

Effects of a Postural Education Program for students of the third year of Elementary School in a State School in Porto Alegre, state of Rio Grande do Sul state, Brazil

Efeitos de um Programa de Educação Postural para escolares do terceiro ano do Ensino Fundamental de uma escola estadual de Porto Alegre (RS)

Efectos de un Programa de Educación Postural para estudiantes del tercer año de la educación básica de una escuela estatal de Porto Alegre (RS)

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ABSTRACT | Back pain and postural changes are present problems for children and adolescents in recent years. One of the factors contributing to the onset of these problems is poor posture while performing daily life activities (DLAs), and it is believed that Postural Education classes can stimulate the students to incorporate appropriate habits. The main objective of this study was to verify the effects of the Postural Education Program (PEP) of nine weeks on the dynamic posture of students while performing DLAs. The secondary objective was to know the perception of the legally responsible person and the teachers about the PEP. This study was of semi-experimental type, and used a mixed method, using a combination of both quantitative and qualitative approaches. The sample was composed of 40 students from the third year of the Elementary School from a State school in Porto Alegre, evaluated by DLA's footage and a Semi-Structured Interview. The PEP was based on the methodology of Postural Schools and lasted for nine weeks. The results showed improvement in the execution of the DLAs: carry backpack ($p=0.005$), pick object from the ground ($p=0.009$), sit on a bench ($p=0.001$), and sit to write ($p=0.001$). In the DLA carrying objects no significant difference was found ($p=0.467$). Regarding the qualitative analysis, the lines of the legally responsible person and of the teachers have shown that students

have made positive comments about the contents and the activities carried out during the program. Respondents perceived changes in the postural habits of the students and satisfaction with the proposal. It is concluded that the PEP was effective to improve the execution of DLAs and had a positive impact on the perception of the legally responsible person and the teachers of the students participating in the Program.

Keywords | Posture; Health Education; Health Promotion.

RESUMO | A dor nas costas e as alterações posturais são problemas presentes em crianças e adolescentes nos últimos anos. Entre os fatores que contribuem para o aparecimento desses problemas está a postura inadequada durante a execução de Atividades de Vida Diária (AVDs), e acredita-se que aulas de Educação Postural podem estimular os escolares a incorporar hábitos adequados. O objetivo principal deste estudo foi verificar os efeitos de um Programa de Educação Postural (PEP) sobre a postura dinâmica de escolares durante a realização de AVDs. O objetivo secundário foi conhecer a percepção de responsáveis e professores sobre o PEP. Este estudo foi do tipo semiexperimental e utilizou método misto, empregando a combinação de abordagens quantitativa e qualitativa. A amostra foi composta por 40 escolares do terceiro ano do Ensino Fundamental de uma escola estadual

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de Porto Alegre, avaliados por meio da filmagem de AVDs e de Entrevista Semiestruturada. O PEP foi embasado na metodologia das Escolas Posturais e teve duração de nove semanas. Os resultados demonstraram melhora na execução das AVDs “carregar mochila” ($p=0,005$), “pegar objeto no solo” ($p=0,009$), “sentar em banco” ($p=0,001$) e “sentar para escrever” ($p=0,001$). Na AVD “transportar objetos” não foi encontrada diferença significativa ($p=0,467$). Com relação à análise qualitativa, as falas dos responsáveis e das professoras revelaram que os escolares fizeram comentários positivos sobre os conteúdos e as atividades realizadas durante o Programa. Os entrevistados perceberam mudanças nos hábitos posturais dos escolares e satisfação com a proposta. Conclui-se que o PEP foi eficiente para melhorar a execução de AVDs e teve uma repercussão positiva na percepção dos responsáveis e professores dos escolares participantes do Programa.

Descritores | Postura; Educação em Saúde; Promoção da Saúde.

RESUMEN | El dolor de espalda y las alteraciones posturales son problemas presentes en niños y adolescentes en los últimos años. Entre los factores que contribuyen para la aparición de estos problemas está la mala postura al realizar las Actividades de Vida Diaria (AVDs), y se cree que clases de Educación Postural pueden estimular los estudiantes a incorporar hábitos adecuados. El objetivo principal de este estudio fue comprobar los efectos de un Programa de Educación Postural (PEP) sobre

la postura dinámica de estudiantes al realizar las AVDs. El objetivo secundario fue conocer la opinión de responsables y profesores acerca del PEP. Este estudio fue semiexperimental y utilizó método mixto, utilizando la combinación de enfoques cuantitativos y cualitativos. La muestra fue compuesta por 40 estudiantes del tercer año de la educación básica de una escuela estatal de Porto Alegre, evaluados por medio de la filmación de AVDs y de Entrevista Semiestruturada. El PEP fue basado en la metodología de las Escuelas Posturales y duró nueve semanas. Los resultados demostraron mejora en la ejecución de las AVDs “cargar mochila” ($p=0,005$), “coger objeto en la tierra” ($p=0,009$), “sentar en un banco” ($p=0,001$) y “sentar para escribir” ($p=0,001$). En la AVD “transportar objetos” no se encontró diferencias significativas ($p=0,467$). Con respecto al análisis cualitativo, las hablas de los responsables y de las profesoras han demostrado que los estudiantes hicieron comentarios positivos sobre los contenidos y las actividades llevadas a cabo durante el Programa. Los entrevistados percibieron cambios en los hábitos posturales de los estudiantes y satisfacción con la propuesta. Se concluye que el PEP fue eficaz para mejorar la ejecución de AVDs y tuvo un impacto positivo en la percepción de los responsables y profesores de los estudiantes participantes del Programa.

Palabras clave | Postura; Educación en Salud; Promoción de la Salud.

INTRODUCTION

Back pain in adults has been considered a public health problem in industrialized countries due to high prevalence and associations with decreased functional capacity and quality of life, and high expenses resulting from treatments and early retirements¹⁻⁵. Postural problems, as well as the occurrence of low back pain, are manifested in great proportions in childhood and adolescence, besides being present in adults in large scale⁶. According to Ribeiro et al. (2008), back pain is currently a cause for concern, especially from the onset of puberty, during which it can reach up to 60% of students⁷.

The cause of back pain is considered to be multifactorial⁸, with postural habits such as poor posture during daily life activities (DLAs) being one of the factors that may contribute to low back pain and postural problems⁹. Body posture can generate or reduce spinal overloads, since it determines the amount and

distribution of effort on the various bodily structures when performing DLAs¹⁰⁻¹². One of the ways to minimize the influence of body posture as a risk factor associated with low back pain and the occurrence of postural problems is the implementation of preventive and educational programs that teach proper postural habits^{3,5,13}.

The Swedish Postural School, proposed in 1969, was one of the first programs of postural education, composed of theoretical information and practical experiences directed to the prevention and treatment of problems caused by inadequate posture habits^{3,5,13}. Initially directed to adults, this proposal has been adapted for children and adolescents in recent years¹⁴⁻²³.

The postural education programs (PEPs) to students proposed in the literature have different methodologies for the development of the contents. The study from Candotti et al. (2010), for example, was composed of eight meetings²², while the study

from Zapater et al. (2004) was conducted in four sessions with further enhancement conducted by trained teachers¹⁷. Some programs have addressed the content only in a theoretical way¹⁵, while others have addressed it in a theoretical-practical way^{18,20,22}, and a third type of program addressed the issue only in a practical way¹⁹.

Postural habits begin to be incorporated in the first years of school life, being relevant to perform activities that can stimulate a proper execution of DLAs to promote the kinetic-functional health of students⁵. This hypothesis has motivated this study, which stands out in relation to those already carried out by combining the quantitative assessment of the execution of DLAs to an assessment of the perception of the legal guardians and teachers to the impact of the PEP for students. Therefore, the main objective of this study was to verify the effects of a Postural Education Program (PEP) over dynamic body posture in DLAs from third-year students from Elementary School in a state school in Porto Alegre, state of Rio Grande do Sul (RS), Brazil. The secondary objective was to understand the perception of legal guardians and teachers about the PEP for students.

METHODOLOGY

This study was of the semi-experimental type²⁴, and used mixed method, employing a combination of quantitative and qualitative approaches²⁵. It was approved by the Research Ethics Committee of the UFRGS (no. 24257).

The sample was made by convenience, being comprised of 40 students, being 23 girls and 17 boys, aged between 8 and 12 years old, enrolled in the third year of Elementary School in Porto Alegre, RS, Brazil.

Inclusion criteria were: being enrolled in the third year of elementary school of the school participating in the PEP; be physically fit to carry out the dynamic posture evaluations; have authorization from the legal guardian to participate in the study. The students who did not perform one of the two dynamic postural assessments were excluded from the study.

The PEP was based on the methodology of Postural Schools and lasted nine weeks^{5,13,16,23}. Classes took place once a week for an hour and a half. The contents worked were: spine; carrying school backpack and walking;

sitting and standing, and posture while writing; using the computer, sleeping and standing up; picking up objects on the ground and carrying them (Box 1).

Box 1. Description of the meetings from the Postural Education Program (PEP)

Class	Contents
-	Students' evaluation (pre-test)
-	Students' evaluation (pre-test)
1	Presentation of the PEP and its purposes. Main structures, curves, and functions of the Spine.
2	Main muscles involved in keeping the Body Posture. DLAs standing straight and walking.
3	Compensatory postural changes DLA carrying the backpack.
4	Overload on the spine. DLA grabbing objects from the ground.
5	Main Spine Disorders DLA sitting and standing up correctly.
6	DLAs remaining sitting for writing, watching television, using the computer or laptop.
7	DLA lying down and standing up correctly. DLA remaining lied down.
8	Game: review of the contents developed during the PEP.
9	Game: review of the contents developed during the PEP.
-	Students' re-evaluation (post-test)
-	Students' re-evaluation (post-test)

The classes were developed by physical therapy students trained and supervised by a professor of the University responsible for the development of the PEP at the school. The program featured the following structure: delivery of the task performed at home by the students; review of the previous content, presentation and experience of the new content, and explanation of the task to be performed at home, with exercises to complete, check or answer, for fixation of the contents worked in class. Games and fixation activities of the contents were used in the experiences. During the games, the children were encouraged to pay attention to their posture and to modify it, if necessary. In the fixation activities, the physical therapy students developed drawing, painting, clay sculpture, installation of a spine with egg cartons and sponge, and picnic activities. On the last day of the program, the legal guardians of the students were invited to participate in the closure of the project.

The Lay-out for Assessing the Dynamic Posture (LADy), a valid and reproducible protocol proposed by Noll^{26,27}, was used for dynamic posture assessment. This evaluation consisted in the shooting of students in the sagittal plane while performing the following DLAs: carrying the school backpack; grabbing an

object from the ground; carrying objects; sitting on a bench and posture while writing. LADy uses a score sheet with predefined criteria to evaluate the postures in each DLA filmed, providing a final numeric score (Box 2).

Box 2. Scoring criteria for the evaluation of dynamic postures: when carrying school backpack, picking up an object on the ground and carrying it, while sitting on a bench and when writing

Posture	Score Criteria	Score
When carrying a school backpack	Carrying the backpack with one strap on each shoulder	0 to 3 points
	Erect trunk	
When grabbing an object from the ground	Head on a neutral position	0 to 5 points
	Erect trunk	
	Object between the feet	
	Knee bending ($\geq 90^\circ$)	
When carrying objects	Symmetrical lower limbs	0 to 3 points
	Sole of the feet leaned against the floor	
	Head on a neutral position	
	Erect trunk	
When sitting on a bench	Object leaned against the body	0 to 7 points
	Head on a neutral position	
	Erect trunk	
	Sole of the feet leaned against a base or the floor	
	Hip bending $90^\circ(\pm 5^\circ)$	
	Knee bending $90^\circ(\pm 5^\circ)$	
	Lower limbs apart (equal to or beyond the shoulder width)	
Aligned shoulders		
When writing	Head on a neutral position	0 to 9 points
	Erect trunk	
	Trunk leaned against the back of the chair	
	Forearm on the desk	
	Sole of the feet leaned against a base or the floor	
	Hip bending $90^\circ(\pm 5^\circ)$	
	Knee bending $90^\circ(\pm 5^\circ)$	
Lower limbs apart (equal to or beyond the shoulder width)		
Aligned shoulders		

*Each criterion equals 1 point

Filming was performed before and immediately after the performance of the PEP in a classroom of the school. A digital camera on a fixed tripod was used for filming. Later, the images were transferred to a computer and analyzed by a trained researcher²⁷.

Semi-structured interviews were used for the evaluation of the legal guardian and the teachers perception. The interviews were conducted in the last week of the PEP by two researchers, interviewing 13 legally responsible persons for the students and the two teachers of the classes participating in the study. All the interviews were recorded and transcribed for content analysis.

Data collection occurred in the period from March to June 2013 and was made by students of physical education and physiotherapy, which were trained and monitored by the teacher of the University responsible for the development of the PEP at the school. In quantitative data analysis, we employed descriptive statistics, with the use of medians, percentiles, and frequency distribution, and inferential statistics, with the Wilcoxon test ($\alpha=0.05$). In the qualitative data analysis, the content analysis proposed by Bardin was used²⁸. After being transcribed, the material was read, and the relevant narratives to the study were chosen. A framework for aggregating similar narratives units was subsequently drafted²⁸.

RESULTS

Table 1 presents the results relating to the evaluation of dynamic postures in DLAs before and after the PEP. The 40 students that started the PEP participated until the end of the program. Furthermore, a significant difference in postures could be observed in the postures while sitting on a bench, writing, carrying backpacks, picking up an object on the ground, and also in the total sum of points of all evaluated positions. The posture when carrying objects presented no significant difference from pre to post-test.

Table 1. Median and interquartile range for the pre- and post-test of the DLAs and value of p

Postures	Pre-test Median (25-75 percentiles)	Post-test Median (25-75 percentiles)	Value of p
When carrying a school backpack (N=40)	3(2-3)	3(3-3)	0.005*
When grabbing an object from the ground (N=40)	2(1-2)	2(1-3)	0.009*
When carrying objects (N=40)	3(2-3)	3(2-3)	0.467
When sitting on a bench (N=40)	0(0-1)	2(2-3)	0.001*
When writing (N=40)	1(-2)	3(1-3)	0.001*
Total Sum (N=40)	9(8-9)	12(10-14)	0.001*

*p \leq 0.05

The results related to the legal guardians and teachers perception were divided into three categories of

analysis: Comments on the PEP; Changes in behavior; and Opinion of the legal guardians and teachers about the PEP.

Comments on the PEP

Comments on students reports in relation to the activities performed during the Program were present at the discourse of 11 legal guardians and of the two teachers. Among all that was reported, we highlight the following:

Student's father: *"She did some demonstrations. There were a few times that she acted some plays for us (relatives) simulating what she did at school."*

Student's mother: *"A lot, with a lot of excitement, and wanting to teach the whole family. Always starting the music too, which was always in her mind. Your work was pretty productive, because it was really copied at home."*

Teacher 1: *"... when one student is not doing it, the other warns about it 'sit up straight, look how you are, you are all bent on the chair, remember the class, how was that?' So, they are always warning each other."*

Behavioral changes

The perception of changes in behavior was mentioned by eight legal guardians and by one of the teachers. The care with the postures when sitting and carrying the backpack was what stood out. Among all that was pointed out, we highlight the following:

Student's mother: *"Sitting down, carrying the backpack and grabbing an object were the stronger ones, which she does the most. Of course, others as well, but these were the ones which she was talking about more, commenting about it."*

Student's grandmother: *"He would sit all wrong and lie down in any way, and now he is being careful."*

Teacher 1: *"I considered it pretty important, because they started to change their habits (some, not the entire class), but the vast majority understood that we have to sit up straight, have to take care of our posture so we don't get a hump, it changes the spine further, that happens over time, so they understood it well."*

Legal guardians and teachers' opinion on the PEP

The relevance of the project was referred to by eight legal guardians and the teachers, according to the comments from the following statements:

Student's mother: *"I think it's a pretty cool project to have at school, right, and it's age appropriate ... back home I have six kids, so we don't have time to keep saying 'sit up straight', not much so, then in the backpack, they take all from inside the backpack, and carry only what they need, it is something that we don't pay a lot of attention, right, so I thought it was very good."*

Teacher 1: *"I think that all schools should have this project. It is very good because they, like I told you, they were integrated. It is something like, something new. I, on my teaching path, it is the first time I've seen the school deal with posture. Of course, the teacher is always looking after, all that sort of thing, but until it gets to school it is a long walk. So, I liked it."*

DISCUSSION

The main objective of this study was to verify the effects of the PEP on the dynamic body posture of students. Significant improvement was found in four of the five verified DLAs and in the total sum of all postures.

Studies directed to school-aged individuals also verified through filming the effects of the Postural Schools in DLAs sitting in a bench, grabbing an object from the ground^{16,20,22} and posture while writing^{16,20}, and found improvement in the execution of these postures. These findings corroborate the results found in this study.

Sitting posture causes greater pressure on the intervertebral discs of the lumbar spine than the standing position²⁹, so the frequent repetition of this pressure may accelerate the degenerative process of the disks, causing prejudice to their ability of cushioning³⁰.

Children and adolescents stay in school for four to six hours per day²⁷, adopting a sitting posture most of the time. Inadequate furniture is one of the factors that contributes to obtaining, preserving and worsening poor postural habits²⁹. The study herein sought to minimize the harm caused by keeping a sitting posture, providing information on the proper positioning of the body and offering resources to adapt the existing furniture, like the footrest box.

The way of carrying the school backpack, as well as the model of the backpack and its load are risk factors for the onset of postural problems such as back pain and postural changes³¹. This DLA was verified by filming in just one other study¹⁸, and the results were positive and similar to those of this study. Carrying school supplies is a daily task of students and should be considered in posture education.

When picking up a heavy object from the ground by flexing the column rather than bending the legs the pressure on the intervertebral discs increases considerably³¹. This DLA is performed daily by people, including individuals in school age¹⁶. Thus, to avoid the degenerative process in the disks to be accelerated through increased pressure³⁰, it is important to incorporate the appropriate way to perform this task as soon as possible.

The posture when carrying objects showed no significant difference, not corroborating the results from other studies^{20,22}. However, it was observed that the students performed this task properly before the development of the PEP. After the completion of the program, students continued performing this DLA properly.

The secondary objective of this study was to know the perception of the legal guardians and the teachers on the PEP, because as Guaragna et al.³² highlights (p. 113), "the perception of close and meaningful people in the life of the child, such as parents and teachers, is an effective tool in obtaining information"³². The interviewed legal guardians and the teachers noticed an improvement in the execution of the DLAs by children participating in the PEP, and reported that the students made positive comments about the program in their homes and at school.

The positive comments of the students show that they felt motivated during the PEP to the extent that they demonstrated to significant people in their lives what they have learned in class¹⁷. The choice of DLAs often performed by children, the appropriate activities for the age of the participants, and the use of teaching resources that stimulate learning are some factors that may have contributed to motivate and stimulate learning.

People are usually resistant to changing behavioral habits; however, in childhood they are more susceptible to acquiring new ones³³. School is an appropriate environment to work with healthy habits, and the first years of school life, in which individuals are growing, is the most appropriate time to carry out preventive programs aimed at changing habits¹⁷.

One of the reasons for the positive assessment by the legal guardians was because the PEP works with issues that they cannot monitor nor control, due to lack of time: such as the weight of the load carried in backpacks. Reinforcing a proper way to carry the school material is important to draw the attention of both children and parents. Benini et al.²¹ (p. 350) point out that "teachers, students and parents are equally involved in determining the load of backpacks, and all can contribute to reduce it"²¹. However, if the legal guardian cannot contribute due to lack of time, it becomes more relevant that the students themselves have information about the appropriate weight load and the way they carry the backpack.

The use of mixed methods (qualitative and quantitative), as we did in this study, is important to consider the impact of the proposal in the lives of the participants, as well as for obtaining information in order to reorganize the proposal, when required^{5,13,32}. In this study, the perception of the legal guardians and of the teachers showed that the impact of the PEP was positive, corroborating with the results observed in the filming. However, the lack of a control group does not enable the assessment of whether there is acquisition of knowledge without performing educational intervention, making it a limitation to this study. The use of a convenience sample also suggests a cautious interpretation of the results.

We propose the continuation of the study through backup and content of future evaluations so the students participating can effectively incorporate appropriate postural habits in their daily lives in both the school environment and their homes³³.

CONCLUSION

It is concluded that the PEP was an effective intervention for students of the third year of elementary school of a State school in Porto Alegre, RS, Brazil, for the improvement of performing DLAs, showing positive repercussions, according to the perception of the legal guardians and teachers.

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