

Original Article

Postural education and behavior among students in a city in southern Brazil: student postural education and behavior

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Abstract. [Purpose] The aim of the present study was to assess the knowledge of the spine and posture among adolescent female students and to determine if they had access to postural education in or outside school. [Subjects and Methods] This was an epidemiological survey of a representative sample of 495 female students aged 14 to 18 years attending a regular secondary school in São Leopoldo, RS, Brazil. Data were collected through a questionnaire. [Results] The results showed that 16.8% of teens did not know what a spine was, 8.3% had no knowledge of posture, and 61% reported receiving no posture education. Posture awareness was associated only with posture while using a computer, while having postural education class was not associated with any postural behavior. [Conclusion] The results showed that, although most students are familiar with the spine and posture, a sizable group is not, and over half had no postural education. These findings suggest that inclusion of postural education programs in schools should be encouraged in order to promote health and prevent diseases related to the spine.

Key words: Posture, Adolescent health, School health

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INTRODUCTION

In recent decades, postural education has become increasingly common in many parts of the world as a strategy to mitigate the high prevalence of back pain and postural changes by altering inadequate postures that can result in spinal damage¹⁾. Participants in postural schools have improved postural behaviors during activities of daily living (ADLs) and increased their theoretical knowledge about the spine²⁾. Teaching postural behavior in postural schools and similar educational programs has been applied widely to the adult population in Brazil^{3, 4)}, as well as to children and adolescents⁵⁾, as adolescents are also affected by back pain

and postural changes⁶⁻⁹⁾.

Educational and preventive programs in school environments have several distinguishing characteristics¹⁰⁾. The structure varies from a single meeting to several meetings and from educational classes targeted exclusively at students to those aimed at a broader audience, including students, parents, faculty, and school boards. The teaching methods include lectures and various teaching resources, including films, posters, transparencies, and practical experiments⁶⁾. Common topics covered in these programs include anatomy and spine biomechanics as well as appropriate postural behaviors for ADLs. Analysis of these methods suggests that researchers use various teaching strategies to teach body posture, a fact that can be explained in part by the limited number of studies that have evaluated the level of knowledge of the spine and body posture among children and adolescents.

Overall, the results of these previous studies demonstrate the effectiveness of education programs to improve the theoretical knowledge and the ability of students to make practical use of this knowledge¹¹⁾. Nevertheless, despite the

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positive effects of postural schools and similar educational programs, studies evaluating the longevity of these changes are scarce. Only a few epidemiological studies have broadly evaluated students with regard to their postural behaviors and knowledge of body posture.

Therefore, this study assessed the level of spine and body posture knowledge among female adolescents, determined if the students had attended postural education classes in or outside school, and assessed whether their postural behaviors were associated with knowledge of body posture or postural education classes in or outside school.

The results of this study can serve as the basis for development of postural schools as well as for teaching and preventive methodologies in the school environment.

SUBJECTS AND METHODS

This school-based epidemiological study evaluated students aged 14–18 years living in São Leopoldo, Rio Grande do Sul, Brazil. This study was part of a broader investigation that evaluated different health outcomes and calculated various sample sizes. We chose a larger sample size that is, 515 adolescents. The final sample consisted of 495 female students⁷⁾. Sample selection was proportional to the number of female students in each school, ensuring that each school had a similar probability of belonging to the sample. In each school, simple random sampling was conducted of all students aged 14–18 years regularly enrolled during the third school semester. The study was approved by the Research Ethics Committee of the University of Vale do Rio dos Sinos (UNISINOS) in accordance with the ethical standards of the Declaration of Helsinki (1975, revised in 1983). All subjects signed an informed consent form.

Variables associated with behavior and knowledge were collected using a standardized, codified, and tested self-administered questionnaire containing closed questions. Illustrative figures of correct and incorrect postures adopted while watching television, using a computer, and retrieving objects from the floor were shown to students, after which they were asked to select the position that best corresponded to their postures while performing these activities during their daily routines. After data collection, the variables were grouped for association analysis.

Data were entered into Epi Info 6.0 by two independent typists to mitigate potential transcription errors. IBM SPSS Statistics for Windows 20.0 was used for statistical analysis. To evaluate possible correlations, bivariate analysis, including χ^2 tests ($\alpha=0.05$), was used.

RESULTS

Out of 495 students, 16.8% ($n=83$) responded that they had no knowledge about the spine. Out of the 83.2% ($n=412$) of female students who reported having knowledge of the spine, 9.7% ($n=40$) obtained this knowledge from physical education teachers, 51.7% ($n=213$) obtained this knowledge from teachers of other subjects, 22.3% ($n=92$) obtained this knowledge from parents, 7.8% ($n=32$) obtained this knowledge from books or magazines, 4.9% ($n=20$) obtained this knowledge from doctors, and 3.6% ($n=15$) obtained this

knowledge from other sources (physical therapists, friends, others).

Among adolescents, 93.7% ($n=464$) did not have knowledge about the intervertebral disc and its function, and 95.8% ($n=474$) did not have knowledge of the number of curves in the spine or answered this question incorrectly.

Among female students evaluated, 8.3% ($n=41$) reported having no knowledge of body posture. Out of the 91.7% ($n=454$) of female students who responded that they had knowledge of body posture, 43.8% ($n=199$) obtained this knowledge from their parents, 17.4% ($n=79$) obtained this knowledge from physical education teachers, 17.2% ($n=78$) obtained this knowledge from other school teachers, 7.3% ($n=33$) obtained this knowledge from doctors, 6.6% ($n=30$) obtained this knowledge from books or magazines, and 7.7% ($n=35$) obtained this knowledge from other sources (physical therapists, friends, Internet, others).

Moreover, 61.0% ($n=302$) of the respondents had not had postural education classes (in or outside school), 24.8% ($n=123$) had postural education classes at school, and 14.1% ($n=70$) had postural education classes outside school. There was no association between the type of school (public or private) and enrolment in postural education classes ($p=0.108$).

In the bivariate analysis, knowledge of body posture was associated with only correct posture while using a computer. Compared with other students, those who reported knowledge about body posture showed a higher probability of having correct posture (supporting their feet and backs) while using a computer (Table 1).

However, postural education classes inside or outside school were not associated with any of the postural behaviors evaluated in this study (Table 2).

DISCUSSION

The results of the current study indicate that most students had knowledge about the spine, and more than 50% learned about this subject from teachers other than physical education teachers. Only a small group obtained this knowledge from physical education teachers. However, more than 90% of the students did not have knowledge of the intervertebral disc and its function or the number of curves in the spine, or they answered this question incorrectly. Furthermore, the results also show that most students reported having knowledge of body posture. Of these students, almost 50% obtained this knowledge from their parents; only a few (17.4%) had obtained this information from physical education teachers.

These results corroborate those of a study conducted in Montenegro, Rio Grande do Sul, Brazil, that assessed whether postural education was included in the syllabus of physical education courses for 5th to 8th graders and evaluated all physical education teachers ($n=22$) in all primary schools in the city using a self-administered questionnaire. The results showed that most physical education teachers of 5th to 8th graders neglected postural education in practice, although these teachers were aware of the importance of teaching and discussing these topics. In addition, they could appropriately define the concept of adequate posture, suggesting a remarkable contradiction between thinking and doing¹²⁾. Another study that evaluated 5th to 8th graders

Table 1. Association between knowledge of body posture and postural behaviors among female students aged 14–18 years living in São Leopoldo, Rio Grande do Sul, Brazil

Variables (N/%)	Knowledge of body posture N (%)
Posture while using a purse or backpack	
Correct: using two shoulder straps or using a strap across the chest (273/55.7)	248 (90.8)
Incorrect: using a single shoulder strap (217/44.3)	201 (92.6)
Reported weight of the purse/backpack/school folder ^c	
Not heavy (259/52.5)	237 (91.5)
Heavy (234/47.5)	215 (91.9)
Posture in the classroom	
Correct: back and feet supported (50/10.1)	45 (90.0)
Incorrect: other positions (445/89.9)	409 (91.9)
Posture while watching television	
Correct (36/7.4)	33 (91.7)
Incorrect (453/92.6)	416 (91.8)
Weekly hours watching television	
0–10 (334/67.5)	303 (90.7)
>10 (161/32.5)	151 (93.8)
Posture while using a computer	
Correct: feet and back supported (111/27.5)	108 (97.3) *
Incorrect: other positions (292/72.5)	264 (90.4) *
Weekly hours using a computer	
0–8 (434/87.7)	395 (91.0)
>8 (61/12.3)	59 (96.7)
Reading or studying in bed	
No (140/28.3)	129 (92.1)
Yes (355/71.7)	325 (91.5)
Posture while retrieving objects from the floor	
Correct: bending the knees (326/65.9)	301 (92.3)
Incorrect: flexing the trunk (169/34.1)	153 (90.5)
Use of high-heeled shoes	
Does not wear or wears up to 2 times per week (360/72.7)	330 (91.7)
Wears more than 3 times per week (135/27.3)	124 (91.9)
Posture while sleeping	
Correct: lateral decubitus or supine position with a pillow between the knees (218/44.0)	202 (92.7)
Incorrect: prone or supine position without a pillow between the knees (277/56.0)	252 (91.0)

*Statistically significant association ($p < 0.05$)

found that the students had limited knowledge of postural deviations and their causes and that they had not learned these topics from their physical education teachers¹³.

The lack of information on proper body postures during school activities and when performing ADLs may be a risk factor for reduced spinal integrity by increasing spinal exposure to inadequately supported loads that in the medium and long terms can lead to vertebral flattening, joint wear, and consequent back pain and spinal complications^{1, 14}. Most postural problems, particularly those associated with the spine, originate during the period of body growth and development, i.e., in childhood and adolescence⁷. Therefore, even teachers without postural education training during their undergraduate courses should be educated on this topic

and aim to include it in course syllabi¹¹.

Several studies have demonstrated the importance of teaching anatomy, biomechanics, and appropriate postural habits during the performance of ADLs in childhood¹⁵. All forms of early intervention are justified as long as they are developed for the appropriate age group. Proper posture in childhood and correction of postural deviations in this phase ensures adoption of proper postural behaviors in adult life^{2, 10}.

Under this assumption, physical education teachers should be actively involved in class planning using published data. One previous study evaluated the static posture, dynamic posture, and theoretical knowledge of posture in 28 children of both genders aged 8–11 years to develop a

Table 2. Association between postural education classes in or outside school and adoption of postural behaviors among female students aged 14–18 years living in São Leopoldo, Rio Grande do Sul, Brazil

Variables (N/%)	Postural education (in or outside school) N (%)
Posture while wearing a purse or backpack	
Correct: using two shoulder straps or using a strap across the chest (273/55.7)	100 (36.6)
Incorrect: using a single shoulder strap (217/44.3)	91 (41.9)
Reported weight of the purse, backpack, or school folder	
Not heavy (259/52.5)	103 (39.8)
Heavy (234/47.5)	90 (38.5)
Posture in the classroom	
Correct: feet and back supported (50/10.1)	20 (40.0)
Incorrect: other positions (445/89.9)	173 (38.9)
Posture while watching television	
Correct (36/7.4)	14 (38.9)
Incorrect (453/92.6)	177 (39.1)
Weekly hours watching television	
0–10 (334/67.5)	137 (41.0)
>10 (161/32.5)	56 (34.8)
Posture while using a computer	
Correct: feet and back supported (111/27.5)	47 (42.3)
Incorrect: other positions (292/72.5)	115 (39.4)
Weekly hours using a computer	
0–8 (434/87.7)	166 (38.2)
>8 (61/12.3)	27 (44.3)
Reading or studying in bed	
No (140/28.3)	55 (39.3)
Yes (355/71.7)	138 (38.9)
Posture while retrieving objects from the floor	
Correct: bending the knees (326/65.9)	130 (39.9)
Incorrect: flexing the trunk (169/34.1)	63 (37.3)
Wearing high-heeled shoes	
Does not wear or wears up to 2 times per week (360/72.7)	142 (39.4)
Wears more than 3 times per week (135/27.3)	51 (37.8)
Posture while sleeping	
Correct: lateral decubitus or supine position with a pillow between the knees (218/44.0)	79 (36.2)
Incorrect: prone or supine position without a pillow between the knees (277/56.0)	114 (41.2)

*Statistically significant association ($p < 0.05$)

postural education program for them. After completing the program, the participants had knowledge of the spine, including its parts and functions, and could correctly maintain spine curvature during ADLs⁶.

Prevention of spinal complications in early primary education offers increased opportunities for implementing reinforcement strategies in higher levels of education and also allows a larger percentage of students to be adequately trained¹¹. Therefore, young people can learn to adopt correct body postures without having to first abandon inefficient posture patterns and inadequate habits¹². In short, preventive actions are easier, faster, and have the best long-term

prognosis^{1, 2}.

Analysis of factors associated with posture in this study showed that having knowledge of body posture was associated only with proper body posture while using a computer. Students who reported having knowledge of body posture had a higher probability of having correct posture compared with those who reported not having knowledge of body posture. The other evaluated postural behaviors were not associated with this variable.

Formal postural education classes were not associated with correct postural behaviors in this study, indicating that these classes had no impact on correct posture during ADLs

among these adolescents.

This finding is corroborated by a recent study⁶⁾, that evaluated the effects of a postural education program for children and adolescents 8 months after its completion. The results indicated that the positive influence on the acquisition of theoretical knowledge and adoption of correct body postures during ADLs after completing the education program did not extend beyond 8 months. We suggest the need for guidance and reinforcement strategies to ensure incorporation of postural habits acquired in Postural Schools. These activities may permit learning of the lessons taught in Postural Schools and incorporation of these lessons into daily habits. However, further studies are needed to test this hypothesis.

Long periods without monitoring or additional learning experiences lead to progressive abandonment of learned motor skills. Without regular practice, automatic movements are lost from the mechanical, physiological, and conditioned reflex points of view, which may explain the lack of associations between postural education classes and knowledge and adoption of appropriate postural behaviors, except for body posture while using a computer.

Postural education programs should be structured to include not only immediate strategies but also short-, medium-, and long-term targets. Education professionals should increase their awareness about factors that interfere with body posture in children and adolescents and increase their theoretical and practical knowledge of adequate postural habits¹⁶⁾. In this respect, increased awareness about postural education could be incorporated as part of the objectives of lessons taught by all teachers during school activities⁶⁾.

Physical education teachers should continuously evaluate their methodologies and lesson contents, as they are vital in this educational context. Because physical education teachers often have the most knowledge about health and hygiene in the community, physical education programs should prioritize health education¹⁷⁾. Nevertheless, it is important that teachers increase student interest in activities^{1, 10)}, optimizing the teaching-learning process, especially when the educator uses strategies that emphasize repetition and memorization of concepts as well as other strategies that enable students to associate theory with practice. It is essential that the content of postural education programs meet the reality of student environments and address situations related to their daily lives. These programs should teach of postural behaviors that can be assimilated, practiced, and corrected on a daily basis¹⁸⁾.

The results of this study indicate that, although most students had knowledge of the spine and body posture, a significant number did not. In addition, more than 50% of the female students had not had postural education classes (in or outside school). Knowledge of body posture was associated only with proper body posture while using a computer, whereas having postural education classes in or

outside school was not associated with any of the evaluated postural behaviors. These results suggest that schools should be encouraged to include postural education to provide students with increased knowledge on these topics and prevent spine disorders in this population.

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