

## LOW BACK PAIN IN ADOLESCENTS: A SCHOOL SCREENING

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### ABSTRACT

**Introduction:** Low back pain is a symptom with biopsychosocial implications with the potential to reach the whole individual. The school-age coincides with an important period in human development and in which inequalities and compensation resulting from poor posture or structural changes may increase the chance of the emergence of pain. **Objective:** To estimate the prevalence of low back pain among adolescents. **Methods:** The sample consisted of 166 adolescents between 11 and 18 years of age (86 girls and 80 boys) enrolled in a private school in a town in the state of Piauí, in the academic year 2012. A structured questionnaire with closed questions on gender and low back pain aspects was used. **Results:** Almost 80% of the students reported the presence of low back pain in the past year, and nearly half (41.3%) reported pain classified as 3, according to faces pain scale. About two-thirds of the adolescents (63.1%) said they did not fail to perform their daily activities due to pain. There was no statistically significant association between gender and low back pain ( $p = 0.117$ ) or pain intensity ( $p = 0.065$ ), although for the latter a variable marginal  $p$ -value was found. **Conclusion:** A high prevalence of low back pain was found in the study group without gender differences regarding pain characteristics.

**Key words:** spine, screening programmes, school health.

### INTRODUCTION

Low back pain (LBP) is characterised by pain or discomfort in between the 12th rib and the inferior gluteal folds, with or without irradiation for the leg.<sup>1</sup> It constitutes an unpleasant sensory and emotional experience as a result of installed or potential tissue injury, which can be characterised as a biopsychosocial disorder.<sup>2</sup>

Low back pain affects approximately 80–85% of people around the world during their life and in developed countries is a major cause of disability in youth and young adults, being considered as one of the greatest contributors to sick leave<sup>3–5</sup>. Results obtained in longitudinal studies, meta-analyses and systematic reviews indicate that the prevalence of low back pain does not differ much between children, adolescents, adults and seniors.<sup>6</sup>

Specifically in adolescents, the prevalence of low back pain in different parts of the world varies

between 8% and 44%, and factors such as age, level of education, social class, diet, smoking, weakness of the hip flexors, low flexibility of the hip extensors, growth spurt and even psychological factors have a close relationship with the incidence of pain symptoms in adolescents.<sup>3,7–8</sup>

Other factors such as improper posture while using computers, backpack weight and physical activity remain controversial.<sup>9–10</sup> Although according Prista et al.<sup>11</sup> LBP can often be associated to postural changes resulting from poor postural habits and repeated exposure to small overloads.

Marked postural changes can come from growth itself, especially at the time of pubertal spurts, which can result in, for example, uneven vertebrae growth or unbalanced development of the dorsal muscles, and such changes positively associated with the presence of low back pain<sup>12</sup>. In general, also during vertebral growth acceleration in childhood and adolescence, most of scoliosis

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Aplicação clínica do estudo: há necessidade de intervenção com processos de orientação postural para preservar a integridade osteomuscular dos estudantes

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arises and, asymmetry or deformity of the body axis, may lead to reduction in the total spine length causing pain, disorders of balance and proprioception.<sup>13, 14</sup>

In the prepubertal and pubertal period, obesity may be related to postural imbalances caused by mechanical overload in the locomotor system, which interfere with the postural pattern due to anterior displacement of the centre of gravity, resulting in postural deviations which can cause pain and possible musculoskeletal deformities.<sup>15,16</sup> In this sense, a study conducted on schoolchildren between 6 and 12 years old, enrolled in a public school in the city of Uberaba/Minas Gerais has shown that obesity and being overweight produce changes in posture, balance and ability to perform everyday activities, and that 61.7% of students had postural changes related to the lower back.<sup>17</sup>

Importantly, most bad postural habits are established during growth and sexual maturation phases, respectively, in childhood and adolescence, causing postural changes, particularly lateral and anterior-posterior changes, which can also be related to sitting posture, either when attending school or to watching TV.<sup>18,19</sup> The early correction of postural additions is essential, because it enables a better prognosis and treatment perspectives.<sup>19</sup>

Moreover, serious low back pain is a public health problem, famously because of the different treatments used nowadays, studies on prevalence are an indispensable guide and manager of healthy behaviors in the statement of interventions to improve the general framework and decreased effects on employment and social activities, particularly in the school environment. Due to the fact of being vulnerable to experience wide variation in their growth and development, the adolescent becomes a target to strategies to reduce musculoskeletal disorders at this stage of life providing, thus, improved quality of life in adulthood. The aim of this study is to estimate the prevalence of low back pain among adolescents.

## METHODS

This study consisted of a descriptive, cross-sectional study with a quantitative approach and a sample of 166 schoolchildren between 11 and 18 years old, enrolled in the academic year 2012 in private schools in the city of Teresina, Piauí.

A calculation of sample size was performed according to the formula proposed by Martins<sup>20</sup> considering a sampling error of 5%, a confidence interval of 90%, and a population of 520 students, the sample size being scaled by 181 students. The sample was chosen by simple lottery.

Prior to data collection, students were informed about the study objectives and received a letter explaining the study along with two copies of a declaration of consent, which were taken to be signed by parents or guardians, one copy of which was to be returned duly signed if the students agreed to participate in the study and the parents allowed their participation. It was determined that the researchers would collect data during weekdays,

in the periods in which students were enrolled, over a month. There was a sample loss of 13 participants, corresponding to 7% of the calculated sample, because six participants did not submit the declaration of consent signed by parents or guardians, three refused to participate and four were not found until the end of the period of data collection.

The instrument used for data collection consisted of a structured questionnaire with tailored questions based on those used by Vidal<sup>21</sup> in a study, which was tested in a pilot study with 10 adolescents from a public state school. The questions present in the instrument were about the presence of pain, its duration and intensity, the presence of precipitating factors or causes (trauma) and if pain made it impossible to conduct activities of daily living. An affirmative response regarding the presence of pain, unrelated to menstrual period or trauma in the 12 months preceding the survey, with a picture of this pain in the lower lumbar region, with a minimum duration of one day, with or without radiating to one or both lower extremities, was considered low back pain.<sup>5</sup> To evaluate the intensity of pain a "visual analogue scale" consisting of graphical representations of six faces was used, ranging from the expression "happy" (zero), corresponding to no pain, to "sad" (five), corresponding to maximum pain intensity (strong). Students were instructed to mark the face that best represented the intensity of the perceived pain.

The data were processed using the SPSS (Statistical Package for Social Sciences) 18.0 program. The Chi-squared test was applied to evaluate the association between gender and the variable presence of pain, intensity and duration of pain, and interference with daily activities. The level of significance was set at  $p < 0.05$ .

The research protocol adopted in this study was approved by the Ethics Committee of the Faculty of Health, Human Sciences and Technology of Piauí - NOVAFAP (Protocol No. CAAE 0501.0.043.000-11) and the research was conducted in accordance with the ethical precepts regulated by the specific resolutions of the National Health Council, and obeying the rules of the 1979 Declaration of Helsinki and the revised 2008 Declaration of Helsinki.

## RESULTS

It is observed the distribution of the study participants according to age and gender. It was observed that more than half (51.81%) of the adolescents were female, although there were 1.3 times more boys in the 11–13-year-old age range (Table 1).

Regarding the presence of low back pain (Table 2), the prevalence was 78.31%, with no statistically significant association with gender ( $p = 0.117$ ). Among teens who reported having felt pain (Table 3), almost half (41.3%) rated the pain on the visual analogue scale as grade 3, and in percentage terms this intensity was 1.66 times more frequent for girls (50.7% versus 30.5% for boys). Regarding the average interval duration of LBP, the

**Table 1:** distribution of teenagers from private schools studied according to sex and age. Teresina, Pi, 2012

AGE GROUP (YEARS)	SEX					
	MEN		FEMALE		GENERAL	
	n	%	n	%	n	%
11 to 13	30	18.07	23	13.86	53	31.93
14 or 15	22	13.25	35	21.08	57	34.33
16 to 18	28	16.87	28	16.87	56	33.74
TOTAL	80	48.19	86	51.81	166	100.00

**Table 2:** Distribution of teenagers from private schools, according to sex and low back pain. Teresina, PI, 2012

PRESENCE OF LOWER BACK PAIN	SEX						p-valor
	MEN		FEMALE		GENERAL		
	n	%	n	%	n	%	
YES	59	73.75	71	82.56	130	78.31	0.117
NO	21	26.25	15	17.44	36	21.69	
TOTAL	80	48,19	86	52,81	166	100,00	

**Table 3:** Characterization of low back pain in adolescents in a private school by sex. Teresina, PI, 2012

VARIABLE	SEX						p-valor
	MEN		FEMALE		GENERAL		
	n	%	n	%	n	%	
Presence of pain*	59	100	71	100	130	100	
<b>Intensity of the second lumbar pain visual analog scale</b>							
GRADE 1	10	16.94	6	8.45	16	12.30	0.065
GRADE 2	24	40.67	21	29.57	45	34.61	
GRADE 3	18	30.5	36	50.70	54	41.53	
GRADE 4	6	10.16	7	9.85	13	10.00	
GRADE 5	1	1.69	1	1.40	2	1.53	
<b>Duration of pain (days)</b>							
1 TO 7	42	71.18	57	80.29	99	76.15	0.293
8 TO 30	7	11.86	4	5.63	13	10.00	
OVER 30	1	1.69	4	5.63	5	3.84	
EVERY DAYS	9	15.25	6	8.45	15	11.53	
<b>Interference in performing Activities of Daily Living (ADLs)</b>							
YES	21	3.5	27	38.2	48	36.92	0.459
NO	38	64.5	44	61.97	82	63.07	

\* Frequencies in percentages were calculated taking as reference only adolescents who reported low back pain.

majority of participants (76.15%) reported the duration of the pain between one and seven days. There was no statistically significant association between gender with intensity ( $p = 0.065$ ) or duration of the pain ( $p = 0.293$ ), although the p-value for intensity was marginal.

Regarding the possible interference of pain symptoms in the routine of students, nearly two-thirds of adolescents (63.07%) reported not to stop their everyday activities due to pain. No statistically significant associations with gender ( $p = 0.459$ ) were found.

## DISCUSSION

Low back pain constitutes a serious public health problem today. Due to the fact of being

vulnerable to experience wide variation in their growth and development, the adolescent becomes a target to strategies to reduce musculoskeletal disorders at this stage of life providing, thus, improved quality of life in adulthood. The objective was to estimate the prevalence of low back pain among adolescents.

Adolescence is a vulnerable period for musculoskeletal disorders due to the occurrence of a wide variation in growth and development. Thus, the adolescent becomes a target of strategies to reduce these disorders in this phase of life and thereby to promote improved quality of life in adulthood. We estimated the prevalence of low back pain among adolescents in this study, and found a high prevalence in adolescents between 11 and 18

years old (78%), with no differences between genders.

This prevalence is higher than that found in other studies.<sup>22,23</sup> In one study there was a prevalence of low back pain in 33% of children between 8 and 10 years old and 47% of adolescents between 14 and 16 years old.<sup>23</sup> Another study showed a prevalence of 40.2% in a sample of 500 individuals between 10 and 16 years old.<sup>24</sup>

The cultural aspect seems not to be an exclusionary factor in symptoms of low back pain. In Kuwait, a similar study with 400 students between 10 and 18 years old showed the prevalence of low back pain in 57.75% of respondents.<sup>22</sup> In Brazil, studies focusing on the prevalence of low back pain in school children are not common and some are confined to verifying the presence of risk factors and postural changes.<sup>19</sup> Regarding the prevalence of this symptom, Vitter et al.<sup>8</sup> in a study of 1236 schoolchildren aged between 11 and 14 years old in the city of Bauru, São Paulo found that 19.5% of respondents had low back pain. Further, in a study of 833 schoolchildren from the 5th to 8th grades in municipal schools of Rio Grande do Sul, the prevalence of back pain was found to be 54.1% in the three-month period before the survey.<sup>25</sup> The differences between the results of different studies on the prevalence of low back pain in adolescents can be partly attributed to the different methodologies used, the age of the subjects and even the geographical location of the studies.<sup>26</sup> In this context, it is important to note that this study included students up to 18 years old, while in the study were in Bauru only schoolchildren aged 11–14 years were evaluated,<sup>8</sup> similar to the age expected for school included in the study conducted in Teutônia, Rio Grande do Sul, with students from 5th to 8th grade.<sup>25</sup>

Although no association was found between the variables analysed when analysing the relationship between back pain and gender among adolescents in Teresina, the ratio of prevalence of pain among boys and girls was equal to 1.12 (82% female versus 73% in males). And, similar to what was demonstrated in this study, there was also no association between gender and back pain.<sup>24,27</sup> However, other studies have shown that males are less prone to experiencing back pain.<sup>8,11,21</sup> Such findings highlight the need to conduct additional studies to examine the relationship between gender and the presence of LBP.

Although not investigated in this study, some possible explanations even without scientific evidence have been proposed to explain the possible association of back pain in females: the first is related to the physical strength, lower in women; another hypothesis is that the problem is psychosocial, where women have a greater predisposition than men to pain perception. Moreover, the fact of presenting an early maturation, accompanied by hormonal changes that changes pain perception, could contribute to making women more susceptible to pain conditions.<sup>21,25,27</sup>

As for the duration of the low back pain, most of the teenagers investigated here (76.15%) reported pain lasting between one and seven days.

This result is consistent with that described in a study conducted in northwest England.<sup>21</sup> Additionally, although this finding could support the theory that low back pain in young people is, in most cases, a common living condition which resolves spontaneously with time, it should be analysed with caution, as currently it is known that children and adolescents who experience pain are those which restate the symptom or pain in other body segments later in life.<sup>27</sup>

The reason for the similar prevalence of low back pain in these different age groups may be at least partly related to the fact that in childhood and adolescence growth spurts happen, which commonly are associated with postural and angular changes, which still makes such important periods in the prevention and reduction of predisposed conditions of postural problems.<sup>28</sup>

Other plausible explanations for the high prevalence of back pain in schoolchildren is the presence of postural changes resulting from poor posture, having a high body mass index, and sedentary living habits.<sup>13,15,29-30</sup> Regarding the relationship between posture and scoliosis, a study in a public school in Presidente Prudente, São Paulo with 104 individuals aged between 11 and 17 years identified postural changes related to scoliosis in 44.23% of the evaluated children.<sup>13</sup> Furthermore, in a study of schoolchildren in the 5th to 8th grade of the Rio Grande do Sul an association was found between the presence of pain and the daily time watching TV, sleeping posture adopted to sit and to write.<sup>25</sup>

Regarding the relationship between body mass index and posture, Rosellet al.<sup>15</sup> Identified postural changes in basically all axes analysed in individuals between 10 and 15 year old who were overweight. Souza et al<sup>30</sup> found similar results in a population of 1,141 individuals between 6 and 18 years old in which there was association with valgus and overweight and obesity. Furthermore, Camargo and Pereira<sup>31</sup> also found a high prevalence of postural changes of the spine, especially hyperextension of the knees and hyperlordosis, in overweight and obese children.

In relation to the possible interference of LBP in performing daily activities, the results of this study are in agreement with those found in adolescents from public schools in Presidente Prudente, São Paulo,<sup>13</sup> in which there was no change in routine due to the pain reported by participants. Moreover, in a study of schoolchildren in Rio Grande do Sul 17.4% of cases of low back pain prevented the development of activities of daily living.<sup>25</sup>

Educational and therapeutic experiences have shown that the practice of leisure and sport activities in physical education is fundamental to the acquisition of healthy postural habits. Moreover, the right position to study and carry school supplies functions as an adjunct to treatment. Although this study did not investigate the associated factors in the onset of pain, the improper use of backpacks is an improper postural habit which can promote postural change,<sup>18</sup> empowering a problem that is already installed, and increasing the chances of occurrence of LBP.<sup>18-19</sup> Accordingly, Basso et al.<sup>31</sup>

demonstrated a correlation between the inappropriate use of backpacks and postural changes, being this correlation potentiated in children who have mouth breathing predominance. Thus, appropriate monitoring with guidelines and serial evaluations of research on postural changes, are the key role in early diagnosis and treatment of children and adolescents.<sup>13</sup>

The study findings highlight the need for efforts to prevent and reduce harmful behaviour which may contribute to the development of postural deviations and changes that may cause or worsen cases of low back pain in adolescents.

Considering the daily long-term of children and adolescents in schools and the fact that young people are especially prone to incorporating into their daily routine sets of attitudes that are properly passed to them, health education programmes should be instituted in schools with a view to designing the behaviours to be taught to future generations. Such programmes should include actions and targeted teaching strategies for postural orientation, family education, identification of low back pain and its causes, as well as helping young

people to become aware of the harmful effects of risk behaviours and to make their own decisions regarding the adoption of healthy habits, contributing to systematic prevention in order to improve quality of life.

This study has limitations related to the fact that the cross-sectional design does not allow the establishment of a relationship of cause and effect as well as the fact that it is a local study, which does not allow the results to be extrapolated to other contexts, since they are influenced by environmental, social, cultural and genetic factors that are specific to each site. However, it is believed that the survey results may be used as a reference for policies geared towards local situations, that do not lose the trends observed nowadays, and results from epidemiological reflection on the implementation of its results for the policy planning in health education.

The study revealed a high prevalence of low back pain in adolescents in the surveyed students, with no difference between gender and characteristics related to the intensity, duration or interference of the pain with the development of activities.

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## RESUMO

**Introdução:** A dor lombar é um sintoma com repercussões biopsicossociais com potencial de atingir o indivíduo como um todo. A idade escolar coincide com um período importante no desenvolvimento humano e em que desigualdades e compensações resultantes de posturas inadequadas ou alterações estruturais podem aumentar a chance do surgimento de dores. **Objetivo:** Estimar prevalência de dor lombar entre adolescentes. **Método:** A amostra foi constituída por 166 adolescentes com idades entre 11 e 18 anos (86 meninas e 80 meninos), regularmente matriculados em um colégio particular em cidade do estado do Piauí, no ano letivo 2012. Um questionário estruturado contendo questões fechadas sobre sexo, idade e aspectos relacionados à dor lombar foi utilizado. **Resultados:** Quase 80% dos estudantes referiram presença de lombalgia no último ano, e quase metade (41,3 %) informou dor classificada como grau 3 segundo escala de faces. Cerca de dois terços dos adolescentes (63,1%) afirmaram não deixar de realizar suas atividades diárias por conta da dor. Não houve associação estatisticamente significativa entre sexo e dor lombar ( $p = 0,117$ ) ou intensidade de dor ( $p = 0,065$ ), embora para esta última variável tenha sido encontrado p-valor marginal. **Conclusão:** Elevada prevalência de dor lombar foi encontrada no grupo estudado, sem diferenças entre sexos quanto às características da dor.

**Palavras-chave:** coluna vertebral, programas de rastreamento, saúde escolar.