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Evaluation of a program to reduce back pain in nursing personnel*

Avaliação de programa para reduzir dores nas costas em trabalhadores de enfermagem

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Keywords
Back pain, therapy.# Occupational health program.# Exercise.# Nurses aides.# Program evaluation. Ergonomics (environmental health). Occupational diseases, prevention and control.

Abstract

Objective
To evaluate the effectiveness of a program designed to reduce back pain in nursing aides.
Methods
Female nursing aides from a university hospital who had suffered episodes of back pain for at least six months were included in the study. Participants were randomly divided into a control group and an intervention group. The intervention program involved a set of exercises and an educational component stressing the ergonomic aspect, administered twice a week during working hours for four months. All subjects answered a structured questionnaire and the intensity of pain was assessed before and after the program using a visual analogue scale (VAS). Student's t-test or the Wilcoxon Rank Sum Test for independent samples, and Chi-square test or the Exact Fisher test for categorical analysis, were used. The McNemar test and the Wilcoxon matched pairs test were used to compare the periods before and after the program.
Results
There was a statistically significant decrease in the frequency of cervical pain in the last two months and in the last seven days in the intervention group. There was also a reduction in cervical pain intensity in the two periods (2 months, 7 days) and lumbar pain intensity in the last 7 days.
Conclusions
The results suggest that a program of regular exercise with an emphasis on ergonomics can reduce musculoskeletal symptoms in nursing personnel.

Descritores
Dor nas costas, terapia.# Programa de saúde ocupacional.# Exercício.# Auxiliares de enfermagem.# Avaliação de programas. Ergonomia (saúde ambiental). Doenças ocupacionais, prevenção e controle.

Resumo

Objetivo
Avaliar o efeito de um programa na redução de dores nas costas em auxiliares de enfermagem.
Métodos
Participaram do estudo auxiliares de enfermagem com menos de 50 anos de idade, do sexo feminino, de um hospital universitário e que apresentavam dores nas costas por um período mínimo de 6 meses. O programa envolveu parte educativa, com abordagem ergonômica, e a realização de exercícios executados durante o horário

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de trabalho, duas vezes por semana, em um período de quatro meses. As participantes foram divididas aleatoriamente em grupo tratado e grupo controle. A intensidade das dores foi avaliada pela escala visual analógica. Foram utilizados os testes t de Student ou de Wilcoxon, para amostras independentes e os testes Qui-quadrado ou Exato de Fisher, para as categóricas. Para comparar as proporções do início e final do programa utilizou-se o teste de McNemar.

Resultados

Ocorreu diminuição estatisticamente significativa na freqüência de dor cervical durante os últimos dois meses e durante a ultima semana no grupo tratado. Houve também redução na intensidade da dor cervical em ambos os períodos (2 meses; 7 dias) e da dor lombar na última semana.

Conclusões

O estudo sugere que programa regular de exercícios, acompanhado por abordagem instrucional ergonômica, pode reduzir sintomas músculo-esqueléticos em trabalhadores de enfermagem.

INTRODUCTION

Musculoskeletal disorders are an important public health problem. Among them are back conditions, a complex problem for certain occupational groups, such as nursing personnel.[10] Historically, back pain has been a major complaint, and nursing professionals are one at the highest risk.[3]

Risk factors for back pain can be either of individual origin or related to the workplace. The main occupational risk factors are: lifting and handling of patients, uncomfortable and immobile postures, inadequate equipment, improper workplace design, heavy physical work, and inadequate work organization.[2,12] Other studies include factors such as physical activity, muscular weakness, smoking, obesity and psychological factors.[6] Back pain most often has a multifactorial origin. Therefore, strategies to reduce musculoskeletal disorders have included an ergonomic approach, which attempts to integrate equipment, tasks, personnel, and the work environment. The most common strategies include education, training in patient transfer and handling techniques, use of mechanical devices, stretching and exercise programs, learning relaxation techniques, better work conditions, and changes in work organization and life style.

Given that, it was established a specific exercise program with an educational ergonomic approach for nursing personnel at a university hospital. The purpose of the study was evaluated whether this program reduced the frequency and intensity of back pain in female nursing aides.

METHODS

Subjects and setting*

The study was conducted in a 412-bed public teaching hospital. Volunteers were selected and did not represent a probabilistic sample of each hospital unit.

Enrolled personnel were first evaluated to assure they were qualified to participate in the program.

The study participants were female nursing aides who had back pain for at least six months. The reference population consisted of nursing aides who had one year of nursing education. The sample population included all nursing aides working at the hospital's supply service division, intensive care unit and inpatients and outpatients clinical, surgical and emergency facilities (except for obstetrics and gynecology care). Their main activities were patient care, transportation, bedside drug administration, and handling of medical instruments. Inclusion criteria were: age less than 50 years; shift-work in the selected areas; self-reporting of back pain; and interest in volunteering for the study. Exclusion criteria were either severe spinal disorder with medical restriction to exercising or history of spinal surgery. A public call for enlisting in the study was made and the list was closed once the calculated sample size was reached. The sample population was 670 nursing aides. All participants signed informed consent forms, and they were randomly divided into control group (n=29) and intervention group (n=27). The control group received only a 45-minute class during working time on subjects such as anatomy of the spine and patient transfer technique.

Educational program

The educational approach was based on previous studies and research in ergonomics.[1-3,14] The educational sessions were planned after assessing the hospital's workplace and the nursing personnel's specifics tasks. The program's educational component for the intervention group consisted of six modules, of an

*The study was approved by Ethics Committee and hospital personnel were informed notified about it.

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hour each, twice a week for four months. Two of the study's authors were in charge of giving a fifteen-minute slide presentation, followed by a set if exercises and relaxation. The program content was:

General advice

Recommendations about back conditions were given, the importance of regular exercise, pain relieve measures, and the effects of sports on the musculoskeletal system were stressed.

Specific ergonomic orientation

Photographs were used to orient nursing personnel about their workplace: work surface height, workspace, and height of reach.[8] The purpose was to offer elevant information regarding the anatomy of the spine; Body mechanics; Situations that may cause back pain. Photographs were taken of the nursing personnel at work, while they were performing their main tasks at their units. Then ergonomic findings were associated with musculoskeletal disorders. Complicated situations were presented to them to develop a critical sense about the effect of the workplace environment on their health. The presentation was divided in two sections: main general factors causing musculoskeletal disorders; and ergonomic risk factors specifically related to hospital equipment and environment.

Patient handling

First, the patient's condition was evaluated, then the equipment, the environment, and nursing personnel were prepared and then the task of moving and transferring the patient was performed.

Exercise program

Randomized treatment allocation was done in an attempt to reduce unbalanced risk factors between the work settings. During the study, the treatment group underwent a 45 minute exercise program, twice a week, including strength and flexibility exercises, conducted during working hours for four months. It also included a set of exercises to be performed after working hours. Two authors were in charge of teaching sessions, which were offered at the beginning of the program at the university's community health center that provides comprehensive care to the university's employees, academic staff, and students.

Data collection

A questionnaire was prepared and assessed in a pilot survey.[3,13] Pain intensity was assessed through self-reporting of symptoms, and visual analogue scale (VAS). The questionnaire was completed before and after completing the program. Back pain frequency and intensity was checked at two distinct retrospective periods (the last two months and the last seven days) and in different regions of the spine: neck (cervical), upper back (thoracic), and lower back (lumbar).

Statistical analysis

The Epi Info program was used in the descriptive analysis to characterize the groups. Student's t-test or the Wilcoxon Rank Sum Test for independent samples were used to compare the variables between groups of independent samples. Chi-square test or exact Fisher test was applied for categorical analyses. The McNemar test and Wilcoxon matched pairs test were used to compare data before and after the program.

RESULTS

One of the participants in the intervention group dropped out due to an unexpected surgery. The study ended with 26 individuals in the intervention group and 29 in the control group.

Both groups were homogeneous for the three variables shown in Table 1 ($p>0.05$). There was no difference in the proportion of married personnel between the groups ($p = 0.11$; Chi-square test).

Table 2 exhibits the difference in cervical and lumbar back pain.

Before starting the program, back pain frequency in different regions of the spine in the last two months and the last seven days was assessed in both groups.

Cervical and lumbar complaints were more common than thoracic ones. Alexandre et al[3] (1996) studied a hospital nursing team and observed that these indi-

Table 1 - Age, number of children and years of employment in nursing (months) in the control (N=29) and treated (N=27) groups.

Variables	Treated group (n=27)				Control group (n=29)					
	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.	Test	p-value
Age (years)	36.9	8.0	22	50	37.5	6.1	25	49	t	0.74
Children number	1.6	1.3	0	4	1.7	1.3	0	5	w	0.70
Years of employment (months)	119.8	81.0	6	312	144.2	86.9	5	300	t	0.28

t = Student's t-test
W = Wilcoxon Rank Sum test for independent samples

Table 2 - Back pain in the control and treated groups in different regions of the spine before and after the program.

Period	Back pain	Group	N Before	N After	p-value*
Last 2 months					
	Cervical	Control	15	16	1.000
		Treated	15	7	0.008
	Thoracic	Control	4	3	1.000
		Treated	4	1	0.500
	Lumbar	Control	19	14	0.180
		Treated	14	10	0.290
Last 7 days					
	Cervical	Control	11	13	0.730
		Treated	11	2	0.004
	Thoracic	Control	2	3	1.000
		Treated	3	0	0.500
	Lumbar	Control	8	12	0.340
		Treated	8	2	0.070

*McNemar's Test
Control group: started with n=29 and ended with n=29
Treated group: started with n=27 and ended with n=26

viduals suffered mainly from lower back and cervical pain, as well as from diffuse back pain. This fact is particularly relevant since most studies focus only on lower back pain.

Back pain complaints was similar in both groups prior to the program, but after its completion, there was a significant difference in relation to cervical pain in the last two months and in the last seven days, and lumbar pain in the last seven days.

The frequency of back pain in the intervention group was reduced in all regions of the spine, but there were no changes in the control group either in the last two months or in the last seven days. There was a statistically significant reduction in the frequency of cervical pain in the last two months and in the last seven days in the intervention group.

Before the program, control and intervention groups referrred similar pain intensities as assessed using the Wilcoxon Rank Sum Test for independent samples. However, at the end of the program, there was a significant difference in cervical pain for both periods. Lumbar pain in the last seven days showed a p-value of 7%, which could be attributed to the significance value in the 93% confidence interval.

Figures 1 and 2 show that nursing aides in the intervention group had a significant reduction in pain intensity in the cervical and lumbar spine regions at the end of the program.

Table 3 presents indicators of the severity of back pain referred, associated with other aspects involving the participants' working life during the study.

DISCUSSION

This study established an education program with

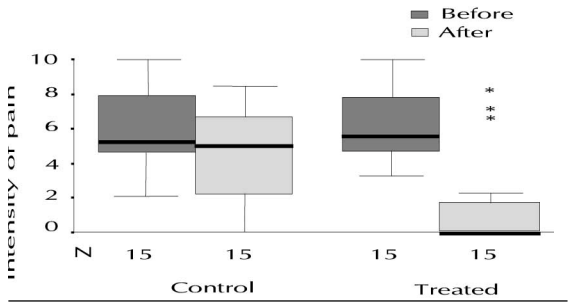

Figure 1/a – Intensity of cervical pain during the last two months before and at the end of the program.

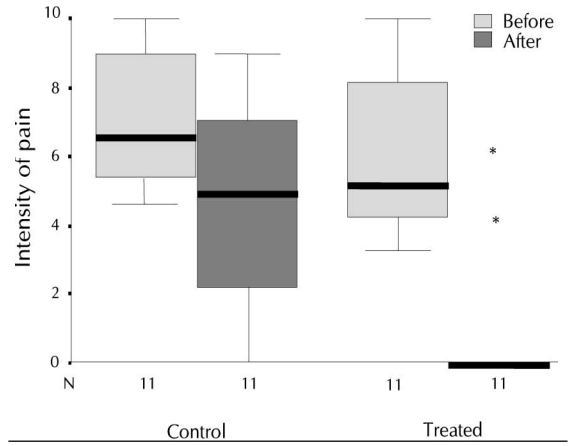

Figure 1/b – Intensity of cervical pain during last seven days before and at the end of the program.

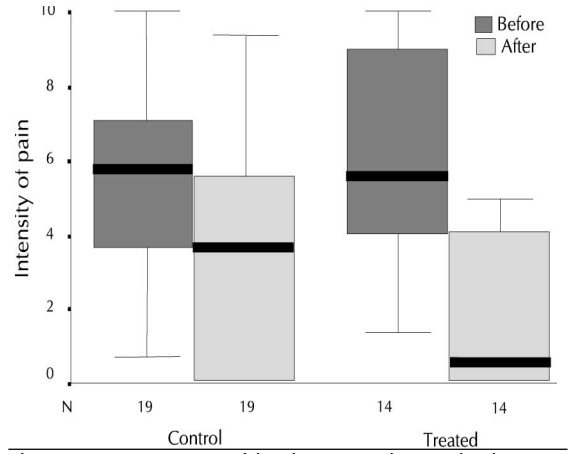

Figure 2/a – Intensity of lumbar pain during the last two months before and the end of the program.

an ergonomic approach and specific exercises for nursing aides within the hospital setting. This group was chosen due to their irregular working schedule and to the fact that most aides have a second job to increase their income given their low salaries in the hospital. Their low socioeconomic status prevent them to participate in activities such as sports and leisure time. The program was well accepted by nursing aides and had excellent support from the hospital management. From now on it will be offered in the gymnasium of the university's community health

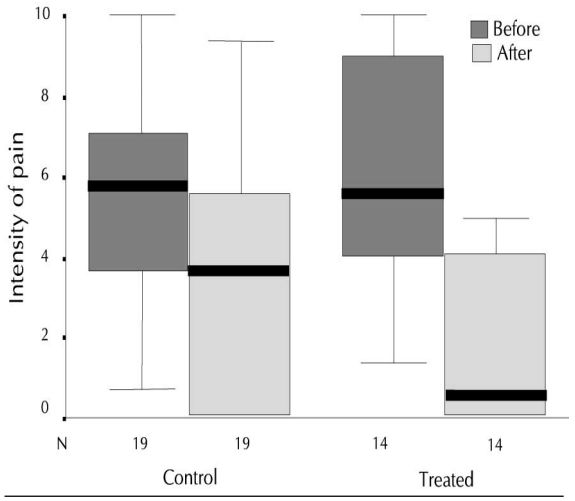

Figure 2/b – Intensity of lumbar pain during the last seven days before and the end of the program.

Table 3 - Frequency of positive answers in the treated and control groups during the last two months, before and after the program.

Back pain	Group	N		p-value*
		Before	After	
Take medication				
	Control	15	14	1.0000
	Treated	19	5	0.0002
Reduction in work activities				
	Control	11	3	0.0200
	Treated	8	2	0.0700
Reduction in the home and/or leisure activities				
	Control	19	11	0.0800
	Treated	24	4	0.0000
Visit to a physician				
	Control	12	4	0.0200
	Treated	8	2	0.0300
Work loss				
	Control	5	2	0.3800
	Treated	5	1	0.1300
Work back injuries				
	Control	0	1	1.0000
	Treated	-	-	-

*McNemar's Test

center. Back pain complaints decreased significantly, and the subjects reported a feeling of well being during the program.

The main limitations of the study were the difficulties found with a non-probabilistic sample due to volunteering, and the need to work sometimes with test power below 80% (60-75%). The inclusion criteria did not provide a balanced distribution for the three subsets of cervical, thoracic and lumbar pain. Therefore lumbar back pain could not reach a significant 5% alpha error threshold for retrospective report for the both the period of the last seven days and the last two months. Despite that, the point estimate for lumbar pain at the last treatment day is significant, and it is possible to have a better understading of the non-parametric retrospective difference between the groups when evaluating the box-plots.

The sparcity of clinical trial studies on back pain among nursing professionals in Brazil impaired the comparability aspects, due to lack of validated methods in Portuguese for standardizing diagnosis and classification of spinal disorders and back pain. Another difficulty was the practice of controversial prevention methods described in the literature. Back pain is, by definition, symptomatic and definite diagnoses are rarely possible. Pain assessment is complex and may be possible through measures of its severity, frequency and disability caused. This study tried to overcome these limitations by estimating severity using the VAS.

Gates[7] (1988) stated that muscular disability is one of the main causes of back pain among nursing personnel. Physical activity and exercise are known to have beneficial effects on the musculoskeletal system.Training in patient lifting procedures and education in body mechanics were initially proposed to avoid back pain in nursing personnel. Stubbs et al[16] (1983) emphasized that training alone would not solve the problem since the training effectiveness cannot be assessed without knowing the environment and individual's concerns.

Few studies have dealt with programs consisting only of exercises designed to reduce back pain. Gundewall et al[9] (1993) reported a decrease in lower back pain complaints and pain intensity in a group of nurses after implementing an exercise program during working hours. Skargren & Oberg[15] (1996) suggested that a moderate weekly exercise program directed to nursing personnel can modify the physical capacity and reduce musculoskeletal symptoms in non-regular exercisers, and probably in subjects over 40 years of age.

The current tendency is to combine different approaches in a single program since various inter-related factors may cause spinal lesions. Thus, recent studies have evaluated programs that simultaneously use different strategies, such as training in lifting and handling patients, with work alteration, life style orientation, organizational changes at the workplace, use of mechanical devices, exercises and relaxation.[5,18]

The prevalence of back pain among nursing professionals stresses the need for further studies to better understand the problem and provide effective approaches for dealing with this condition.

Programs based on ergonomics and postural aspects for patient's lifting and handling can prevent back impairment and improve patient management skills.[11,17] Such training has become requisite in health institutions in countries with occupational health concerns.

In Brazil, schools and health institutions are not particularly concerned about training nursing personnel in moving and transferring patients and there is no specific legislation relating nursing personnel education.

The present study indicates that there is a need of an educational program with emphasis on ergonomics for health workers. Its results should also encourage more research on the evaluation of specific training projects to reduce back pain among nursing personnel.

Researchers and organizations worldwide are looking for solutions regarding musculoskeletal disorders seen in nursing personnel. In Brazil, this is a particularly important problem and active measures are needed.[3,4]

As a conclusion, this study indicated that the frequency and intensity of back pain among nursing aides, mainly in the cervical ($p<0.05$), and lumbar regions ($p=0.07$) decreased more significantly in the intervention group. This suggests that a program of exercises conducted twice a week with an ergonomic approach could reduce musculoskeletal symptoms in nursing personnel.

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