

Scandinavian Journal of Public Health

<http://sjp.sagepub.com>

Low back pain as a predictor of long-term work disability

BÅrd Natvig, Willy Eriksen and Dag Bruusgaard

Scand J Public Health 2002; 30; 288

DOI: 10.1080/14034940210133951

The online version of this article can be found at:
<http://sjp.sagepub.com/cgi/content/abstract/30/4/288>

Published by:



<http://www.sagepublications.com>

On behalf of:

Associations of Public Health in the Nordic Countries

Additional services and information for *Scandinavian Journal of Public Health* can be found at:

Email Alerts: <http://sjp.sagepub.com/cgi/alerts>

Subscriptions: <http://sjp.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.co.uk/journalsPermissions.nav>

Citations <http://sjp.sagepub.com/cgi/content/refs/30/4/288>

Low back pain as a predictor of long-term work disability

Bård Natvig, Willy Eriksen and Dag Bruusgaard

University of Oslo, Institute of General Practice and Community Medicine, Oslo, Norway

Scand J Public Health 2002; 30: 288–292

Aim: To investigate low back pain (LBP), with and without other musculoskeletal pains, as a predictor of long-term work disability. **Method:** A four-year prospective study was conducted. All inhabitants in the municipality of Ullensaker, Norway, born in 1928–30, 1938–40, 1948–50, 1958–60 and 1968–70, received a mailed questionnaire in 1990 and 1994. The present study comprised the 1,788 responders who were working in 1990. Of these, 1426 (80%) returned the questionnaire four years later. The main outcome measure was long-term work disability ($>$ eight weeks) in 1994. **Results:** LBP in 1990 predicted long-term work disability in 1994 (odds ratio (OR) = 1.95, 95% confidence interval (CI) = 1.39–2.74). Localized LBP however, did not predict long-term work disability, while LBP accompanied by widespread pain did (OR = 3.52, 95% CI = 1.09–11.37), also after adjustments for demographic, lifestyle, and work-related factors. Other predictors of long-term work disability were high age, sick leave last year, heavy lifting in the job, poor sleep quality and smoking. **Conclusion:** LBP in persons with widespread musculoskeletal pain predicted long-term work disability, while localized LBP did not.

Key words: low back pain, survey, widespread pain, work disability.

Bård Natvig, University of Oslo, Institute of General Practice and Community Medicine, PO Box 1130 Blindern, N-0317 Oslo, Norway. Tel: +47 22850608, fax: +47 22850610. E-mail: bard.natvig@samfunnsmed.uio.no

INTRODUCTION

Low back pain (LBP) is one of the most common medical complaints, especially in high-income areas like the Nordic countries but also in the rest of the world (1, 2). LBP is a common cause of disability and high-risk groups for disability in LBP should be identified for further studies of causes, prognostic factors, and effective treatment and prevention (3, 4). In a cross-sectional study we found several demographic and clinical differences between persons with localized LBP and persons with both LBP and widespread pain (5).

Multiple symptoms increase the risk for chronicity in LBP (6), and males with localized LBP seem to have a better short-term prognosis than males with LBP as part of widespread pain (7). The association between localized LBP and LBP accompanied by widespread pain, and work disability has not previously been described.

The aim of the study was to investigate LBP, with and without other musculoskeletal pains, as a predictor of long-term work disability.

METHODS

Sample and setting

A questionnaire covering musculoskeletal pain was sent to a population sample in the municipality of Ullensaker in Norway. The sample consisted of all

inhabitants born in 1928–30, 1938–40, 1948–50, 1958–60 and 1968–70. In 1990, 2,501 of 3,703 persons responded (participation rate 68%). The sample in the present study comprised the 1,788 responders who were working in 1990. Of these, 1,426 (80%) returned a second questionnaire in 1994 (Figure 1).

Dependent variable (“long-term work disability in 1994”)

In both 1990 and 1994, the subjects were asked about their work status. They could mark the following options: “working” (vocationally active), “housewife”, “unemployed”, “receiving rehabilitation benefits” (time-limited social security benefits after 12 months’ sick leave), “disability pensioned” (lifelong social security benefits for persons considered permanently disabled), “age pensioned”, and “student”. Persons who reported being 50% or more vocationally active were coded as working.

In 1994, the subjects were also asked whether they had had any sick leave during the previous year (“no”, “yes, less than a week”, “yes, between one and eight weeks”, and “yes, more than eight weeks”). In the present study, the dependent variable “long-term work disability in 1994” was defined as sick leave for more than eight weeks during the previous year, receiving rehabilitation benefits, or disability pension.

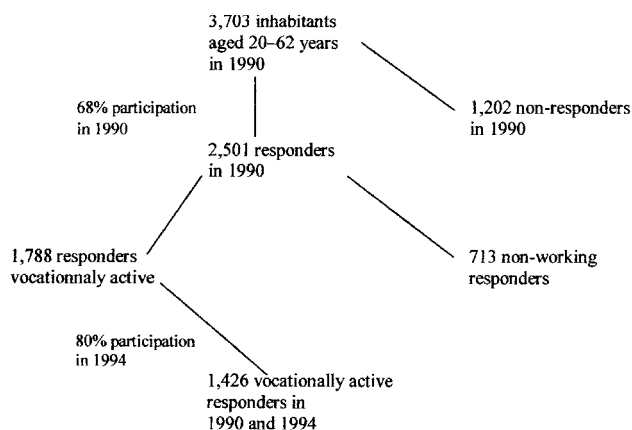


Fig. 1. The study sample.

Independent variables

Musculoskeletal symptoms were registered using a standard Nordic questionnaire (8). The respondents were asked to report any pain or discomfort from the following 10 areas during the previous week: head, neck, shoulder, elbow, hand/wrist, upper back, lower back, hip, knee, and ankle/foot. The words were supplemented by a "pain-region drawing".

The category "localized LBP" was defined as LBP reported according to the Nordic questionnaire as the only localization of musculoskeletal pain. The category "LBP as part of widespread pain" was defined as LBP plus symptoms from four or more other areas of the body.

Age, gender, civil status, smoking, pain duration, subjective severity, functional status, leisure physical activity level, emotional symptoms (GHQ-20), sleep problems, and several work characteristics were also registered. These variables have previously been described in more detail (5, 9-13).

Statistical analysis

Chi-square tests were used to test differences between groups. A forward stepwise mechanical logistic regression model was used to explain the variations in long-term work disability. All scientific relevant variables were included in the model, with selection criteria for inclusion ($p=0.05$) and exclusion ($p=0.10$).

RESULTS

The responders in 1990 were more often middle-aged and older and were more often females than the non-responders. The lowest response rates were found among young men, and also among elderly women (70-72 years) (11). This pattern was repeated in 1994 with an even higher prevalence of women. The responders in 1994 were more often married or cohabiting, non-

smokers, and less inclined to exercise than those who dropped out between 1990 and 1994. There were no differences between the dropouts and the responders with respect to LBP, widespread pain, sleep quality, emotional symptoms, sick leave due to musculoskeletal complaints, or self-evaluated health in 1990 (data not shown).

Of the 1426 responders in 1994, 160 persons (11%) reported long-term work disability in 1994. The respondents who reported LBP during the previous week in 1990 experienced more long-term work disability four years later (16%, $n=64$) than persons with no LBP during the previous week in 1990 (9%, $n=96$) ($p<0.001$), OR = 1.95; 95% CI = 1.39-2.74).

Only 81 (21%) of 386 persons reporting LBP during the previous week had strictly localized LBP (Table I). The rest (79%) reported musculoskeletal symptoms from at least one other area of the body. Persons with LBP as part of widespread pain in 1990 more often reported long-term work disability than persons with localized LBP (Table I). The tendency was the same when we analysed the three types of work disability (sick leave for more than eight weeks last year, receiving rehabilitation benefits or disability pension in 1994) separately (data not shown).

Older persons, persons working less than 40 hours a week in 1990, and persons who were smoking in 1990 more often had long-term work disability in 1994 (Table II). Persons with high perceived severity of musculoskeletal complaints in 1990 also more often had long-term work disability. There were no significant differences between the genders or between married/cohabiting persons vs. single or divorced persons. In a regression model (Table III), long-term work disability in 1994 was predicted by low back pain in persons with widespread pain (OR = 3.52; 95% CI = 1.09-11.37), by age, and by the following variables measured in 1990: more than one week sick leave last year, much heavy lifting in the job, medium or poor sleep quality, and smoking.

Persons with LBP accompanied by pain from 1-3 additional body areas had results (demographic characteristics such as sex, age, and civil status, and lifestyle factors such as smoking and work hours per week) between those of the group with localized LBP and LBP together with widespread pain (data not shown). However, the difference in long-term work disability between localized LBP and LBP together with pain from 1-3 additional areas was not significant (OR = 2.00; 95% CI = 0.63-6.36).

DISCUSSION

We found that LBP in persons with widespread musculoskeletal pain predicted long-term work disability, while localized LBP did not.

Table I. *Long-term work disability in 1994 by pain characteristics in previous week in 1990*

Pain in previous week (1990)	Long-term work disability (1994)	
	No. persons in different pain groups	Persons with long-term work disability (1994) %
Localized LBP	81	7 8.6
LBP and some additional pain (1–3 additional areas)	185	26 14.1
LBP in persons with widespread pain (4 or more additional areas)	120	31 25.8
Pain, but not LBP	442	50 11.3
No pain	598	46 7.7
Total	1426	160 11.2

$P=0.002$ for the difference in long-term work disability four years later between the group with localized low back pain (LBP) and the group with LBP in persons with widespread pain.

Table II. *Long-term work disability in 1994 by demographic characteristics in 1990 (n=1426; missing values on some variables)*

Characteristics in 1990	n	Long-term work disability (1994) (no.)	Long-term work disability (1994) (%)	p	
Sex	Female	719	87	12.1	0.29
	Male	707	73	10.3	
Age (years)	20–22	214	10	4.7	<0.001
	30–32	285	25	8.8	
	40–42	437	41	9.4	
	50–52	338	48	14.2	
	60–62	152	36	23.7	
Civil status	Married/cohab.	1115	129	11.6	0.38
	Single/divorced	306	30	9.8	
Work hours per week	≤ 20	128	14	10.9	0.005
	20.1–39.9	718	97	13.5	
	≥ 40	521	40	7.7	
Smoker	No	868	76	8.8	0.001
	Yes	532	76	14.3	
How bad have your musculoskeletal complaints been?	No complaints/not so bad	535	34	6.4	<0.001
	Moderate	415	41	9.9	
	Bad	339	53	15.6	
	Very bad	137	32	23.4	

Methodological considerations

As a result of selection bias in 1990 (11) and in 1994, the responders were older and comprised a higher proportion of females, and non-smokers, than the total working population. This may have led to an overestimation of long-term work disability figures, because musculoskeletal disability is more frequent in older persons and in women (6, 14).

Smoking is a well-known risk factor for LBP (9), and the under-representation of smokers in our sample may have led to an underestimation of LBP.

The proportion of persons reporting chronic LBP may be overestimated because our short pain registra-

tion period (one week) will include almost everyone with long-lasting or chronic LBP, but only a proportion of those with episodic LBP.

However, it is unlikely that these problems are responsible for the main result, i.e. the differences in prediction of long-term work disability.

The cut-off point for LBP as part of widespread pain, four or more painful areas in addition to the LBP, was based on experience. In another study (12) the same cut-off point included most members of a local fibromyalgia association, and only a modest fraction of the population. In addition, the results were similar when alternative cut-off points were used.

A measure of work disability attributed to LBP

Table III. Factors in 1990 that predicted long-term work disability in 1994: results of a forward stepwise mechanical logistic regression analysis (n = 1125)

Factors in 1990		OR	95% CI
Pain previous week	Localized LBP (ref. cat.)	1.00	
	LBP+ pain in 1–3 other areas	2.00	0.63–6.36
	LBP in persons with widespread pain	3.52	1.09–11.37
	Pain, but no LBP	1.79	0.59–5.46
	No pain	1.04	0.34–3.23
Age (years in 1990)	20–22 (ref.cat)	1.00	
	30–32	1.74	0.73–4.15
	40–42	1.92	0.86–4.28
	50–52	2.66	1.18–6.01
	60–62	6.53	2.67–15.95
Sick leave last year	No (ref. cat.)	1.00	
	Yes, <1 week	0.46	0.10–2.14
	Yes, 1–8 weeks	1.93	1.09–3.41
	Yes, >8 weeks	4.30	2.05–9.05
Much heavy lifting in the job	No (ref. cat.)	1.00	
	Yes	2.21	1.41–3.46
How do you usually sleep?	Well (ref. cat.)	1.00	
	Medium/poor	1.99	1.28–3.09
Daily smoking	No (ref. cat.)	1.00	
	Yes	1.60	1.04–2.46

Note: OR adjusted for gender, body mass index, civil status, pain duration in years, pain duration during the last year, leisure physical activity level, emotional symptoms (GHQ), perceived severity, and the following work characteristics: work hours per week, high work pace, repetitive stereotyped movements, work in the same position for a long time, work with hands above shoulder level, a large amount of sitting, a large amount of standing, stressful work or work environment, the extent to which persons felt they could influence their work situation, and work satisfaction.

might give a better impression of the impact of LBP on work ability. On the other hand, reduced work ability is often caused by a combination of medical and social factors, and work disability attributed to other causes than LBP may in some cases partly be due to LBP.

It is also a problem in our study that we do not know how many of those persons with LBP and widespread musculoskeletal pains regard their LBP as a substantial part of their pain problem. However, as LBP is one of the most frequent diagnoses on applications for disability pensions, the results in this study should be of relevance for most individuals presenting LBP problems to the healthcare system.

Low back pain as a predictor of long-term work disability

As expected, LBP in general predicted long-term work disability four years later. However, dividing LBP into subgroups, only LBP in persons with widespread musculoskeletal pain predicted long-term work disability four years later, while localized LBP did not.

There are several possible explanations for this result. First, localized LBP and LBP in persons with widespread pain can be different disorders, with differ-

ent prognosis, aetiology, and functional consequences (5).

Second, it is possible that the group with localized LBP was dominated by persons with minor LBP symptoms. As severe LBP might be accompanied by other symptoms, for instance increased muscular tension in other areas of the body, widespread pain could act as a marker of severity for LBP. But even though perceived severity predicted long-term work disability in bivariate analysis, it did not add to the logistic regression model.

Third, the widespread distribution may itself cause reduced function. In another study we have shown that the association between reduced function, measured by the COOP/WONCA chart, and number of body parts with symptoms is almost linear (13).

Fourth, it is possible that chronic pain involves the spread of symptoms to other areas of the body. When LBP become chronic it might cause more widespread bodily pain. Likewise, pain from other areas, such as neck or shoulder, may spread to the low back area. This process probably also involves an increase of other symptoms, such as tiredness, dizziness, sleeplessness, or problems with concentration (15). The work disability might be linked to this combination of symptoms following chronic, widespread pain.

Fifth, it is possible that pain cognition differs between persons with localized LBP and persons with LBP accompanied by widespread pain. Persons with good coping strategies and coping ability might experience their pain as more localized than persons with fewer coping resources, and perhaps this is combined with lower levels of anxiety and distress in those who cope.

Finally, there may be factors related to both long-term work disability and widespread musculoskeletal pain that we have not been able to control, for example lifestyle factors other than smoking, sleeping, and physical leisure activity, workplace factors not covered by our questionnaire, or psychological factors not covered by the GHQ-20.

As expected, the oldest respondents and responders with more than one week of sick leave due to musculoskeletal complaints in 1990 more often experienced long-term work disability in 1994. Long-term work disability was also predicted by poor sleep quality, heavy lifting in the job, and smoking. We have discussed the links between smoking, heavy lifting, and work disability, and the relationship between sleep problems and work disability, in previous articles (9, 16).

CONCLUSIONS

Our results support the idea (5) that localized LBP and LBP as part of widespread pain should be regarded as different problems, in research and probably also in treatment and rehabilitation.

ACKNOWLEDGEMENTS

Olav Rutle, who died unexpectedly in autumn 1996, initiated this article. We remember with thanks his inspiration and friendship. The study was financed by the Norwegian Research Council, the University of Oslo and the Trygve Gythfeldt Fund.

REFERENCES

1. Leboeuf-Yde C, Lauritsen JM. The prevalence of low back pain in the literature. A structured review of 26 Nordic studies from 1954 to 1993. *Spine* 1995; 20: 2112–18.
2. Volinn E. The epidemiology of low back pain in the rest of the world. A review of surveys in low- and middle-income countries. *Spine* 1997; 22: 1747–54.
3. Cassidy JD, Carroll LJ, Côté P. The Saskatchewan Health and Back Pain Survey. The prevalence of low back pain and related disability in Saskatchewan adults. *Spine* 1998; 23: 1860–7.
4. Leboeuf-Yde C, Lauritsen JM, Lauritzen T. Why has the search for causes of low back pain largely been non-conclusive? *Spine* 1997; 22: 877–81.
5. Natvig B, Bruusgaard D, Eriksen W. Localized low back pain and low back pain as part of widespread musculoskeletal pain: two different disorders? A cross-sectional population study. *J Rehab Med* 2001; 33: 21–5.
6. Valat JA, Goupille A, Védere V. Low back pain: risk factors for chronicity. *Rev Rhum Engl Ed* 1997; 64: 189–94.
7. Macfarlane GJ, Thomas E, Croft PR, Papageorgiou AC, Jayson MIV, Silman AJ. Predictors of early improvement in low back pain amongst consultants to general practice: the influence of pre-morbid and episode-related factors. *Pain* 1999; 80: 113–18.
8. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Appl Ergon* 1987; 18: 233–7.
9. Eriksen W, Natvig B, Bruusgaard D. Smoking as a predictor of long term work disability in physically active and inactive people. *Occup Med* 1998; 48: 315–20.
10. Eriksen W, Natvig B, Knardahl S, Bruusgaard D. Job characteristics as predictors of neck pain. A 4-year prospective study. *J Occup Environ Med* 1999; 41: 893–902.
11. Natvig B, Nessjøy I, Bruusgaard D, Rutle O. Musculoskeletal symptoms in a local community. *Eur J Gen Pract* 1995; 1: 25–8.
12. Natvig B, Bruusgaard D, Eriksen W. Physical leisure activity level and physical fitness among women with fibromyalgia. *Scand J Rheumatol* 1998; 27: 337–41.
13. Natvig B, Rutle O, Bruusgaard D, Eriksen WB. The association between functional status and the number of areas in the body with musculoskeletal symptoms. *Int J Rehabil Res* 2000; 23: 49–53.
14. Michel A, Kohlmann T, Raspe H. The association between clinical findings on physical examination and self-reported severity in back pain. Results of a population-based study. *Spine* 1997; 22: 296–304.
15. Eriksen HR, Svendsrød R, Ursin G, Ursin H. Prevalence of subjective health complaints in the Nordic European countries in 1993. *Eur J Publ Health* 1998; 8: 294–8.
16. Eriksen W, Natvig B, Bruusgaard D. Sleep problems: a predictor of long-term work disability? A four-year prospective study. *Scand J Public Health* 2001; 29: 23–31.

Accepted 01 11 13