Effectiveness of a back school program in low back pain

L.H. Ribeiro, F. Jennings, A. Jones, R. Furtado, J. Natour

São Paulo Federal University, Division of Rheumatology, São Paulo, Brazil.

Abstract

Objectives

To evaluate the effectiveness of a back school program in pain, functional status, quality of life, and in anxiety and depression in patients with non-specific low back pain.

Methods.

Sixty patients with low back pain were randomized to an intervention and control group. The intervention group underwent a five-weekly back school program. The control group was seen in weekly medical visits, without educative approaches. Both groups took acetaminophen as analgesic medication. All subjects were evaluated by a blind physiotherapist after randomization, 30, 60 and 120 days. Rolland-Morris, SF-36, STAI and Beck questionnaires, pain visual analogical scale and Schober's test were applied. Non-steroidal anti-inflammatory drugs (NSAID) consumption was considered co-intervention. The statistical analyses were performed using Pearson's Chi-Square analysis and Student's t-test to compare the baseline characteristics of the groups and the analysis of variance (ANOVA) with repeated measures to assess changes inter/intra groups.

Results

There were no significant differences in the baseline characteristics between the two groups. Fifty-five patients completed the study. The intervention group showed a significant improvement in the general health domain, assessed by SF-36, and also in the reduction of acetaminophen and NSAID intake. There was no significant difference between the groups in pain, functional status, anxiety or depression.

Conclusion

The back school program was more effective than any educational intervention in general health status and in decreasing acetaminophen and NSAID intake. It was ineffective in the other quality of life domains, in pain, functional status, anxiety and depression.

Key words

Back school, low back pain, treatment, lumbar spine, education, rehabilitation.

Luiza Helena Ribeiro, MD;
Martim Fábio Jennings, MD;
Anamaria Jones, physiotherapist;
Ricardo Furtado, physiotherapist;
Jamil Natour, MD.

Please address correspondence and reprint requests to: Dr. Jamil Natour, Rua Botucatu 740, Disciplina de Reumatologia, 04023-900 São Paulo - SP, Brazil.
E-mail: jnatour@reumato.epm.br

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Introduction

Low back pain has become a considerable problem in modern society, reaching alarming proportions and costs involving medical care for the patient as well as social security costs, as it is one of the main causes of absenteeism, physical disability and early retirement. (1-3). It is estimated that 60 to 80% of the population in industrialized countries will develop low back pain at some point in life. For years, studies have focused on the wide variety of therapeutic options available for low back pain in different parts of the world. Systematic reviews have assessed the effectiveness of most currently available therapeutic interventions for the treatment of back pain. Van Tulder *et al*. (4) analyzed the principal therapeutic options and concluded that few were indeed effective for low back pain, according to the evidence available at the time. More recent reviews, such as those conducted by the Cochrane Back Review Group, have assessed some of these interventions on an individual basis, including a review of the effectiveness of back schools for non-specific low back pain. (4-15).

The first back school for lumbar disorders originated in Sweden in 1970. It was developed by Zarichsson-Forsel at the Danderyl Hospital and later became known as the Swedish Back School.

The etiological aspects of low back pain, such as biomechanical stress and increased intradiscal pressure, were the basis for the development of the program, which focused primarily on an educational approach to the ergonomic elements related to pain (16). Other back schools have since been developed with a number of different approaches, contents and duration of treatment, and are currently operating in different parts of the world (17). Among the best known are the Canadian Back Education Unit (18), the California Back School (19) and the American Back School (17).

The first reports showing the positive effects of these programs in the treatment of low back pain, albeit from uncontrolled studies, led to the proliferation of back schools in many countries. Subsequently, several randomized controlled trials were conducted with the purpose of evaluating their effectiveness regarding low back pain. The results, however, have been controversial. (1, 20, 21) In the most recently published systematic review, Van Tuder *et al*. (11) assessed the short and long-term effectiveness of the back school in patients with acute or chronic nonspecific low back pain. The results demonstrated that the back school program was not effective for acute low back pain. In cases of chronic low back pain, the short-term program proved to be moderately effective, although the same was not observed in the long-term. The assessment of a subgroup that followed the program within an occupational setting demonstrated the positive effects of the program in this specific group. The authors concluded that, when applied in occupational settings, the back school program may be effective in patients with chronic low back pain. However, they have recommended the conduction of further studies using qualified methodology. Thus, the aim of the present study was to assess the effectiveness of a back school program in patients with non-specific chronic low back pain regarding functional status as well as quality of life, pain relief, depression, and anxiety.

Material and methods

Inclusion criteria

The study included 60 patients aged 18 to 65 years diagnosed with chronic nonspecific low back pain, defined as pain in the back, located between the last rib and the gluteal fold, with mechanical characteristics lasting more than 3 months (22). To determine the duration of pain, patients were asked to report on how long the sympton had been present for most of the time. Patients were recruited from rheumatology and orthopedic outpatient clinics from October 2002 to November 2003. All patients were required to sign an informed consent term. The Ethics Committee of the Universidade Federal de São Paulo approved the study with registration number 1837/06.

Exclusion criteria

This constituted previous back surgery, spinal tumor, spinal fracture, pregnancy, fibromyalgia, inflammatory or infectious spinal diseases and litigant patients.

Randomization
Patients were selected according to the inclusion/exclusion criteria by a single investigator blinded to the allocation. After signing the informed consent term, subjects were randomized and allocated to the intervention group (IG) and control group (CG) by drawing lots. Folded pieces of paper indicating one of the groups were placed in sealed envelopes in a container. Another investigator selected the envelopes to determine to which group individual subjects would belong.

Procedures
1) Intervention group: this group followed the back school program, which consisted of 5 one-hour group sessions (four consecutive once-a-week sessions and a fifth reinforcement session after 30 days). Sessions were instructed by a rheumatologist and a physical therapist for groups of 10 participants. Orientation was given regarding the anatomy and physiology of the spine, causes and treatment of low back pain, and ergonomic guidelines relevant to back problems, such as standing and sitting postures, reaching, kneeling, twisting, lifting, pushing and pulling. Abdominal and back strengthening exercises were also performed. After the exercises, sessions ended with a relaxation posture in bed (semi-Fowler or psoas position).
2) Control group: patients were seen at 3 medical visits within a four-week period (Week 1; Week 2; Week 4) and at a fourth visit 30 days after Week 4. Each medical visit was conducted by a rheumatologist (other than the back school instructor). Patients were asked about their back problems and medications taken to relieve pain. A general physical examination and an examination of the spine were performed. No educational orientation was imparted to the control group.
Both the back school program and medical visits were initiated between one and seven days following randomization.

Follow-up assessment
Patients from the IG and CG were assessed by an investigator (physiotherapist) blinded to the groups on four different occasions. They were advised not to tell the physiotherapist to which group they were allocated. The first assessment (T0) took place immediately after randomization and before initiating the intervention at a maximum interval of seven days. Other assessment visits took place 30 (T30), 60 (T60) and 120 (T120) days after initiating the intervention. The following assessment instruments were used: Schober's Test to assess the level of spine mobility, Visual Analogical Scale (VAS) for pain with scores from zero to ten; and the questionnaires SF 36 (Short Health Survey) (23) for quality of life, Roland-Morris (24) for functional status, Beck Depression Inventory and the State-Anxiety Inventory (STAI) (25). All questionnaires had been translated into the Portuguese language and validated (23-26). Accountability of analgesic medication intake (acetaminophen) supplied at each assessment visit was also conducted. Patients were instructed to take notes on the number of analgesics they had taken every other day. The consumption of anti-inflammatory medication was considered co-intervention. Patients were instructed to take notes on the intake of AINEs.

Drop outs
Patients from either group who missed more than one session of the back school program (IG) or one medical visit (CG) were considered drop outs, unless a replacement session/visit was scheduled. Similarly, patients who failed to complete all four assessments were also considered drop outs. These subjects were excluded from the statistical analysis.

Statistical analysis
The sample was calculated based on the VAS variable, using a significance level $\alpha = 5\%$ and power of $1 - \beta = 90\%$. The final result observed for the statistically significant difference between groups has a 67% intergroup power and a 75% intragroup power. The homogeneity of the sample was tested using the Student's *t*-test for numerical variables (age, schooling, BMI) and Pearson's Chi-Square test was used for categorical variables (sex, race, duration of pain, tobacco use). ANOVA with repeated measures was performed to evaluate inter- and intra-group differences. ANOVA provided a p value evaluating the variables within a given group during follow up versus the other group (intergroup analysis) and another p value evaluating the variable in each group compared to their respective values at baseline T0 (intragroup analysis). Variable results were expressed in terms of mean and standard deviation with a 95% confidence interval. A 5% significance level ($\alpha = 5\%$) was used for all variables and tests revealing descriptive level below 5% ($p < 0.05$) were considered statistically significant.

Results
A total of 71 patients fulfilled inclusion criteria, eleven of them refused to participate and were not randomized. Most of them due to the distance from home and the frequency of the program/ visits Sixty patients were randomized, five of whom failed to complete the 120-day follow-up: two from the Control Group and three from the Intervention Group. In four cases, the reason for the incomplete follow-up was noncompliance, and one CG case was due to death as a result of acute myocardial infarction. Thus, 55 patients completed the study (Fig. 1).
The sample was considered homogeneous. Both groups were similar regarding demographic characteristics, duration of pain, level of education, body mass index (BMl) and sedentary life (Table I). Both groups were also considered homogenous regarding the baseline values obtained in the assessment tests. Tables II and III display the assessment results at the four different time points. The mean VAS score for pain had baseline values of 5.2 and 5.3 cm in the IG and CG, respectively. These results were maintained in both groups and no statistically significant difference ($p = 0.601$) was observed. Results obtained from the Rolland-Morris questionnaire revealed no significant difference between groups ($p = 0.735$). Similar results were obtained regarding the extent of spine mobility as measured by Schober's Test ($p = 0.983$). The Beck Depression Inventory showed baseline

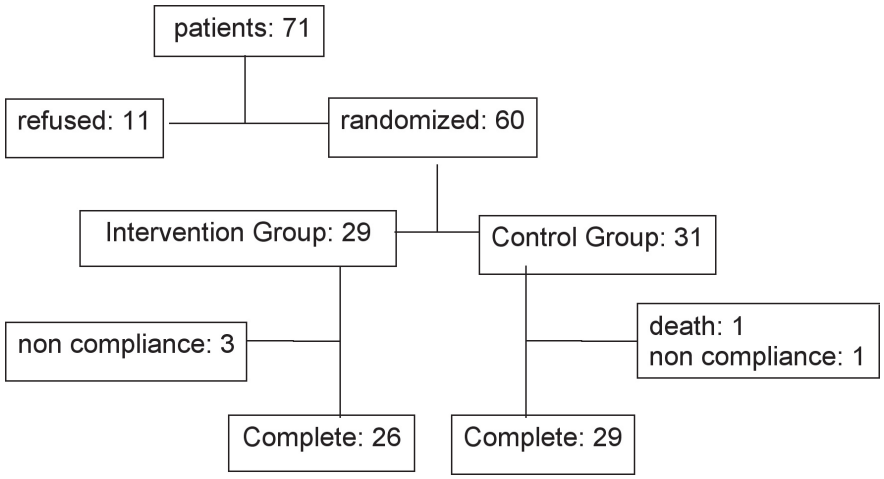

Fig. 1. Algorithm of the patients' inclusion.

Table I. Baseline characteristics.

	Intervention group n = 26	Control group n = 29	*p*
Age mean (SD)	48.1 (14,1)	52.8 (10)	0.053
Schooling (yrs) mean (SD)	6.1 (3.6)	4.4 (3.3)	0.322
BMI mean (SD)	27.1 (4.8)	27.1 (3.2)	0.096
Sex			0.112
male	7 (26.9%)	3 (10.3%)	
female	19 (73.1%)	26 (89.7%)	
Race			0.087
white	12 (46.2%)	20 (69.0%)	
not white	14 (53.8%)	9 (31.0%)	
Smoke			0.642
Ex- smoker	7 (26.9%)	5 (17.2%)	
smoker	4 (15.4%)	4 (13.8%)	
non smoker	15 (57.7%)	20 (69.0%)	
Duration of pain			0.322
1 year	6 (23.1%)	8 (27.6%)	
1 - 5 years	14 (53.8%)	10 (34.5%)	
more than 5 yrs	6 (23.1%)	11 (37.9%)	
Fitness			0.286
sedentary	25 (96.2%)	29 (100%)	
not sedentary	1 (3.8%)	0	

n: number of patients; SD: standard deviation; BMI: body mass index.

scores indicative of mild depression in both groups and no statistically significant difference was observed between groups (p = 0.745). STAI revealed baseline scores in both groups that were compatible with traits of low-level anxiety, whereas both groups exhibited medium levels for state of anxiety. No statistically significant differences were observed between the groups regarding either traits (p = 0.697) or state of anxiety (p = 0.706) at the different time points. In the SF-36 domains, hole functioning, physical functioning, bodily pain, vitality, emotional functioning, social functioning and mental health revealed no statistically significant variations between groups. However, in the general health domain, a significant improvement was observed in the intervention group as compared to the control group (p = 0.018) (Table III).

Acetaminophen intake was assessed by calculating the average of tablets taken per day. At the 30-day assessment, intake was lower in the IG (0.79 tablets/day) than the CG (0.45 tablets/day); this finding was statistically different (p = 0.039). There was also a decrease in acetaminophen intake in both groups at the final assessment (Table IV). NSAID consumption was considered co-intervention. As just a few patients took this type of medication, the consumption was assessed by calculating the proportion of patients who had taken NSAIDs. At the 30-day assessment, 23% of the IG patients and 34.5% of the CG patients had used NSAIDs. At the 120-day final assessment, a reduction in the percentage of patients using these medications in the IG (11.5%) was observed, whereas the CG remained unchanged (37.5%); this difference between groups was statistically significant (p = 0.046). (Table V).

Discussion

The results of the present study demonstrate the limited effectiveness of the back school program in the management of chronic nonspecific low back pain when compared to medical visits without educational intervention. The program was only effective in terms of reducing the use of analgesic and anti-inflammatory medication as well as affecting quality of life, as measured by general health status.

Assessment of pain using the VAS showed that patients in both groups maintained the level of intensity of their complaints throughout the follow-up. In a systematic review by Van Tuder (11) on the effectiveness of back schools, studies using qualified methodology to evaluate pain as a clinical response showed no positive evidence of benefit. The functional status assessment results measured by the Roland-Morris questionnaire revealed no differences between groups, despite the IG showing a significant improvement during the final assessment when compared to baseline values and the CG showed a tendency toward improvement. In addition to the Roland-Morris, international studies have used other questionnaires, such as the Oswestry Questionnaire, to assess functional capacity. However, the results have been controversial (11).

The assessment of depression and anxiety conditions was also similar between groups. The baseline assessment of both groups showed evidence of mild depression and low-level anxiety. Studies evaluating the impact of back schools

Table II. Comparison between groups during follow-up.

Variable /Range Assessment	Intervention group mean SD	CI 95%	Control group mean SD	CI 95%	*p* intergroup
VAS (0-10 cm)					0.601
T 0	5.26 (2.14)	4.36-6.17	5.34 (2.40)	4.49-6.19	
T30	3.46 (3.08)	2.31-4.60	4.24 (2.74)	3.15-5.32	
T60	3.53 (2.94)	2.39-4.68	3.44 (2.88)	2.36-4.53	
T120	3.34 (3.08)	2.13-4.56	3.86 (3.09)	2.71-5.01	
Schober (cm)					0.983
T0	3.69 (1.39)	3.19-4.18	3.31 (1.13)	2.84-3.78	
T30	3.51 (1.71)	2.94-4.09	3.52 (1.18)	2.98-4.07	
T60	3.57 (1.48)	3.05-4.09	3.68 (1.14)	3.19-4.18	
T120	3.26 (1.24)	2.79-3.74	3.50 (1.19)	3.04-3.95	
Rolland-Morris (0-24)					0.735
T0	11.46 (4.71)	9.65-13.26	11.48 (4.46)	9.77-13.19	
T30	9.07 (5.26)	7.09-11.05	9.89 (4.82)	8.02-11.77	
T60	7.38 (5.33)	5.33- 9.43	8.13 (5.09)	6.19-10.07	
T120	8.15 (5.99)	5.87- 10.43	8.24 (5.62)	6.08-10.40	
Beck (0-63)					0.745
T0	10.42 (4.02)	8.58-12.26	10.96 (5.19)	9.22-12.70	
T30	10.65 (4.95)	8.74-12.56	10.00 (4.78)	8.18-11.81	
T60	8.42 (3.80)	6.66-10.17	8.93 (4.97)	7.27-10.59	
T120	7.42 (4.66)	5.66-9.17	8.41 (4.26)	6.75-10.07	
STAI Trace (20-80)					0.697
T0	29.53 (9.98)	26.04-33.03	28.27 (7.75)	24.96-31.58	
T30	26.76 (8.15)	23.22-30.31	27.20 (9.72)	23.84-30.56	
T60	24.73 (6.14)	22.54-26.92	24.34 (4.99)	22.27-26.41	
T120	27.61 (9.65)	24.11-31.11	26.24 (9.65)	22.92-29.55	
STAI State (20-80)					0.706
T0	42.46 (9.82)	38.26-46.66	41.89 (11.37)	46.66-45.87	
T30	35.76 (11.50)	31.61-39.92	38.00 (9.65)	39.92-41.93	
T60	32.88 (10.53)	28.82-36.94	34.51 (10.14)	36.94-38.36	
T120	34.42 (11.45)	30.45-38.39	34.82 (8.68)	38.39-38.58	

T0: initial; T30: 30 days; T60: 60 days; T120: 120 days; CI: confidence interval; SD: standard deviation; *p* intergroup: *p* value between groups; VAS: visual analogic scale.

on depression and anxiety are lacking. Morrison *et al*. (27) found no positive effects regarding anxiety, as assessed by STAI. The results of quality of life assessments showed a positive effect of the back school program on the general health status of patients, as expressed in the SF-36 questionnaire by the way patients feel about their health in general. However, the program appears not to influence most of specific factors related to quality of life in patients with low back pain. This was perhaps due to the fact that psychosocial factors that may be directly associated with quality of life and identified as perpetuators of low back pain were not addressed, such as discontentment at work, low salaries and general worries (28-30).

The consumption of analgesic and anti-inflammatory medication showed a decreasing intake of acetaminophen and anti-inflammatory drugs in the IG in comparison to the CG. This reduction could be attributed to the positive effect of the intervention on behavioral changes by the use of techniques for protection of the spine, resulting in the reduction of pain. The orientation imparted in terms of discouraging excessive consumption of NSAIDs due to the side effects may also have played a role in this finding.

The gap between theoretical assumptions regarding the benefits of a multifactor educational approach and practical findings, which have generally been negative in relation to its effectiveness, demonstrates that the failure may be inherent to the program itself. The format of the back school program developed for this study was based on that of the original Swedish Back School with some adaptations. When developing the first back school program, Forsell based it on the theory that low back pain is triggered by mechanical stress. Thus, the content of the sessions focused mainly on compensatory measures for this stress through posture orientation. (16) A more psychological approach is not characteristic of the Swedish Back School. Other models considered a more behavioral approach, such as the one developed by the Canadian school, which focuses on changing behavioral patterns and attitudes toward pain (18). Another limiting factor was the low level of education of the study population, as the cognitive level of patients participating in the program might have influenced effectiveness. In 1988, Pincus (31) discussed the influence of the level of education on behavioral, psychological and cognitive variables, as it is related to the capacity to cope with the disease and maintain good health. The lack of available validated instruments for assessing disease

Table III. Comparison between groups in SF-36 domain.

Domain / Assessment	Intervention group mean SD	CI 95%	Control group mean SD	CI 95%	*p* intergroup
Total functioning				0.320	
T0	62.11 (24.90)	52.58-71.64	60.17 (23.62)	51.14-69.20	
T30	73.65 (24.68)	64.89-82.40	69.82 (19.84)	61.53-78.11	
T60	75.38 (22.26)	66.84-83.92	69.48 (21.18)	61.39-77.56	
T120	76.73 (22.49)	67.55-85.90	67.24 (24.03)	58.55-75.92	
Physical functioning					0.978
T0	45.38 (37.46)	30.48-60.28	46.55 (38.22)	32.44-60.65	
T30	66.34 (37.37)	51.74-80.95	64.65 (36.91)	50.82-78.48	
T60	69.11 (35.55)	54.41-83.81	73.27 (38.92)	59.35-87.19	
T120	68.26 (42.75)	51.16-85.37	63.79 (44.11)	47.60-79.98	
Bodily pain					0.122
T0	38.07 (18.41)	31.37-44.78	38.44 (15.71)	32.10-44.79	
T30	49.38 (21.10)	41.98-56.78	44.10 (16.50)	37.09-51.11	
T60	57.38 (24.67)	49.04-65.72	46.86 (17.52)	38.96-54.75	
T120	54.00 (21.05)	46.28-61.71	46.06 (18.22)	38.76-53.37	
General health					0.018*
T0	60.92 (22.35)	51.26-70.58	49.13 (26.36)	39.99-58.28	
T30	65.42 (21.75)	55.98-74.86	57.58 (25.82)	48.65-66.52	
T60	73.30 (20.69)	64.19-82.42	56.96 (25.18)	48.33-65.59	
T120	69.69 (20.70)	61.00-78.37	52.51 (23.23)	44.29-60.74	
p intragroup	0.039*		0.098		
Vitality					0.265
T0	60.76 (24.31)	51.30-70.23	48.10 (23.80)	39.14-57.06	
T30	63.07 (22.40)	53.87-72.28	57.41 (24.26)	48.69-66.13	
T60	64.80 (22.24)	55.14-74.47	57.75 (26.47)	48.60-66.91	
T120	62.88 (23.67)	52.83-72.93	63.79 (27.11)	54.27-73.30	
Social functioning					0.936
T0	78.36 (26.82)	67.89-88.83	81.89 (26.42)	71.98-91.81	
T30	89.42 (17.92)	80.08-98.76	78.44 (27.93)	69.60-87.29	
T60	88.94 (18.81)	80.91-96.97	88.79 (21.73)	81.19-96.39	
T120	81.73 (24.03)	73.31-90.15	87.93 (18.74)	79.95-95.90	
Emotional functioning					0.571
T0	87.18 (23.24)	74.19-100.16	75.86 (39.73)	63.57-88.15	
T30	88.46 (32.58)	79.65-97.26	100.0 (0.00)	91.66-108.33	
T60	97.43 (9.04)	94.99-99.88	100.0 (0.00)	97.68-102.31	
T120	88.46 (29.72)	78.27-98.64	94.26 (21.92)	84.61-103.90	
Mental health					0.381
T0	63.69 (26.84)	53.22-74.15	55.86 (26.39)	45.95-65.77	
T30	75.38 (23.15)	66.28-84.48	67.17 (23.11)	58.55-75.78	
60	75.84 (20.84)	67.54-84.14	69.79 (21.31)	61.93-77.65	
T120	68.30 (27.24)	58.08-78.53	72.00 (24.81)	62.31-81.68	

T0: initial; T30: 30 days; T60: 60 days; T120: 120 days; CI: confidence interval; SD: Standard deviation; SF-36: Short-Form Healthy Survey; *p* intergroup: *p* value between groups; *p* intragroup: *p* value in each group; $^{*}p < 0.05$.
Range: 0-100.

knowledge was a limiting factor for acquiring data related to changes in the patient's knowledge of the disease during follow-up. Earlier studies assessing the degree of knowledge used their own non-validated questionnaires, developed specifically for conducting the studies. Some showed positive results in terms of increased knowledge among patients participating in back school programs as compared to the controls. Despite the positive results in increasing knowledge, there was no correlation with clinical improvement in the population of these studies. (17, 27, 32, 33). The implementation of educational programs addressing self-management has many supporters. This means developing the skills necessary to perform the daily activities for which the patient is capable of recognizing and adapting to his health status. (34, 35) Although posture orientation was foreseen in our study, no specific training for acquiring these skills was included in the program. According to literature, some back school programs have addressed developing these skills and assessing their correct implementation (27, 36). A cognitive mechanism, self-effectiveness addressed through behavioral therapy, may be also incorporated in the back school program to enable patients to recognize their own involvement in the pain (37).

The present study demonstrated the effectiveness of the program in only some items. This limited effectiveness may be associated to the variety of elements

Table IV. Acetaminophen daily intake.

	Intervention rroup mean (SD)	Control group mean (SD)	*p* intergroup
			0.039*
T 30	0.45 (0.23)	0.79 (0.77)	
T60	0.48 (0.29)	0.67 (0.51)	
T120	0.34 (0.18)	0.47 (0.41)	
p intragroup	0.004*	0.013*	

T30: 30 days; T60: 60 days; T120: 120 days; SD: standard deviation; *p* intergroup: *p* value between groups; *p* intragroup: *p* value in each group during follow up. *$p < 0.05$.

Table V. Anti-inflammatory intake in both groups.

	Intervention group n = 26	Control group n = 29	*p*
T30	6 (23.15%)	10 (34.5%)	0.352
T60	7 (26.9%)	11 (37.9%)	0.385
T120	3 (11.5%)	10 (34.5%)	*0.046

T30: 30 days; T60: 60 days; T120: 120 days; n: number of patients. *$p < 0.05$.

addressed. The current format appears to be insufficient to reach all the mechanisms proposed in patient education programs. Changes in the program contents are required, as are further studies to assess the effectiveness of the back school program.

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