J Rehab Med 2001; 33: 216–224

WOMEN AT WORK DESPITE ILL HEALTH: DIAGNOSES AND PAIN BEFORE AND AFTER PERSONNEL SUPPORT

A prospective study of hospital cleaners/home-help personnel with comparison groups

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The present study sought to elicit the diagnoses behind the pain conditions causing complaints by female hospital cleaners and home-help personnel who were working despite their symptoms. We also wished to describe the prevalence of musculoskeletal diagnoses and the intensity, frequency and location of pain, and changes in the clinical picture and pain after personnel supporting interventions. A prospective study was carried out with intervention groups and non-randomized comparison groups. The hospital cleaners intervention programme comprised occupational organizational measures, competence development, physical and psychosocial working environmental measures and individual and rehabilitation measures on both an individual and a group basis. The home-help programme comprised a 2-week stay at an orthopaedic rehabilitation unit, training of supervisors, comrade massage, purchase of training equipment and stress management. Myalgia/tendinitis occurred in 61% of shoulder girdle elevators, 18% of rotator cuffs, 16% of dorsal neck muscles and 29% of hip muscles. There was musculoskeletal pain in the lower back in 28% of cases. Referred pain from a musculoskeletal focus occurred in about one-sixth to one-third of individuals with the diagnosis in question. Neurogenic pain occurred in 6% of cases. No fibromyalgia syndrome was found. One-third of individuals felt pain all the time or almost all the time. The mean rated perceived "worst pain" was 70 mm on a visual analogue scale of 1–100 mm. Comparisons between intervention and reference groups indicated that some improvement in the clinical picture can be attained using this kind of general support programme for employees.

Key words: musculoskeletal diagnoses, referred pain, location of pain, intensity of pain, women, workplace intervention.

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(Accepted February 2, 2001)

INTRODUCTION

Sweden has about 400,000 disability pensioners out of a total population of 8.8 million. The number of newly disability pensioners in 1999 was 38,000 (National Social Insurance Board database, Siluett). The total cost of disability pensions, sickness benefits and disability allowances was about 9 billion Euro in 1998 (1). The most frequent diagnosis resulting in the award of a disability pension is some form of musculoskeletal disease or disorder and this has been recognized as a major national problem. Theoretically the number of disability pensioners can be reduced either by increasing the number of long-term sick leavers reintroduced to the labour force or by decreasing the number of people who become long-term sick leavers. This paper deals with the latter alternative.

It was felt important to study the effects of workplace actions aimed at preventing the transition from working despite ill health to long-term sick leave. This necessitated a study of what was causing the symptoms, i.e. of what diagnosis groups were involved.

The incidence and prevalence of diseases/injuries have been reported for specific professional groups [see e.g. Hagberg & Wegman (2); for a review see Hagberg et al. (3)]. The prevalence of musculoskeletal diseases and disorders in a randomized Swedish population sample of working age was described in the Stockholm study (4–6). Disease/disorder prevalence is often described for either whole groups of employees or for long-term sick leavers only. There are no studies of the prevalence of disorders/diseases in subgroups of specific groups working despite ill health. Disease prevalence differs for different employment groups and circumstances; hence the need for specific studies. This lack of reports has led to a variety of guesses among people involved in rehabilitation about the reasons for this early sick-leave phase when people are able to work regularly, with the exception of short periods of sick leave. The occurrence of diseases/disorders in this very select group is particularly interesting as this phase may lead to long-term sick leave, with all its consequences.

A frequent complaint among these employees was pain. Little is known about pain types and details in subgroups of employees (3). In general, pain in lower or upper extremities (brachialgia) can occur in combination with more proximal focal pain in the

 ISSN 1650–1977

lower back or neck. Distal pain can be either neurogenic or referred from focal musculoskeletal pain (7, 8). It is not known what proportion of subjects with local musculoskeletal pain also have referred pain or referred sensations. Therefore an analysis of pain types was considered interesting in these subjects.

One aim of the study was to throw light on the diagnoses behind the pain conditions causing complaints in women working despite ill health, and to describe the prevalence of different musculoskeletal diagnoses. Another aim was to determine the intensity, frequency and location of pain in female hospital cleaners and home-help personnel working despite their symptoms. A third aim was to attempt to demonstrate possible changes in the clinical picture and pain after personnel support interventions.

The following specific questions were addressed:

1. What kind of diagnosis occurs and what is the prevalence of musculoskeletal diagnoses in female hospital cleaners and home-help personnel working despite symptoms?
2. What is the prevalence of (i) neurogenic pain and (ii) referred pain or referred sensations from a primary musculoskeletal pain focus in these two subpopulations?
3. In an earlier article (9) the dimension "life quality due to pain" was very low in all these subgroups of women working despite ill health, compared to the general Swedish female population. It was therefore considered interesting to study possible effects of personnel support programmes on the pain problems and the clinical picture in the intervention group compared to a reference group.

MATERIAL AND METHODS

Study design

This is a descriptive study of the occurrence of pain problems in hospital cleaners and home-help personnel. In addition the study has a prospective part. Data were collected before, during and after intervention. The reference groups were studied at corresponding points of time. The study material comprised two intervention groups and two non-randomized reference groups. The intervention lasted 12 months for the hospital cleaners and 8 months for the home-help personnel. There were no prerequisites for randomization into support and non-support groups at one workplace, as the support programme included all employees.

Selection of workplaces

For the greatest possible selection consonant with our criteria a certain workplace size was required. Two predominantly female workplaces that were intending to conduct workplace support programmes were selected, one employing cleaning personnel and one home-help personnel. Only women took part in the study. Comparisons were made with reference groups of employees in the same occupational categories and with pain trouble but who were not receiving support from specialialized staff. The reference groups were located in another county (hospital cleaners) and another municipality (home-help personnel) and were not aware of the existence of the support programme for the intervention groups. Instead, the reference groups received customary personnel support according to Swedish regulations.

Study participants

Forty-five female hospital cleaners participated: 23 in the intervention group (mean age 44.4 years, range 27–59 years) and 22 in the reference group (mean age 44.2 years, range 28–62 years). The hospital cleaners intervention group was selected on the basis of the management's knowledge of their health problems and their absence on sick leave. All the hospital cleaners at the reference workplace were first asked to complete an enquiry form which contained simple questions regarding their symptoms and sick leave. This group was selected on the basis of information obtained from the questionnaire according to the principles stated (see below). There were 54 female home-help personnel: 25 in the intervention group (mean age 43.1 years, range 29–56 years) and 29 in the reference group (mean age 42.3 years, range 25–65 years). The home-help intervention group and the reference group were selected on the basis of the company's knowledge of health problems and absence on sick leave. The 99 women enrolled in the study in total were living and working in a rural area about 600 km north of Stockholm.

The guidelines given to the management or the occupational health care were that women who had taken long periods of sick leave should not be included. Women who had taken few or no periods of sick leave due to pain problems during the year prior to the investigation were included. Participation in the study was voluntary and all those invited accepted. The reference groups were comparable with the intervention groups concerning age distribution within the group, educational level, occupational affiliation (cleaner, home help), similar work tasks.

Intervention programmes

Two different support programmes were used, one for the hospital cleaners and one for the home-help personnel. The programmes were created according to both the employers' and employees' ideas, within the framework of economic support from the national programme for the development of working life. The authors had nothing to do with the content of the support programme, which had been decided before our pre-data were collected. The support programme entailed measures aimed at both pain alleviation and activity maintenance.

Hospital cleaners

All personnel at the workplace took part in the support project, both men and women. The project leader (behavioural scientist) was assigned a group of seven selected hospital cleaners. The project group represented work colleagues and, after the collection of views, was asked to design an intervention programme of personnel support together with the management. During the course of the project the leader had private discussions with those in the group who desired this. The discussions concerned personal development, self-confidence and job satisfaction, together with problems and thoughts of a more personal nature. The intervention programme covered group development, leadership training, lectures on somatic and mental health problems, development of suggestions, healthcare activities, massage, better cleaning methods, training in floor care, drawing up of a working environment programme and development of collaboration with other authorities.

Home-help personnel

A personnel support programme was conducted at both group and individual levels. The target group chiefly comprised all employees in the child and youth services and in social services. Thirty-five employees with pain problems were selected to spend time at an orthopaedic rehabilitation unit. The programme contained the following parts: a 2-week stay at an orthopaedic rehabilitation unit (following a medical investigation and assessment entailing diagnosis, prognosis and treatment plan), during which the women were offered physical and mental training and lectures on anatomy, ergonomics, training theory, stress handling, relaxation, analgesics, mobbing at the workplace, crises and crisis management, sleep disturbance and diet. (The project application specified the desire that people taking part in the 2-week rehabilitation unit programme should also by way of continuation be trained as back- and healthcare representatives at their own workplaces.) The intervention also entailed training of supervisors, comrade massage, purchase of training equipment, life and stress management and information on the harmful effects of smoking and ways of giving up smoking.

Questionnaire

The subjects filled in a four-page pain screening questionnaire before, during and after the intervention. The questionnaire comprised selected,

modified material regularly used at the Department of Rehabilitation Medicine, Karolinska Hospital and contained questions about frequency of pain, rating of perceived intensity of pain [visual analogue scales (VAS) for "worst", "least" and "present" pain were used].

The subjects indicated the location of their pain on diagrams. The total spread of pain-marked areas on self-administrated pain drawings for the four subgroups was presented graphically. Categorization was based on the number of subjects (percentage) who had made a pain mark in each area of the body. The frequency intervals were evenly divided into 1–18%, 19–36%, 37–54% and 55–72%, plus a zero category. The percentages show the number of women who had marked pain in each small areas. Figure 1 is based on the responses "Yes" or "No" for the existence of pain in each small area. Twenty-three areas were combined to constitute the neck–shoulder–upper extremity region, nine areas constituted the lumbosacral spine–thigh region and 12 areas constituted the knee–lower leg–foot region. Several women marked pain areas in more than one region.

Physician's investigation—diagnostic criteria

The subjects were examined by two physicians with specialist licences in rehabilitation medicine (J.E., K.S.) before and after the intervention and the reference subjects were examined at the same times. The same physician examined the subject before and after intervention. The circumstances of this research project did not allow neutral persons to perform the assessment. This is a methodological drawback but we judged it important to take the opportunity to investigate these groups of women who were working despite pain problems.

Certain definitions and criteria were used in the establishment of diagnoses. The prevalence of the diagnoses myalgia and tendinitis was based on (i) information from the medical history and (ii) findings at the physical examination. Information from medical history alone was thus not considered a diagnosis. The presence of disturbed sensibility was based on alterations found during the physical examination.

Myalgia/tendinitis in the neck and shoulder regions was diagnosed specifically for the muscles/tendons generating the symptoms/signs. The classical signs of tendinitis were used, such as pain elicited or worsened on direct tension or active contraction through attempted movement against resistance of structure. The elicited pain should be adequately located. Examples are tendinitis of levator scapulae, myalgia of trapezius pars descendens, tendinitis of supraspinatus and myalgia of the neck extensors. The findings and medical history were noted after each investigation.

In a second phase these specific ICD-10 diagnoses (10) relating to the neck and shoulder regions and noted in the records were categorized as: (i) myalgia/tendinitis of the shoulder girdle elevators (ICD-10: M70.8, M62.6), (ii) myalgia/tendinitis of the shoulder joint rotator cuff (M70.8, M62.6, M75.5), (iii) myalgia/tendinitis of the dorsal neck muscles regulating neck/head movements (M70.8, M62.6).

Other musculoskeletal diagnoses were humeral epicondylitis (M77.1, M77.0, M70.8), carpal tendovaginitis (M70.0) and myalgia/tendinitis of the hip abductors and short hip rotator muscles [trochanter tendinitis (M70.6); gluteal tendinitis (M76.0)].

The concept of low-back pain was used for local symptoms from the lumbosacral spine and dorsal aspect of the pelvis. Pain conditions located in the above region were denominated musculoskeletal disorder of the lumbosacral back. The denomination thoracic pain refers here to pain from the middle and lower parts of the thoracic back.

Thorough "bedside" neurological examination of sensibility was performed in both upper and lower extremities to detect sensory changes indicative of neurogenic pain. The occurrence of referred pain from musculoskeletal pain foci was assessed. The definition of referred pain/sensation presented by the IASP international task force (7) was applied.

Non-musculoskeletal diseases were also diagnosed. They were less frequent and are therefore given less space here.

Categories of change in clinical picture

Changes in the clinical picture were assessed later using the diagnosis notes and the physician's physical examination records. The subjects quite commonly had more than one diagnosis and sometimes one condition had improved while another had deteriorated. In order to be able to include such variations the following categories of change in clinical picture were used:

A = definitely improved clinical picture;

B = slightly improved clinical picture, or improved in some aspects and deteriorated in some aspects but with a preponderance of improvement;

C = unaltered clinical picture, or improved and deteriorated to about the same overall extent;

D = slightly deteriorated clinical picture, or deteriorated in some aspects and improved in some aspects with a preponderance of deterioration; and

E = definitely deteriorated clinical picture.

Statistical methods

t-tests for independent samples were used to analyse the number of pain-marked areas. Change in the number of pain-marked areas after intervention was tested using the Wilcoxon matched-pairs signed-ranks test and the Mann–Whitney paired test. Change in frequency of pain was tested using the χ^2 test. Intensity of pain was investigated using a two-factor repeated measures ANOVA of mixed design (General Linear Model, SPSS). The three basic questions were: is there a main effect of factor 1 (moment of measurement; before, during, after)? is there a main effect of factor 2 (intervention vs non-intervention)? and is there an interaction effect of factors 1 and 2? The assumption was made that the prerequisites for a two-way ANOVA were fulfilled.

RESULTS

As non-randomized groups were used for comparisons, this section—after an introductory description of features of the subjects—gives a relatively extensive description of similarities and dissimilarities between the groups before the intervention. A third part reports the effects of interventions.

Occurrence of diagnoses/disorders in all subjects

Myalgia/tendinitis of the shoulder girdle elevators dominated, with an incidence of 61% (Table I). Myalgia/tendinitis was less frequent in the rotator cuff muscles of the shoulder joint (18%) and in the dorsal neck muscles (16%). Musculoskeletal pain in the lumbosacral spine was found in 28% of the women and myalgia/tendinitis of the hip muscles in 29%. Many subjects had more than one musculoskeletal diagnosis.

The existence of fibromyalgia syndromes was thoroughly examined. No subject fulfilled the American College of Rheumatology criteria of 1990 (11) before intervention but one developed a clinical picture of suspected fibromyalgia, all the criteria being fulfilled at the follow-up except for duration of pain for 3 months. Neurogenic pain or local abnormal sensibility was found in only 6% of the subjects.

Other diseases found in parallel with the musculoskeletal disorders were contact eczema ($n = 6$), asthmatic bronchitis ($n = 3$), migraine ($n = 3$), psoriasis ($n = 2$), hypertonia ($n = 1$), porphyria ($n = 1$) and vertigo ($n = 1$). One subject was operated on for a cataract and one was under observation for glaucoma. One subject had been hysterectomized due to a non-malignant cause and one was under investigation for a mammary tumour.

Referred pain/sensation

Table II (upper part) shows the number of persons with referred pain/sensation from one nociceptive focus of musculoskeletal pain. Myalgia/tendinitis in shoulder girdle elevators was the only source of referred pain/sensation in 14/37 persons. For

Table I. *Occurrence of diagnoses/groups of diagnoses in the musculoskeletal system and occurrence of neurogenic pain/disturbed sensibility at examination before intervention in all four groups. Absolute values are given, with percentages in parentheses. Some subjects had several diagnoses within two groups of diagnoses*

	Hospital cleaners				Home-help personnel					
Diagnoses/groups of diagnoses	Interv. ($n = 23$)	Ref. ($n = 22$)	Subtotal ($n = 45$)		Interv. ($n = 25$)	Ref. ($n = 29$)	Subtotal ($n = 54$)		Total ($n = 99$)	
Myalgia/tendinitis in shoulder girdle elevators	13	10	23	(51.1)	22	15	37	(68.5)	60	(60.6)
Myalgia/tendinitis in rotator cuff	6	2	8	(17.8)	6	4	10	(18.5)	18	(18.2)
Myalgia/tendinitis in dorsal neck muscles	6	1	7	(15.6)	5	4	9	(16.7)	16	(16.2)
Epicondylitis	4	4	8	(17.8)	1	5	6	(11.1)	14	(14.1)
Tendovaginitis in wrist region	1	0	1	(2.2)	0	0	0	(0)	1	(1.0)
Musculoskeletal pain in middle or lower part of thoracic spine	4	2	6	(13.3)	3	4	7	(13.0)	13	(13.1)
Musculoskeletal pain in the lumbosacral spine	5	5	10	(22.2)	10	8	18	(33.3)	28	(28.3)
Myalgia/tendinitis in hip muscles	5	5	10	(22.2)	14	5	19	(35.2)	29	(29.3)
Neurogenic pain/disturbed sensibility	1	3	4	(8.9)	2	0	2	(3.7)	6	(6.1)

Interv. = intervention group. Ref. = reference group.

combinations of diagnoses, the occurrence of referred pain/sensation was slightly higher for the upper part of the body (Table II, lower part). Referred pain in the lower extremities due to nociceptive foci with myalgia/tendinitis in the hip muscles occurred in 2/15 persons.

Before intervention

Hospital cleaners.

Spreading of pain before intervention. The distribution of the mean number of pain-marked areas in the self-administrated pain drawing for all subjects in the intervention and reference groups is shown in Fig. 1. Note that the intervention and reference groups are fairly similar in terms of pain distribution. No differences in the number of pain-marked areas in the self-administrated pain drawing were found between the intervention and reference groups before intervention in any of the three regions (neck–shoulder–upper extremity, lumbosacral spine–thigh and knee–lower leg–foot) for the cleaners (Fig. 2).

Intensity of pain before intervention. There was no significant difference between the intervention and reference groups in rated perceived intensity of pain before intervention for 'worst pain', 'least pain' and 'present pain' (Fig. 3). The rated perceived intensities of pain before intervention were 72 and 68 (means, mm VAS on a scale of 1–100 mm) for "worst pain", 15 and 12 for "least pain" and 32 and 40 for "present pain" for the intervention and reference groups, respectively.

Frequency of pain before intervention. Table III shows the frequency of pain in the groups before intervention. The sums of subjects responding to the three least severe categories 1–3 were similar ($n = 15$). Fewer subjects in the intervention group indicated that they were never pain-free (1 vs 7). In contrast, more subjects in the intervention group indicated (categories 4 and 5) that they had pain almost all the time ($4 + 3$). The sums of categories 4–6 were almost the same (8 vs 7). In principle the groups were rather similar. Note that about one-third of the hospital cleaners felt pain all the time or almost all the time.

Diagnoses before intervention. The intervention group showed higher values for diagnoses in the neck–shoulder region

Table II. *Referred pain/sensation on examination before intervention in all four groups taken together. Absolute numbers with referred pain/sensation per person with diagnosis/diagnoses*

Diagnoses	Number of people
Myalgia/tendinitis in shoulder girdle elevators as only source of referred pain/sensation	14/37
Myalgia/tendinitis in dorsal neck muscles as only source of referred pain/sensation	2/5
Myalgia/tendinitis in rotator cuff muscles as only source of referred pain/sensation	1/5
Musculoskeletal pain in thoracic spine as only source of referred pain/sensation	2/13
Medial and lateral humerusepicondylitis as only source of referred pain/sensation	1/4
Myalgia/tendinitis in hip muscles as only source of referred pain/sensation	2/15
Combinations:	
Myalgia/tendinitis in shoulder girdle elevators, in rotator cuff muscles and in dorsal neck muscles in combination as a possible source of referred pain/sensation	1/3
Myalgia/tendinitis in shoulder girdle elevators and in dorsal neck muscles in combination as a possible source of referred pain/sensation	4/6
Myalgia/tendinitis in shoulder girdle elevators and in rotator cuff muscles in combination as a possible source of referred pain/sensation	2/7
Myalgia/tendinitis in shoulder girdle elevators and epicondylitis in combination as a possible source of referred pain/sensation	1/7

Table III. *Frequency of pain before intervention in all four groups. Values shown refer to number of people in each subgroup*

How often do you have pain?	Frequency of pain			
	Hospital cleaners		Home-help personnel	
	Interv. gr. ($n = 23$)	Ref. gr. ($n = 22$)	Interv. gr. ($n = 25$)	Ref. gr. ($n = 29$)
1. Pain-free at the moment	1	1	0	1
2. Almost every week; can be pain-free in certain weeks	7	9	7	10
3. Almost every day; can be pain-free on certain days	7	5	7	8
Sum of 1–3	15	15	14	19
4. Almost all the time; can be pain-free a few hours	4	0	2	4
5. All the time; can be pain-free a few hours after treatment	3	0	3	3
6. All the time; never pain-free	1	7	6	3
Sum of 4–6	8	7	11	10

Interv.gr. = intervention group; Ref.gr. = reference group.

(13, 6 and 6 vs 10, 2 and 1) (Table I). In the hospital cleaner groups myalgia/tendinitis of m. trapezius pars descendens occurred before the start of personnel support in 26.7% of women, and myalgia/tendinitis of m. levator scapulae in 37.8% (not shown).

Home-help personnel.

Spreading of pain before intervention. The distribution of the mean number of pain-marked areas in the self-administrated pain drawing for all subjects in the intervention and reference groups is shown in Fig. 1. The home-help personnel reference group had significantly fewer pain-marked areas in the self-administered pain drawing than the intervention group in the regions neck–shoulder–upper extremity ($p = 0.022$) and lumbo-sacral spine–thigh ($p = 0.002$) (Fig. 2). There was no difference between the groups in the knee–lower leg–foot region.

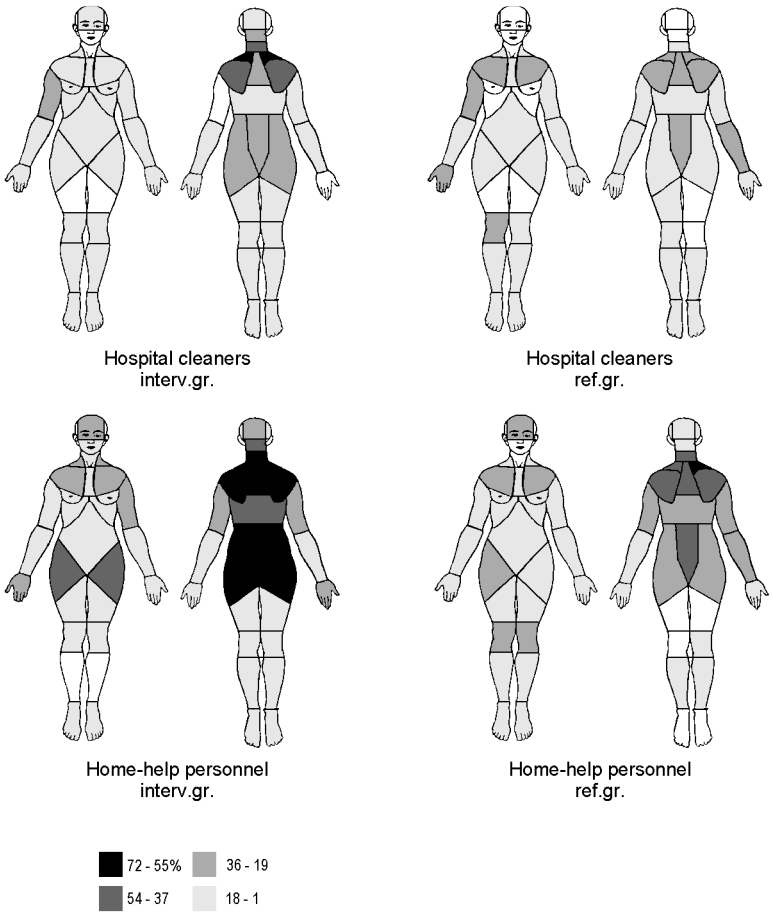

Fig. 1. Distribution of mean pain-marked areas in self-administrated pain drawings. Different intensities of shading correspond to the frequency intervals shown. No marks were made in the unshaded areas.

Table IV. *Change in clinical picture at follow-up after intervention in all four groups. Absolute values are given, with percentages in parentheses. Classification of clinical picture A-E. A = obviously improved clinical picture. B = slightly improved clinical picture or improved in some aspects and deteriorated in some aspects but with a preponderance for improvement. C = unaltered clinical picture, or improved and deteriorated to about the same total extent. D = slightly deteriorated clinical picture or deteriorated in some aspects and improved in some aspects with a preponderance for deterioration. E = obviously deteriorated clinical picture*

	Hospital cleaners				Home-help personnel			
Category	Interv. gr. ($n = 23$)		Ref. gr. ($n = 22$)		Interv. gr. ($n = 25$)		Ref. gr. ($n = 29$)	
A	8	(34.8)	2	(9.1)	7	(28.0)	1	(3.4)
B	9	(39.1)	4	(18.2)	8	(32.0)	4	(13.8)
C	2	(8.7)	6	(27.3)	3	(12.0)	9	(31.0)
D	3	(13.0)	4	(18.2)	6	(24.0)	11	(37.9)
E	1	(4.3)	6	(27.3)	1	(4.0)	4	(13.8)

Interv. gr. = intervention group; Ref. gr. = reference group.

Intensity of pain before intervention. No statistically significant difference between the intervention and reference groups in rated perceived intensity of pain was found before intervention for "worst pain" (72 vs 74 mm VAS), "least pain" (16 vs 14) or "present pain" (32 vs 31) (Fig. 3).

Frequency of pain before intervention. Fewer reference group subjects felt pain all the time or almost all the time than intervention group subjects: 10/29 vs 11/25 (Table III).

Diagnoses before intervention. The intervention group showed higher values for diagnoses in almost all regions, indicating more medical problems than the reference group (Table I).

In the home-help personnel groups myalgia/tendinitis of m. trapezius pars descendens occurred before personnel support in 55.6% of women and myalgia/tendinitis of m. levator scapulae in 48.1% (not shown).

Effects of intervention: comparison between intervention and reference groups

Analysis of physician's examinations and assessment of changes in clinical picture. The subjects often had more than one musculoskeletal pain condition and the examinations showed that after intervention some subjects improved in certain aspects but deteriorated in others. Table IV shows the changes in assessed clinical picture based on examinations made before the intervention/control period and at follow-up. In the hospital cleaners intervention group, 73.9% (34.8% + 39.1%) were clearly improved or slightly improved (categories A + B), compared to 27.3% (9.1% + 18.2%) in the reference group. In the hospital cleaners intervention group 17.3% (13.0% + 4.3%) had clearly or slightly deteriorated (categories D + E), compared with 45.5% (18.2% + 27.3%) in the reference group. Statistical analysis (χ^2 test) of the differences between the intervention and reference groups showed that after intervention more intervention group subjects than reference group subjects had an improved clinical picture.

In the home-help personnel intervention group, 60% (28% + 32%) improved or slightly improved (categories A + B), compared to 17.2% (3.4% + 13.8%) in the reference group (Table IV). In the home-help personnel intervention group, 28% (24% + 4%) had clearly or slightly deteriorated (categories D + E), compared to 51.7% (37.9% + 13.8%) in the

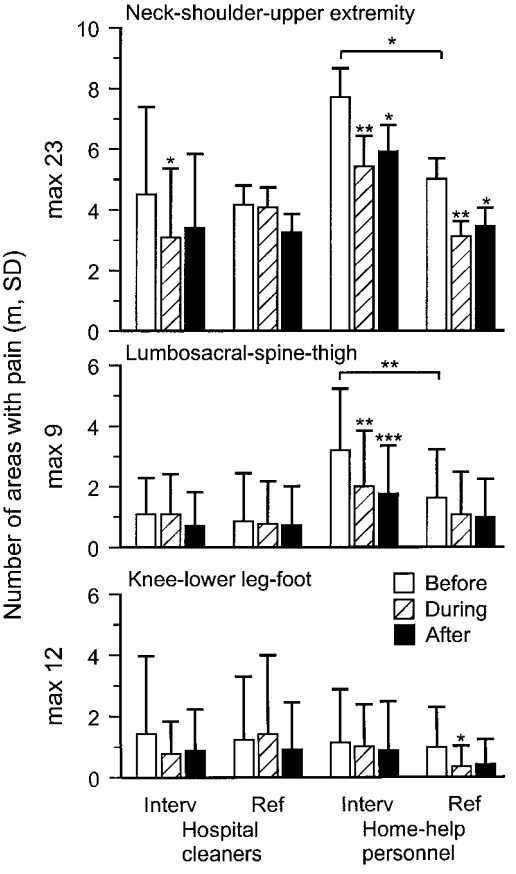

Fig. 2. Occurrence of pain-marked areas in self-administrated pain drawings. Number of pain-marked areas (mean, SD) in neck–shoulder–upper extremity (upper, maximum 23 areas), lumbosacral spine–thigh (middle, maximum nine areas, and knee–lower leg–foot (lower, maximum 12 areas) regions for all four groups indicated beneath the horizontal axis of the lowest diagram before, during and after intervention/control period. Levels of statistical significance are indicated for comparisons between intervention and reference groups before/during and before/after intervention: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

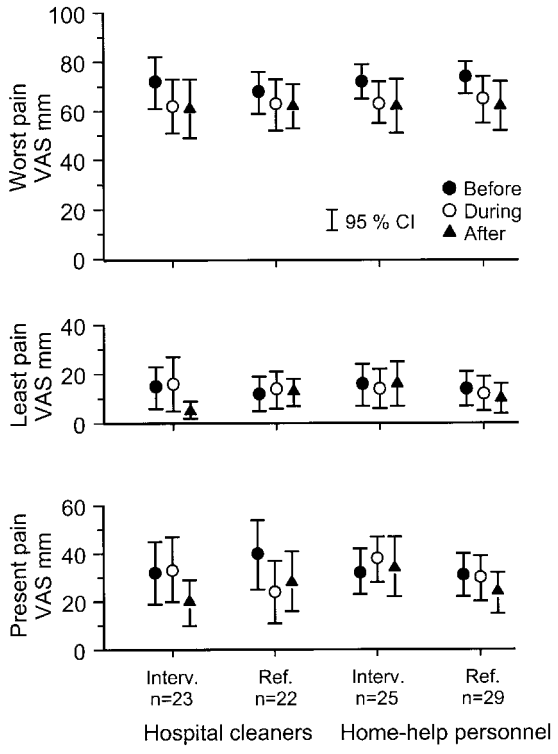

Fig. 3. Rated perceived intensity of pain (VAS mm, means, 95% confidence intervals) as "worst" (upper), "least" (middle) and "present" pain (lower) for all four groups before, during and after intervention/control period.

reference group. Statistical calculations of the differences between the intervention and reference groups demonstrated that more women had an improved clinical picture after intervention in the intervention than in the reference group (Table IV).

Changes in spread of pain

In the between-group comparison of before/during changes, a tendency towards reduction in pain-marked areas in the neck–shoulder–upper extremity area was seen among the hospital cleaners ($p = 0.057$). The before/during within-group comparison showed a reduction in pain-marked areas ($p = 0.015$) (Fig. 2).

In the between-groups comparison of before/during and before/after differences, no changes in pain-marked areas for the neck–shoulder–upper extremity region were found among the home-help personnel ($p = 0.753$ and 0.453, Mann–Whitney U-test). The before/during and before/after within-group comparisons in the home-help personnel intervention and reference groups showed reductions in pain-marked areas for the neck–shoulder–upper extremity area. In the intervention group a reduction was also found for the lumbosacral spine–thigh region ($p = 0.0052$ and 0.0002) (Fig. 2). In the between-groups comparison of before/after differences for the lumbosacral spine–thigh region, a significant reduction in pain-marked areas was found in the intervention group ($p = 0.043$, Mann–Whitney U-test).

Intensity of pain

Hospital cleaners. There was a tendency to main effect of the factor moment of measurement (before, during, after) (two-factor repeated measure ANOVA; $F_{2,86} = 2.510$, $p = 0.087$). The hospital cleaners had a tendency to decrease in "worst" pain intensity during and after the intervention/control period (Fig. 3). The post-hoc tests (within-subjects contrasts) showed a tendency to differ between during measurement and before measurement ($p = 0.052$) and between after measurement and before measurement ($p = 0.057$). The main effect of personnel support on the hospital cleaners' rated perceived "worst" pain intensity was not significant ($F_{1,43} = 0.026$, $p = 0.873$). No significant interaction was found between the factors personnel support and moment of measurement ($F_{2,86} = 0.260$, $p = 0.772$).

There was a main effect of the factor moment of measurement ($F_{2,86} = 3.347$, $p = 0.040$). The hospital cleaners decreased in "present" pain intensity over the moments of measurement (Fig. 3). The post-hoc tests (within-subjects contrasts) showed a significant difference between after measurement and before measurement ($p = 0.019$). There was no significant main effect of the factor personnel support on the hospital cleaners' rated perceived "present" pain intensity.

Regarding the hospital cleaners' rated perceived "least" pain intensities the ANOVA showed no significant main effects of personnel support or the factor moment of measurement ($F_{2,86} = 1.820$, $p = 0.168$). However, the post-hoc tests (within-subjects contrasts) showed a tendency to significant interaction between the factors moment of measurement and personnel support, with a tendency to differ between after measurement and before measurement ($p = 0.055$). The hospital cleaners given personnel support had a tendency to lower intensity of "least pain" after the intervention (Fig. 3).

Home-help personnel. There was a main effect of the factor moment of measurement (before, during, after) (two-factor repeated measure ANOVA; $F_{2,104} = 6.707$, $p = 0.002$). The home-help personnel decreased in "worst" pain intensity during and after the intervention/control period (Fig. 3). The post-hoc tests (within-subjects contrasts) showed differences between during measurement and before measurement ($p = 0.006$) and between after measurement and before measurement ($p = 0.003$). There were no main effects of the personnel support or interaction between the factors personnel support and moment of measurement (Fig. 3).

As regards the home-help personnel's rated perceived "present" and "least" pain intensities, no main effects or interactions were found (Fig. 3).

Frequency of pain

There were no statistically significant changes in frequency of pain before vs during or before vs after intervention in hospital cleaners or home-help personnel (χ^2 tests).

DISCUSSION

When comparing non-randomized groups there is always a risk of selection and it is important to find out how similar and different the two groups are before the intervention. No differences were found between the cleaners intervention group and the reference group before intervention in terms of intensity, spread or frequency of pain. The intervention group had a slightly higher occurrence of diagnoses within the neck–shoulder region, but in terms of other musculoskeletal diagnoses the groups were rather similar. The hospital cleaners groups were also similar in terms of reduced self-estimated quality of life in the dimensions of bodily pain, vitality and general health perceptions, as described elsewhere (9). No significant differences were found between the intervention and reference groups in terms of the following background factors: age distribution within the group; number of children under the age of 12; trade and job category; length of employment at the workplace in question or in similar work; working conditions; and working equipment. Basically, the groups were largely similar and judged to be sufficiently so for conclusions to be made.

The home-help personnel intervention and reference groups were similar in rated perceived intensity of pain. The intervention group had a somewhat greater spread and frequency of pain. They also had more musculoskeletal diagnoses. There are thus important similarities but also dissimilarities between the compared groups of home-help personnel, indicating that the intervention group had non-negligibly more medical problems than the reference group. This is taken into account in the conclusions.

The distribution of pain-marked areas was different in the two different occupational groups. This can be explained by different load exposure in the two types of work. We think that this explanation is more likely than the difference being due to selection into these two professions. The home-help personnel had more pain-marked areas for the lumbosacral spine and thigh region than the hospital cleaners, which might be explained by higher exposure to heavy lifting and carrying in home-help work. Both groups had high occurrences of pain in the shoulder region.

The "Stockholm study" material is sufficiently similar to the present material for analogies to be drawn. This study of Stockholm county (4) showed a prevalence of female rotator cuff tendinitis of 3.9% while we show a 4.6-times higher prevalence of rotator cuff myalgia/tendinitis. The "tension neck syndrome" in the Stockholm study had a prevalence in women of 11.7%. As defined in the Stockholm study this syndrome can be approximately compared with myalgia/tendinitis of the dorsal neck, with a 1.5-times higher prevalence for women in the present study.

The relatively high occurrence of myalgia/tendinitis, 29%, in hip muscles is remarkable. In the Stockholm County study the prevalence of tenderness in short rotator muscles/tendons of the hip joint on physical examination was 7.5%. Part of such myalgia/tendinitis in the present study may be load-related, due to occupational activities (3). The possible relation of these complaints to early idiopathic osteoarthrosis in the present study is unknown (4, 12). However, no subject had a limited range of motion in the hip joints, which is a sign of osteoarthrosis.

Fibromyalgia syndrome is often given as a reason for pain. Therefore it is of interest to observe that no subject fulfilled the criteria for this syndrome before intervention; neither was there any psychogenic pain, except in one case where depression may have contributed.

Regarding pain caused by nerve root/peripheral nerve lesions, there is no definite information about the prevalence among women doing this kind of work. Interestingly the frequency was low, 6%, compared to the musculoskeletal pain frequency.

The results indicate that personnel support of hospital cleaners and home-help personnel has some effect on the clinical picture. No such effect has been demonstrated previously for these occupational groups. A methodological weakness may be the fact that the physicians were not "blinded" regarding the groups being assessed. However, it may have been an advantage that the same physician assessed the subjects both before and after the intervention/control period as the changes *per se* could be assessed more directly, provided that the assessment was as "objective" as possible. The subjects in the reference groups were not aware that they were in a comparison group.

Effects on the other outcome measures used in the present study were limited, although some changes were demonstrated. The effects on pain intensity during and after intervention among hospital cleaners and home-help personnel were seen in both the intervention and reference groups, and thus were non-specific (not shown to be due to personnel support). "Least" pain—which for the patient is often an important factor—tended to be less in the hospital cleaners intervention group after personnel support. There was a tendency towards fewer pain-marked areas in the neck, shoulder and upper extremity in the hospital cleaners' intervention group during personnel support and in the lumbosacral spine and thighs of the home-help personnel intervention group during and after personnel support.

The results indicate that certain effects can be achieved with preventive and early rehabilitative programmes of the kind studied here. The effects may depend on the duration of the support programme and on, for example, how well the programme corresponds to individual needs. An early analysis of individual needs could be an instrument for selecting programme content. Developing effective preventive work-place-based programmes is very important, among other things as a tool to prevent long-term sick leave. This area needs more research.

A new finding is the frequency of referred pain/sensation from a musculoskeletal pain focus. No information was found in the literature on "early clinical cases". The phenomenon has been studied in several human experimental studies (13–16) and is of great interest in clinical pain analysis and impairment assessment. Our material shows the occurrence of referred pain simultaneously with focal pain in, for example, the shoulder

girdle elevators in 14/37 persons and in the dorsal neck muscles in 2/5 persons. Although the material is limited, the proportions found provide new information about the magnitude of the prevalence of clinical referred pain.

ACKNOWLEDGEMENTS

Economic support for the study has been gratefully received from the Swedish Council for Work Life Research, the Swedish Medical Research Council, MFR proj. No. 5720, the Karolinska Institute, the National Institute for Working Life, the social insurance offices in Jämtland and Stockholm, the Land and Sea-Fund and Helge Axelsson Johnsson's Foundation. We express our grateful thanks to Anna-Lena Bylund for assistance.

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