

## INDIVIDUAL OR GROUP REHABILITATION FOR PEOPLE WITH LOW BACK PAIN: A COMPARATIVE STUDY WITH 6-MONTH FOLLOW-UP

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**Objective:** To compare the effectiveness of group rehabilitation and individually dosed rehabilitation in treating chronic low back pain.

**Design:** Institutional rehabilitation intervention in 2 non-randomized groups with a 6-month post-intervention follow-up.

**Subjects:** Persons with chronic low back pain: 64 group-rehabilitated and 66 individually rehabilitated.

**Methods:** The rehabilitation period for all subjects was 21 days. Those being group-rehabilitated, about 10 patients per group, had a common programme including 3–5 exercise groups per day, group discussions and lectures including back and neck school. Local physical therapy was given if needed. The individually rehabilitated subjects had individually designed programmes: local physical therapy, muscle strengthening programme, group exercises and participating in back school. The duration of the guided programme was 62 hours for group rehabilitation and 45 hours for individual rehabilitation.

**Results:** During the rehabilitation period the strength and flexibility of individually rehabilitated subjects improved more than that of group-rehabilitated subjects ( $p < 0.05$  and  $p < 0.01$ , respectively). After the 6-month follow-up period, group-rehabilitated subjects showed a decrease in the Oswestry and pain indexes, while individually rehabilitated subjects showed an increase in the Oswestry index. The group-rehabilitated subjects evaluated the goals of rehabilitation to have been attained better and considered themselves better motivated in self-care. The costs of the 2 rehabilitation programs were approximately equal.

**Conclusion:** These tentative results suggest that group rehabilitation can compete with individual rehabilitation at least in short-term follow-up.

**Key words:** low back pain, multidisciplinary rehabilitation, group rehabilitation.

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### INTRODUCTION

In industrialized countries, low back pain (LBP) causes great loss to society in the form of care costs and lost working days. It

is considered the most expensive disability of the working-age population (1). Although the prognosis of a period of LBP is excellent, it is estimated that 7–10% of patients with LBP eventually suffer chronic LBP. These patients consume about 80% of the money spent on low back disorders (2). Only 1–2% of back illness cases will eventually require surgery, so the need for rehabilitation is great (2). The biomedical concept of back illness does not adequately assess certain important problems such as pain and physical disability (3). The acceptance of psychosocial factors of LBP as important components of the illness has created a need for comprehensive care.

The “gate-control” theory is the prevalent view of pain physiology. According to this theory, the irritation that is felt as pain will be damped or reinforced by different parts of the central nervous system (4). Under these circumstances, psychological and social factors also have an influence on pain sensation. This supports the idea of multidisciplinary biopsychosocial rehabilitation. A recent systematic review concludes that there is moderate evidence of the positive effectiveness of multidisciplinary rehabilitation for subacute LBP (5).

Group rehabilitation for people with LBP aims at relieving unnecessary fear of using the back and at guiding basic exercise. The behaviourist-cognitive view can be seen as the cornerstone of group rehabilitation. According to this view, the physiotherapist is seen as an instructor and companion rather than an expert and authority. The instructor should have a holistic view of human nature and pedagogical skills. She or he should not support the illness behaviour of group members; instead, their self-confidence and ability to overcome difficulties should be encouraged with empathy. Optimism and control beliefs predict the outcome of the multimodal back treatment program (6). On the other hand, the importance of individual programming of the LBP patient’s rehabilitation has been emphasized (7). It might be assumed that it is easier to achieve this in individual than in group rehabilitation. In individual rehabilitation, the entire programme can be planned according to individual needs, without having to consider the demands and limitations of the group.

Cohen et al. (8) reviewed the literature on group education for people with LBP. In a systematic search, they found 13 primary studies, 6 of which were sufficiently well designed and executed for their findings to be considered. Of the 4 quality studies with chronic back pain subjects, only 1 presented a positive short-term effect for 1 of the outcome measures considered; pain intensity. In the 2 studies with acute cases, group education was found by 1 of the studies to reduce pain duration and initial sick

leave duration in the short term. At 1 year of follow-up, there was no evidence of clinically important benefits for any of the outcome measures in the 6 studies. The conclusion was that there is insufficient evidence to recommend group education for people with LBP. More recently, Tulder et al. (9), in a thorough systematic review, concluded that back schools may be effective for patients with recurrent and chronic LBP in occupational settings. Guzmán et al. (10) systematically reviewed multidisciplinary rehabilitation (defined as including the physical dimension and at least 1 of the other: psychological, social or occupational dimensions) for chronic LBP. They found strong evidence for functional improvement and moderate evidence for pain reduction, but only as concerns intensive rehabilitation (more than 100 hours of therapy) with functional restoration.

We found no earlier reports comparing group rehabilitation and individual rehabilitation for LBP.

While planning this study, it seemed obvious by clinical experience that individually rehabilitated persons felt more relief of their symptoms at the end of the treatment period than did group-rehabilitated persons. On the other hand, it was postulated that in group rehabilitation it is possible to take the psychological factors of chronic low back disorders into consideration better, thus possibly giving more benefit.

## MATERIAL AND METHODS

The source population consisted of rehabilitation inpatients for whom the Finnish Social Insurance Institute had decided to finance an institutional rehabilitation period because of chronic low back disorder. Included in the study were 130 patients, 64 of whom (about 10 patients per group) were guided to group rehabilitation by the Social Insurance Institute. Sixty-six persons were picked up from those guided to individual rehabilitation by the Institute, and who came to the institutional rehabilitation at the same time and were of the same age as the group-rehabilitated patients. All the persons included in the study had the same physician (MN) during the rehabilitation period.

Excluded were patients with inflammatory rheumatoid disease and those for whom LBP was not the main illness impairing function.

At the beginning of the treatment period, patients answered the following questionnaires about the severity of the LBP and the degree of disability it caused: visual analogue scales 0–100 mm (pain at present, pain in the morning during the last month, pain after the working day during the last month, and pain in the evening during the last month); the Oswestry Low Back Pain Disability Questionnaire (11); and back pain index (12). The Oswestry questionnaire is a sum-index (range 0–100) of 10 different situational items, including, for example, trouble in sitting, walking, travelling and social activities. The back pain index is also a sum-index, with a scale from 6 to 36, comprising 6 different items describing the frequency and severity of back and leg pain, during rest or activities. In addition to this, questions were raised on the use of medication, other treatments and ergonomic measures in the workplace.

A physiotherapist measured trunk muscle strength and the mobility of the thoraco-lumbar spine. Spinal flexion was measured by placing marks on the sacrum and on the processus prominens with the patient in an upright position, and then measuring the distraction of the 2 marks during maximum forward bending (13). Side bending was measured as the distance the tip of the middle finger could move down the thigh by means of purely lateral bending (14). Thoraco-lumbar rotation was measured with a compass, the patient sitting on a wooden table, using the method described by Mellin (15). The trunk muscle strength measurements included the number of sit-ups from supine to test the stomach muscles, and the number of trunk raisings from prone to test back muscles (16). The measurements were repeated by the same physiotherapist at discharge, when suitable parts of the questionnaires were also answered

again. After 6 months, patients were sent a postal questionnaire; this included the questions posed at the beginning plus a self-evaluation form asking how well the goals for the rehabilitation period were attained (range 0–28) and how patients were motivated in self-care (range 0–8).

The rehabilitation period with individual patients consisted of individually considered local physical therapy and a muscle-strengthening program. In addition, patients participated in suitable gymnastic group exercises. All individually rehabilitated patients participated in back school, and some also took part in neck school.

The group rehabilitation patients had a more common programme with emphasis on group sessions and a cognitive-behaviouristic approach. At the beginning, better grouping was attempted with the help of meetings. The programme was common for all group-rehabilitated and included 3–5 exercise groups per day. In addition to this, a guided muscle-strengthening programme was carried out in groups of 5 patients, as was a conversation lead by a psychologist. Superficial heat and massage were reserved for muscle care. On the theoretical side, there were discussions on several topics: conditioning exercise; factors causing LBP; principles of the treatment; adapting to chronic illness; healthy lifestyle and nutrition; and the social security system. Exercise groups were also active on Saturdays, but Sundays were days of rest. Local treatments were considered if necessary. Back and neck school was included in group rehabilitation. A home exercise program was presented to all the patients.

After the daily programme, all patients had the chance to follow their own exercise programme, use the swimming hall and take part in spare time activities.

Both in individual and group rehabilitation, patients were guided to visit a psychologist and a social worker individually if needed. The rehabilitation period lasted 21 days for everyone. At the end of the period, group members and leaders got together once more for a final meeting. Individually rehabilitated patients visited only the physician at the end of the programme.

The total net duration of the guided programme was 62 hours for group rehabilitation and 45 hours for individual rehabilitation. This consisted of 33 vs 25.5 hours of active physiotherapy (group physiotherapy, guided strength and endurance training, individual therapeutic exercise), 10 vs 14 hours of passive physiotherapy (other individual physiotherapy) and 19 vs 5.5 hours group programme other than group physiotherapy (back and neck school, other teaching discussions, opening and closing meetings). Table I, compiled as described below, shows details of the differences in treatment programmes between the groups.

The duration of the programmes was calculated by multiplying the mean number of each event (Table I) by the net duration of that event (without transit times, etc.) and adding up the durations of single events.

For an economic analysis, 22 group-rehabilitated and 32 individually rehabilitated subjects were chosen randomly (a larger number of individually rehabilitated subjects was needed because of the greater variation in the contents of their programme). The number of different events in each one's rehabilitation programme was counted based on the rehabilitation records. The mean of each event for both groups were calculated (Table I) and multiplied by the unit price. The sums were added up to give the mean total cost of the rehabilitation programme. The cost of the rehabilitation period was the sum of the costs caused by the rehabilitation programme and full boarding.

### Statistics

The Wilcoxon test was used for analysing changes within a group and the Kruskal-Wallis test for changes between the groups with the help of the Systat program (Systat Inc., Evanston, IL, USA).

## RESULTS

A total of 130 patients answered the questionnaire at the start of the rehabilitation period (64 group-rehabilitated and 66 individually rehabilitated) of whom 113 (54 group and 59 individually rehabilitated) were tested and measured by a physiotherapist and answered the questionnaire at discharge. At the 6-month follow-up, 91 persons responded (48 group and 43

Table I. Differences between the rehabilitation programmes for group rehabilitation and individually designed rehabilitation (mean number per patient of different exercise groups, treatments, lectures, etc. during the rehabilitation period)

	Group	Individual <sup>1</sup>
Group physiotherapy		
back gymnastics	6.2	7.2
relaxation	2.9	5.5
water gymnastics	9.5	3.9
outdoor and indoor aerobic exercise	12.3	8.4
neck and shoulder group	4.4	5.2
guided strength and endurance training <sup>2</sup>	3.9	0
Individual physiotherapy		
therapeutic exercise	1.4	2.6
massage	6.2	7.0
traction	5.7	10.1
superficial heat	10.1	13.4
deep heat	2.4	2.0
electrotherapy	4.5	4.9
Group discussion <sup>2</sup>	2.0	0
The opening/closing meeting	1/1	0/0
Lecture/teaching discussion		
physiotherapist	8.3 <sup>3</sup>	4.6 <sup>3</sup>
exercise physiologist	1	0
doctor	1	0
psychologist	1	0
nurse	1	0
social worker	1	0.75

<sup>1</sup> Program for individually rehabilitated patients was planned according to their needs.

<sup>2</sup> Half a group.

<sup>3</sup> Back and neck school.

individually rehabilitated). Statistical comparison showed the study groups to be similar at entry, except for sex distribution (during the rehabilitation period), the amount of exercise before the rehabilitation period, spinal flexibility and trunk muscle strength (Table II).

After the rehabilitation period, both study groups showed increased spinal mobility and strength.

The individually rehabilitated subjects improved their strength and flexibility (sum of spinal flexion and side bending) ( $p < 0.05$  and  $p < 0.01$ , respectively) more than those in the group rehabilitation programme (Table III).

Table III. Subjective outcome, spinal mobility and strength at discharge for the group-rehabilitated and for the individually rehabilitated. Mean (SD)

	Group		<i>p</i> -value <sup>1</sup>	Individual	
	At entry	At discharge		At entry	At discharge
Oswestry-index (0–100)	38 (12)	37 (14)	n.s.	39 (12)	38 (17)
Visual analogue scales (0–100) pain at the moment	50 (26)	41 (26)**	n.s.	43 (22)	41 (27)
Flexibility <sup>2</sup>	40 (7.4)	40 (11)**		37 (8.9)	39 (9.0)**
Rotations <sup>3</sup>	77 (17)	84 (21)***	n.s.	79 (19)	87 (22)**
Strength <sup>4</sup>	52 (9.6)	53 (12)*	*	48 (11)	51 (10)*

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

<sup>1</sup> *p*-value for the difference in change between the groups.

<sup>2</sup> Flexion + side bends.

<sup>3</sup> Thoracolumbar rotation, right + left.

<sup>4</sup> Sum of repetitions in dynamic stomach and back muscle strength tests.

n.s.: not significant.

Table II. Clinical characteristics at entry, for group-rehabilitated and individually rehabilitated patients. Mean (SD) (except for sex)

Individual group		
Sex F/M		
treatment period	27/32	36/18*
at 6 months	19/24	30/18
Age (years)		
treatment period	47 (±8)	46 (±8)
at 6 months	47 (±8)	47 (±8)
Oswestry-index (0–100)		
treatment period	39 (±12)	38 (±12)
at 6 months	39 (±12)	39 (±12)
Back pain index (6–36)		
treatment period	22 (±4)	21 (±5)
at 6 months	22 (±4)	22 (±5)
Visual analogue scales (0–100) mean of all the scales <sup>1</sup>		
treatment period	49 (±22)	55 (±23)
at 6 months	48 (±21)	55 (±22)
Pain at the moment		
treatment period	43 (±22)	50 (±26)
at 6 months	43 (±21)	51 (±24)
Flexibility <sup>2</sup>	37 (±8.9)	40 (±7.4)**
Rotations <sup>3</sup>	79 (±19)	77 (±17)
Strength <sup>4</sup>	48 (±11)	52 (±9.6)*
Exercise (AU) <sup>5</sup>	5.1 (±1.4)	4.6 (±2.0)*
Use of pain medication (AU)	26 (±28)	33 (±32)
Use of physical therapy	1.6 (±1.1)	1.7 (±1.0)
Use of corsets (AU)	4.2 (±1.3)	4.0 (±1.3)
Ergonomic measures (AU)	0.2 (±0.4)	0.2 (±0.4)
Spinal operations (AU)	0.3 (±0.4)	0.3 (±0.5)
Smoking (AU)	0.3 (±0.5)	0.2 (±0.4)

\*  $p < 0.05$ ; \*\*  $p < 0.01$ .

AU = arbitrary units.

<sup>1</sup> Visual analogue scales used: pain at the moment, pain in the morning during the last month, pain after the working day during the last month, and pain in the evening during the last month.

<sup>2</sup> Flexion + side bends.

<sup>3</sup> Thoracolumbar rotation, right + left.

<sup>4</sup> Sum of repetitions in dynamic stomach and back muscle strength tests.

<sup>5</sup> Frequency of aerobic, gymnastic and/or strength training.

#### Subjective outcome

At the start of the rehabilitation period there was no difference in the reported disability caused by LBP between the group- and individually rehabilitated subjects (Table II). During the

Table IV. Results of the follow-up questionnaires (A = group, B = individual). Mean (SD)

		Before treatment	At 6 months
Oswestry-index (0–100)	A <sup>a</sup>	39 (±12)	35 (±18)*
	B	39 (±12)	41 (±16)*
Back pain index (0–100)	A <sup>b</sup>	22 (±5)	20 (±6)***
	B	22 (±4)	22 (±5)
Visual analogue scales (0–100) mean of all the scales <sup>1</sup>	A	55 (±22)	47 (±26)*
	B	48 (±21)	49 (±22)
	A <sup>b</sup>	51 (±24)	46 (±26)*
	B	43 (±21)	46 (±24)
Exercise (AU)	A	4.6 (±2.0)	4.6 (±1.6)
	B	5.1 (±1.4)	5.0 (±1.7)
Use of pain medication (AU)	A	33 (±32)	31 (±35)
	B	26 (±28)	21 (±28)
Use of physical therapy (AU)	A	1.7 (±1.0)	1.0 (±0.9)**
	B	1.6 (±1.1)	1.0 (±1.0)**
Use of corsets (AU)	A	4.0 (±1.3)	4.0 (±1.4)
	B	4.2 (±1.3)	4.0 (±1.3)
Ergonomic measures (AU)	A	0.2 (±0.4)	0.2 (±0.4)
	B	0.2 (±0.4)	0.2 (±0.4)
Operations (AU)	A	0.3 (±0.5)	0 (±0)***
	B	0.3 (±0.4)	0.02 (±0.2)*

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

AU = arbitrary units.

<sup>1</sup> Visual analogue scales used: pain at the moment, pain in the morning during the last month, pain after the working day during the last month, and pain in the evening during the last month.

<sup>a</sup>  $p < 0.01$  between the groups, <sup>b</sup>  $p < 0.05$  between the groups.

rehabilitation period there was no difference in change between the groups, although the group-rehabilitated subjects reported diminished pain on a visual analogue scale (Table III). Instead, a statistically significant difference between the groups came out at the 6-month follow-up point, in both the Oswestry and back pain indexes; when compared with the situation at entry, the group-rehabilitated patients showed a decrease in both indices, while the individually rehabilitated patients showed an increase in the Oswestry index (Table IV). When patients evaluated how well the goals of rehabilitation had been attained at the 6-month follow-up, the group-rehabilitated patients evaluated them to be fulfilled significantly better than the individually rehabilitated patients ( $p < 0.05$ ); likewise, the group-rehabilitated patients considered themselves to be more highly motivated in self-care ( $p < 0.05$ ). At 6-month follow-up, both the group and individually rehabilitated patients reported less use of passive treatments compared with the onset of the rehabilitation period (Table IV).

#### Economic analysis

The mean total cost (the cost of the rehabilitation program plus full board) of a group rehabilitation period was 2% higher than the cost of the individual rehabilitation period. The analysis revealed that more passive treatment than assumed was given to the group-rehabilitated.

## DISCUSSION

In this study, we compared the institutional rehabilitation of LBP in groups of approximately 10 persons with individual rehabilitation periods. Rehabilitation clients were directed into either group or individual rehabilitation by the Finnish Social Insurance Institute, so a random selection to the 2 study groups was not possible. Because the use of groups in in-patient rehabilitation was just beginning at the time of the study, the number of individually rehabilitated patients was greater. Thus, it was possible to choose those clients who came to the rehabilitation period at the same time with a rehabilitation group, and were of the same age. The clinical characteristics of the study groups did not differ significantly at entry.

The aim of the physical measurements was to characterize the study population and to motivate the patients to exercise. The lower baseline values of flexibility and strength may explain why individually rehabilitated patients improved their strength and flexibility more than group-rehabilitated patients. However, the physical measurements must be interpreted with caution, and the changes are probably clinically insignificant. The results of recent studies suggest that the usability of trunk strength tests in monitoring patients is limited due to large intra-individual variation between subsequent tests, and that the association between these tests and disability indices is low (17).

In LBP, strength and mobility are not the ultimate goals, but means to achieve less pain and disability. There are good theoretical reasons to believe that many psychosocial factors have significant roles in LBP (6). Our assumption was that group-rehabilitated patients would be better motivated for long-term exercise to achieve strength, mobility and aerobic fitness, because of the stronger behaviourist-cognitive approach of the group-rehabilitation compared with the programme for the individually rehabilitated patients. Additionally, and as importantly as the exercise part, we supposed that the behaviourist-cognitive approach would result in attitude changes towards LBP being (at least partially) accepted as a natural phenomenon, usually with a favourable long-term outcome, without feelings of fear or catastrophe.

Finally, we hoped that, put together, better self-care and changes in attitudes would result in less perceived disability when compared with individually rehabilitated patients. The results of the 6-month follow-up seem to confirm this, at least partially, because when compared with individually rehabilitated patients, the group-rehabilitated patients reported less pain and disability and more motivation to take exercise to promote low back health. However, there was no change in the reported amount of exercise when compared with the situation at entry. Thus, a change in attitudes may be the explaining factor. Another possible explanation might be the greater need felt by the group-rehabilitated patients to please the rehabilitation team and give more positive answers. According to literature, the members of a group are inclined to change their ideas towards those of the group leader's, and the increasing solidity of the group makes it easier for a group member to identify with the

group, and accept its values and norms (18). One would, however, expect this mechanism to play an even greater role during the rehabilitation period, but no difference in perceived pain or disability between the study groups was seen at discharge.

The lack of increase in self-care at 6-month follow-up was an unexpected and disappointing result, and in contradiction to, for example, the results of a large study comparing institutional rehabilitation periods with out-patient care (19). In that study, all the patients were invited to a control visit after 12 months, and the awareness of this follow-up examination may at least partly explain the difference. In our study, a control visit could not be arranged, but a similar longer follow-up would have been desirable.

The positive results of both study groups were fairly modest. This may be due to insufficient intensity of the programme, 62 hours in group and 45 hours in individual rehabilitation; according to the review of Guzmán et al. (10) trials with less than 100 hours of rehabilitation did not show improvements in pain or function compared with non-multidisciplinary outpatient rehabilitation or usual care.

According to a brief economic analysis, there was practically no difference between the costs of the rehabilitation programs. However, the group rehabilitation programme was 38% longer than that of the individual rehabilitation programme. This was mostly due to the many group sessions with cognitive-behaviouristic approach, which we suggest explains the differences between the study groups at the 6-month follow-up, tentatively favouring group rehabilitation.

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