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"ACTIVE BACK SCHOOL", PROPHYLACTIC MANAGEMENT FOR LOW BACK PAIN: THREE-YEAR FOLLOW-UP OF A RANDOMIZED, CONTROLLED TRIAL

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The purpose of the present study was to investigate the long-term effect of the Active Back School programme on minimizing recurrences of episodes of low back pain. Forty-three subjects were randomly allocated to the Active Back School group and 38 to the control group. There were no significant differences between the groups with regard to baseline characteristics. The Active Back School programme comprised 20 lessons each divided into a 20-min theoretical and a 40-min exercise part during a 13-week period. Nine participants (11%) dropped out during the study period. Recurrence of new low back pain episodes was significantly less ($p = 0.04$), and the time from inclusion to the first new low back pain episode was significantly on the side of the Active Back School group ($p < 0.01$). The duration of sick leave was found to be significantly shorter ($p < 0.01$) in the Active Back School group compared to the control group. The Active Back School reduced the recurrence and severity of new low back pain episodes at 36 months' follow-up.

Key words: Back school, low back pain, secondary prophylaxis, long-term follow-up, ergonomics, functional exercise, physical therapy.

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INTRODUCTION

Low back pain (LBP) causes major medical and economic problems in Western industrialized countries (1). The natural history of acute LBP is one of improvement over days or weeks, with 90% of patients reporting that the pain has subsided by 2 months (2). However, many patients may have intermittent back pain or back pain that resolves to a low level of pain or discomfort rather than complete resolution (3, 4). Back pain among primary care patients typically runs a recurrent course (4, 5) and more than 50% of patients with back pain will have recurrences of pain in the following year (6). A previous history of LBP is shown to be a strong predictor of new LBP episodes (7–9) and may predispose patients to develop more serious and chronic back problems. Prevention of recurrent LBP is therefore an important issue in both an individual and a socioeconomic perspective (10).

Several treatment and prevention strategies have been employed for acute and chronic LBP, common among which are back schools used by physical therapists (11). However, the efficacy of back schools remains controversial (12–17). Active Back School (ABS)—a new back school concept—involves more practical training than previously reported back schools (13, 16, 18–20), and has proved effective in a randomized controlled trial (21). During a follow-up period of 1 year, recurrences of LBP and consequent days of sick leave were significantly reduced. These results were promising, but reflected only short-term efficacy of the intervention.

The aim of the present study was to assess the *long-term* effect of the ABS programme on minimizing recurrence of LBP episodes 3 years after cessation of the organized intervention. In addition, the participants were asked which movements, activities or circumstances were connected with development or maintenance of LBP.

METHODS

Design

This study was designed as a 3-year follow-up of the original study: Active Back School—Prophylactic management for low back pain (21). The study was carried out as a prospective, randomized single center trial with stratified parallel group design. The Slumps test (22) and the number of LBP episodes during the 36 months preceding inclusion were used as stratification factors. After baseline assessments, the study participants were allocated, by block randomization with six blocks (23), to either secondary prophylaxis with ABS or a control group.

Study group

Individuals were recruited for the project by referral from other health professionals and by advertising in the local media. Inclusion criteria included individuals of both genders, 18–50 years of age, who had experienced at least one episode of LBP in the previous year and had finished treatment and sick leave at the time of enrolment. An episode of LBP was defined as LBP resulting in professional treatment or requiring sick leave. Exclusion criteria included previous surgical procedures for LBP, pregnancy, specific rheumatologic diseases, spondylolisthesis, spinal tumour, spinal fracture, drug or alcohol abuse, and documented mental illness.

In the original study, 81 individuals (37 men and 44 women) with an average age of 39.4 years (range 19.2–49.8), agreed to take part in the study. Nineteen men and 24 women were randomly allocated to

secondary prophylaxis with ABS, and 18 men and 20 women to the control group. All individuals studied gave their written consent to participation after being informed of the risks and benefits of the study. The study was approved by the local ethics committee.

Study procedure

Individuals allocated to the ABS received 20 sessions over a period of 13 weeks after inclusion in the study. There were two sessions per week for the first 7 weeks and one session per week for the final 6 weeks. Each lesson lasted 1 hour, divided into a didactic part (20 min) and a practical training part (40 min) (Fig. 1) (21). Total compliance was attendance at 20 sessions. Percentage of the total was estimated and reported as compliance rate.

Individuals allocated to the control group did not receive any further attention or information apart from the follow-up assessments; however, participants in both groups were free to choose other treatments for LBP or engage in other physical activities during the study period.

The participants did not receive any further information or attention during the follow-up period, except postal reminders twice a year to the participants of the ABS group with a focus on applying the ergonomic principles in daily life activities and on doing home exercises.

At 3-year follow-up, all the included individuals were contacted by telephone for an appointment to attend a structured interview and clinical investigation, similar to the procedure used at baseline and at 5-month and 12-month follow-up (21).

The primary outcome variables in the long-term follow-up were recurrence of LBP episodes and sick leave due to LBP based on memory ratings. Other outcome variables included LBP in general and related to 12 different daily activities and general low back function, subjectively recorded on 10-cm visual analogue scales (VAS) (24–26). All VAS assessments were related to the last month. General functional status was assessed using the COOP-WONCA Functional Status Assessment Chart consisting of the items "physical fitness", "emotional problems", "limitations of social activities due to health condition", "problems with daily activities due to health condition", "general health condition" and "quality of life" (27, 28). Finally, the participants were asked which movements, activities or circumstances were connected with provoking LBP and habits concerning home exercises and physical training.

Statistical methods

The continuously distributed variables were expressed as the mean values with 95% confidence intervals (95% CI), standard deviation and total range. The confidence intervals for the mean values were constructed using the Student procedure (29). Contingency tables were used for presenting discontinuously distributed variables (30). The time from inclusion to the first LBP episode was expressed using a Kaplan & Meier plot (31). In order to give a summarized overview of pain, an overall experienced pain score were defined. Overall experienced pain score is defined as the average of pain in general and the pain related to 12 different daily activities.

All tests were carried out two-tailed with a significance level of 5%. The *p*-values in the manuscript are referred to as exact numbers when larger than 1% and as ≤ 0.01 if less or equal to 1%. Bonferroni correction is used to avoid multisignificance (29). Comparison between groups with regard to continuously distributed variables was performed using an Analysis of Variance (ANOVA) with the stratification factors and the initial value of the variable as covariates (32). Changes within groups were determined by ANOVA with repeated measurements (33). Discontinuous variables were analysed by Contingency Table Analysis (30). Comparison of the groups related to variables as "time until event" was performed by survival analysis and Gehan test (31).

Drop-outs caused by factors unrelated to the treatment were defined as drop-outs type A, and were described but not included in the analysis. Drop-outs due to the prophylactic treatment or other factors directly related to the project were defined as drop-outs type B, and were entered into an intention-to-treat analysis with the less favourable values.

RESULTS

No significant difference was found between the two groups with regard to drop-out rate and time until drop-out. Within the first year, five patients in the ABS group and three in the control group dropped out. Additionally, one more patient in the ABS group dropped out between the 1- and 3-year follow-ups because of relocation to another city. All drop-outs were classified as type A. The analysed sample at 3-year follow-up consisted of 37 patients in the ABS group and 35 in the control group. The two groups were comparable with regard to all observed demographic factors and factors related to the history of LBP (Table I).

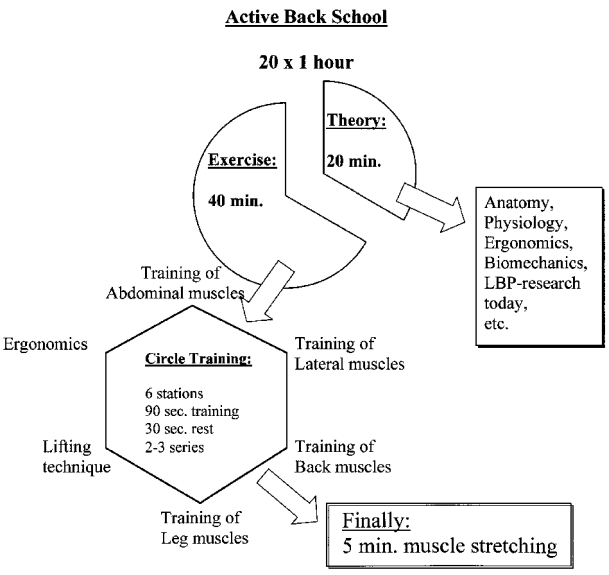

Fig. 1. The content of an Active Back School session.

The mean number of LBP episodes from 3 years before to 3 years after the intervention was significantly reduced from 1.2 to 0.28 episodes per year in the ABS group ($p \leq 0.01$). The similar reduction in the control group was from 1.3 to 1.0 episodes ($p = 0.02$). The number of new LBP episodes in the 3 years after enrolment was significantly smaller ($p = 0.04$) in the ABS group compared to the control group (Table II). In addition, the time from enrolment until the first new LBP episode was significantly ($p \leq 0.01$) in favour of ABS (Fig. 2).

During the study period of 3 years, 12 subjects in the ABS group and 18 of the controls took sick leave due to LBP (Table II). The duration of sick leave was significantly shorter ($p \leq 0.01$) in the ABS group than in the control group.

In the follow-up period the mean number of healthcare contacts in the ABS group was 4.2 and in the control group 17.4. The difference was significant ($p \leq 0.01$).

The mean overall experienced pain score was significantly reduced ($p \leq 0.01$) from baseline to both 1-year and 3-year follow-up (Table III). Significant reductions in overall experienced pain score were also detected in the control group after both 1 and 3 years. However, the differences in overall experienced pain score were significantly in favour of ABS after both 1-year ($p = 0.04$) and 3-year follow-up ($p \leq 0.01$).

The general low back function score increased significantly

Table I. *Background variables. The results are expressed as mean values with standard deviations in parentheses and total range*

	Active Back School ($n = 37$)	Control ($n = 35$)	p-values
Age (years)	40.6 (6.1) 26.9–49.3	38.9 (6.6) 21.2–49.8	$p = 0.26$
Body Mass Index (kg/m^2)	24.6 (3.5) 18.3–35.0	24.9 (3.2) 19.5–32.9	$p = 0.75$
Low Back Pain at the time of inclusion (mm VAS)	40.2 (21.0) 0–88	41.6 (21.2) 4–88	$p = 0.78$
Time since the first Low Back Pain episode (months)	166 (109) 9.9–355.4	134 (76) 0.7–287.1	$p = 0.16$
Time since the first sick leave caused by Low Back Pain (months)	111 (94) 1.1–321.2	102 (79) 0.7–279.2	$p = 0.71$
No. of Low Back Pain episodes during the last 3 years	3.6 (1.8) 1.0–9.0	3.9 (2.3) 1.0–10.0	$p = 0.48$
No. of days of sick leave caused by Low Back Pain during the last 3 years*	46.1 (92) 0–450	54 (73) 0–230	$p = 0.67$
Job satisfaction (mm VAS)	82.1 (24.1) 6–100	81.5 (21.0) 6–100	$p = 0.92$

* Sick-leave only registered for participants with work outside the home.

($p \leq 0.01$) from baseline to the 1- and 3-year follow-up in both groups (Table III). Comparison of the two groups regarding the general low back function scores shows a significant difference in favour of ABS at both 1-year ($p \leq 0.01$) and 3-year follow-up ($p = 0.03$).

Quality of life measured using the COOP WONCA chart improved significantly in the ABS group from baseline to both 1-year ($p = 0.03$) and 3-year follow-up ($p \leq 0.01$). An improvement in the quality of life from baseline to the 3-year follow-up was also detected in the control group (Table IV). This improvement, however, did not reach significance level ($p = 0.08$). Comparison of the groups with regard to quality of life indicated differences in favour of ABS, but the difference did not reach significance, neither at 1-year ($p = 0.08$) nor at 3-year follow-up ($p = 0.07$).

At 3-year follow-up almost all subjects had an opinion about movements, activities and circumstances associated with LBP. The subjects were allowed to report more than one condition provoking LBP, and the same pattern was revealed in both the ABS and the control group. The most frequently reported conditions were lifting/carrying, long-time sitting without support and forward bending and rotation.

Table II. *Number of episodes with low back pain (LBP) and days of sick leave caused by LBP during the 36 months after inclusion in the study*

Variable	Active Back School	Control
No. of episodes with LBP		
0	17	8
1	13	7
2	4	4
3	2	3
4	1	5
≥5	0	8
Days of sick leave due to LBP		
No. of subjects	12	18
Mean (SD)	14.4 (12.7)	63.9 (76.3)
95% CI	6.3–22.5	26.0–101.9
Total range	3.0–44.0	2–278

At 3-year follow-up, there was no significant change in number of weekly physical training sessions between the groups. However, there was a reduced tendency in the frequency of home exercising in both the ABS group and the control group.

DISCUSSION

At 3-year follow-up, ABS was still effective in reducing recurrent LBP episodes and days of sick leave compared to the control group. In addition, LBP and low back function were significantly improved. General functional status showed a positive trend, but did not reach significance level.

It was expected that the positive effects observed at the 12-month follow-up would decay over time. Surprisingly, contrary to other observed patterns with weakening of the effect over time (34), the prophylactic effect of ABS improved even more from 12 months to the 3-year follow-up. In view of the fact that the participants did not increase their frequency of home exercising or number of weekly physical training sessions during the study period, the benefit was unexpected. The fact is that the importance of home exercising and physical training was very much stressed in the ABS group since one cannot expect that the physical training effect obtained during the first 3 months of the study will persist almost 3 years later. It was therefore disappointing that the participants did not alter the frequency of home exercise and physical training. However, since the content of the ABS programme emphasizes proper lifting techniques, movement strategies, body awareness and body mechanics according to ergonomic principles, it is suggested that these were factors contributing to the favourable long-term results. These main principles are also part of most other back schools (13, 17–20). However, the efficacy of back schools remains controversial (12, 13, 15, 17, 35).

Review of the literature revealed five studies dealing with

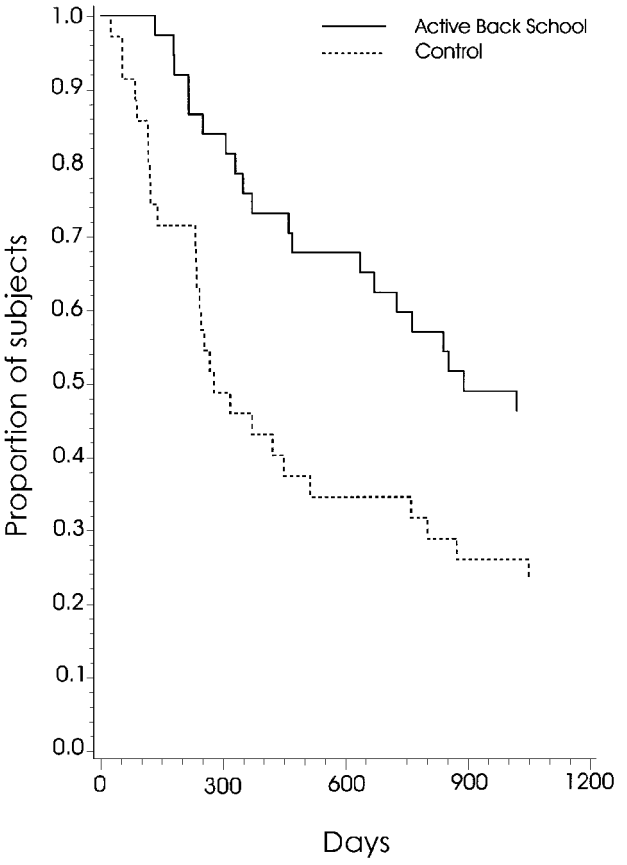

Fig. 2. The time until the first low back pain episode after inclusion in the Active Back School and control groups expressed by a Kaplan and Meier plot.

back schools as secondary prophylaxis for LBP (13, 18, 19, 36, 37). These studies differ considerably with regard to design, study population, outcome measures and follow-up from the present study. A direct comparison between studies is therefore difficult, but a common feature is that the different schools are often of short duration and put low emphasis on practical training. Because changing behaviour takes time and practice, the ABS concept is of longer duration and makes use of more exercise than most other back school studies and may be one reason for the more favourable outcome of this trial.

The unblinded test procedure was the greatest weakness of this study and may have biased participant response. However, Lanes et al. (38) claimed that patients would probably perceive the same pressure to please the investigator in contact with an independent interviewer. In addition, it is uncertain how this response bias influenced participants of the "disappointed" control group.

Another weakness of the study is the reliance on the participant's self-reported data regarding LBP episodes and sick leave. However, after inclusion, the participants were informed that they would be asked the same questions at the later follow-up assessments. Several of the subjects were prepared with notes. Since the participants assigned to the intervention group were focusing on LBP and its treatment on a regular basis, they may have more accurately remembered episodes of LBP and number of days of sick leave than individuals of the control group. However, use of a sick leave diary would probably have improved the accuracy of the data.

This study population may have been more motivated than the typical LBP patient, and may therefore not be representative of a general LBP population of patients. However, participation in

Table III. *Mean overall experienced pain score and general low back function score*

	Initially		After 1 year		After 3 years	
	Active Back School	Control	Active Back School	Control	Active Back School	Control
Overall mean score for degree of pain						
Mean (SD)	3.5 (1.7)	4.0 (1.9)	2.2 (1.9)	3.3 (2.1)	1.7 (1.4)	2.7 (1.7)
95% CI	2.9–4.0	3.4–4.7	1.5–2.8	2.6–4.0	1.2–2.2	2.1–3.3
Min-Max	0–6.8	0.4–9.1	0–7.5	0.3–7.4	0.1–5.5	0.2–5.9
General low back function score						
Mean (SD)	4.6 (1.8)	4.1 (1.9)	6.7 (2.3)	5.2 (2.3)	7.1 (2.0)	6.1 (2.1)
95% CI	4.0–5.2	3.4–4.7	5.9–7.5	4.4–6.0	6.4–7.8	5.4–6.8
Min-Max	0–9.4	0.7–7.1	0.5–9.6	0.3–8.8	0.8–9.9	1.9–9.8

Table IV. *The Coop Chart, Quality of Life Index*

	Initially		After 1 year		After 3 years	
	Active Back School	Control	Active Back School	Control	Active Back School	Control
Mean (SD)	12.7 (3.9)	12.9 (4.2)	10.8 (3.6)	12.5 (4.6)	10.0 (2.7)	11.6 (3.5)
95% CI	11.4–14.0	11.4–14.3	9.6–12.0	10.9–14.0	9.1–11.0	10.3–12.8
Min-Max	7.0–25.0	6.0–23.0	6.0–24.0	6.0–22.0	5.6–16.8	5.6–17.6

exercise trials is voluntary, and motivation will always be an important contributing factor to the effect (19).

ABS is a low-cost prophylactic regimen carried out in an outpatient setting in a private physiotherapy institute. The total cost is estimated at approximately $400 per participant and should make the ABS concept of interest also from an economic point of view with regard to the prophylactic potential.

In conclusion, ABS as secondary prophylaxis proved to have a significant long-term effect measured at the 3-year follow-up. Future research is needed to test the generalizability of the results of ABS in other populations and contexts, which should also include a cost-effectiveness analysis.

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