

Knowledge and Practices of Back Care, Experience in Colombian Children

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Abstract

Early back care has become the preventive strategy to mitigate bad postural habits and musculoskeletal alterations that trigger inadequate postural patterns in the body schema. The objective was to determine the knowledge and practice of back care in first-grade school children after applying an educational intervention for back care. Quasi-experimental study with pre-test and post-tests in a sample of 71 first grade school students. Knowledge and practices for back care were evaluated before and after of the intervention. During 5 weeks, a program of education for back care was developed in the intervention group, formed by concepts about anatomy, physiology, alterations of the spine, adoption of appropriate postures and movements in school life and the execution of adequate movements learned. Simultaneously, physical exercises based on aerobic work, strengthening and stretching the back muscles were carried out with the children in the control group. A linear regression model and a two-level hierarchical model were applied to estimate the effect of the intervention. After the execution of the back care education program, a better score was found in the knowledge and practice questionnaire, which was different between the intervention group and the control group (1.72 95% CI 1.21-2.24). The development of an education program generated a change in the score of the questionnaire on knowledge of back care in the intervention group, which suggests the implementation of these strategies in the school context during early childhood, contributing to the prevention of back disorders and deficiencies

Keywords

posture, health education, school health, lifestyle, children

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Background

In the school stage, children assume different postures as a normal consequence of their development, but some are adopted and maintained as inadequate postures for the execution of daily activities,^{1,2} which leads to the development of muscular-skeletal disorders and pain at the level of the back. Back pain is defined as a muscular-skeletal condition that can manifest itself with pain in the neck, middle and lower back,³ is associated with physical, psychosocial, behavioral, and genetic factors and with postural alterations.^{4,5}

Studies report a prevalence of postural impairment of 65% in children 7- to 12-year-olds⁶ 25% to 55% in children 10- to 15-year-olds,⁷ 27% to 47% in children 11- to 15-year-olds.⁸

According to the normal development, at the age of 6, the child achieves the integration at brain level of the codification of visual, auditory, kinesthetic, and motor stimuli, which enable the development of symbols, reasoning, reversibility of thought, and other higher forms of cognitive activity.⁹ In this phase of development, posture acquires adjustments and adaptations

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due to changes in the body and the psychosocial factors that affect them.

On the other hand, the inadequate practice of postures and movements of the back at an early age leads to significant musculoskeletal problems attributable to modifiable behavioral factors where health professionals and teachers can avoid them.

In this sense, education for back care has become a strategy that has mitigated the high prevalence of back pain and alterations, improving postural behavior during daily activities by implementing programs aimed at promoting back care in school settings directed at children and adolescents.¹⁰ It reports a positive effect on theoretical knowledge and the posture adopted during daily life activities. Consequently, the period of childhood is a good time to detect and identify situations that generate the risk of adopting inadequate postures, as well as to promote healthy habits through education aimed at establishing measures for the adequate care of the back and posture in an early manner.^{10,11} In the recent literature, some studies have evaluated postural education programs in children and young people, which include training in postural habits,¹² knowledge acquisition,^{13,14} or both.¹⁵ Some have also included physical activity.^{16,17} However, few studies on back care at early ages such as early childhood, are a crucial stage where posture and movement are consolidated, which are reflected in adulthood.

Based on the successful strategies identified in previous studies, the present study's objective was to determine the knowledge and practice of back care in first-grade students after implementing a back care education program.

Methods

Studio design: A quasi-experimental study with pre-test (before the intervention), post-test (after the intervention) in a sample of 71 first grade students selected at convenience. A quasi-experimental investigation that consists of a study in which an intervention is applied to one or more groups, and they are compared with one or more control groups, which do not receive the intervention, with the difference that the subjects are assigned to the study group using a non-random mechanism.¹⁸

Participants: At the time of the study, 71 children were enrolled in the first grade of primary school, distributed in 3 groups A, B, and C. Parents were asked to sign an informed consent form to participate in the study and the school's authorization.

As criteria for exclusion, the following were taken into account: children with neurological diseases, being in a delicate state of health at the time of the intervention,

and the fact that the child's parent did not accept the child's participation study.

The sample was made up of the total number of children enrolled in first grade (71 children) from 5 to 7 years of age in socioeconomic stratum I (low) belonging to the subsidized regime. The participants were distributed into 2 groups: the intervention group (formed by the children enrolled in first A and first B; n=50) and the control group (formed by the children enrolled in first C; n=21).

Instruments: An adaptation of the questionnaire was applied to evaluate back care in children;¹⁹ it consists of 9 questions that, in addition to the text, indicate through illustrations knowledge of appropriate postures (Figure 1).

The child had to circle the picture that he considered to be the right answer. For the analysis, the questions were grouped in 3 dimensions: distribution and lifting of loads, adoption of postures, and anatomy of the spine. The first dimension refers to the children's knowledge of the posture for lifting a box from the floor, carrying bags from the market, loading the case, and picking up an object from the floor. The second dimension involves adopting postures for sleeping, sitting, and standing. Regarding the spine's anatomy, the children were asked about the number of curves in the spine.

A questionnaire was applied in an auditorium with capacity for all the children participating in the study by 2 physiotherapists trained for this purpose.

The research was carried out in a Public Education Institution in the city of Pamplona, Norte de Santander, Colombia, attended by children from a low economic status and a low probability of receiving education on healthy habits (in this case postural health) free of charge and with quality.

Intervention: Following the measurement of knowledge and practice in back care, the development of the educational program began with the intervention group, which lasted fifteen sessions (2 hours each session) distributed over 5 weeks (3 times a week), carried out during the school day by 2 physiotherapists previously trained for this purpose and with the presence of the corresponding group leader teacher.

The Back Care Education Program was developed from the health education approach, through which self-care is facilitated and supported to adopt healthy postural habits. Two components were taken into account: cognitive and attitudinal.

The cognitive component refers to concepts about anatomy, physiology, alterations of the spine, adoption of appropriate postures and movements in school life: distribution and lifting of loads (lifting a box off the floor, carrying bags from the market, carrying a briefcase, picking up an object from the floor), adoption of sleeping postures, sitting and standing (Figures 2 and 3).

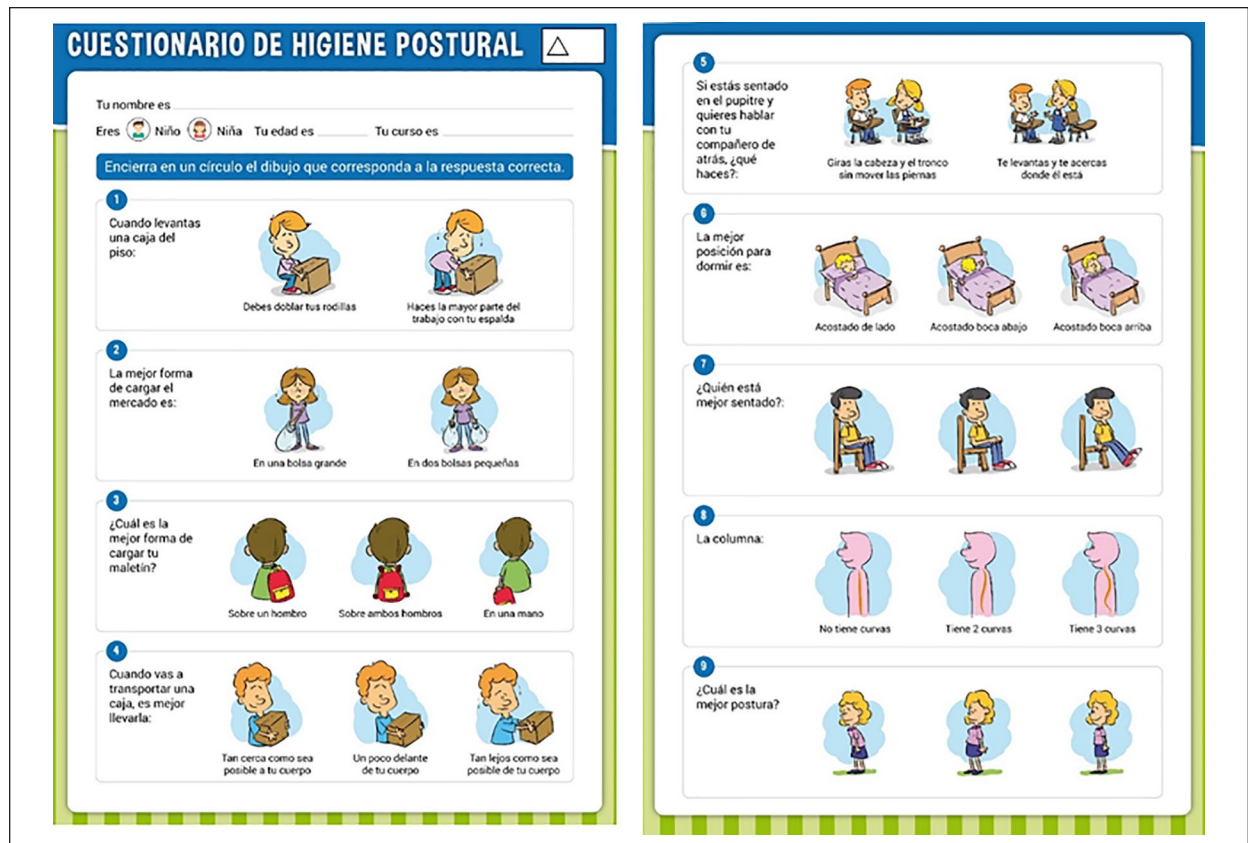


Figure 1. Adaptation of the cardon questionnaire.



Figure 2. Knowledge of concepts of anatomy and physiology of the spine.



Figure 3. Knowledge of appropriate postures and movements in school life.

Simultaneously, as the cognitive component was developed, the attitudinal component was practiced by adopting postures and the execution of appropriate movements that had been learned theoretically, which were intended to become mechanized until they became habits (Figure 4).

Passive learning methods (films, stories) and active methods (children's rounds, anatomy workshops, primary back pathology, basic principles, and simulation of the

correct posture when carrying out the different activities of daily life such as: carrying the backpack, standing, sitting, lying down, lifting objects and bending down to pick them up; games and exercises that included relaxation, stretching, and muscle strengthening) were applied.

Simultaneously with the intervention time, physical exercise activities based on aerobic work, strengthening and stretching the back muscles were carried out



Figure 4. Practice of proper postures and movements in school life.

with the children in the control group, with the same duration as the intervention group (Fifteen sessions (2 hours each session) distributed over 5 weeks (3 times a week)).

After the 5 weeks of intervention, the questionnaire on knowledge and practice of back care was again applied to all the children who made up the study sample.

Statistical analysis: First, exploratory analysis is presented for the quantitative variables, in which the distribution of the variables (extreme values, symmetries, kurtosis, types of distribution) was determined; Relative frequencies are presented for the qualitative variables (erroneous data). Following is a description of the baseline for each group; the qualitative variables are reported through absolute and percentage frequency. In the case of quantitative variables, their mean and standard deviation are described. In order to estimate the effect of the intervention, an intention-to-treat (ITT) analysis was carried out using 2 generalized linear models to verify the consistency between the results. The first variable is a generalized linear regression model (family: standard, link: identity), which is outlined as follows: $y = \beta_0 + \beta_1 X_{(1_Int)}$

The second variable was adjusted for the baseline and sex (it was decided to adjust for sex because there is a difference between women in the 2 groups): $y = \beta_0 + \beta_1 X_{(1_Int)} + \beta_2 \text{Baseline} + \beta_3 \text{Sex}$

Where y is the scale score after the intervention, β_0 the intercept, β_1 the coefficient of change of the subjects belonging to the intervention group, adjusted for $\beta_2 y \beta_3$ (the line's values and the sex).

Ethical responsibilities: This study took into account the guidelines of Resolution 8430, which establishes the scientific, technical, and administrative standards for health research, classified in the category of research with

Table 1. Description of the Baseline. Intervention and Control Group.

Variable	Intervention group		Control group	
	<i>n</i>	%	<i>n</i>	%
Sex				
Girls	17	31.3	4	19.0
Boys	33	68.8	17	81.0
	\bar{x}	<i>sd</i>	\bar{x}	<i>sd</i>
Age (years)	5.66	0.75	5.57	0.51
Pre-intervention score	5.02	1.18	5.43	1.21

n, absolute frequency; %, perceptual frequency; \bar{x} , average; *sd*, standard deviation.

minimum risk according to Article 11.²⁰ Moreover, the Declaration of Helsinki.²¹ Also, It was also approved and endorsed by the Committee on Ethics and Environmental Impact of the University of Pamplona as stated in Act 004 of 21 May 2018.

Results

The average age of the children in the study was 5.65 (± 0.08). The 27.54% were female. The characteristics of the baseline in Table 1.

In Table 2, the results obtained after applying the back education knowledge questionnaire, before and after the intervention, are shown in the study and in the control group. In the three categories of the questionnaire: distribution of loads, posture and anatomical knowledge, more correct answers were obtained in the study group than in the control group; after the intervention.

Table 3 refers to the results of the first regression model, where it is observed that the children who received the back care education program generated an increase in the score of 1.71 (CI95% 1.17-2.24).

Discussion

Education for early back care requires basic knowledge of the spine's anatomy, musculoskeletal disorders, and proper postural habits.

On the other hand, good practice in postural habits during the development of daily activities in school children, such as remaining seated during class, lifting objects, the use of backpacks, the use of the computer, watching television, video games, the use of tablets or mobile phones, allow the acquisition of real learning about back care.

In this context, the present study determined the knowledge and practices for back care in a group of

Table 2. Scores Knowledge of Back Care Questionnaire, Before and After the Intervention. Study and Control Group.

	Valuation	Before intervention			After intervention		
		Intervention group	Control group	Total	Intervention Group	Control group	Total
Use of hygienically posture							
Load distribution							
Raise an object	Correct	30	12	42	46	14	60
	Incorrect	20	9	29	4	7	11
Raise the market	Correct	23	7	30	43	7	50
	Incorrect	27	14	41	7	14	21
Raise a briefcase	Correct	39	18	57	49	21	70
	Incorrect	11	3	14	1	0	1
Carry a box	Correct	18	11	29	30	13	43
	Incorrect	32	10	42	20	8	28
Posture							
Talk to someone who is behind	Correct	27	12	39	45	11	56
	Incorrect	23	9	32	5	10	15
Position for sleeping	Correct	21	7	28	35	10	45
	Incorrect	29	14	43	15	11	26
A seated position	Correct	41	20	61	48	21	69
	Incorrect	9	1	10	2	0	2
Anatomy							
Number of curves of the spine	Correct	8	6	14	43	5	48
	Incorrect	42	15	57	7	16	23
Proper posture	Correct	44	20	64	48	20	68
	Incorrect	6	1	7	2	1	3

Table 3. Effect of the Educational Intervention for Back Care in Children. Intervention and Control Group.

	Intervention group \bar{x} (sd)	Control group \bar{x} (sd)	Unadjusted average difference* <i>diff</i> (CI95%)	Difference in averages adjusted by model I <i>diff</i> (CI95%)**
Test score, after the intervention	7.73 (1.03)	5.90 (0.94)	1.82 (1.28-2.36)	1.71 (1.17-2.24)

\bar{x} , average; *sd*, standard deviation; *diff*, difference in averages.

*T-student of independent samples of post-measurement.

**It is equivalent to the coefficient β_1 of the first model (scale of intervention).

children between 5 and 7 years of age, ages which imply a critical developmental period for the early prevention and reduction of the risk of postural alterations or chronic back pain in adulthood.^{22,23} This study's development was considered timely due to the scarcity of publications on this subject in early childhood. Since there is a high vulnerability to the appearance of bad postural habits, due to the beginning of the development of gross, fine motor activities such as the processes of reading and writing that imply the adoption of sedentary postures in the family and school environment, in which it is necessary to correct and modify them promptly.²⁴

Therefore, the results were mostly to evaluate the postural habits of the children, an adaptation of a questionnaire that has been used in previous studies with the same purpose was applied.¹⁷

Scientific literature refers to studies^{10,12,15} that have been carried out to find the most effective type of intervention in the child population to promote good posture habits and prevent back injuries and alterations in infants. These studies were different in terms of the type of intervention, methodological aspects, duration, and frequency; however, they have proven to be effective. Meanwhile, the combination of theory and practice has been the most widely used technique in educational back care teaching for a better understanding of healthy behaviors in school children;^{14,27} which has also been carried out in the present investigation.

It was found that the schoolchildren reported having more excellent knowledge and acceptable practice of body postures and movements regarding back care once the intervention period was completed; results similar to those reported by,²⁶ who found receptivity on the part of

the schoolchildren to knowledge and postural habits related to back care. Although in the control group, strengthening and stretching exercises for the back muscles were developed simultaneously with the educational intervention, this was not sufficient to generate a change in their knowledge and practice of back care.

Other authors such as Minghelli et al²⁸ evaluated the effects of a school of back and postural education on the improvement of ergonomic knowledge in the short and long term of the postures adopted at school and at home, as well as on the reduction of low back pain in adolescents. Their results showed an improvement in ergonomic knowledge of the postures adopted at school and home as an effect of the educational program and a decrease in self-reported low back pain.

Regarding the intervention programs' duration, the present study proposed a 5-week intervention with sessions of 3 days a week (2 hours per session). According to what has been published by other authors, the duration of the reported interventions differs from ours, with interventions of six 60-minute sessions,^{18,29} 6 weeks,³⁰ 9 weeks once a week with a duration of one and a half hours.²⁵ Studies in which the duration of the intervention was 1 week, from 2 to 6 weeks, from 8 to 15 weeks and even 96 weeks^{25,27,31-35} which proves its effectiveness and usefulness in a few weeks but with greater hourly intensity.

This study also highlights the need for back care or a school health program for students^{25,27,31,36} that provides education and guidance to all. Teachers should be taught methods promoting a pain-free life, including correct body postures, the benefits of exercise, and exercises to relax the back part and release tension and toward the future could affect the prevention of alterations and back pain, and consequently, the decrease of absenteeism caused by them.

As limitations, it has been identified that it exceeds the objective of this study to review various factors that determine the adoption and maintenance of positions, as well as changes not only in knowledge but also in the positions of children, which is essential to identify in order to optimize the results derived from the intervention. In essence, this study's results trace potential implications at the educational level on the parameters of the intervention of a preventive and promotional nature in children between 5 and 7 years of age. On a scientific level, this study allowed the hypothesis testing of physiotherapeutic intervention to acquire knowledge for back care in the same sample of children.

Conclusions

The development of an education program generated a change in the questionnaire score on knowledge of back

care in a group of children between 5 and 7 years of age. Suggesting that this type of intervention should be strengthened and implemented within the framework of educational and public health policies, from the professional practice of physiotherapists; that it includes postural education in the school context during early childhood and contribute to the prevention of back disorders and deficiencies.

Author Contributions

MSC: Made a substantial contribution to the concept and design of the work, acquisition, analysis and interpretation of data, drafted the article and revised it critically for important intellectual content; approved the version to be published.

JCA: drafted the article and revised it critically for important intellectual content, approved the version to be published.

L PR: Made a substantial contribution to the concept and design of the work, acquisition, analysis and interpretation of data, drafted the article and revised it critically for important intellectual content; approved the version to be published.

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