

A THREE-YEAR FOLLOW-UP OF 195 REPORTED OCCUPATIONAL OVER-EXERTION INJURIES

Kristina Kemmlert,¹ Margareta Örelius-Dallner,² Åsa Kilbom¹ and Francesco Gamberale²

From the National Institute of Occupational Health, ¹Department of Physiology and ²Department of Psychology, Solna, Sweden

ABSTRACT. Three years after reporting occupational over-exertion injuries, 181 persons took part in a follow-up study by questionnaire. The objective was to study these persons with respect to their current status of health, well-being and functional capacity and when possible compare collected data to reference data from the "normal population". The studied group reported more physical and psychological symptoms than the reference groups. More than 50% reported difficulties in activities of daily living. Long sick-leaves in the year following the reported injury were associated with remaining pain and low rate of employment. Three years after the injury, 109 persons were in employment. Almost one third of these had changed occupations and now had more varied tasks than at the time of the report. Those whose work loads had been reduced after the injury, did not report less musculoskeletal disorders than others. However, access to social support was positively related with health and psychological well-being.

Key words: ergonomic, musculoskeletal injury, prevention.

According to the Information System on Occupational Injuries in Sweden [ISA] the number of over-exertion injuries (accidents and diseases) has increased during recent years and now constitutes more than one third of all reported injuries (24, 25).

In 1985, a study with systematic analyses of reported occupational musculoskeletal injuries attributed to ergonomic shortcomings was initiated (13, 15, 21). The study comprises 195 reports on accidents and diseases causing sick-leave periods for more than 8 days. The reports were gathered consecutively and derive from employed persons in all main occupational groups (22). Just over a year later the work places of the injured were evaluated (15). The present study is a 3-year follow-up of the cases.

The aims of the present study were: (i) to describe the state of musculoskeletal health, psychological

well-being and functional capacity in the group 3 years after the reported injury and to illustrate economic consequences of the work injury encountered by the injured persons; (ii) to analyse factors associated with the state of musculoskeletal health, psychological well-being and functional capacity in the group 3 years after the report; (iii) to analyse the influence of preventive measures at the work place on musculoskeletal health, psychological well-being and functional capacity in the group.

MATERIAL AND METHODS

Study group

In 1988, a questionnaire was sent to a group of 195 persons who had reported occupational over-exertion injuries 3 years earlier. 181 persons (93%) responded to the questionnaire. Eight persons could not be reached and 6 persons did not wish to participate in the study. Fig. 1 gives information on the distribution of age and sex in the group. This is in concordance with national data on occupational over-exertion injuries as regards gender and age (24, 25). However, diseases are over-represented in the studied group in comparison to national data.

Research data

The questionnaire comprised 105 items and was constructed to investigate the following areas:

- Health and well-being: musculoskeletal, psychological and psychosomatic symptoms (54 items)
- Functional capacity and expenses due to disorders and dysfunction related to the occupational injury (9 items)
- Employment rate, physical and psychosocial working conditions and present work tasks (27 items)
- Social support (8 items)
- Opinions on help given at the time of the injury and on present health and life situation and expectation concerning future working capability (7 items)

To express opinions four answer possibilities were given, i.e. very often, often, seldom and never. Questions about musculoskeletal symptoms were posed via "the standardised Nordic Questionnaire for the analysis of musculoskeletal symptoms" (18).

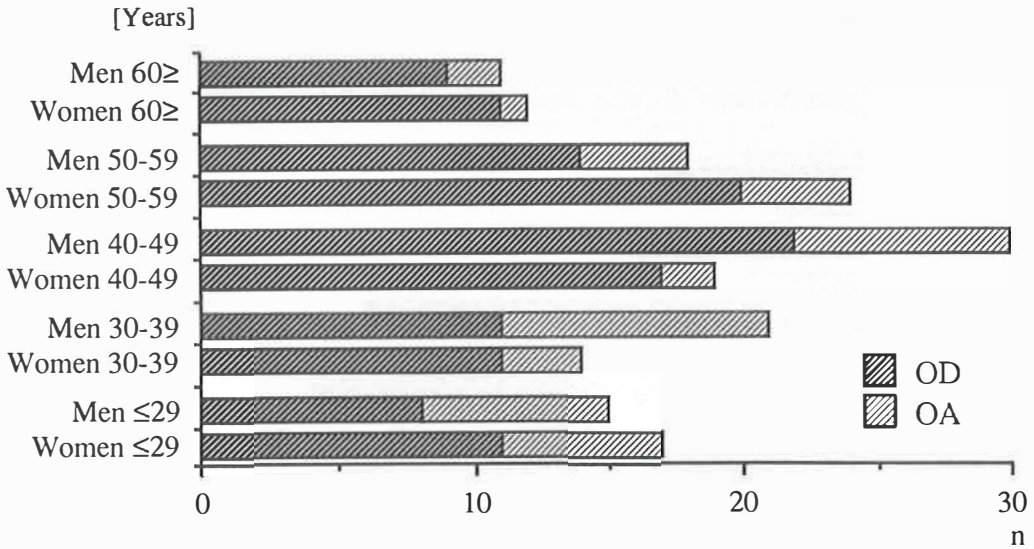


Fig. 1. Number of occupational diseases (OD) and occupational accidents (OA), distribution according to age and gender (95 men and 86 women).

Furthermore the following data were utilized in the follow-up:

- Data from the occupational injury reports
- Information from the work place visits on working conditions and on length of sick-leaves
- Data from three reference studies, partly comprising questions identical to those in the questionnaire. Two are Swedish studies of large "normal populations" (1, 23)

For these comparisons the materials have been stratified for gender. The third reference group is Finnish (12, Nygård C-H, unpublished data 1990). Since the respondents in this latter study were men and women 48–62 years of age, only answers from an age-matched group ($n=64$), in the studied population have been used for comparisons.

Statistical analysis

Percentages for answers given have been calculated. The response rate to specific questions was never below 90%. Due to the limited size of the studied group, a presentation of answers distributed according to age and gender has not been possible.

Differences between groups have been tested by χ^2 -tests. Significance was accepted at $p < 0.05$. The levels of significance are given in the tables of the report.

RESULTS

Health and well-being

Five persons reported no musculoskeletal symptoms. Among those who reported complaints most symptoms derived from the neck/shoulder region or the low back (Table I). Thirty-two persons (18%) had symp-

tom from two body regions, and 2 persons from three regions.

Recovery, since the time of the injury report, was reported by 21 persons (12%). Remaining symptoms were reported by 152 persons; 56 persons (32%) reported unchanged symptoms and 96 persons (55%) deterioration of symptoms. Eight persons gave no answers.

Almost all of those with symptoms (95%) reported that they came from the same anatomical regions as were registered in the reports in 1985.

The number of subjects reporting symptoms was often twice as great in the studied group as in reference

Table I. Reported musculoskeletal symptoms ("other" disorders were: inguinal hernia, muscle rupture and joint disease)

Anatomical region	n	%
Neck/shoulders	76	35
Elbows, forearms, hands	49	23
Feet	3	1
Knees and hips	25	12
Low back	61	28
Other	3	1
Total	217	100

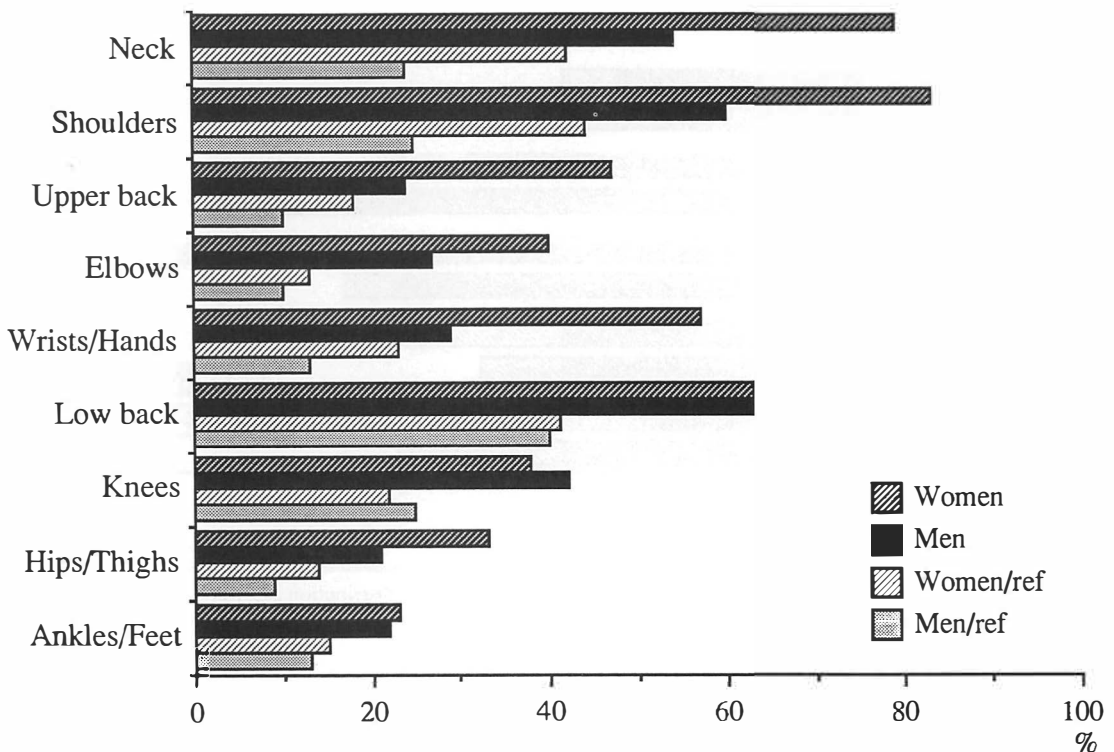


Fig 2. Reported symptoms in different body regions during the previous 12 months. Percentages of answers from the studied group (95 men and 86 women) and reference data (17443 men and 17701 women) (1).

data (1) (Fig 2). The differences were significant for all regions except the feet, where symptoms were rare.

Half the group estimated their own health to be equal to that of others of the same age. Only 5% estimated their own health to be better, while 45% estimated it to be worse than that of others. In one of the reference studies (23) less than 10% were of the opinion that their health was worse than that of others.

Similar results were obtained concerning physical fitness in comparison to the Finnish data (12, Nygård C-H unpublished data 1990). In an age-matched group from the studied population, 47% considered themselves to be fitter, or at least at the same level of physical fitness, as other people.

The number of answers to the same question was significantly greater (70%) in the Finnish group.

Fig. 3 presents results concerning psychological symptoms. Tiredness and headaches were reported from more than 50% of the respondents. Comparisons to reference data (1) (Fig 3) show that all psychological symptoms were almost twice as common in the study

group. The differences between the groups were statistically significant for all symptoms. In Living Conditions, from Statistics Sweden (23), a corresponding occurrence of symptoms was found among persons with an early retirement pension or prolonged unemployment.

In the studied group tiredness for no apparent reason, headaches, sleeping difficulties and depression occurred significantly more often among women than among men (Fig. 3).

Many (66%) were satisfied with their present life situation. Among respondents, 48–62-years old, 61% gave positive answers to this question. In the reference group, where the same question was posed (12, Nygård C-H unpublished data 1990), 94% were satisfied with present life situation. The difference between the groups was statistically significant.

Functional capacity

A large proportion of the studied group reported disturbances in activities of daily living (Table II).

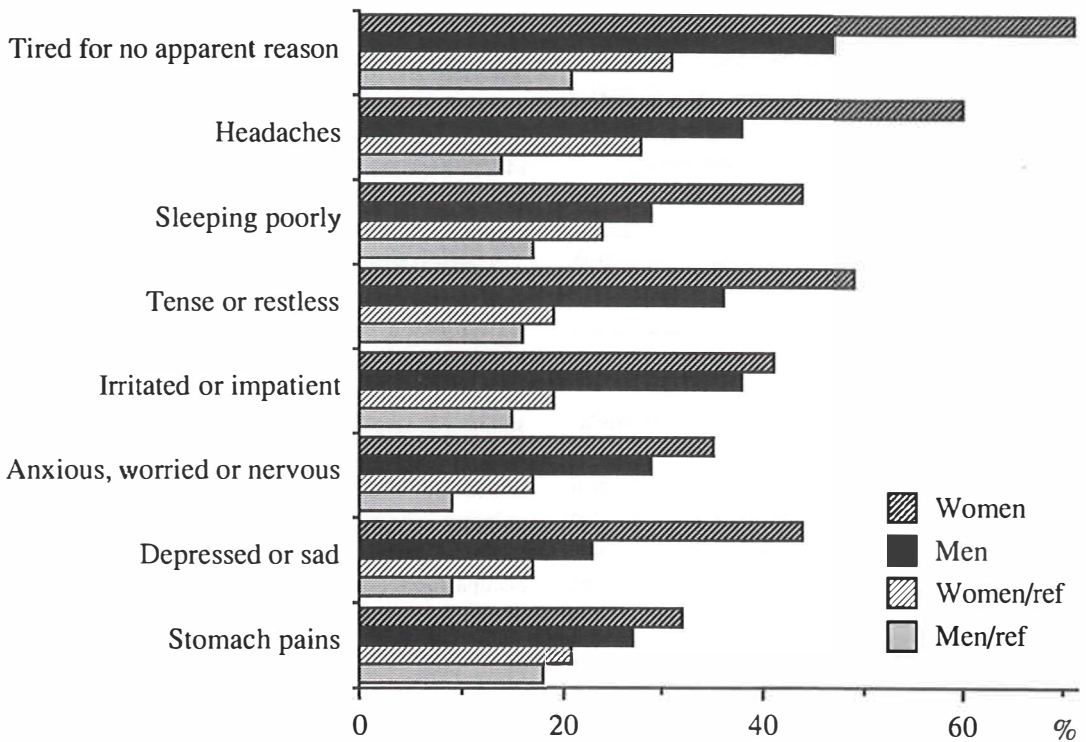


Fig. 3. Reported psychological symptoms. Percentages of answers from the study group (95 men and 86 women) and reference data (17 443 men and 17 701 women) (1).

On average more than 2/3 of the respondents considered their difficulties to be related to the occupational injury.

Comparisons of answers to identical questions on functional capacity from the studied group and the Finnish population (12, Nygård C-H unpublished data 1990) show that more persons in the reference group reported performance without any difficulty (Table III). As regards ability to run a short distance the difference was significant.

More than a quarter of the respondents mentioned that life had become complicated and expensive for

them and for their families, due to effects of the occupational injury. They stated that, except for costs for medication and treatments, obtaining help from other people created expenses both in time and money.

Employment and working conditions

Every third person had been on sick-leave for more than 6 months during the year following the report of the injury. Those in the group with long sick-leaves were more seldom in employment at the follow-up, were to a greater extent suffering from symptoms connected to the injury and reported more disturbances in functional and psychological capacity (Table IV).

The study revealed a significant difference in employment rate between men and women. Three years after the notification of the injury, 75% of the men and 44% of the women were in employment (Table V). Those who had reported low back injuries reported to 84% that they expected that they would be able to continue to work. Among those who had

Table II. Percentage of respondents ($n = 181$) reporting difficulties in performing certain activities

Difficulties in	%
Running a short distance	54
Taking down an object from a shelf	44
Carrying out heavy household work	71
Sitting for some hours	59
Carrying out hobby work	60
Taking a walk	34

Table III. Percentage of positive answers, in the age group 42–62 years, concerning functional capacity

Studied group $n = 64$, reference group $n = 5\,500$ (12, Nygård C-H unpublished data 1990).

	Study group (%)	Reference group (%)	$p <$
Able to run a short distance	24	40	0.05
Able to sit for some hours at a party or a meeting	37	45	

reported neck and shoulder injuries, 61% had similar expectations.

Nearly one-third of those in employment had changed professions since the notification of the injury, mostly to less monotonous and repetitive tasks.

Those who characterized their jobs as comprising mainly varying tasks had more positive views on the possibilities to continue working. Persons who performed heavy manual handling, worked in constrained positions or had repetitive tasks more often belonged to the group that thought that they would not be able to go on working. The difference between the groups was statistically significant.

Among those who did not work, 57% answered that they did want employment, provided that they were offered a suitable job.

At the work place visits the researchers had assessed that 47 injured had their work loads reduced (15). Reduction of work load did not have any observable effect on most symptoms or on employment rate 3 years after the injury report (Table VI). However, those whose work load had been reduced were more satisfied with the help they had been given at the time of the occupational injury. They also more seldom reported symptoms such as irritation and anxiety.

Table IV. Percentage of answers on employment rate and assessments of health

Distribution according to length of sick-leave during the year following the injury report (≤ 6 months; $n = 120$, > 6 months; $n = 61$).

	≤ 6 months (%)	> 6 months (%)	$p <$
Not in employment	23	79	0.001
Assess symptoms from the injury as being the same or worse	49	67	0.01
Assess their health as being worse than that of others	37	60	0.01
Sleeping poorly	37	58	0.01
Feeling irritated or impatient	36	55	0.05

Social support

Two indices, for 'general social support' and 'social support at work', were constructed from the answers to different questions. In the study group, 89 persons (49%) experienced strong 'general social support'. Strong 'social support at work' was registered from 59 persons (54%) of those who were in employment.

'General social support' showed statistically significant associations with most health variables, as well as with opinion on health and present life situation (Table VII).

'Social support at work' also showed statistically significant associations with many health variables, as well as with opinion on health and present life situation (Table VIII). In addition, it was more usual to believe oneself to be capable of continued work and more unusual to report remaining symptoms from the occupational injury, in the group experiencing strong 'social support at work'.

DISCUSSION

The response rate of the 3-year follow-up was high (93%), thus it may be surmised that the data provide a representative picture of the conditions in the group. The study group is heterogeneous and consists of persons from different occupations with different injuries, accidents and diseases. This should vouch for the representativity of the results.

The interpretation of the results depends to a great extent on the reliability of the questionnaire answers which depict subjective responses. However, information on symptoms and functional capacity could not have been gathered in any other way than directly from the injured. In a review article, Wallace & Buckle stress that studies of pain must always rely on self report (27). In the present study the validity of the self

Table V. *Employment rate three years after reported occupational over-exertion injury*

Distribution according to occupational diseases (OD), occupational accidents (OA), men and women ($n = 181$).

	Working		Not working	
	<i>n</i>	%	<i>n</i>	%
OD men	48	75	16	25
OD women	29	41	41	59
OA men	23	74	8	26
OA women	9	56	7	44

reports is supported by the relationship between severity of symptoms, functional difficulties and duration of sick-leave.

After 3 years, the majority of the injured reported symptoms from the same localisation as was reported injured after the medical investigations in 1985. This is remarkable, since a lack of concordance between investigations, even when performed within a brief period of time, has been demonstrated in other studies (2, 10). The consistency of symptoms, demonstrated in this study, emphasizes the poor prospects of recovery in cases of musculoskeletal injuries.

The questionnaire was designed so that the answers given could be compared to answers from different reference populations. However, it should be noted that the data in the Örebro system (1) sometimes originate from working groups with a high proportion of manifest problems. Thus, in making comparisons, it

should be considered that the rate of symptoms can be high already in the reference material.

Despite the above mentioned consideration, most answers from the studied group concerning health, well-being and functional capacity were significantly more negative than from the reference groups. It can be assumed that these unambiguous differences were caused by the occupational injuries reported 3 years earlier.

The everyday idea concerning the condition of persons who report occupational injuries is certainly not as negative and alarming as demonstrated in this study. It has even been suggested in mass media that the situation of being sick-listed might be gainful and agreeable. However, such expressions have only been based on suppositions since previously no equivalent study of these conditions has been performed (17).

According to recent research in rehabilitation (8) it can be questioned whether shorter sick-leaves would have resulted in reduced symptoms. However, this study cannot answer this question of cause and effect. The results can only emphasize that long sick-leaves are warning signals.

The disturbances in functional capacity had resulted in increased expenses for many families and the costs for treatment and medication had sometimes been considerable. In a study by Andreoni (3) it was also emphasized that the economic consequences of occupational injuries finally affect the injured person's entire family.

A reduction of symptoms would normally be expected as an effect of secondary prevention. How-

Table VI. *Percentages of answers concerning occurrence of various symptoms, employment and opinion on received help with the occupational injury problem*

The results are distributed according to those who had obtained reduced work load ($n = 47$) and those who were working in unchanged conditions ($n = 44$) 18 months after the reported injury.

	Work load reduced (%)	Work load not reduced (%)	<i>p</i> <
Tired for no apparent reason	47	46	
Headaches	55	42	
Sleeping poorly	20	30	
Tense or restless	28	37	
Irritated or impatient	21	40	0.01
Anxious, worried or nervous	12	29	0.01
Depressed or sad	18	26	
Stomach pains	24	26	
Remaining musculoskeletal symptoms	50	66	
Not in employment	30	23	
Dissatisfied with the assistance regarding the occupational injury problem	32	48	0.05

Table VII. Percentages of answers concerning occurrence of various symptoms, opinion on present life situation and own general health

The results are distributed according to strong ($n=89$) and weak ($n=18$) 'general social support'.

	Strong 'general social support' (%)	Weak 'general social support' (%)	$p <$
Tired for no apparent reason	60	69	
Headaches	48	53	
Sleeping poorly	32	49	0.05
Tense or restless	36	59	0.001
Irritated or impatient	31	65	0.001
Anxious, worried or nervous	26	56	0.001
Depressed or sad	19	56	0.001
Stomach pains	25	61	0.001
Remaining musculoskeletal symptoms	48	60	
Dissatisfied with present life situation	24	56	0.001
Dissatisfied with own general health	40	61	0.01

Table VIII. Percentages of answers concerning occurrence of various symptoms, opinion on work capacity, on present life situation and on own general health

The results are distributed according to strong ($n=59$) and weak ($n=23$) 'social support at work'.

	Strong 'social support at work' (%)	Weak 'social support at work' (%)	$p <$
Tired for no apparent reason	49	39	
Headaches	40	52	
Sleeping poorly	22	58	0.001
Tense or restless	27	36	
Irritated or impatient	30	45	0.05
Anxious, worried or nervous	17	23	0.05
Depressed or sad	12	32	0.001
Stomach pains	24	23	
Remaining musculoskeletal symptoms	40	68	0.001
Believes oneself capable of continued work	86	55	0.001
Dissatisfied with present life situation	16	41	0.001
Dissatisfied with own general health	29	48	0.01

ever, it was not possible to demonstrate that those whose workload had been reduced reported fewer symptoms than those who worked in unchanged conditions.

The question is whether a reduction of symptoms really can be expected as a direct effect of improved working conditions. In a study of 157 cases of occupational injury to the low back (9) Dionne reported that symptoms and functional difficulties were still present 5 years after the injury. He showed that even though two-thirds of the injured had returned to their employment, problems with health and economy were reported as often as in groups with severe chronic handicaps. Also Berg and co-workers (4) studied the development of musculoskeletal symp-

toms among shipyard workers 3 years after retirement without finding any reduction of symptoms.

Thus recovery from disorders does not seem to be a certain effect of secondary prevention or retirement. According to Wallace & Buckle, successful secondary prevention may instead provide opportunities to continue an employment despite symptoms (27). Even if a reduction in work load does not appear to lead to freedom from symptoms, it will probably prevent further impairment.

When estimating the effects of secondary prevention it must therefore be kept in mind that long-term disorders may be masking expected results (27). Symptoms remain and in consequence criticism may unjustly be levelled against preventive measures that

have been performed. The weakening interest in work station redesign in favour of work reorganization may be one sign of this tendency (16).

In a previous study of neck and shoulder disorders (14) it was unexpectedly found that those who experienced such disorders had the best ergonomic conditions. Since the study was cross-sectional it could not be decided whether improvements had taken place as a result of disorders. However, the present study further emphasizes that there is no simple and straightforward relationship between ergonomic working conditions and musculoskeletal symptoms.

In the present study those who had received reduced work load experienced less anxiety and irritation than those who worked in unchanged conditions. The possibilities of coping (7, 11) had probably improved despite remaining musculoskeletal symptoms.

As in other studies (5, 6, 7, 11, 19, 20) social support, in general and at work, was strongly associated with well-being. There was a lower occurrence of musculoskeletal and psychological symptoms, a more positive belief in future working capacity and a greater satisfaction with present life situation in the group that experienced strong 'social support', than in the group with 'weak social support'.

The occupational injury insurance law has been discussed and criticized since it was implemented in Sweden in 1977. One of the main topics of debate has been the lengthy investigation periods preceding the decisions at the National Insurance Board (26). The results in this study are in agreement with the criticism of long sick-leaves which have been shown to create inactivity and to prevent social contacts (8). Our findings support the idea that the most effective route to rehabilitation is through prompt care in friendly surroundings.

Our previous study showed, however, that in connection with reported occupational injuries, long sick-leaves were more common than changes in working conditions (15). The present study demonstrated high occurrence of long lasting symptoms and functional disturbances among the injured. Evidently sick-listing was not a good solution for the injured. Early activities against experienced ergonomic shortcomings would most probably have been more effective.

REFERENCES

- Andersson, K. & Hahne, M.: Compilation and testing of questionnaires in occupational health. Experiences from the Örebro system. Proceedings, XXI International Congress in Occupational Health. Dublin, Ireland, 1984.
- Andersson, K., Karlehagen, S. & Jonsson, B.: The importance of variation in questionnaire administration. *Applied Ergonomics* 18: 229-232, 1987.
- Andreoni, D.: The cost of occupational accidents and diseases. Occupational safety and health series No 54. International Labour Office, Geneva, 1986.
- Berg, M., Sandén, Å., Torell, G. & Järvholm, B.: Persistence of musculoskeletal symptoms: a longitudinal study. *Ergonomics* 31: 1281-1285, 1988.
- Biering-Sørensen, F. & Thomsen, C.: Medical, social and occupational history as risk indicators for low-back trouble in a general population. *Spine* 11: 720-725, 1986.
- Bigos, S.J., Spengler, D. M., Martin, N. A. et al.: Back injuries in industry: A retrospective study of employee-related factors. *Spine* 11: 252-256, 1986.
- Cohen, S. & Syme, L. (Eds.): *Social Support and Health*. Academic Press, New York, 1985.
- Derebery, J. V. & Tullis, W. H.: Delayed recovery in the patient with a work compensable injury. *J Occup Med* 25: 829-835, 1983.
- Dionne, C.: Études de suivi à long terme d'un groupe d'accidents du travail ayant présenté un épisode de lombalgie grave nécessitant des soins de réadaptation spécialisée. Thesis, Université Laval, Québec, 1989.
- Hagberg, M. & Wegman, D. H.: Prevalence rates and odds ratios of shoulder-neck diseases in different occupational groups. *Br J Ind Med* 44: 602-610, 1987.
- House, J. S.: *Work, Stress and Social Support*. Addison Wesley, London, 1981.
- Ilmarinen, J., Tuomi, K., Eskelinen, L., Nygård, C-H., Huuhtanen, P. & Klockars, M.: The aging worker; Background and objectives of cross sectional follow-up studies in the Finnish municipal branch (1981-1985). *Scand J Work Environ Health* 17 (Suppl 1): 1-9, 1991.
- Kemmlert, K. & Kilbom, Å.: Identification of musculoskeletal stress factors which may have injurious effects. Proceedings, XIth World congress on the prevention of occupational accidents and diseases. Stockholm, 1987.
- Kemmlert, K. & Kilbom, Å.: Besvär i nacke/skuldra och samband med arbetssituation. (Musculoskeletal trouble in the neck and shoulder and relationship with workplace design in office). *Arbete och Hälsa* 1988:17. (Summary in English). National Institute of Occupational Health, Solna, Sweden, 1988.
- Kemmlert, K., Nilsson, B., Kobom, Å. & Bjurvald, M.: Ergonomiska förhållanden och arbetsskade-hantering (An investigation of 195 cases of occupational overexertion injuries with special regard to ergonomic working conditions). *Arbete och Hälsa* 1989: 33. (Summary in English). National Institute of Occupational Health, Solna, Sweden, 1989.
- Kilbom, Å.: Intervention programmes for work-related neck and upper limb disorders: strategies and evaluation. *Ergonomics* 31: 735-747, 1988.
- Kilbom, Å. & Bjurvald, M.: Ergonomics and musculoskeletal injuries. *Int J Ind Ergonomics* 2: 168-172, 1988.
- Kuorinka, I., Jonsson, B., Kilbom, Å., Vinterberg, H., Biering-Sørensen, F., Andersson, G. & Jørgensen, K.: Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Applied Ergonomics* 18: 233-237, 1987.
- Linton, S. J. & Kamwendo, K.: Risk factors in the psychosocial work environment for neck and shoulder pain in secretaries. *J Occup Med* 31: 609-613, 1989.

20. Magora, A.: Investigation of the relation between low back pain and occupation. *Scand J Rehabil Med* 5: 191-196, 1973.
21. Nilsson, B., Kemmlert, K., Kilbom, Å., Andersson, R. & Bjurvald, M.: Prevention av belastningsskador genom riktad arbetskadautredning (Prevention of occupational overexertion injuries through systematic work-place investigations). Undersökningsrapport 1990: 9. (Summary in English). National Institute of Occupational Health, Solna, Sweden, 1990.
22. Nordic Occupational Classification based on International Standard Classification of Occupations. International Labour Office, Geneva, 1958.
23. Official statistics of Sweden. *Levnadsförhållanden 1975-83*, Rapport 32 och 42. (Living conditions 1975-83). Statistics Sweden, Stockholm 1985.
24. Official statistics of Sweden. Occupational accidents 1987-1988. National Board of Occupational Safety and Health. Solna, Sweden, 1990.
25. Official statistics of Sweden. Occupational diseases. 1987-1988. National Board of Occupational Safety and Health. Solna, Sweden, 1990.
26. The Swedish Council on Technology Assessment in Health Care (SBU). *Ont i ryggen*. (Low back pain). Stockholm, 1991.
27. Wallace, M. & Buckle, P.: Ergonomic aspects of neck and upper limb disorders. *International Reviews of Ergonomics*. (Ed. David J. Osborne) 1: 173-200, 1987.

Address for offprints:

Kristina Kemmlert
Division of Applied Work Physiology
National Institute of Occupational Health
S-171 84 Solna
Sweden