Lumbar disc syndrome in Finland

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SUMMARY The prevalence of lumbar disc syndrome (herniated disc or typical sciatica) and its consequences in terms of disability, handicap, and need for medical care were studied as part of the Mini-Finland Health Survey. A sample of 8000 persons representative of the Finnish population aged 30 or over was asked to come for examination, and 7217 (90%) participated. A diagnosis of lumbar disc syndrome based on medical history, symptoms, and standardised physical examination was made for 5.1% of the men and for 3.7% of the women. Half of these patients were assessed to be in need of medical care, over 80% of which was considered to be adequately met. One third of all patients with lumbar disc syndrome had been previously hospitalised for that syndrome, and one fifth of the patients had undergone lumbar surgery. At least slight disability was found in almost 60% of the patients, though severe functional limitations were rare. About 6% of the population's work disability was estimated to be attributable to lumbar disc syndrome.

When the nucleus of a lumbar intervertebral disc extrudes through the enveloping annulus fibrosus capsule the adjacent nerve roots may be compressed. Sciatica, a myotomal pain radiating to either of the legs along the nerve, is the most characteristic symptom of a herniated intervertebral disc. On the other hand, a definite sciatica rarely occurs without disc herniation. Because of the close relation between abnormalities in the lumbar intervertebral discs and sciatic pains, these two entities can be jointly referred to as lumbar disc syndrome.

Although lumbar disc syndrome is certainly not the most common type of low back pain, it is very important because it often results in handicap and frequently requires surgery. No accurate estimates of its frequency and public health impact are available. Estimates made thus far have been based on insurance and hospital discharge statistics,¹⁻⁴ interviews,⁵⁻⁹ or selected clinical material.¹⁰ The diagnosis of lumbar nerve root compression is often difficult, and there are no clinically acceptable diagnostic criteria that could be applied in population surveys. No epidemiological studies based on clinical examination of a representative population sample have been published.

Our main aim was to estimate the prevalence of lumbar disc syndrome in Finland. Another goal was to study its contribution to disability in the population, and to assess the need and use of medical services attributable to it. The study on musculoskeletal

diseases was conducted as part of the Social Insurance Institution's Mini-Finland Health Survey¹¹ carried out in 1977-80 in a representative sample of the adult Finnish population.

Study population and methods

The study population was a stratified two-stage cluster sample¹² drawn from the population register to represent Finnish adults aged 30 years or over. The first stage comprised selection of 40 representative areas. In the second stage, a systematic sample of inhabitants was drawn from each area. The sample consisted of 8000 persons (3637 men and 4363 women) from 40 areas of the country.

The examinations were carried out by the Mobile Clinic of the Social Insurance Institution in two main phases, a screening phase and a re-examination phase. All subjects in the sample were asked to come to the screening phase. A total of 7217 persons (90% of the sample) participated. The distributions of sex, age, marital status, and level of education in the participants and in the whole Finnish population were compared, and found to be closely similar.

The methods used to study musculoskeletal diseases have been described in detail elsewhere.¹¹ Along with the invitation to come for examination, the subjects received a basic questionnaire including questions about previous diseases, hospitalisations, and operations. The questionnaire also inquired about

reductions in working and functional capacity which the subject may have had, and the diseases that caused them. Furthermore, the questionnaire inquired about the subject's ability to perform non-occupational tasks and leisure-time activities. A separate, specific interview for the musculoskeletal system comprised questions about low back pain and sciatica and their consequences. To detect functional limitations, an examination comprising ten test movements was carried out. However, no actual back function tests were performed in this context. The information covering all disability pensions due to musculoskeletal diseases was obtained from the registers of the Social Insurance Institution through record linkage.

The subjects with a disease history, symptoms, or findings suggesting musculoskeletal disease were asked to participate in the re-examination phase. The screening criteria for low back complaints were as follows: history of lumbar surgery; absence from work for at least 30 days due to low back pain or sciatica during the previous year; history of back injury, with a permanent handicap; or history of low back pain during the previous month or at least two episodes of pain radiating from the thigh to the foot, and inability to perform daily tasks for more than one month during the preceding five years, being confined to bed for more than six weeks or at least twice during the previous five years, or continuous back pain for more than three months.

There were 3775 persons (52% of those examined) who met at least one of the screening criteria for musculoskeletal diseases and were thus asked to come

for re-examination; 3437 (90%) subjects participated. The re-examination comprised standardised physical examination carried out by seven specially trained physicians. The physicians worked according to detailed written instructions and applied uniform diagnostic criteria. The physical examination comprised an inspection of back curvature, tests of flexion, extension, and torsion of the back, the straight leg raising test, and mobility of limb joints. Other findings were recorded individually. The field physicians made the final diagnoses and evaluated the consequences of the diseases on the basis of all available information, including disease history, symptoms, and clinical findings. The diagnostic criteria are given in table 1.

The doctor recorded whether or not the patient was under medical care and whether the services provided were adequate. The need for such care was estimated according to current therapeutic practice, taking into account the type and severity of the disease as well as the patient's age and general state of health.

The clinical examination ended with an assessment of the subject's working capacity and functional ability. Working capacity was classified (in reference to the present or last job) as follows: (1) not limited; (2) slightly limited—occasional difficulty in ordinary tasks, or regular difficulty in heavy or demanding tasks; (3) markedly limited—regular difficulty in ordinary tasks, or unable to accomplish heavy or demanding tasks, or subject to long sick leaves in the past; or (4) completely unable to work. The following classification was applied in grading functional ability:

Table 1 *Criteria for low back syndromes used in the clinical examination*

<i>Basis:</i>		
A Disease history	B Symptom history	C Physical status
A1 Document concerning a relevant diagnosis which is based on convincing clinical findings	B1 Convincing history of low back pain which has also occurred during the preceding month	C1 Flexion or rotation restricted by 30% or more; objective signs of back pain in motion; scoliosis of 20° or more; significantly straightened lumbar lordosis; Laseque's test positive at 60° or less; or other severe abnormality
A2 History of diagnosed low back condition but not sufficient documentation	B2 Convincing history, but no significant symptoms during the preceding month	C2 Minor pathological finding in any of the tests above
<i>Criteria:</i>		
Definite low back syndrome	A1 and B1; or A2 and B1 and C1	
Probable low back syndrome	A2 and B1 and C2; or A2 and B2 and C1; or B1 and C1	
<i>Classification:</i>		
Herniated lumbar disc	Herniation of the intervertebral disc previously confirmed by operation or myelography	
Sciatica	Typical symptoms or findings of lumbar nerve root compression, but no direct evidence of a herniated intervertebral disc	
Lumbar disc syndrome	Herniated lumbar disc or sciatica	
Other low back syndrome	Definite or probable low back syndrome (spondylolisthesis, spondylarthrosis, chronic muscular pain, other defined, or not classified), but not sufficient evidence of lumbar disc syndrome	

(1) not limited; (2) slightly limited—occasional difficulty in light daily activities, or regular difficulty in heavy daily activities; (3) markedly limited—regular difficulty in light daily activities or completely unable to perform some heavy activity; or (4) almost completely or completely limited—completely unable to perform some light activity.

STATISTICAL METHODS

Age-standardised prevalences were calculated using the direct method,¹³ with the Finnish population in 1980 as the standard. Differences in age-adjusted prevalences between men and women were tested by means of a logistic model.¹⁴ The impact of lumbar disc syndrome on disability and use of health care services was expressed as 'population attributable fractions'. The fractions were calculated on the basis of the age-adjusted prevalences of disability and use of health care services among the subjects with and without lumbar disc syndrome. Mantel-Haenszel's statistics were used to test differences in frequency of disability and use of services between the diagnostic categories.¹⁵ The agreement between diagnoses made at the field examination proper and the extensive clinical examination was estimated with kappa-coefficient.¹⁶

Kappa-coefficients were also used to estimate the agreement between the self-assessed degree of disability and the corresponding assessments based on the clinical examinations. Systematic differences between the prevalences obtained with the two methods were tested by MacNemar's test.¹⁶

QUALITY CONTROL

In order to assess the sensitivity of the screening methods, a random subsample of 740 persons participating in the screening phase underwent clinical examination irrespective of the screening results. A definite or probable lumbar disc syndrome was diagnosed in 42 of those subjects. The sensitivity rates of the screening procedure for herniated lumbar disc and sciatica were 94% (15 out of 16) and 89% (23 out of 26), respectively. Thus the overall screening failure was approximately 9.5%. The high sensitivity was largely due to the patients' concomitant musculoskeletal conditions, as the symptom interview, aimed especially at identifying the eventual victims, missed a significant proportion of the cases.

To study the reliability of the diagnoses, a sample of 199 persons representative of those who had reported low back pain in the screening phase were examined extensively during two days at the Rehabilitation Research Centre of the Social Insurance Institution.¹⁷ These examinations were carried out about one year after the screening phase. A standardised clinical

examination was performed by a physician who diagnosed musculoskeletal diseases on the basis of all information obtained. The information included a detailed medical history, symptoms, physical findings, plain radiographs of the lumbar spine, an electroneuromyographic examination (L4 to S1), and the electric reactivity of four muscles of the lower extremities (vastus lateralis, gastrocnemius, tibialis anterior, and extensor digitorum brevis).

For the diagnosis of herniated lumbar disc, the agreement was satisfactory between the field phase proper and the extensive clinical examination, the kappa value being 0.60 (95% confidence interval 0.28 - 0.92). However, for the diagnosis of sciatica the agreement was rather poor (kappa = 0.25; 95% confidence interval 0.02 - 0.48). McNemar's test showed no significant systematic differences in the prevalences between the two examinations ($\chi^2 = 0.00$ for herniated disc and 1.89 for sciatica; $df = 1$; $p > 0.05$).

Results

PREVALENCE OF LUMBAR DISC SYNDROME

The prevalences of lumbar disc syndrome and its subcategories are presented in table 2. The prevalence of lumbar disc syndrome was significantly ($p < 0.005$) higher in men (5.1%) than in women (3.7%). In both sexes, the prevalence was highest in those aged 45-64. Other types of low back syndrome, on the other hand, were still prevalent in old age, and no difference was found between men and women. When the observed prevalence (4.3%) was corrected for the approximate screening failure, an overall estimate of 4.8% was obtained.

DISABILITY

The differences in disability between the diagnostic categories varied similarly in both sexes, and so the results for men and women were combined. The fractions of reductions attributable to lumbar disc syndrome in everyday duties apart from work and in leisure-time activities were estimated to be 3.5% and 4.7%, respectively (table 3). According to the field physician, the ability to perform daily activities was at least slightly limited in 56%, at least markedly limited in 21%, and severely limited in 5% of the subjects with lumbar disc syndrome. No significant differences were found when the results were compared with the corresponding assessments of the subjects in whom other low back syndrome was diagnosed. The handicap reported by the patients themselves showed a close relation to the disability assessed by the field physician (table 4).

According to both the questionnaire completed by the patient and the physician's assessment at the

Table 2 Prevalence (%) of lumbar disc syndrome, its categories, and other low back syndrome diagnosed at the clinical examination by sex and age (years)

Diagnosis	Men						Women						Age-adjusted		
	30-44	45-54	55-64	65-74	75-	Total	30-44	45-54	55-64	65-74	75-	Total	Men	Women	p
Lumbar disc syndrome, definite or probable	3.6	8.5	7.0	4.1	1.9	5.3	3.4	5.4	5.6	2.3	0.3	3.8	5.1	3.7	0.005
Herniated disc, definite	1.0	4.1	2.0	1.2	0.6	1.9	1.0	1.7	2.6	0.6	0	1.3	1.8	1.3	0.07
Herniated disc, probable	0.2	0.1	0.3	0.2	0	0.2	0.2	0.1	0.4	0	0	0.2	0.2	0.2	0.82
Sciatica, definite	1.2	2.7	3.3	1.2	0.6	1.9	1.2	2.4	1.5	0.8	0	1.3	1.8	1.3	0.09
Sciatica, probable	1.2	1.5	1.3	1.6	0.6	1.3	1.0	1.2	1.2	0.9	0.3	1.0	1.3	1.0	0.23
Other low back syndrome, definite or probable	6.6	14.3	19.1	17.2	15.1	12.5	7.1	12.1	19.9	17.9	17.3	13.2	12.5	12.7	0.93
No. of subjects	1343	781	603	436	159	3322	1373	828	745	642	307	3895	3322	3895	

Table 3 Age-standardised prevalences (%) of various kinds of handicap in men and women with lumbar disc syndrome, other low back syndrome, and no low back diagnosis

Handicap	Lumbar disc syndrome	Other low back syndrome	No low back diagnosis	Attributable to lumbar disc syndrome (%)
<i>Self-reported in the questionnaire:</i>				
Forced to abandon or reduce duties apart from job	33.0	34.0	18.2***	3.5
Forced to cut down or reduce leisure activities	40.2	38.7	18.6***	4.7
<i>Assessed at clinical examination:</i>				
At least slightly limited performance of daily activities	55.6	53.4	29.3***	3.7
At least markedly limited performance of daily activities	21.1	23.7	14.1***	2.5
Severely limited performance of daily activities	5.2	4.6	2.9	0.9
No. of subjects	326	927	5 964	

Difference from the lumbar disc syndrome as tested with Mantel-Haenszel statistics: ***p<0.001; unmarked if p>0.05

Table 4 Comparison of self-reported handicap and disability assessed by physician in the patients with lumbar disc syndrome

Self-reported handicap in tasks apart from job or in leisure activities	At least slight disability assessed by physician		
	No	Yes	Total
No	86	55	141
Yes	44	141	185
Total	130	196	326

Proportion classified indentically = 69.6%
Kappa = 0.38; 95% confidence interval 0.27 - 0.48
McNemar's test: $\chi^2 = 1.01$; df = 1; p > 0.05

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clinical examination, 15% of the subjects less than 65 years old and having lumbar disc syndrome were completely incapable of working in their present or last occupation (table 5). The proportion of work disability attributable to lumbar disc syndrome was estimated to be 6%. The agreement between the patients and the field physician as to their assessments of work disability was satisfactory (table 6).

NEEDS AND USE OF MEDICAL SERVICES

According to the field physicians, 51% of the patients with lumbar disc syndrome needed long-term medical care (table 7). In 84% of these the need was considered to be adequately met. The estimated numbers of patients in Finland are given in table 8. These estimates were corrected for the screening failure of approximately 9.5%.

During the last 12 months the subjects with lumbar disc syndrome had visited a physician (due to illness and outside hospital), on average, 3.8 times, those with other low back syndrome 3.4 times, and those without back diagnosis 2.3 times. The differences in the use of medical services between men and women were small.

Therefore only combined results are given in table 9. Heavy use of primary health care services (10 or more annual visits to the physician) proved particularly common in the presence of lumbar disc syndrome, and 5% of this was estimated to be attributable to the syndrome. Of the subjects with lumbar disc syndrome, 32% had previously been hospitalised, and 21% had been operated upon because of a low back condition.

Discussion

Due to the cross-sectional design, the results reflect the prevalence of chronic syndromes. The representativeness of the sample and the high participation rate (90%) allow generalisation about the results. As the screening proved to be sufficiently sensitive (90%) and the diagnoses were based on standardised clinical examinations by specially trained physicians, the results can be considered as accurate.

Diagnoses based on clinical examination, even when performed by skilful physicians, may be unreliable.¹⁸ Quality control was therefore included in the study design. The level of agreement in the

Table 5 Age-standardised prevalences (%) of work disability in men and women aged 30 to 64 with lumbar disc syndrome, other low back syndrome, and no low back diagnosis

Work disability	Lumbar disc syndrome	Other low back syndrome	No low back diagnosis	Fraction (%) attributable to lumbar disc syndrome
<i>Self-reported in questionnaire:</i>				
Partial or complete	39.4	37.1	19.0***	5.0
Complete	14.6	11.7	6.8***	5.7
<i>Assessed at clinical examination:</i>				
At least slight	58.2	46.1**	18.1***	7.5
At least marked	26.8	21.7**	10.1***	7.7
Complete	14.5	11.1	6.4***	6.5
No. of subjects	289	660	4724	

Difference from the lumbar disc syndrome as tested with Mantel-Haenszel statistics: **p<0.01; ***p>0.001; unmarked if p>0.05

Table 6 Comparison of work disability reported by patients with lumbar disc syndrome and work disability assessed by field physician

Work disability (complete) reported by patient	Work disability (complete) assessed by physician		
	No	Yes	Total
No	216	16	232
Yes	15	42	57
Total	231	58	289

Proportion classified identically = 89.3%

Kappa = 0.66; 95% confidence interval 0.55 - 0.77

McNemar's test: $\chi^2=0$; df=1; p>0.05

Table 7 *Met and unmet need for medical care due to lumbar disc syndrome (definite or probable): age-standardised percentages*

<i>Assessment at clinical examination</i>	<i>Men</i>	<i>Women</i>	<i>Total</i>
Lumbar disc syndrome diagnosed; prevalence	5.1	3.7	4.3
Prevalence corrected for screening failure	5.6	4.1	4.8
Need for care: proportion of population	2.7	2.2	2.4
proportion of patients	48.6	53.7	51.0
Care adequately met: proportion of population	2.2	1.9	2.1
proportion of need for care	80.8	87.8	84.0

Table 8 *Lumbar disc syndrome and the need for medical care in the Finnish population aged 30 or over*
The estimated numbers of patients are based on age-standardised prevalences corrected for screening failure

<i>Group</i>	<i>Number</i>
Population aged 30 or over	2 651 000
Patients with lumbar disc syndrome	127 000
Patients who need medical control	65 000
Patients whose care is inadequate	9 000

Table 9 *Use of health services in men and women with lumbar disc syndrome, other low back syndrome, and no low back diagnosis: age-standardised percentages*

<i>History of health service use</i>	<i>Lumbar disc syndrome</i>	<i>Other low back syndrome</i>	<i>No low back syndrome</i>	<i>Fraction (%) attributable to lumbar disc syndrome</i>
At least ten visits to physician during last 12 months	10.8	8.0	3.8***	5.0
Hospitalised for any disease during last 12 months	20.3	19.4	15.0***	2.1
Ever hospitalised because of low back condition	31.9	8.4***	1.8***	35.9
Ever operated for low back condition	21.4	1.4***	0.5***	65.0
No. of subjects	326	927	5964	

Difference from lumbar disc syndrome as tested with Mantel-Haenszel statistics: *** $p < 0.001$; unmarked $p > 0.05$

diagnosis of herniated lumbar disc between the field phase proper and extensive clinical examination was satisfactory, whereas the diagnosis of sciatica proved to be more difficult to reproduce after one year. This

could be expected, as sciatica is very likely to be labile with time.¹⁹ The point prevalence of sciatica obtained in the present study is still correct, if the diagnosis was reliable and only the clinical course fluctuated with

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time. However, this reasonable presupposition remained unconfirmed.

The prevalence of lumbar disc syndrome proved to be clearly less than that of sciatic pains obtained in previous surveys⁶⁻⁹ but much higher than the disease history of 'intervertebral disc displacement' reported by the United States National Health Survey.⁵ However, no true discrepancy existed, as within the present study leg pains and the disease history were poor predictors of the diagnosis made by the physician. According to clinical series published previously, herniated lumbar disc requiring surgery affects males twice as frequently as females,²⁰ whereas sciatica treated conservatively²¹ and back pain radiating to the leg⁸ have been reported to be equally prevalent in both sexes. The present study confirmed the clearcut male predominance of definite lumbar disc syndrome, both herniated lumbar disc and sciatica.

Both the subjects' self-reported experiences and the physicians' assessments were used to indicate various types of disability and handicap. The questionnaire data were independent of diagnostic judgements and were thus suitable for comparisons between persons with and without back syndromes, whereas the clinical assessment as made by the same physician who diagnosed the syndrome may involve bias in those comparisons. Thus the proportions of disability attributable to lumbar disc syndrome may have overestimated the true impact of the syndrome with respect to the doctor's assessments on functional limitations. Although there was a 30% disagreement between self-reported handicaps and disability assessed by a physician, the two methods gave almost equal frequencies. Slight disability was very common in lumbar disc syndrome, but severe functional limitations were rare. This was true of both sexes, for both herniated disc and sciatica. Furthermore, no significant difference in the prevalence of disability was found compared with patients with other low back syndromes.

In 1980, 3.7% of the disability pensions granted by the Social Insurance Institution to Finnish adults aged 30 to 64 were due to lumbar disc syndrome. However, these statistics indicate no diagnoses other than the primary one, and many cases may have been recorded as non-specific low back pain. Thus the proportion of work disability attributable to the syndrome, estimated by the present study as 5.7%, reflects the true impact of the condition more accurately than insurance statistics.

There is no general agreement on principles in the treatment of low back pain, as stated in the literature,²²⁻²⁴ and thus no standards were available by which to judge the medical control of the patients in this survey. The assessments made on the need for

adequacy of care referred to the current, accepted clinical practice, and the results can be seen as representing an average approach to treatment. Based on these estimates, 80% of all victims of lumbar disc syndrome in the Finnish population seemed to be under adequate medical control. As much as 10% of frequent use of primary care services, defined as ten or more annual visits to a physician, was found to be consequent on lumbar disc syndrome. However, this rate refers to the persons having lumbar disc syndrome rather than to the disease entity as such. Probably these patients are increasingly prone to other disorders, which explains their tendency to visit physicians.²⁵⁻²⁶

Sciatica as a symptom and herniated lumbar disc as a pathological abnormality seem to constitute a continuum of more or less manifest syndromes rather than a dichotomic entity. This pattern can also be seen in the prevalence of lumbar disc lesions demonstrated by computed tomography: herniated intervertebral discs have been found in one of every five asymptomatic subjects.²⁷ Thus few victims of herniated disc develop typical sciatica, a minority of those remain chronic, and, again a small proportion of even chronic syndromes result in severe disability. In turn, non-definite leg pains are prevalent in the general population, but the contribution of herniated lumbar discs to these pains is unknown. The entity 'lumbar disc syndrome', with its wide spectrum of outcomes, offers many challenges for future epidemiological research. Acceptable diagnostic criteria, based on reproducible standard methods, are needed to make comparable population studies possible.

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