

SOCIAL FACTORS AND OUTCOME IN A FIVE-YEAR FOLLOW-UP STUDY OF 276 PATIENTS WITH SCIATICA

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ABSTRACT. Social factors of 179 operated and 97 non-operated patients one year after hospitalization due to low back pain and sciatica were tested by multivariate regression analysis in relation to the five-year outcome evaluated according to the WHO Handicap Classification. For operated men a subjective working incapacity (relative risk RR=4.6) and co-morbidity (RR=2.7) predicted a poor outcome. For operated women the predictive factors were subjective working incapacity (RR=3.2) and older age (RR=1.9). For non-operated men an increased occurrence of occupational hazards (RR=3.6) and for non-operated women co-morbidity (RR=7.1) indicated a poor outcome.

Key words: low-back pain, prediction, social factors, outcome, occupation handicap, relative risk.

Social functioning capacity can be defined by the qualifications a person must possess when he is daily confronted with other people, with family, at work, and in other social contacts. In recent years interest in investigating the relation between social well-being and low back pain (LBP) has been increasing. The question of interaction has been debated in this context: Is it the LBP patients with social problems who have a poor prognosis, or does a long history of LBP itself predispose to social problems (16)? An answer is not easy to find on the basis of present knowledge. Nevertheless, a need for further descriptive studies and for assessment of the predictive role of different tests has been recognized (30). This was one of the incentives for undertaking the project of which the present follow-up study is a continuation.

The Rehabilitation Research Centre (RRC) of the Social Insurance Institution in Finland and the surgical departments of Turku University Central Hospital and Turku City Hospital commenced a joint project in 1980, with the basic aim of examining the rehabilitation process in the back patient, using lumbar disc prolapse as an example of spinal pathology. Factors predicting the results of surgery as well as factors

associated with rehabilitation and changes in occupation handicap during the first post-operative year have been reported earlier (1, 2, 4, 14). The present prospective study also included those patients who were not treated surgically. Results concerning the general five-year outcome as well as the associations between earlier clinical findings and the occupation handicap at the five-year follow-up have been reported elsewhere (18, 19).

This study concentrated on the social field. The main purpose was to find out which social factors in early rehabilitation after hospital treatment for LBP and sciatica would best predict the long-term outcome, the outcome in this context being evaluated by the occupation handicap of the WHO Handicap Classification (3, 29). Another interest was to see whether these factors would prove suitable for interventional measures.

MATERIAL AND METHODS

The basic study population consisted of 342 patients admitted to hospital because of severe sciatic pain during the years 1980-1982. The final study group comprised the 276 patients who had attended both at the one- and the five-year follow-ups. No randomization of treatment at the initial hospital phase was used. On the basis of established clinical indications lumbar disc surgery was performed on 179 patients. The remaining 97 patients were submitted for further conservative treatment such as rest, physical exercise, traction and injections. Sex and age characteristics of the two study groups are presented in Table I. More detailed descriptions of the study population have been published elsewhere (18).

Clinical evaluation. The investigations at the one- and five-year follow-ups were essentially similar in character. Questionnaires were used for recording back symptoms, treatment, daily and leisure time activities, psychological feelings and social performance. The clinical examinations were carried out in the RRC. The patients were interviewed by the psychologist and the social worker.

Both the physician and the physiotherapist examined the patients thoroughly. The outcome five years after the hospitalization was evaluated according to a modification of the

Table I. Sex and age of the patients at the five-year follow-up

	Operated patients			Non-operated patients		
	n	Age (yrs)		n	Age (yrs)	
		Mean	SD		Mean	SD
Males	89	43.9	7.9	46	44.4	10.4
Females	90	44.8	8.8	51	46.9	9.0
Total	179	44.4	8.4	97	45.7	9.7

WHO Handicap Classification (3, 29). A team consisting of the physician, the social worker and the psychologist defined each patient's handicap according to the following scale:

Class 0

Customarily occupied (no handicap). No problems at work or in leisure time activities.

Class 1

Intermittently occupied (mild handicap). Only intermittent inability to follow customary occupation or leisure time activities. On most days there are no symptoms of low back pain, and need for sick leave is uncommon.

Class 2

Curtailed occupation (moderate handicap). Individuals are unable to participate in all the activities associated with their customary occupation or recreation. Low-back pain symptoms are almost chronic and need for sick leave occurs every now and then.

Class 3

Adjusted occupation (severe handicap). Individuals are able to follow only a modified or alternative full-time occupation and need special arrangements at the work place. Strenuous leisure-time activities are almost totally restricted. Low-back pain and need for sick leave are chronic, and individuals may have received a part-time pension.

Class 4

Reduced occupation (very severe handicap). Ordinary work and/or strenuous leisure time activities are totally restricted. Individuals have received a pension because of low-back disorder, and they encounter many difficulties in the activities of everyday life.

Class 5

Restricted occupation (extremely severe handicap). Besides total restriction of working capacity, light leisure-time activities are also nearly totally restricted. Individuals need assistance with the general activities of everyday life.

For analysis the handicap was dichotomized:

- classes 0-1 = mild group
- classes 2-5 = severe group

Finally the team defined the need of disability pension in each case.

Below are listed the social factors at the one-year follow-up that were related to the five-year occupation handicap status.

1. Age (yrs) as a continuous variable
 2. Marital status:
 - single
 - married
 - divorced/widowed
 3. Social group, which was based on a classification of vocational status (20) comprising nine subgroups:
 - I 1-6 upper class and middle class
 - II 7-9 lower class
 4. Vocational education:
 - none
 - vocational course/school; technical/commercial/high school; or university
 5. Total sick leave during the first postoperative year (for non-operated patients: during the year after myelography):
 - ≤ 2 months
 - > 2 months
 6. Co-morbidity. The diagnoses at dismissal from the one-year follow-up examinations were registered according to the ICD classification (WHO, 1967). Back disorder diagnoses occurring in this study were 725.10, 728.70 and 728.80. Based on the distribution of diagnoses in the material two classes were formed:
 - patients with one diagnosis only (= back disorder)
 - patients with a primary back disorder diagnosis plus additional diagnosis(es) other than those mentioned above
 7. General strenuousness of work divided into three categories according to Hurme et al. (13):
 - light (e.g. student, clerk, teacher)
 - moderately heavy (cook, policeman, nurse)
 - heavy (plumber, fisherman, lumberjack)
 8. Working posture and habits. Dichotomic (yes - no) answers to questions concerning:
 - lifting and carrying heavy objects
 - flexed, rotated or otherwise strained posture
 - continuous standing
 - continuous sitting
 - work using vibrating tool
 - continuously repeated series of movements
 - forced working pace
- For statistical processing the number of "yes"-answers

Table II. Distribution of severity of occupation handicap at the five-year follow-up of operated and non-operated patients

Handicap	Operated				Non-operated			
	Men		Women		Men		Women	
	n	%	n	%	n	%	n	%
None	24	27	12	13	1	2	2	4
Mild	37	42	29	32	18	39	16	31
Moderate	11	12	19	21	17	37	12	24
Severe- extr. severe	17	19	30	34	10	22	21	41
Total	89	100	90	100	46	100	51	100

were summed up to form an index (range 0-7) which was treated as a continuous variable.

9. Occupational hazards occurrence classified into group 0 = no, 1 = some, 2 = considerable
 = noise
 = heat, cold, dust

Table III. Significance levels for relations of social factors at one-year follow-up to occupation handicap at five-year follow-up of operated patients

Student's *t*-test used for age, χ^2 -test for the rest

Social factor	Men	Women
Age	NS	***
Marital status	NS	*
Social group	NS	*
Vocational education	NS	NS
Sick-leave	***	*
Co-morbidity	***	*
Strenuousness of work	NS	NS
Working posture and habits		
Heavy lifting	*	NS
Strained posture	**	NS
Continuous standing	NS	**
Continuous sitting	NS	NS
Work using vibrating tools	NS	NS
Repeated series of movements	NS	NS
Forced working pace	NS	NS
Occupational hazards		
Noise	NS	NS
Heat, cold, dust	*	NS
Monotonous work	*	NS
Tight work schedule	NS	NS
Work satisfaction	**	**
Subjective working capacity	***	***
Leisure time activity	*	NS
Team recommendation	**	NS

NS = not significant, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

- monotonous work
- tight work schedule

The sum of these four questions was used as an index with a maximum value of 8, which for analysis was dichotomized into classes 0-1 and 2-8.

10. Work satisfaction related to back disease:
 - satisfied
 - dissatisfied
11. Subjective working capacity
 - full capacity
 - moderate to total incapacity
12. Leisure time physical activity:
 - low (passive)
 - moderate (e.g. gardening, repairing furniture, hunting)
 - high (regular jogging, dancing, skiing)
13. Team recommendation of disability pension:
 - yes
 - no

Statistical methods

The relations of all the specific factors of the one-year follow-up to the handicap evaluated at the five-year follow-up were examined by chi-square testing, except for age, where Student's *t*-test was used. A multivariate model for examination of the relations between the occupation handicap and all the previously mentioned social factors was analysed by stepwise logistic regression (6). For the social factors that remained in the final model the common relative risk (RR) for ending up with a severe occupation handicap was estimated according to Mantel-Haenszel. All analyses were performed for operated and non-operated men and women separately.

RESULTS

The distribution of the occupation handicap classes in the study groups at the five-year follow-up is shown in Table II. Mild handicap was more common for men than for women both in the operated (69% vs. 45%) and the non-operated (41% vs. 35%) groups.

The significance levels of the chi-square test of relations between the specific social factors at the one-year

Table IV. Significance levels for relations of social factors at one-year follow-up to occupation handicap at five-year follow-up of non-operated patients

Student's *t*-test used for age, χ^2 -test for the rest

Social factor	Men	Women
Age	NS	**
Marital status	NS	NS
Social group	NS	NS
Vocational education	NS	NS
Sick-leave	NS	***
Co-morbidity	NS	***
Strenuousness of work	**	**
Working posture and habits		
Heavy lifting	*	NS
Strained posture	*	NS
Continuous standing	NS	*
Continuous sitting	NS	*
Work using vibrating tools	**	NS
Repeated series of movements	NS	*
Forced working pace	NS	NS
Occupational hazards		
Noise	*	NS
Heat, cold, dust	NS	NS
Monotonous work	NS	NS
Tight work schedule	*	NS
Work satisfaction	NS	*
Subjective working capacity	NS	**
Leisure time activity	NS	NS
Team recommendation	NS	NS

NS = not significant, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

follow-up and the occupation handicap status of the five-year follow-up are presented in Table III (operated patients) and Table IV (non-operated patients).

The distribution in the dichotomized handicap classes (mild vs. severe) of those specific factors where significance was reached is presented below.

1. *Age*. Mean age for operated women was 36.3 yrs in the mild group and 44.9 yrs in the severe group. For non-operated women the result was 37.8 vs. 46.0 yrs.

2. *Marital status*. Of the operated women in the severe group 31% had been widowed/divorced at the one-year follow-up compared with 12% in the mild group.

3. *Social group*. Of operated women with severe handicap 67% had belonged to the lower social class at the one-year follow-up compared with 44% of women with mild handicap.

4. *Vocational education*. No significant associations with handicap were found in either study group.

5. *Sick-leave after operation/myelography*. The proportion of operated men who had been on sick-leave for more than 2 months during the first postoperative year was 71% in the severe group and 38% in the mild. Corresponding distribution for operated women was 78% and 49%. For non-operated women (sick-leave after myelography) frequencies of 73% and 29% were noted.

6. *Co-morbidity*. The proportion of operated men with additional diagnoses was 82% in the severe group and 34% in the mild. For operated women the distributions were 65% vs. 39%. For non-operated women frequencies of 94% vs. 22% were noted.

7. *General strenuousness of work*. Of the non-operated men with severe handicap 52% had been engaged in heavy jobs compared with 28% of men with mild handicap. Non-operated women had mostly been in moderately heavy jobs at the one-year follow-up. In the severe group the proportion was 55% and in the mild 39%.

8. *Working posture and habits*. Jobs that included lifting heavy objects were recorded in 59% of the operated men with severe handicap. In the mild group the frequency was 35%. Corresponding frequencies for non-operated men were 65% and 28%.

Of the operated men with severe handicap 73% had been in jobs involving strained working postures, while the same frequency for the mild group was 35%. Corresponding values for non-operated men were 76% and 39%.

In the group of operated women with severe handicap 63% had been in jobs including continuous standing, while the frequency in the mild group was 33%. For non-operated women corresponding frequencies were 63% and 28%.

Of non-operated women with mild handicap 56% had worked mostly in a sitting position compared with 19% in the severe group.

Of the non-operated men with severe handicap 61% had reported work using vibrating tools, while the frequency for the mild group was 17%.

Of the non-operated women with severe handicap 52% had been in jobs comprising continuously repeated series of movements compared with 26% in the mild group.

9. *Occupational hazards*. Of the non-operated men with severe handicap 33% had been exposed to much noise in their jobs, as compared with 6% in the mild group.

Of the operated men with severe handicap 41% had been exposed to much heat, cold or dust compared

Table V. Social factors of the one-year follow-up remaining in the final regression analysis model and the relative risk (RR) of severe occupation handicap four years later for operated and non-operated patients

Social factor	Coefficient	<i>p</i>	RR	95° confidence interval
<i>Operated</i>				
<i>Men</i>				
Subjective working capacity	1.15	<0.001	4.6	2.3-9.1
Co-morbidity	0.75	<0.05	2.7	1.3-5.6
<i>Women</i>				
Subjective working capacity	1.54	<0.001	3.2	2.1-4.8
Age (≤40 yrs vs. >40 yrs)	1.04	<0.01	1.9	1.4-2.6
<i>Non-operated</i>				
<i>Men</i>				
Occupational hazards	1.07	<0.01	3.6	1.6-8.2
<i>Women</i>				
Co-morbidity	1.81	<0.001	7.1	3.4-14.8

Goodness of fit χ^2 for the model: operated men = 67.0, $p=0.75$, d.f.=76; operated women = 70.8, $p=0.68$, d.f.=77; non-operated men = 39.0, $p=0.18$, d.f.=32; non-operated women = 34.8, $p=0.74$, d.f.=41.

with 17% in the mild group.

A high degree of monotonous work had occurred for 18% of the operated men with severe handicap. In the mild group the corresponding proportion was 3%.

A considerable tight work schedule had been the case in 72% of the non-operated men with severe handicap and in 33% in the mild group.

10. *Work satisfaction.* Of operated men with mild handicap 90% had been satisfied with their work at the one-year follow-up. In the severe group the proportion was 61%. Corresponding distributions for operated women were 83% and 53% and for non-operated 75% vs. 39%.

11. *Subjective working capacity.* A total of 79% of operated men with severe handicap had felt themselves moderately to totally incapable at the one-year follow-up. The frequency in the mild group was 18%. For operated women proportions of 82% vs. 22% were noted and for non-operated 82% vs. 38%.

12. *Leisure time activity.* Of the operated men with mild handicap 28% had reported high levels of activity compared with 4% in the severe group.

13. *Team recommendation.* None of the operated men in the mild handicap group had been recommended a disability pension, whereas this had occurred for three men (11%) in the severe group.

Regression analysis results

Table V presents social factors in the one-year follow-up that remained in the final model after stepwise logistic regression analysis.

In the operated men's group a feeling of moderate to total working incapacity and an increased number of diagnoses at the one-year follow-up related to a deteriorated occupational handicap status four years later. If they were subjectively incapacitated, the risk of ending up with a future severe handicap was almost five times as great (RR=4.6) and when there were additional diagnoses the risk was almost three times as great (RR=2.7).

For operated women a subjective working incapacity was associated with severe handicap and also increased age. The risk was for working incapacity three times as great (RR=3.2) and for age twice as great (RR=1.9).

In the non-operated men's group an increased number of detrimental work environment factors was associated with severe handicap, the risk being almost four times as great (RR=3.6). For non-operated women an increased number of diagnoses pointed to a severe handicap, the risk being seven times as great (RR=7.1).

DISCUSSION

The original material included 98.7% of the patients operated on for lumbar disc herniation in Turku during the years 1980-1982 (14). A relatively high proportion, about 80% of the patients originally included in the study, participated in the five-year follow-up examinations (18).

The WHO Handicap Classification is relatively lit-

tle used in rehabilitation research and in some reports a clear ambiguity is expressed. In a study of stroke patients (11) the WHO system was found to be useful in the description of patients admitted to rehabilitation and in providing information for their discharge as well. Difficulties were experienced in differentiating between handicap and disability and the utility of using three distinct categories of functional consequences was seriously questioned.

A study of geriatric patients (7) found the WHO system useful for assessing the need for aids and assistance, but advertised for more developmental work in standardization and agreement, in particular on the concept of handicap. The use of the occupation handicap as an outcome indicator (response variable) in the present study was based on experience gained from the one-year (1) and five-year (18, 19) follow-up investigations. According to its definition the handicap of the WHO system can be considered as the social dimension of an individual's impairment or disability which at the same time incorporates elements of the underlying functional categories.

The choice of the independent variables, i.e. those social factors that are to be related to the outcome, is of course arbitrary. The aim was, however, to include those factors which in other studies of similar type have been well-tried and commonly used, such as age, family, education, social status, work, subjective evaluation, etc.

Regression analysis results

Self-estimated working incapacity, higher age and co-morbidity predicted a poor outcome in the group of *operated patients* (Table V). Subjective incapacity proved to be an important predictor in both men and women, which furthermore is emphasized by the higher relative risk values found. Correlations between self-rated evaluations of work, working ability, ADL performance and clinical evaluations have also been observed in other studies (10, 12, 26).

The number of disorders has been observed to be associated with the result of rehabilitation or with extended duration of disability (17, 23), which coincide with the results of this study.

Severity of back pain generally appears to be associated with increased age (9). Several studies have found age to be an important predictor of recurrent disability and absence from work (8, 15, 21, 27, 31). In Weber's controlled study only age correlated with unsatisfactory results at the ten-year follow-up (28). In the study by Sørensen et al. (25) age did not,

however, significantly relate to a poor outcome in patients operated on for the first time for lumbar disc herniation.

For the *non-operated* men a higher occurrence of occupational hazards predicted a poor outcome, while for the women a poor outcome was associated with co-morbidity (Table V).

As has been authoritatively stated (5, 30), there is no evidence for a causal relationship between back pain and environmental or occupational factors, although some correlations have been observed. Svensson et al. (24) found that monotonous work, a high physical activity level at work and a feeling of tenseness and anxiety significantly associated with an increased frequency of low back problems. Vällfors (27) observed that absenteeism and disability from LBP were more likely to occur when the work environment was unpleasant and noisy. A panel of experts trying to determine the relative weights of various factors that might be predictive of low back disability gave the occupational category the highest weight (20/100) in a list of eight categories (9). Two large prospective studies could not, on the other hand, demonstrate any significant associations between occupation and prolonged absence (21) or self-assessed work environment and early retirement (31).

Co-morbidity proved to be a relatively strong predictor of a poor outcome in non-operated women with a seven times greater risk of ending up with a severe occupation handicap.

Contrary to other studies (8, 22) the recommendations by the rehabilitation team did not in this study emerge as final significant predictors of the outcome.

The difference in the final results of the operated and non-operated patients is evident, but the lack of random allocation to treatment in the hospital phase made any statistical comparisons impossible. Earlier studies of the material (18, 19) have implied that the non-operated patients had a more multifactorial background, which, combined with less distinct disease features, could prove explanatory.

SUMMARY AND CONCLUSIONS

Social factors in 179 operated and 97 non-operated patients one year after hospitalization due to low back pain and sciatica were tested for their relation to the five-year outcome. In the multivariate regression analysis the following results indicated a poor outcome (relative risk for severe occupation handicap in brackets):

Operated	Men	Women
Subjective working incapacity	+ (4.6)	+ (2.7)
Co-morbidity	+ (3.2)	
Higher age		+ (1.9)
Non-operated		
Increased number of occupational hazards	+ (3.6)	
Co-morbidity		+ (7.1)

A subjective working incapacity may be the end point of several different events occurring both within and outside a person's daily job. It is probably closely linked to motivation, which depends among other things on individual psychological factors. The task of work motivation improvement seems somewhat arduous, but in the light of the results of this study it might be worth an attempt. Co-morbidity and ageing are factors that can be taken into consideration both in the employment phase and when necessary also later on, if a change of assignment is needed. These are, together with efforts to reduce occupational hazards risks, responsibilities of the occupational health care system.

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