ISSN 1413-3555
Rev Bras Fisioter, São Carlos, v. 12, n. 1, p. 20-5, jan./fev. 2008
©Revista Brasileira de Fisioterapia

Effects of two educational programs on musculoskeletal symptoms in office workers

Efeitos de dois procedimentos educacionais sobre os sintomas musculoesqueléticos em trabalhadores administrativos

De Vitta A[1], Bertaglia RS[1], Padovani CR[2]

Abstract

Objective: To investigate the effect of applying two educational programs (one using a self-instructional approach and the other using a traditional approach similar to educational workshops), on the perceived frequency of musculoskeletal symptoms. **Methods:** A quasi-experimental study was conducted in 94 office workers in a public company. The participants were divided into three groups through simple randomized sampling with no replacement. The first group (32 employees) underwent a traditional/workshop program, the second (28) used a self-instructional manual and the third (34) was a Control Group. The frequency of musculoskeletal symptoms was measured by means of the Nordic Musculoskeletal Questionnaire, at the beginning of the program and 30 days after its completion. The statistical analysis consisted of descriptive statistics, a nonparametric analysis of variance technique for a repeated measure model in three independent groups and the Goodman test. **Results:** From the data collected in pre and post-test comparisons, it was observed that the traditional/workshop educational program significantly reduced the frequency of musculoskeletal symptoms over the final seven days. For the self-instructional manual group and control group, no difference was observed in the frequency of musculoskeletal symptoms. **Conclusions:** It could be concluded that the interventions, particularly the traditional approach using educational workshops, had a positive effect on the individuals' actions. Despite the complexity of some of the preventive measures needed, there was a reduction in musculoskeletal symptoms of the participants during work.

Key words: educational programs; workers' health; musculoskeletal symptoms; seated posture.

Resumo

Objetivo: Verificar o efeito da aplicação de dois procedimentos de educação (auto-instrucional e tradicional associado às oficinas de educação) na freqüência de sintomas musculoesqueléticos percebidos. **Métodos:** Realizou-se um estudo quase-experimental, com 94 funcionários administrativos de uma empresa pública, alocados em três grupos por amostragem aleatória simples e sem reposição, sendo um do Tradicional/Oficinas (32), um de Manual Auto-instrucional (28) e o Controle (34). Mensurou-se a freqüência de sintomas musculoesqueléticos por meio do questionário Nórdico de Sintomas Músculo-esqueléticos, no início e após 30 dias do término dos programas. Utilizou-se a estatística descritiva, a técnica de variância não-paramétrica para o modelo de medidas repetidas em três grupos independentes e o teste de Goodman. **Resultados:** Pelos dados obtidos na comparação do pré e pós-teste, observa-se que o programa de educação baseado em tradicional e oficinas reduziu significativamente a freqüência de sintomas musculoesqueléticos, nos últimos sete dias. Nos Grupos Controle e do Manual Auto-instrucional, não se observou diferença na freqüência dos sintomas musculoesqueléticos. **Conclusões:** Pode-se concluir que as intervenções, principalmente o tradicional associado a oficinas, teve efeito positivo sobre as ações dos indivíduos e, apesar da complexidade de algumas medidas preventivas necessárias, houve uma diminuição dos sintomas musculoesqueléticos dos usuários no trabalho.

Palavras-chave: procedimentos educacionais; saúde do trabalhador; sintomas musculoesqueléticos; postura sentada.

Recebido: 3/01/2007 – **Revisado:** 4/07/2007 – **Aceito:** 21/09/2007

[1] Physical Therapy Course, Universidade do Sagrado Coração (USC) – Bauru (SP), Brazil
[2] Department of Biostatistics, Universidade Estadual Paulista (UNESP), Botucatu (SP), Brazil
Correspondence to: Alberto De Vitta, Curso de Fisioterapia e Programa de Mestrado em Saúde Coletiva da Universidade do Sagrado Coração, Rua Irmã Arminda, 10-50, CEP 17044-160, Bauru (SP), Brazil, e-mail: albvitta@yahoo.com.br
Financial Support: Fapesp; grant no. 03/11142-9

Introduction

Perceived musculoskeletal symptoms can be defined as reports of unpleasant physical perceptions, pain, feelings of heaviness, "pins and needles" and fatigue[1]. Some studies have shown that the prevalence of these symptoms is reaching epidemic proportions[2-5].

The ways of decreasing and/or preventing the musculoskeletal symptoms caused by different occupational situations consist of planning and/or replanning the physical work environment and the tasks to be accomplished, and educational programs, among others. Today, the discussions concerning the adopted educational programs are vast. Among such programs are self-instructional practices, which do away with constant contributions from specialists, because they are administered by the person himself and enable progress at a pace that suits the individual's own interests.

Coury[1] investigated the effects of applying a self-instructional program to identify and control critical aspects of physical comfort during sedentary, occupational situations. This author's results indicated that the program promoted significant changes in the individual's perception, suggesting an increased capacity to correlate symptoms with environmental risk factors.

Another type of educational program is the use of traditional pedagogy based on oral exposition of material (expositive classes) that is centered on presentation of the teacher's knowledge. This emphasizes repeated exercises to ensure memorization of the material that is unrelated to the student's everyday life and even less to the student's social realities[6].

Workshops allow educators to make good use of the experiences brought in by the participants and provide a better elaborated vision of the situation. This enables students to seek solutions for the different risk factors that are detected and equips them to face these risks[7,8]. Faucett et al.[9] compared two types of training (muscle learning therapy and educational workshops) in relation to perceived musculoskeletal symptoms in workers and found that, comparing the two experimental groups, the workshops presented the best results.

The importance of studies that aim to prevent musculoskeletal problems in occupational situations lies in the fact that these diseases generate social and economic consequences for the state, companies and individuals. For companies, these problems mean decreased numbers of man/hours worked, because of absences from work for considerable periods of time that cause losses in production and service quality. For the state, the expenses fall upon the INSS (National Social Security Institute), and result from payments of social security benefits, treatment and rehabilitation[10,11]. For individuals, these problems cause great suffering, leading to levels of incapacity not only for work, but also for a large portion of everyday and social activities.

Another important point in such studies is that education is an essential element related to individuals, their environment and their task procedures, making it possible for individuals to have the requisites to act significantly in regards to different risk factors. For physical therapists, such studies expand the work objectives within the profession into a field that is much superior to that of the activity of recovery and rehabilitation, in that when educational work is implemented, its purpose is precisely preventive.

Thus, from individuals who work sitting down and taking two evaluation times into consideration, the aim of the present study was to investigate the effects of applying two educational programs (one using a self-instructional approach and the other, a traditional approach similar to educational workshops), on the perceived frequency of musculoskeletal symptoms.

Material and method

A quasi-experimental design was used, in which the dependent variable was represented by the frequency of the musculoskeletal symptoms and the independent variable, by the educational programs.

Individuals

The worker population at the Water and Sewage Department of Bauru consists of 680 individuals, of whom 180 (26.5%) perform administrative functions and 500 (73.5%) do light and heavy physical activities. Among those who perform administrative functions, 110 were chosen by means of the following inclusion criteria: carrying out writing and typing work while in a seated posture for more than a year, remaining seated for at least half of the working day and not doing any type of training on ergonomics relating to the seated position.

Within this context, the individuals were randomly allocated to three groups. The first group (G1) consisted of 38 individuals who underwent a traditional program associated with educational workshops; the second (G2) had 35 individuals who received the program through a self-instructional manual; and the third (G3) was the control group, with 37 individuals who did not receive any kind of training over the course of the present study. By the end of the program, six individuals from the classes and workshops group, seven from the manual group and three from the control group were eliminated for various reasons, such as vacations, sick leave, not having gone to one of the classes or workshops and not having read all of the manual within 60 days.

Procedures

Stage A or pretest

The socio-demographic and occupational information was collected by means of a questionnaire that consisted of the following items: age, sex, marital status, educational level attained, company job and length of service in the company and in the present occupation. To evaluate the musculoskeletal symptoms, the Nordic Questionnaire[12] was used, as adapted to the Brazilian culture by Barros[13].

The questionnaires were applied in individual sessions at the workplaces, and were colleted on the same day. The individuals were informed about ethical matters and signed the consent statement. The study was approved by the Research Ethics Committee of the Universidade do Sagrado Coração (USC) (procedure no. 011/2004).

Training 1: Traditional in association with educational workshops

During this stage, an educational program based on traditional pedagogy in association with health education workshops was presented to group 1. The program was held in the company's training room, during regular work hours. The times and dates for applying the program were discussed with the section head of each sector, so that it would only minimally alter their routine.

The first part consisted of a traditional program by means of expositive classes lasting 60 minutes, with the use of slides and posters. The topics were divided in the following way: first class – basic anatomy of the vertebral column, upper and lower limbs; possible effects of the seated posture on the lumbar column; second class – effects of the seated posture on the legs and neck; third class – effects of the seated posture on the upper limbs; fourth class – use of microcomputers.

The educational workshops lasted 60 minutes, once a week, and consisted of demonstration techniques, practical applications and feedback that added the "how to" and supplied information for developing preventive actions regarding the risk factors relating posture and movements. The workshop themes were divided in accordance with the class topics.

Training 2: Self-instructional

A "self-instructional manual concerning the seated posture" drawn up by Coury[1] was applied to group 2. It consisted of the following parts: effects of the seated posture on the lumbar column, blood circulation in the legs and neck; some possible effects from positioning and movements of the upper limbs when working sitting down; use of video terminals; repetitive movements; pauses and alternation of postures; and exercises.

To encourage the workers to read the manual, they were supplied, preferably in individual sessions, with information on the manual's objectives, its format, contents and how to do the reading. The manual contains a text on how to use it and a guide for identifying and controlling critical aspects of the work environment.

Successive parts of the manual were handed out to the group participants weekly, and they had a one-week period to read each part. If individuals had not read it, they would have another seven days to do so and, after that period, they would then receive the next part of the manual.

Stage B: Post-test:

In this stage, 30 days after finishing the interventions, the musculoskeletal symptoms over the last seven days were reevaluated. Questions were asked about the vocabulary and texts that were used, the assistance that the program provided, the kinds of problems that were found in the work environment and the types of measures adopted. This was done for the traditional/workshop and manual groups. For the control individuals, only a questionnaire about musculoskeletal symptoms was applied.

Analysis of the results

The data obtained were inserted into a database in the SPSS statistics software (version 10.0). To analyze the frequency of musculoskeletal symptoms over the last seven days, the technique of non-parametric analysis of variance for repeated measures with three independent groups (Kruskal-Wallis) was used[14]. To compare the programs using the test responses before and after the intervention, the Goodman[15] homogeneity test was performed. Lower-case letters were used to indicate comparisons between groups, setting the type of intervention and time; upper-case letters were used for comparisons within the groups, at different times. To interpret the results, it was considered that two medians with the same letter of the same type would not differ (> 0.05) with regard to the factor level under consideration.

The presentational aspects of the manual and the traditional/workshop program; the types of movement most used at work; whether the programs helped in understanding the effects of the seated posture and intervention; the types of problems found and the measures adopted were analyzed by means of descriptive statistics on the percentages of the individuals responding to each question[14]. All of the statistical conclusions were discussed at the significance level of 5% ($\alpha \leq 0.05$).

Results

The data revealed that, when asked about the type of movement that were used the most, groups 2 and 3 more frequently

said it was repetitive movements, while group 1 said it was repetitive movements and fixed postures. When asked about the quality of the programs and the assistance that these instruments provided with regard to understanding and doing something while in the seated position, only one person (3.57%) from group 2 answered that the manual text was not clear and understandable. Regarding the size of the text used in the manual, 25 (89.29%) of the workers of this group, declared that the text was of an appropriate size. In group 1, all participants reported that the program was clear and helped them understand the effects of the seated posture and how to do something about it.

With regard to the type of assistance, 84.37% of the individuals in group 1 and 60.71% in group 2 reported that the intervention helped in changing the environmental (organization of materials on the desk, correct positioning of the monitor, regulating of the height and position of the monitor and chair with objects such as books and others). Changes in postural habits (movement, adequate positioning of the upper and lower limbs and use of the chair back) were mentioned by 81.25% of the workers in group 1 and 85.71% in group 2. In evaluating the work environment after the educational programs had been applied, 93.75% of the individuals in group 1 and 89.29% of the individuals in group 2 reported that they found problems, especially related to the furniture and postural habits.

Out of all the workers, only 3.12% from group 1 and 35.71% from group 2 did not take any measures after the educational program had been applied. Changes regarding the furniture were implemented by 62.49% and 21.42% of the workers in groups 1 and 2, respectively. Changes in habits took place among 65.61% of group 1 and 53.57% of group 2 and increases in movement was implemented by 56.24% of group 1 and 28.57% of group 2. The frequencies of the musculoskeletal symptoms over the last seven days found in the pre-test and post-test and the respective results from the statistical tests can be seen in Table 1.

If the frequencies of musculoskeletal symptoms over the last seven days are compared between the groups, a statistically significant decrease can be seen in group 1, which did not occur in groups 2 and 3.

Discussion

An investigation involving comparison of two educational programs (traditional/workshops and self-instructional manual) and evaluation of the frequencies of musculoskeletal symptoms in workers was conducted. The workers in groups 1 and 2 evaluated the text as clear, objective and of an appropriate size and all participants reported that the text assisted them in understanding the effects of the seated posture and that it helped them to do something about their posture and the work environment.

In the study conducted by Coury[1], 97.3% of the individuals who read the manual considered the text clear and 91.9% of them considered it to be of an appropriate size. All of the individuals believed that the text helped to understand the effects of their work posture on their organism and 97.3% said that the text helped them to decrease these effects.

For the individuals in group 1, the main contribution of the intervention program was in regard to changes to the

Table 1. Pre-test and post-test descriptive measurements of musculoskeletal symptoms among the workers over the last seven days, and results from the statistical tests.

Group	Descriptive measurement	Time		Comparisons between times
		Pre-test	Post-test	
Group 1	Minimum value	0	0	
	First quartile	1	0	
	Median	3 aB	1 aA	p< 0.05
	Third quartile	5	5	
	Maximum value	9	9	
Group 2	Minimum value	0	0	
	First quartile	0.3	0	
	Median	3 aA	2 aA	p> 0.05
	Third quartile	5	5	
	Maximum value	10	10	
Group 3	Minimum value	0	0	
	First quartile	1	1	
	Median	2 aA	4 aA	p> 0.05
	Third quartile	5	5	
	Maximum value	8	8	
Group test		p> 0.05	p> 0.05	

environment and postural habits. In group 2, the workers reported that the main contribution was in regard to changes to postural habits, followed by information about and changes to the environment, respectively. In the study by Coury[1], 81% of the individuals said that the text helped them by supplying information and 72% believed that the text helped them through suggesting changes to the furniture and postural habits. In the study by Raymundo et al.[16], 93% answered that the main contribution was the knowledge that made it possible to intervene regarding their postural habits. In evaluating the work environment after the educational programs had been applied, the individuals in the present study reported that they found problems, especially relating to furniture and postural habits.

Coury[1] found that 81.08% of the individuals reported problems relating to work habits and 62.16% and to the furniture, fixed postures and excessive movements. Basso et al.[17] found that the problems identified in the work environment mostly related to the furniture, followed by inadequate postural habits during working hours, fixed postures and excessive movements. On the other hand, 28.6% of the female workers did not find any sort of problem. Raymundo et al.[16] noted that 97.7% of the female teachers said that the main problems related to furniture and 88.4% to postural habits.

In the present study, 96.88% of the individuals in group 1 and 64.29% in group 2 took measures to decrease the negative effects of the seated posture in their work environment. In group 1, the principal measures adopted were changes in habits and furniture modifications, while in group 2 they related to postural habits and movements. Similar data were obtained by Coury[1] and Raymundo et al.[16].

The changes that occurred regarding postural habits and body movements can be explained by the fact that these are interventions that depend solely on the workers' interest, ability and decision to put them into practice. Changes to the furniture and work environment were less frequently adopted, because of factors of a practical and/or structural nature. In other words, the work stations did not have adjustable furniture and therefore such changes are initiatives that did not depend on the workers. Basso et al.[17] reported that the main barriers that influenced individuals not to make changes to companies' physical working conditions were influenced by economic conditions, lack of structural conditions (non-adjustable furniture and equipment) and lack of management involvement.

The traditional program in association with workshops (group 1) gave rise to a significant decrease in the frequency of musculoskeletal symptoms over the last seven days reported by the individuals, following this intervention. Basso et al.[17] found that, after applying a traditional program and workshops, 64.3% of the individuals decreased their symptoms, as well as making changes to their postural habits and to the organization of their occupational environment. Sobaszek et al.[18] noted that the traditional/educational workshop training promoted an absence of symptoms in 11% of the administrative workers of a university hospital and decreased their frequency and occurrence in 44% of these individuals.

According to Mendes and Casagrande[19] and Ferrari and Jeolás[20] the traditional pedagogical strategy in association with workshops is a place for reflection, thereby making the person an active individual: a person of action and reflection. Moreover, these authors reported that this learning technique stimulated interpersonal relationships between employees, thus making discussions between people with the same objectives easier, allowing exchanges of information, assisting them in understanding the knowledge about the seated posture, stimulating employees to reflect about adopting intervention strategies for work risk factors, and reinforcing their responsibilities and rights regarding their own health.

The decrease in the symptoms among the individuals in group 1 may also have been influenced by the changes adopted by these individuals, since 97% adopted some kind of measures suggested by the program. Similar data were observed by Basso et al.[17], in which they found that the individuals who achieved decreases in their musculoskeletal discomfort following the application of an educational program had made some kind of modification to their postural habits and furniture, and that individuals who did not register any changes in symptom frequency or reported increased frequencies, made very few if any, changes after the program.

In analyzing the data relating to the frequencies of musculoskeletal symptoms in group 2, it was seen that no significant changes had occurred. This is possibly related to the percentage of individuals (35.71%) who did not take measures to minimize the effects of the problems that were found, after application of the program. Coury[1] noticed that the number of symptoms increased in individuals who did not make changes to their work environment and decreased among those who made changes to the furniture and equipment.

Whereas the individuals in the present study made changes to their environment, postural habits and body movements, all of these changes came exclusively from within themselves, without any investment by the company, and were only implemented after application of the educational programs. This allows us to conclude that the programs, and especially the expositive program in association with workshops, had a positive effect on the individuals' actions and, despite the complexity of some of the needed preventive measurements, there was a decrease in musculoskeletal symptoms among the workers.

Thus, the educational program (expositive in associations with workshops) was a place for reflection, for praxis and for action. The techniques demonstrated in the workshops, allowed the individuals to deepen and consolidate their knowledge, and to link practical application with theoretical knowledge, criticism and creativity, thereby making them able to identify and intervene in risk factors that were present in their occupational situation which could be changed.

It is important to emphasize that the objective of this study was to investigate the effect of applying two educational programs (self-instructional and traditional in association with educational workshops) on the frequency of perceived musculoskeletal symptoms. The educational programs used in the present study are useful tools for professionals of the health sector in their different fields of work. They allow reformulation of theoretical models based on unidirectional, dogmatic and authoritarian communication practices, and as such, they can focus on the transmission of information through discussion and reflection.

Studies with other individuals and longitudinal training are fundamental for confirmation of the data in the present study. Although education alone does not have the power to enable populations to attain desirable health standards, it can supply elements that make individuals capable of gaining autonomy and knowledge regarding choices for healthier conditions. In this sense, health education as a factor for health promotion and protection is also a strategy for achieving civil rights. However, for preventative programs that have the objective of reducing occupational musculoskeletal discomfort to be successful, it is fundamental for there to be multidisciplinary work promoting a combination of wide-ranging measures, such as reorganization of the company (pace, shifts, breaks and task variability) and work stations (desk, seats and equipment), and interventions among the individuals themselves to increase their capacity for body perceptions, among other matters.

References

1. Coury HJCG. Programa auto-instrucional para o controle de desconfortos posturais em indivíduos que trabalham sentados [Tese]. Campinas (SP): Unicamp; 1994.
2. Salin CA. Doenças do trabalho: exclusão, segregação e relações do gênero. São Paulo Perspect. 2003;17:11-24.
3. Jackson-Filho J. Avaliação da incidência de LER nos setores de compensação bancária e de processamento de dados na região de Florianópolis do Banco do Estado de Santa Catarina. Fundacentro. 1993;30:23-35.
4. Brandão AG, Horta BL, Tomasi E. Sintomas de distúrbios osteomusculares em bacários de Pelotas e região: prevalência e fatores associados. Rev Bras Epidem. 2005;9(1):94-102.
5. Maciel ACC, Fernandes MB, Medeiros LS. Prevalência e fatores associados à sintomatologia dolorosa entre profissionais da indústria têxtil. Rev Bras Epidem. 2006;9(1):94-102.
6. Lopes AO. Aula expositiva: superando o tradicional. In: Veiga IPA (org). Técnicas de ensino: por que não? Campinas: Papirus; 1995. p. 35-48.
7. Veiga IP. Nos laboratórios e oficinas escolares: a demonstração didática. Campinas: Papirus; 1995.
8. Chiesa AM, Westphal MF. A sistematização de oficinas educativas problematizadoras no contexto dos serviços públicos de saúde. Saúde Debate. 1995;46:15-23.
9. Faucett J, Garry M, Nadler D, Ettare D. A test of two training interventions to prevent work-related musculoskeletal disorders of the upper extremity. Appl Ergon. 2002;33:337-47.
10. De Lucca SR. Os acidentes do trabalho no Brasil – algumas implicações de ordem econômica, social e legal. Rev Bras Saúde Ocup. 1994; 22(81):7-14.
11. Candeias NMF. Conceitos de educação e de promoção em saúde: mudanças individuais e mudanças organizacionais. Rev Saúde Pública. 1997;31(2):209-13.
12. Dickinson CE, Campion K, Foster AF, Newman SJ, O'rourke AMT, Thomas PG. Questionnaire development: an examination of the Nordic Musculoskeletal Questionnaire. Appl Ergon. 1992;23(3):197-201.
13. Barros E. Cross-cultural adaptation of the Nordic musculoskeleta questionaire. Int Nurs Rev. 2003;50(2):101-8.
14. Norman GR, Streiner DL. Biostatitics: the base essentials. St. Lowis: Mosby Year Book; 1994.
15. Goodman LA. Simultaneous confidence intervals for contrast among multinomial populations. Annals of Mathematical Statistics. 1964;35(2):716-25.
16. Raymundo PPL, De Vitta A, Silva JCP. Postura sentada: programa auto-instrucional para educadores. Salusvita. 2003;22(3):405-14.
17. Basso AC, De Vitta A, Luz FRC. Análise de um programa de ensino de auto-cuidado postural para indivíduos que trabalham sentados. Salusvita. 2000;19(1):19-29.
18. Sobaszek A, Fantoni-Quinton S, Delval M, Rejou P, Mauppin JM, Lefranc D, et al. Long-term assessment of a sanitary education and lumbar rehabilitation program for health care workers with chronic low back pain at the University Hospital of Lille. J Occup Environ Med. 2001;43(3):289-94.
19. Mendes MD, Casagrande LDR. Trabalhadores e educação em saúde: utilização da metodologia problematizadora pelo enfermeiro do trabalho. Rev Bras Saúde Ocup. 1997;24(89/90):9-14.
20. Ferrari RAP, Jeolás LS. Oficinas de prevenção em um serviço de saúde para adolescentes: espaço de reflexão e de conhecimento compartilhado. Ciên e Saúde Colet. 2003;8(2):611-20.