study. EurSpine J, 2005; 14: 331–36
5. Feldman DE, Rossignol M, Shrier I, Abenhaim L: Smoking a risk factor for development of low-back pain in adolescents. Spine, 1999; 24: 2492–96
6. Dieck GS, Kelsen JL, Goel VK et al: An epidemiological study of the relationship between postural asymmetry in the ten years and subsequent back and neck pain. Spine, 1985;10: 872–77
7. Ceran F, Ozcan A: The relation of the functional rating index with disability, pain and quality of life in patients with low back pain. Med Sci Monit, 2006; 12(10): CR435–39
8. Feise RJ, Menke JM: Functional rating index: literature review. Med Sci Monit, 2010; 16(2): RA25–36
9. Widar M, Samuelsson L, Karlsson-Tivenius S, Ahlstrom G: Long-term pain conditions after a stroke. J Rehabil Med, 2002; 34: 165–70
10. Camdeviren H, Mendes M, Ozkan MM et al: Determination of depression risk factors in children and adolescents by regression tree methodology. Acta Med Okayama, 2005; 59(1): 19–26
11. Sumbuloglu K, Akdag B: Regression Methods and Correlation Analysis (in Turkish). Hatiboglu Press, 2007; 73–98
12. Bevilacqua M, Braglia M, Montanari R: The classification and regression tree approach to pump failure rate analysis. Reliab Eng Syst Safet, 2003; 79: 59–67
13. Clark LA, Pregibon D: Tree-based models; in statistical models in S. Chambers JM and Hastie TJ, eds. Chapman and Hall: London, 1992; 377–419
14. Cavlak U, Cimbiz A, Akdag B: Non specific low back pain in a Turkish population based sample of school children: a field survey with analysis of associated factors. The Pain Clinic, 2006; 18(4): 351–60
15. Prista A, Balague F, Nordin M, Skovron ML: Low back pain in Mozambican adolescents. Eur Spine J, 2004; 13(4): 341–45
16. Jacobson BH, Hugh AG, Brad MH, Thomas S: Effectiveness of a selected bedding system on quality of sleep, low back pain, shoulder pain and spine stiffness. J Manipulative Physiol Ther, 2002; 25: 88–92
17. Korovessis P, Koureas G, Papazisis Z: Correlation between backpack weight and way of carrying, sagittal and frontal spinal curvatures, athletic activity, and dorsal and low back pain in schoolchildren and adolescents. J Spinal Disord Tech, 2004; 17: 33–40
18. Lee YH, Chiou, WK: Risk factors for low back pain and patient handling capacity of nursing personnel. J Saf Res, 1994; 25: 135–45