

An Evaluative Study to Determine the Effectiveness of Ergonomic Health Promotion Programme (EHPP) on Postural Health among School Children in Selected Schools of Chennai (TN)

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Abstract

Musculoskeletal pain among school aged children is a well-known concern as acknowledged by WHO. Many children are not involved in regular physical activities, and spend more time on screen without maintaining normal posture. Assessment of posture and creating awareness among children is very important to reduce the disorders musculoskeletal symptoms. The present study aimed to evaluate the effect of ergonomic health promotion programme (EHPP) on postural health among school children in selected schools of Chennai (TN). A quasi-experimental design was used, and samples for the study were selected using total enumeration and consecutive sampling technique. The tools used in this study were background variables of school children and their parents, Standardised Nordic Body Map Questionnaire (SNBMQ), self-structured questionnaire, ergonomic awareness test questionnaire. The data was analysed using descriptive statistics (frequency and percentage) and inferential statistics (paired and unpaired 't' test, correlation and association). The study has given some suggestions and educational implications on postural health of students studying in elementary schools. Majority of the school children (65%) had musculoskeletal problems. Majority of children followed acceptable posture, were relieved from musculoskeletal symptoms, 65 percent had adequate knowledge, 35 percent had moderately adequate knowledge on ergonomics in experimental group of school children. The study revealed that EHPP benefits in not only reducing the musculoskeletal symptoms, but also increases the exercise frequency, academic performance, and improves knowledge of lessening the musculoskeletal symptoms among school children.

Key words: Postural health, Health promotion programme, School children

Children are vital to the nation's present and its future. Children today spend more time on screen and carry heavy school bags. As they are the future generation of the nation, creating awareness about maintaining a good posture in daily activities is essential. Research indicates that low back discomfort in teenagers may be a major risk factor for back pain in later life. One of the main strategies for lowering lower back discomfort is ergonomic seating and adopting appropriate posture when performing tasks. The variation of anthropometric measures of children, the performance of daily activities exposing children in various postures, and the physical design features of school furniture are the three factors which influence the postural health of school children. Low back pain in school children can predict low back pain in later years of life (Paranjape & Ingole, 2018). Musculoskeletal pain among school-aged children is a well-known

concern as acknowledged by WHO. Between 16 and 86 percent of school children in wealthy nations report having musculoskeletal complaints at some point in their lives; in poor nations, the incidence is higher, ranging from 46.3 to 88.8 percent. Ergonomic Health Promotion Programme (EHPP) was planned to assess the musculoskeletal symptoms, and creating knowledge on ergonomics and given practice on stretching exercise which will reduce their musculoskeletal symptoms and maintain correct posture.

Objectives

The study was set with following objectives:

1. To assess the postural health, estimate the prevalence of musculoskeletal symptoms and assess the level of knowledge on postural health among school children,
2. To determine the effectiveness of Ergonomic Health Promotion Program among school children, and
3. To determine the association between selected background variables and postural health.

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Research Hypotheses

H1: There will be a significant difference in postural health (postural practice & musculoskeletal symptoms) before and after EHPP between control and experimental group of school children.

H2: There will be a significant difference in knowledge, postural health before and after EHPP between control & experimental group of school children.

H3: There will be a significant association between selected demographic variables and postural health among control and experimental group of school children.

Review of Literature

A cross-sectional study was conducted by Resende et al (2023) to assess the prevalence of postural changes among school children and adolescents. Hundred & Nine school children of both sexes with mean age of 13 years were evaluated in public school in the city of Brazil. The New York scale was used for posture analysis, measuring body weight, height, backpack weight, and body mass index (BMI). The ANOVA statistical test and Pearson's correlation test were used, considering a significance level of 0.05. The result showed that general average of the scores of postural problems was 68.7 points, with a predominance in the head, spine, hips, trunk, and abdomen.

Menor-Rodríguez et al (2022) conducted a study to evaluate the influence of educational intervention to modify postural hygiene habits of school-age children. Using stratified multistage selection, they chose three public primary schools at random from the Galician provinces of Orense and Pontevedra. A sample of 479 pupils was acquired, which amounts to 2 percent of all 6- to 12-year-old children registered in those provinces for the 2015–2016 school year. After the intervention, there was improvement in the postural hygiene of the students. There were statistically significant differences in the amount of time they spent watching television (0.531 hours per day), how they carried their school supplies and books (using wheeled backpacks, increased from 58.5% to 64.1%), and how they improved their postural hygiene when watching television (more people chose to watch on a chair than to lie down). It was found that the harmful behaviours were improved and corrected by educational intervention, also the intervention had role in developing good postural hygiene practices at a young age.

Similarly, García-Soidan et al (2020) reported that although sedentary girls have greater balance than active boys, active children have better

postural control than sedentary children. Thus, exercise training appears to support a more effective development of postural control.

Materials and Methods

This study was conducted using quasi-experimental design after obtaining ethical clearance from the Institutional Ethics Committee of Apollo College of Nursing, Chennai. Formal consent was obtained from the children of selected schools and their parents. The study was carried out in two phases. The prevalence of the musculoskeletal problems among school children was assessed in phase I and the effectiveness of the EHPP on postural health was assessed in phase II. The sample size estimation was calculated by open epi for Phase I, based on the study conducted by Resende et al (2023). The calculated sample size was 174. Hence 300 samples were selected for this study considering 10 percent attrition and better generalisation. In Phase II, based on the study of Syazwan et al (2011), RULA score was used with mean as = 4.94, SD= 0.64 power (1-beta) %, 95 Alpha error (%) 80. mean = 4.94, SD= 0.64, power (1-beta) - 80%, Alpha error 95%. The required minimum sample size was 71. Therefore, considering an attrition rate of 10 percent, a total sample size of 80 were selected in each group. A pilot study was conducted among 10 percent of the calculated sample size to establish the feasibility. An extensive review of literature laid foundation for the selection and development of tools. The content validity was obtained from the field experts and the reliability was established by test retest and Cronbach's alpha method. The study was conducted at four selected schools in Chennai viz. (1) Sri Vidhya Nikethan Matriculation School, Ambattur, (2) UCCK Matriculation Higher Secondary School, Athipattu, (3) TI School, Ambattur, and (4) Sethu Baskara Matriculation Higher Secondary School, Ambattur. Among these first two schools were chosen for pilot study and remaining two schools were chosen for main study. After obtaining initial introduction, the main study was conducted in 2 phases in two selected schools (one for experimental and one for control group). Data collection period was 45 days.

In phase I, total enumeration sampling technique was used for screening musculoskeletal symptoms among 300 students (150 students in each experimental and control group) studying in classes IV (n=50), class V (n=50) and class VI (n=50), standard using standardised Nordic Body Map Questionnaire: there were 50 students in each standard to maintain homogeneity. After initial introduction, the main study was conducted in 2

phases in two selected schools (1 for experimental and 1 for control group).

In phase I, screening for musculoskeletal symptoms was done among 300 students (150 students in each experimental and control group) studying in IV, V and VI standard using standardised Nordic Body Map Questionnaire. In Phase II, a sample of 160 children with mild to moderate musculoskeletal symptoms were included, they were selected from two different schools by consecutive sampling technique and were allotted to experimental group and control group (80 in each group).

The Intervention

The background variables of children were collected by interview method. Pre-test knowledge on ergonomic risk factors and assessment on postural practice was done by structured questionnaire in both the control and experimental groups before EHPP. The EHPP was given to the experimental group of children by teaching through power point presentation and demonstrating stretching exercise by sitting in the chair. In the recess, they were involved in such activities as Shoulder Rotation, Lifting the arms, Rolling the hands, Turning side to side, Stretching the arms & fingers, Stretching the hands, Triceps muscles stretching, Waving the hands (each exercise requiring 10–16 repetitions for 30 minutes). The correct way of carrying school bags was taught using posters and pamphlets. The school children were made to practice stretching exercises daily during physical education period for 21 days; after 21 days of intervention, post-test knowledge, postural practice and musculoskeletal

symptoms were reassessed by using structured knowledge questionnaire and standardised Nordic Body Map Questionnaire (SNBMQ). Level of satisfaction regarding EHPP was assessed in the experimental group of children.

Results & Discussion (Tables 1-5)

There was a significant difference in pain score was higher than control group. Hence the hypothesis H1 “there will be significant difference in postural health (musculoskeletal symptoms) before and after EHPP between control and experimental group of school children” was retained.

Table 1: Frequency & percentage distribution of prevalence of musculoskeletal symptoms among control & experimental Group of school children (N = 300)

Group	N	f	Prevalence (%)
Control group	150	102	68
Experimental group	150	94	63
Overall	300	196	65

There was a significant difference in post-test knowledge score. Hence the research hypothesis H2 stating that “there will be significant difference in pre-test and post-test knowledge on postural health between control and experimental group of school children” was accepted.

Hence the research hypothesis H3, i.e. “there will be a significant association between selected demographic variable and postural health among control group” was accepted with respect to class of study, bag weight and postural health in post-test.

Table 2: Frequency and percentage distribution of level of postural health (practice & pain) in control & experimental group of school children (N = 160)

Level of postural health (Practice & Pain)	Score	Control group (n = 80)				Experimental group (n = 80)			
		Pre-test		Post-test		Pre-test		Post-test	
		f	%	f	%	f	%	f	%
Practice (Max score-10)									
Acceptable posture	8-10	9	10	0	0	10	13	57	71
Changes may be needed	5-7	49	50	80	100	51	64	23	29
Changes needed soon	1-4	22	20	0	0	19	23	0	0
Pain (Max score -108)									
No pain	< 28	0	0	37	46	0	0	62	77
Mild pain	28-54	64	70	33	41	75	94	18	23
Moderate pain	55-81	16	30	10	13	5	6	0	0
Severe pain	82 - 108	0	0	0	0	0	0	0	0

Table 3: Comparison of mean & standard deviation of postural health (Practice & Pain) between pre & post-test among control & experimental group of school children (N = 160)

Postural health	Assessment	Control group (n = 80)		Experimental group (n = 80)		Independent 't' value & 'p' value
		Mean	SD	Mean	SD	
Practice (Max -10)	Pre-test	5.5	1.45	5.5	1.45	t=0.00 p>0.05 (NS)
	Post-test	5.9	0.69	8.3	1.19	t =15.7 p<0.05
	Paired 't' & p value	2.4 p <0 .01		12.7 p < 0.01		-
Pain (Max - 108)	Pre-test	41.8	10.1	38	8.4	t =1.96 p<0.01
	Post-test	33.5	9.7	28	2.94	t = 4.84 p<0.01
	Paired 't' & p value	5.3 p<0.01		10.4 p<0.01		-

Table 4: Comparison of mean & standard deviation of knowledge scores on ergonomics pre-test & post-test between control & experimental group of school children (N = 160)

Assessment (Global score - 18)	Control Group (n = 80)		Experimental (n= 80)		Ind 't' value & 'p' value
	Mean & mean%	SD	Mean & mean %	SD	
Pre-test	7.71 & 42%	2.01	7.86 & 44%	2.13	t = 0.47 P>0.05 (NS)
Post-test	10.06 & 56%	0.99	13.5 & 75%	3.0	t = 9.75 p< 0.001(S)

Table 5: Association of post-test level of postural health (practice & pain) among experimental group of school children with their selected demographic variables (n=80)

Variables	Practice			Pain		
	Upto mean	Above mean	χ^2 and p value	Up to mean	Above mean	χ^2 and p value
Gender						
Male	29	11	1.14 p- 0.28 (NS)	32	8	0.34, p-0.55 (NS)
Female	33	7		34	6	
Class						
4 th – 5 th	19	21	2.4 p- 0.11 (NS)	30	10	3.11 p-0.05 (S)
6 th	26	14		36	4	
Bag weight						
Up to 5 kg	16	24	8.5 p-0.01 (S)	31	9	3.5 p-0.05 (S)
Above 5 kg	29	11		37	3	

Conclusion

The study revealed that Ergonomic Health Promotion programme supports positive benefits in reducing musculoskeletal symptoms. It also increases the exercise frequency and helps lead a healthy life and improve academic performance among school children.

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