











POSTURAL EDUCATION PROGRAM FOR SOCIALLY VULNERABLE ADOLESCENTS PROTECTED BY INSTITUTIONAL CARE: CASE SERIES

PROGRAMA DE EDUCAÇÃO POSTURAL PARA ADOLESCENTES SOCIALMENTE VULNERÁVEIS PROTEGIDOS POR CUIDADOS INSTITUCIONAIS

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Abstract

Introduction: Institutionalized young people may exhibit impaired development due to lack of support, correct guidance regarding their physiological changes, and knowledge about postural changes.

Methods: This is a longitudinal observational case series study. Adolescents residing in shelters who could understand the entire protocol were invited to participate in the study. Ten meetings were held, once a week, with 8 theoretical-practical interventions and 2 pre and post-PEP evaluations. The evaluations were: static posture, dynamic balance, handgrip strength, self-esteem, quality of life, and a theoretical questionnaire on general knowledge.

Results: From 18 adolescents, 11 (7 boys and 4 girls), with an average age of 14.8 (± 1.3) years concluded the study. After the PEP intervention, a significant improvement was found in the knee angles (3.56° vs. 2.28°) and hip (-12.03° vs. -4.18°) in its plane lateral. The scores of the theoretical questionnaire were 4.75 vs. 11.63 and the handgrip strength was 22.91 vs. 28.54 kgf and 21.55 vs. 26.82 kgf for the right and left limbs. In the quality of life and self-esteem questionnaires, no statistically significant differences were obtained.

Conclusion: PEP imparts benefits to socially vulnerable adolescents for postural angles, handgrip strength and theoretical knowledge. Self-esteem and quality of life did not change, probably due to their high vulnerability.

Keywords: Posture. Adolescents. Social vulnerability. Health education.

Resumo

Introdução: Jovens institucionalizados podem apresentar comprometimento do desenvolvimento por falta de apoio, orientação correta quanto às suas alterações fisiológicas e conhecimento sobre alterações posturais.

Métodos: Trata-se de um estudo observacional longitudinal de série de casos. Foram convidados a participar do estudo adolescentes residentes em abrigos que conseguissem compreender todo o protocolo. Foram realizados dez encontros, uma vez por semana, com 8 intervenções teórico-práticas e 2 avaliações pré e pós-PEP. (programa de educação postural). As avaliações foram: postura estática, equilíbrio dinâmico, força de prensão manual, autoestima, qualidade de vida e questionário teórico de conhecimentos gerais.

Resultados: Dos 18 adolescentes, 11 (7 meninos e 4 meninas), com idade média de 14,8 ($\pm 1,3$) anos, concluíram o estudo. Após a intervenção PEP, foi encontrada melhora significativa nos ângulos do joelho ($3,56^\circ$ vs. $2,28^\circ$) e quadril ($-12,03^\circ$ vs. $-4,18^\circ$) no seu plano lateral. As pontuações do questionário teórico foram 4,75 vs. 11,63 e a força de prensão manual foi 22,91 vs. 28,54 kgf e 21,55 vs. 26,82 kgf para os membros direito e esquerdo. Nos questionários de qualidade de vida e autoestima não foram obtidas diferenças estatisticamente significativas.

Conclusão: A PEP traz benefícios aos adolescentes em situação de vulnerabilidade social quanto aos ângulos posturais, força de prensão manual e conhecimento teórico. A autoestima e a qualidade de vida não se alteraram, provavelmente devido à sua elevada vulnerabilidade.

Descritores: Postura. Adolescentes. Vulnerabilidade social. Educação saudável.

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Introduction

During adolescence, young people are constantly evolving and growing, exhibiting changes in both their physical body and their psychological state. Furthermore, at this age, the school and family environments become places of socialization and formation of personal opinions and attitudes and can provide behavioral and psychological changes^{1,2}.

Institutionalized young people may exhibit impaired development due to lack of support, correct guidance regarding their physiological changes, and knowledge about postural changes. The lack of information can negatively influence their postural bearing and consequently their quality of life^{2,3}.

Postural changes may be directly related to behavioral, genetic, and psychosocial factors. The postural educational program “Back School” (Escola de Postura, in Portuguese)⁴ was created in 1969 and introduced in Brazil in 1972, to minimize the effects of these postural changes and their risk factors.

Such theoretical and practical programs follow the principle of teaching the management of one's health and were later adapted in several regions of the world for children and adolescents^{5,6}. Currently, Postural Education Programs (PEP) are recommended for children and adolescents since they spend many hours in the school environment and are a key target for preventing future problems through good postural habits⁷ to become adults with an understanding of their physiological particularities.

Within the contexts of social vulnerability and institutional care, PEP ends up becoming even more interesting, as a way to provide the opportunity for knowledge, correct orientations, and especially self-care for young people.

Diverse Back School configurations have been published^{8,9} and the most currently used for children and adolescents follow the general principle of an educational measure of daily activities and physical and mental quality of life. This model of PEP mainly works to improve the postural pattern by experiencing body practices and exercises, understanding the basic contents of anatomy, and good postural practices to improve posture, the quality of life, and psychological aspects^{8,9}.

In Brazil, PEP has had a positive effect on adolescent athletes¹⁰ and schoolchildren^{11,12}. Thus, the present study aimed to evaluate the effects of the PEP intervention on static posture, body balance, and quality of life of adolescents in situations of social vulnerability and who are assisted by institutional care services.

Methods

This was an analytical interventional and longitudinal study, with pre- and post-intervention evaluations. The study sample comprised adolescents of both sexes, institutionally cared for at two foster homes (one for males and the other for females), in the south of Brazil, who agreed to participate in the PEP intervention. The adolescents were selected in an intentional non-probabilistic manner. The inclusion criteria were institutionalized adolescents living in public female or male shelters, aged between 12 to 18 years old, in the South of Brazil, and with the ability to understand the proposed protocol.

The intervention took place in a private room within spaces provided by the homes themselves and the study was conducted after informed consent from the legal guardians of the adolescents. This study was approved by the Ethics Committee on Human Beings of Santa Catarina State University (CEPSH/UDESC), with the approval number 2.898.517.

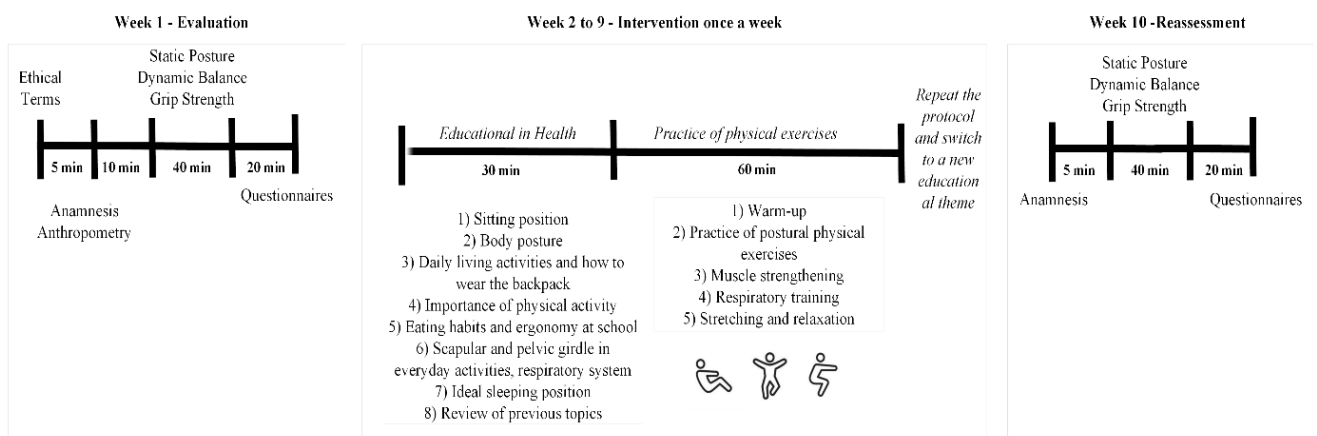
Anthropometric measurements (body mass, height, lower limb length) were performed for sample characterization. Biophotogrammetry was used to evaluate static posture and was performed using the Postural Assessment Software (SAPO v.0.69). The evaluation protocol was followed according to Miranda et. al.¹³ A modified Star Excursion Balance Test was used to obtain the result of the dynamic balance of the patients, the test protocol and data normalization were performed according to the study by Bulow et al.¹⁴ A manual hydraulic dynamometer (Jamar® Dynamometer, Lafayette Instrument, Lafayette, IN, USA), was used to measure the grip strength of the participants. The dynamometry was performed according to the American Society of Hand Therapists¹⁵ recommendations. The participant was instructed to press the device with maximum force, and the best result of three attempts, with a one-minute rest, was calculated.^{16,17}

Five questionnaires were applied, “Back Pain and Body Posture Evaluation Instrument - BackPEI,” for back pain and postural habits. Contains 30 questions, 28 multiple-choice questions for which the participant could choose just one option: the one that best represented their perceived condition. The remaining two questions were related to the intensity of back pain and neck pain using a visual analog pain scale (VAS). “World Health Organization Quality of Life Assessment – WHOQOL” has 26 questions, two of which are general quality of life questions and the others are divided into four domains: physical, psychological, social relationships and environment. “Autoquestionnaire qualité de vie enfant image – AUQEI” is based on the point of view of the child's satisfaction, visualized from 4 figures that are associated with different domains of life, through 26 questions that explore family, social

relationships, activities, health, bodily functions, and separation. The Rosenberg Self-Esteem Scale – ROSENBERG is a unidimensional measurement scale consisting of ten statements related to a set of feelings of self-esteem and self-acceptance that assesses overall self-esteem. Items are answered on a four-point Likert scale ranging from strongly agree, agree, disagree and strongly disagree. All questionnaires were translated and validated in the Portuguese language. Finally, participants filled out a theoretical questionnaire with 11 questions addressing the themes of theoretical classes applied throughout the intervention.

Eight interventions of a 90-minute duration were held weekly. The first 30 minutes were a brief review of the previous lesson followed by the educational agenda of the meeting. In the subsequent 60 minutes the participants were submitted into the exercise session, in a playful way in the order presented in Figure 1 (per meeting). The exercise session was composed of warm-up, the practice of postural physical exercises such as postural awareness work and conscious stimuli for corrections, respiratory training, muscle strengthening, in addition to stretching and relaxation. At the end of each intervention, participants received a card summarizing the week’s lesson, a folder with exercises and reminders of educational content, and a diary where they recorded their daily physical practices for further control of the study. Figure 1 shows the protocol timeline.

Figure 1 - Protocol Timeline

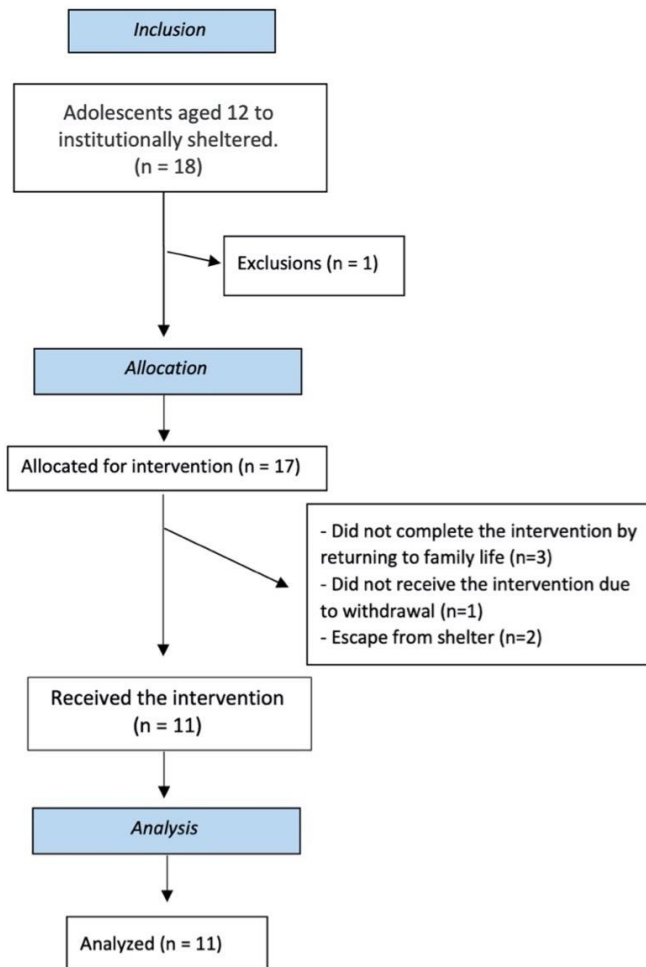


All analyses were performed using SPSS version 20.0 (IBM, Chicago, USA). The data normalization was verified through the Shapiro-Wilke test. For the pre and post-intervention analysis, the Student's *t*-test was used. The level of significance was 5% ($P \leq 0.05$).

Results

Figure 2 shows the flowchart of the study, from the inclusion of participants to the final analysis. Adherence to the PEP was 61.1%.

Figure 2 - Flowchart of the study design, inclusion, allocation and analysis

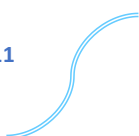


The characterization of the participants is described in Table 1.

Table - 1 Sample Characterization

VARIABLES	FEMALE (n=4)	MALE (n=7)	TOTAL
AGE (years)	14.25	15.14	14.81 ± 1.30
HEIGHT (cm)	1.57	1.64	1.61 ± .08
WEIGHT (kg)	63.67	64.55	64.23 ± .10.76
BMI (kg/m ²)	24	26	25 ± 3.44

Data presented as mean ± SD. Abbreviations: BMI, body mass index.



Static posture

The angular measurements (°) presented in Table 2 show the values obtained in the postural evaluation in the anterior, right and left, and posterior lateral views before and after the PEP intervention, with the calculated mean and standard deviation. On comparing these values before and after the intervention, the hip and knee angles exhibited significant improvement in the lateral view of the right and left lower limbs.

Table 2 - Angular measurements (°) of postural assessment in the anterior, right and left lateral and posterior views before and after the Back School intervention (n=11)

VIEW	ANGLES	PRE-INTERVENTION	POST-INTERVENTION	P - VALUE
ANTERIOR	Horizontal head alignment	2.37 ± 2.18	3.42 ± 2.84	.362
	Horizontal alignment of acromions	-.03 ± 1.58	-.37 ± 1.44	.782
	ASIS horizontal alignment	.77 ± 1.85	1.45 ± 1.31	.791
	Angle between the 2 acromions and 2 ASIS	0.81 ± 2.81	1.83 ± 2.19	.699
	Front angle of the RLL	-1.67 ± 4.06	-.50 ± 4.09	.237
	Front angle of the LLL	-1.03 ± 3.77	1.18 ± 5.55	.182
	Horizontal alignment of the tibial tuberosities	-.10 ± 2.91	.62 ± 3.61	.261
	Right Q angle	12.02 ± 3.96	12.96 ± 8.63	.698
	Left Q angle	10.18 ± 3.96	9.81 ± 6.71	.437
RIGHT LATERAL	Horizontal alignment of the head (C7)	11.06 ± 14.67	10.57 ± 16.92	.917
	Vertical head alignment	49.63 ± 3.35	50.03 ± 4.29	.814
	Vertical trunk alignment	-4.2 ± 2.04	-1.7 ± 2.27	.117
	Vertical body alignment	1.83 ± 1.36	1.48 ± .99	.901
	Horizontal alignment of the pelvis	-12.63 ± 3.63	-13.88 ± 6.29	.934
	Hip angles	-12.03 ± 3.51	-4.18 ± 5.62	.006*
	Knee angle	-3.56 ± 6.88	2.28 ± 5.29	.003*
	Tibial tarsal angle	85.82 ± 4.42	85.22 ± 2.23	.249
LEFT LATERAL	Horizontal alignment of the head (C7)	17.68 ± 11.57	15.31 ± 15.89	1.000
	Vertical head alignment	52.17 ± 4.67	51.13 ± 4.67	.119
	Vertical trunk alignment	-4.08 ± 3.63	-2.93 ± 2.71	.244
	Vertical body alignment	1.51 ± 1.67	1.07 ± 2.22	.295
	Horizontal alignment of the pelvis	-13 ± 2.35	-13.02 ± 11.45	.662
	Hip angles	-10.58 ± 5.27	-8.01 ± 4.59	.039*
	Knee angle	-2.53 ± 4.16	-.66 ± 3.61	.026*
	Tibial tarsal angle	86.01 ± 2.66	85.58 ± 2.42	.296
POSTERIOR	Hindfoot leg angle R	7.20 ± 6.72	7.66 ± 4.93	.623
	Hindfoot leg angle L	7.67 ± 6.00	7.58 ± 5.80	.897
	Angle of PSIS	.97 ± 1.49	1.41 ± 1.51	.569

Values displayed by averages ± standard deviations. ASIS anterior superior iliac spine, RLL: right lower limb, LLL: left lower limb, C7: seventh cervical vertebra, R: right, L: left, PSIS: posterior superior iliac spines. *: (p≤0.05).

Dynamic balance and grip strength

Table 3 shows the results of the dynamic balance and maximum strength test. The maximum strength of the participants increased significantly in the right and left hands after the PEP.

Table 3 - Dynamic balance and grip strength of the adolescents participating in the study (n=11)

VARIABLES	PRE-INTERVENTION	POST-INTERVENTION	P-VALUE
ANT R	71.09 ± 11.64	69.36 ± 12.86	.532
ANT L	71.00 ± 14.12	70.73 ± 14.77	.923
POST MED R	76.64 ± 11.95	80.09 ± 16.55	.470
POST MED L	74.36 ± 16.31	81.09 ± 12.98	.260
POST LAT R	75.36 ± 15.35	75.82 ± 10.92	.940
POST LAT L	76.55 ± 14.89	77.09 ± 15.19	.931
POST CRUZ D	88.07 ± 11.03	88.69 ± 8.93	.881
POST CRUZ L	93.28 ± 14.89	89.82 ± 9.94	.470
MAXR STRENGTH	22.91 ± 9.69	28.54 ± 11.26	.030*
MAXL STRENGTH	21.55 ± 8.22	26.82 ± 9.82	.011*

Values displayed by averages ± standard deviations. ANT, anterior; POST MED, medial posterior; POST LAT, lateral posterior; POST CRUZ, backcrossed; R, right lower limb; L, left lower limb. MAXR STRENGTH: maximum strength of the right upper limb; MAXL STRENGTH: maximum strength of the left upper limb. *: (p<0.05).

Questionnaires

Five questionnaires were applied, and the scores of the assessed questionnaires are presented in Table 4.

Table 4 - Quality of life, self-esteem back pain, and theoretical knowledge questionnaires

QUESTIONNAIRE	PRE-INTERVENTION	POST-INTERVENTION	P-VALUE
AUQEI	69.63 ± 10.99	62.50 ± 11.86	.203
BACKPEI	50.13 ± 9.43	46.38 ± 8.46	.169
WHOQOL	85.00 ± 10.78	71.88 ± 6.66	.173
THEORETICAL	4.75 ± 6.76	11.63 ± 1.40	.020*
ROSENBERG	22.88 ± 4.76	25.88 ± 2.29	.074

Values presented as means ± standard deviations (SD). AUQEI: 'Autoquestionnaire qualité de vie enfant image'; BACKPEI: 'Back Pain and Body Posture Evaluation Instrument; WHOQOL: 'The World Health Organization Quality of Life assessment; THEORETICAL: theoretical questionnaire developed by the researchers; ROSENBERG: Rosenberg Self-Esteem Scale. *: (p<0.05).

Discussion

Exposure to violence, precarious or lack of family support, low income, low educational level of guardians, and poor housing conditions¹⁰ are some of the examples that characterize the vulnerability of the population studied. Dropouts during the program may be related to these factors.

In addition to providing exercises and guidance to the health professional, a postural evaluation allows the early detection of possible changes and the adoption of preventive strategies in treatment.¹¹ The pre and post-intervention postural evaluation of the PEP revealed a significant difference in the knee and hip angles in the lateral view of the participants, reflecting positively on the overall posture of these adolescents. The analysis of the knee flexion angle, which is the angle between the femur and the tibia, allows the identification of flexion or hyperextension.¹⁷ Before the intervention, 72% of the total sample analyzed presented hyperextension of the knees. Post-intervention, improvement was observed in the alignment of the knees as the number of participants with hyperextension of the knees decreased to 27%, bringing these adolescents closer to normal extension¹⁷, thus avoiding joint overload and preventing injuries. The hip angle analyzes the angulation obtained between the trunk and thigh, evaluating possible retroversion or anteversion in the adolescents studied¹⁰. A general increase in hip angulation of the post PEP participants was observed. The vast majority of participants presented a negative angle, an anteverted hip pre-intervention, and the increase in this angle post-intervention, therefore helps provide pelvic symmetry to these adolescents. It is important to emphasize that pelvic symmetry is essential for adequate global postural alignment, resulting in a good positioning of the abdomen, trunk, and lower limbs.¹⁸ In the theoretical questionnaire addressing the topics of the theoretical classes given throughout the intervention, a significant increase in the final score for each parameter was found, after participation in the 10 meetings of the intervention. According to studies with children and adolescents of the same age and social situation^{12,19} this age group does not have access to information about the functioning of their body, its structures, and postural habits. These increased post-intervention figures show that participation in PEP can provide this attention to self-care and interaction with health through theoretical knowledge about anatomy, physiology, body posture, and activities of daily living.⁴

The measurement of grip strength assesses the integrity of the upper limbs and is also used as a general health indicator and its increase post-intervention can be held as an improvement in upper limbs functionality and health of the individuals analyzed.²⁰ At the age

group assessed, the reference value for females²¹ is similar to the results of the present study. However, on comparing our results with the reference value for males, grip strength was decreased. Despite the possible differences in grip strength between females and males, due to the reduced sample size, the results of the present study did not conform with the standard values for each gender.

Furthermore, no statistically significant effects were found regarding self-esteem, quality of life, and dynamic balance after the PEP intervention. It is noteworthy that improvements in self-esteem and quality of life, even if minimal in the public in our study, can already be considered positive, as mentioned above, they are people who go through very complicated biopsychosocial processes. However, in a protocol aimed at another population¹⁷ the effects were significant for these same variables. Nevertheless, the application of the PEP intervention in a larger sample may reveal benefits in these outcomes⁴.

We consider the sample size as limitations in our study, since access to our study population is extremely limited and difficult due to the environment in which they are inserted. It is also possible that the vulnerability presented by the study population influenced the results. Therefore, an intervention with psychological support and with more application time could provide better results for the group.

Conclusion

The results of the intervention of this Postural Education Program, in general, were positive in relation to certain postural angles, theoretical knowledge, and upper limb strength of the cohort of children and adolescents protected by institutional home care. The intervention time, the lack of psychological support, the number of participants and the study population may have interfered with the self-esteem and quality of life results. Therefore, we conclude that the PEP imparts benefits to participants, and can help prevent postural changes in adolescents with social vulnerability.

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