Conservative Treatment of Acute Low-Back Pain

A Prospective Randomized Trial: McKenzie Method of Treatment Versus Patient Education in "Mini Back School"

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The purpose of this study was to compare the effect of the McKenzie method of treatment with patient education in "mini back school" in patients with acute low-back pain. The study included 100 patients, 23 women and 77 men with the average age 34.4 ± 9.7 (range 18–61) years. The study included only those who were employed. The patients were randomly allocated to two groups, one group receiving treatment according to the McKenzie technique and the other group receiving education in a "mini back school." Assessments were made after 3 weeks by an independent observer and after 52 weeks they were seen by one of the authors. Patients were assessed on seven variables: return to work, sick-leave during the initial episode, sick-leave during recurrences, recurrences of pain during the year of observation, patients' ability to self-help, pain and movement. Although the effect of attention placebo cannot be ruled out, the results demonstrated that the McKenzie method of treatment for patients with acute low-back pain was superior for five out of seven variables studied. The only variables that did not show any statistically significant differences were sick-leave during recurring episodes of pain and patients' ability to self-help. [Key words: acute low-back pain, McKenzie method of treatment, education in "mini back school"]

LOW-BACK PAIN is experienced by 80% of the population in Western countries at some time during their life.[10] Retrospective surveys in Sweden have shown that 50–80% of adults at some time suffer from back pain.[1,7–9,21]

Although practically all anatomic structures in the region of the motion segment have their proponents in the etiologic discussion, at present it is thought that the lower intervertebral disc most likely causes the pain.[15] Biomechanical and epidemiological studies indicate that increased mechanical stress, due to body position and movement pattern, is important for development of low-back pain.[12] Physiotherapists are using different methods in their treatment of patients with low-back pain. These treatments have one factor in common—a general lack of research evidence to substantiate their use.[16] However, Bergqvist-Ullman and Larsson[6] have shown that low-back pain patients who had had back school[22] had a shorter duration of sick-leave during the initial episode of pain.

To date, insufficient data of a controlled nature exist recommending the use of low-back schools for patients with chronic low-back pain. With regard to acute pain, reporting is more positive, but no conclusions may be reached concerning the schools' effectiveness.[11]

According to McKenzie[14] there are three predisposing factors in the etiology of low-back pain: 1) poor sitting posture, 2) loss of extension, and 3) frequency of flexion. McKenzie recommends exercises and postural instructions that restore or maintain lumbar lordosis, and suggests that according to the studies by Armstrong[4] and Shah et al,[19] nucleus pulposus migrates forward in lumbar extension and backward in lumbar flexion. He also stresses the importance of self-treatment. The exercise should be repeated 10 times per session and the sessions should be spread evenly six to eight times throughout the day.

The purpose of the present study was to compare the effect of the McKenzie method of treatment with patient education in "mini back school."

MATERIALS AND METHODS

At the beginning of the study we decided to randomize 100 patients with acute low-back pain with or without radiating pain to the buttock, thigh, calf or foot (Table 1); 23 were women and 77 men. Their range of age was between 18–61, with an average age of 34.4 ± 9.7 years. They all had acute low-back pain (Table 1). The circumstances of the onset of the acute low-back pain are presented in Table 2. Forty-six percent had only central and 54% had central plus radiating pain to the buttock, thigh, calf or foot (Table 3). Only those who were employed were included. Criteria of exclusion were: patients with chronic low-back pain, pregnancy, back surgery, spondylolisthesis, tumors, fractures and patients with neck, shoulder or thoracic pain.

The duration of symptoms before entry to the study is presented in Table 4.

Positions or activities that the patients experienced as worse or better during the initial assessment are presented in Table 5.

After agreeing to enter the study, the patients were randomly allocated by one of the authors to two groups by drawing a sealed envelope with randomized numbers, which had been produced by a random-number generator.

The patients were afterwards assessed according to the McKenzie principle: group 1 = 50 patients receiving treatment according to the McKenzie technique and group 2 = 50 patients receiving education in "mini back school."

The McKenzie Method. The patients in this group received treatment lasting approximately 20 minutes with emphasis on maintaining the lordosis at all times with or without lumbar support. At the beginning of treatment the patients are instructed to lie prone for 5 minutes, followed by sustained lying prone in extension on the elbows for another 5 minutes, which is followed by repeated full elbows extended while keeping the pelvis, hips and legs relaxed on the table. For those who are not able to reach extension with the help of the arms, sustained passive extension using the table is used, followed by repeated extension while lying prone.

Postural correction was done for those patients with lateral deviation,

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Table 1. Occupation and Sex of the Patients

Occupation	Group 1	Group 2
Men		
Office workers	2	6
Engineers/technicians	7	2
Laborers	17	19
Drivers	5	3
Electricians	2	5
Not in above categories	3	6
Total	36	41
Women		
Office workers	8	2
Nurses	1	2
Laborers	4	3
Teachers	1	2
Total	14	9

Table 2. Circumstances of the Onset of Back Pain

	Group 1	Group 2
Bending	6	6
Lifting	17	19
Sport activities	3	7
Other incidence	10	10
No apparent reason	14	8
Total	50	50

Table 3. Pain Distribution Within the Two Groups

	Group 1	Group 2
1. Low back pain only	24	21
2. Low back pain and radicular/referred pain	26	29

and then followed by repeated extension in standing. After approximately 2 weeks the patients were instructed to continue with flexion in lying, which was followed by flexion in sitting and in standing. The patients were given postural and ergonomic instructions and were instructed to continue the training program by themselves.

"Mini Back School." The patients in this group received only back care education, without exercises. This consisted of one lesson lasting approximately 45 minutes. The anatomy and function of the back were explained with the aid of a skeleton. The results of intradiscal measurements were discussed and the most strain-relieving position during rest and during various postures was emphasized. Patients were adviced to refrain from exercise but lie supine in the semi-Fowler or, if painful, the fetal position several times per day, but to keep on the move during the day in order to avoid the inactivity syndrome. The patients also were provided with leaflets on back care. All patients had previously received practical ergonomic instructions at their places of employment.

There was no difference in the mean age between the groups (group 1 34.9 ± 10 and group 2 33.9 ± 9 years). There were no differences in occupation between the groups (Table 1), nor differences in derangements according to McKenzie method.

Assessment of the patients was made initially by one of the authors, after 3 weeks by an independent observer to avoid a bias, and after 52 weeks by one of the authors.

The following variables were assessed: return to work; sick-leave during the initial episode; recurrences of pain during the first year; the patients' ability to self-help; sick-leave during recurrences; pain; and low-back movement.

Table 4. Duration of Symptoms Before Entry to the Study

	Group 1	Group 2
Less than 1 week	40	39
1-2 weeks	5	7
2-3 weeks	3	1
3-4 weeks	2	3

Table 5. Positions or Activities that Patients Experienced as Worse or Better During the Initial Assessment (Patients Were Allowed to Give One or Several Alternatives)

	Group 1	Group 2
When worse:		
Bending	22	24
Sitting	22	24
Rising from sitting	19	20
Standing	13	11
Walking	6	12
Lying	1	6
When better:		
Bending	0	2
Sitting	2	5
Rising from sitting	0	0
Standing	12	5
Walking	14	18
Lying	44	39

The pain was assessed according to the graphic rating scale representing the patient's maximum pain during the last 24 hours.[18]

Spinal Movements. Loss of flexion, extension and side gliding were assessed objectively using a four-point scale: major = 3, moderate = 2, minimal = 1, and none = 0.

No movement loss of flexion in standing was assessed if the patient was able to reach the floor with fingertips without bending the knees. No movement loss of extension was assessed if the patient, in prone lying position, could extend his/her elbows fully with the pelvis still on the table. No movement loss of side gliding in standing was assessed if the patient was able to glide his/her pelvis maximally to the left and to the right side.

Statistical Methods. Student's *t* test, chi-square fourfold table and Wilcoxon's (Mann-Whitney) rank sum test were used.

RESULTS

Return to work during the initial period in both groups is presented in Figure 1. There were significant differences in favor of group 1 in return to work within 1, 2, 3, 4 and 6 weeks. All patients in group 1 had returned to work within 6 weeks and in group 2 within 11 weeks. The mean duration of sick-leave during the initial period was, for group 1, 11.9 ± 6.5 days and for group 2 21.6 ± 15.3 days ($P < 0.001$).

The number of recurrences of low-back pain and the need of help is presented in Table 6. Group 1 had significantly less recurrences during the year observed ($P < 0.001$). Also, significantly fewer in group 1 had to seek medical attention for their recurrences compared with group 2 ($P < 0.02$). The mean duration of sick-leave during the recurrences in 1 year of observation was, in group 1, 27.0 ± 14.4 days and in group 2 40.1 ± 59.6 days.

Pain: initially both groups had the same pain scoring but after 3 and 52 weeks there was significantly less pain in group 1 ($P < 0.001$).

Spinal movements: initially both groups had the same scoring for flexion, extension and side gliding. However, after 3 weeks scoring was

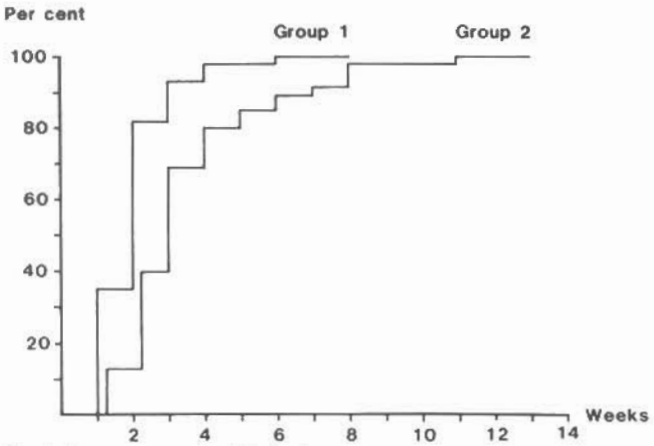

Fig 1. Return to work within both groups.

significantly better in group 1 for flexion ($P < 0.001$), extension ($P < 0.001$) and side gliding ($P < 0.01$). The same was observed after 52 weeks.

There was, however, no significant difference between group 1 and group 2 when the patients were asked about their physical activities and smoking after 1 year of the observation (Table 7).

DISCUSSION

In this study McKenzie's treatment for acute low-back pain was significantly better than patient education in a "mini back school" with regard to return to work during the initial period, sick-leave during the initial episode, recurrences during the first year, pain and spinal movement. In McKenzie's treatment as well as in the "mini back school" the patients were advised to maintain lordosis in sitting with and without lumbar support. Andersson et al[2,3] found that by maintaining lordosis disc pressure is decreased.

Our results are comparable with those from the Volvo study,[6] which showed that among 184 patients 68% returned to work within 1 month. The comparative data from our "mini back school" were 80% and for the McKenzie group 98% within 4 weeks. In a study performed by Volvo, the median absence from work was 20.6 days for the back school and 26.5 for placebo group and physiotherapy group. Our median values were 17.5 days for the "mini back school" group and 10 days for the McKenzie treatment group. It also has been shown that among the 217 workers of the Volvo study 62% had relapses of pain during 1 year and 31.3% were on sick-leave. In our material in the "mini back school" there was an 80.4% rate of recurrence and a 44.9% rate in the McKenzie treatment group, but only 36.9% in the "mini back school" and 26.5% in the McKenzie treatment group were on sick-leave. It is, however, difficult to compare different studies since there were different inclusion criteria. When studying sick-leave it is important to notice that this does not solely reflect the severity of the condition. It is also influenced by various occupational, social and personality-related factors.[6] Taylor[20] showed that sick absence is increased in subjects with work dissatisfaction, regardless of diagnosis.

Ten and one-half percent of our patients had to change their jobs because of low-back pain (three patients in group 1 and seven patients in group 2). In another study[6] the figures were 32%.

Pain was assessed using the Graphic Rating Scale. Scott and Huskisson,[17] in an analysis of different rating scales, found that the most reliable were the Visual Analogue Scale and Graphic Rating Scale on a horizontal line with word descriptors spread along the lines. According to the scale, there was less pain in group 1 ($P < 0.001$).

One study[5] described advantages and disadvantages of commonly used clinical tools to measure lumbar spine motion. Radiographs, inclinometers and spondylometers have fairly good reliability, but equipment is not always accessible. Plumb line method, goniometry and tape measurement over the spine have questionable reliability. Fingertips-to-floor provides only an index of total forward bending.

In this study a four-print scale was used in order to register range of motion since patients with acute low-back pain have such pain that they can barely stand in an upright position, and they often have gross deformities such as kyphotic lumbar spine sciatic scoliosis and accentuated lumbar lordosis.

What different factors could have caused the differences between the McKenzie method of treatment and the "mini back school?" Both

Table 6. Recurrences of Pain During 1 Year of Observation, Need of Help With Treatment, and the Patients' Ability for Self-Help*

	Recurrences	*No recurrences*
Group 1	22	27
Was in need of help with treatment	7	
Was able to self-help	10	
Did nothing	5	
Group 2	37	9
Was in need of help with treatment	17	
Was able to self-help	16	
Did nothing	4	

*Group 1 had significantly less recurrences during the year of observation ($\chi^2 = 12.73$; df = 1; $P < 0.001$). Significantly less in group 1 had to seek help with treatment ($\chi^2 = 6.459$; df = 1; $P < 0.02$). There were no between-group differences for the patients' ability for self-help ($\chi^2 = 2.466$; df = 1; not significant).

Table 7. Daily and Sport Activities During 1 Year of Observation

	Group 1 (n = 49)	*Group 2 (n = 46)*
Do you go for a walk?	49	45
a) less than 5 hours/week	21	18
b) between 5-10 hours/week	16	19
c) more than 10 hours/week	12	8
Do you ride a bicycle?	33	27
a) less than 5 hours/week	15	13
b) between 5-10 hours/week	15	12
c) more than 10 hours/week	3	2
Sport activities?		
a) yes	27	19
b) no	22	27
Do you have low-back pain during a hobby?		
a) yes	11	13
b) no	38	33
Have you stopped with any sport activities/hobby because of low-back pain?		
a) yes	6	4
b) no	43	42
Do you smoke?		
a) yes	20	19
b) no	25	26
c) sometimes	4	1

groups had an educational program, and this has been shown to positively influence the outcome in acute low-back pain. There are, however, some differences in the educational program between the groups. McKenzie stresses the importance of self-treatment in case of a recurrence. On the other hand, in "mini back school" the subjects are advised not to do any strengthening of abdominal muscles, which is a part of the Swedish back school. One possible additional factor could be, apart from the educational program, that there is also a treatment program in the McKenzie group that could be beneficial to the patients during the initial period of pain.

The subjects in group 1 (McKenzie method of treatment) began treatment immediately following the initial assessment, preferably, continued daily for 1 week, and then successively diminished. The average was 5.5 treatments (range 2–20 treatments), in these are included seven patients who had recurring episodes of pain during the year of the observation. Thus, the patients in group 1 had spent on average of 110 minutes with the physiotherapist during the year, compared with 45 minutes for the patients in "mini back school."

On the other hand, one should not forget that six patients in "mini back school" during the initial episodes and 17 patients during the recurring episodes of pain had to seek help with treatment; this probably equals the time spent in physiotherapy with group 1.

Another important aspect pointed out by Martin et al[13] is that physiotherapy exercises to increase spinal mobility and muscle strength have no certain effect. They randomly selected 36 patients in three treatment groups: mobilizing exercises, isometric exercises and an attention-placebo control group (patient's expectation of improvement as a result of repeated contact with the therapist). Their results do not support the hypotheses concerning the effects of physiotherapy exercises. This study points out the importance of attempting to ensure that the groups have similar contacts with the physiotherapists.

The information concerning sick-listing during the initial episode and during relapses was obtained either from the Swedish National Health Insurance Office and/or patients' files.

CONCLUSIONS

Low-back pain is an enormous medical, social and economic problem.[1] Three conclusions can be drawn from the study:

1. Treatment according to the McKenzie principle is in this study superior to "mini back school."

2. Due to the possible positive influence of continuous contact with the physiotherapist at the beginning of the treatment, which is an integral part of the McKenzie method of treatment, "mini back school" should provide the same opportunity.

3. Further studies about the effectiveness of the McKenzie method of treatment should be conducted.

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