

NECK AND SHOULDER DISORDERS IN MEDICAL SECRETARIES

Part I. Pain Prevalence and Risk Factors

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ABSTRACT. 420 medical secretaries took part in a cross-sectional study aimed at examining the prevalence of musculoskeletal disorders as well as the relationship between neck and shoulder pain and possible risk factors. Sixty-three percent had experienced neck pain sometime during the previous year and while 15 % had suffered almost constant pain 32 % had experienced neck pain only occasionally. Shoulder pain during the previous year had been experienced by 62 %, 17 % had suffered almost constant pain while 29 % experienced pain only occasionally. Fifty-one percent had experienced low back pain. Age and length of employment were significantly related to neck and shoulder pain. Furthermore, working with office machines 5 hours or more per day was associated with a significantly increased risk for neck pain (OR 1.7), shoulder pain (OR 1.9) and headache (OR 1.8). Finally, a poorly experienced psychosocial work environment was significantly related to headache, neck, shoulder and low back pain. The results of this study suggest that work with office machines as well as the psychosocial work environment are important factors in neck and shoulder pain.

Key words: musculoskeletal pain, work environment, risk factors.

Musculoskeletal disorders of the neck and shoulders are receiving an increasing amount of attention (4). Earlier reports from Japan suggested that the problem was growing (12), and Swedish statistics on occupational injuries show an increase in the number of reported neck and shoulder disorders during the years 1982-1985 (13). Factory workers as well as office workers have been mentioned as risk groups (8, 12), and female workers in Sweden report relatively more injuries in the neck, shoulders, and arms than do men (8).

A variety of risk factors has been suggested for neck and shoulder disorders. One example is the introduc-

tion of modern technology resulting in specialized monotonous tasks which imposes static or repetitive loads. Consequently, a relationship has been shown between time spent working with office machines, including visual display units (VDU), and the occurrence of musculoskeletal symptoms (9, 14). Other studies have indicated that the problem is multifactorial with mental strain, lack of control, and low job satisfaction being important elements in the development of the disorder (12, 15, 16).

There is little agreement concerning the prevalence of neck and shoulder disorders in office workers ranging from 11 % (7) to as much as 81 % (15). Thus, there remains uncertainty concerning the magnitude of the problem. The cited studies indicate that office personnel may constitute a group at risk for developing musculoskeletal pain although the magnitude of the disorder and the complexity of the problem still is not fully understood. The aim of this study was to investigate the prevalence of experienced musculoskeletal disorders among medical secretaries and to analyse the relationship between neck and shoulder disorders and various risk factors including those related to the psychosocial work environment.

MATERIAL AND METHOD

Subjects

438 female secretaries employed on a monthly basis and currently working at the Medical Center Hospital in Örebro (1 153 beds) during the autumn of 1985 were asked to participate in the study.

The participation rate was 96 % (420). The responders' mean age was 39 years (SD 11.7 years). Sixty-eight percent of the secretaries had worked 10 years or less with secretarial work (mean 8.3, SD 6.8 years). Fifty-six percent worked full-time, that is 40 hours per week, 23 % worked 30 hours per week, and 21 %, finally, worked 20 hours per week.

The secretaries' major tasks were typing patient journals, letters, and reports. In addition telephone, mail, and appoint-

ment duties formed part of their daily work routines. The emphasis on the various tasks, however, varied from department to department as well as from day to day. Seventy-five percent of the responders said they sat 5 hours or more per day at work, and 43 % reported working with office machines, e.g. typewriter or visual display unit 5 hours or more daily. By contrast, 25 % reported working only 1–2 hours daily with office machines.

Method

A questionnaire containing 48 items was used. Two questions dealt with neck and shoulder pain experienced during the previous year and used a 6 point frequency scale ranging from "very often" to "almost never". One question asked whether or not the secretaries had often experienced headache. The Nordic Musculoskeletal Pain Questionnaire was also included (10). This standardized form, employing a nominal yes or no scale, referred to nine body areas including the neck and shoulders. For each body area the subjects were asked whether they had felt discomfort, ache, or pain during the previous year, whether they had experienced pain during the last 7 days, and whether the pain had prevented them from doing their daily duties.

In addition, the secretaries were asked to rate their experienced psychosocial work environment on a 10 question standardized form employing a 4 category scale from "yes usually" to "no never" (6). The questions are listed in Table I.

The questionnaire also included items concerning length of secretarial employment, the extent of employment (part- or full-time), and daily average number of hours spent sitting respectively working with office machines.

An explanatory letter accompanied the forms which were mailed to the participants. Subsequently, two reminder letters were sent out. The secretaries were assured that the collected data would be handled confidentially.

The study was conducted by the hospital's Occupational Health Care Center in cooperation with the Department of Occupational Medicine. The hospital's Health and Safety Committee as well as the Board of Ethics approved the study and office managers and union representatives were informed about the project.

Statistical analyses

Data were summarized to provide prevalence rates and frequency distributions. Since the data were on both nominal and ordinal levels, relationships between dependent and independent variables were examined by use of the chi-square test for independence. For neck and shoulder pain the 6 point scale served as a dependent variable. In order to avoid expected frequencies of less than 5 in the chi-square contingency table, adjacent categories were combined, thus providing a three category scale (often = 1–2 points, sometimes = 3–4 points, seldom = 5–6 points). For headache as well as low back pain the yes/no scale was used as the dependent variable.

For analyses of stratified data those frequently having neck and shoulder pain (1–3 points) were compared with those less frequently having pain (4–6 points), and Mantel-Haenszel odds ratios (OR/MH) with 95 % confidence intervals were calculated.

Since the 10 psychosocial work environment questions all

Table I. *Psychosocial questions*

1. Do you regard your work as interesting and stimulating?
2. Is there enough variation in your work?
3. Are you told if you do a good job?
4. Is there good contact and cooperation between yourself and your supervisors?
5. Is there a friendly spirit of cooperation between you and your fellow workers?
6. Do you get help and support if you run into difficulties in your work?
7. Are you able to influence your working conditions?
8. Are you given too much to do?
9. Are the demands of your work too great for you?
10. Do you feel anxiety about the possibility of your working situation being changed by reorganization, introduction of new techniques etc?

used a 1–4 category scale, an index ranging from 10–40 points was calculated. A "good" environment was defined as a score between 10–20 points, and a "poor" environment as a score between 21–40 points. The two groups were then compared in terms of outcome on the dependent variable in the manner outlined above.

As a basis for comparison with earlier research (14) "low" exposure (1–4 hours) and "high" exposure (5–8 hours) for sitting or working with office machines were used as the independent variables in 2x2 contingency tables. As the dependent variable for neck and shoulder pain, the dichotomized 6 point scale (1–3 points and 4–6 points) was used.

RESULTS

Pain prevalence

Musculoskeletal pain experienced during last year (period prevalence) as well as pain experienced during last 7 days (point prevalence) are displayed in Fig. 1. Neck and shoulder pain show the highest period prevalence rates (63 and 62 % respectively) followed by low back pain (51 %). Similarly, the highest point prevalence rates were found for neck and shoulder pain (33 and 34 % respectively) followed by low back pain (25 %). In addition 31 % of the participants had often suffered from headache during the previous year.

There was considerable overlap between the three major pain areas. Fifty-two percent of all responders had experienced both neck and shoulder pain, 37 % shoulder and low back pain, and 36 % neck and low back pain. Finally, 31 % had experienced pain from all three major pain sites.

Although approximately two thirds of the secretaries had experienced pain, the more detailed infor-

% of responders

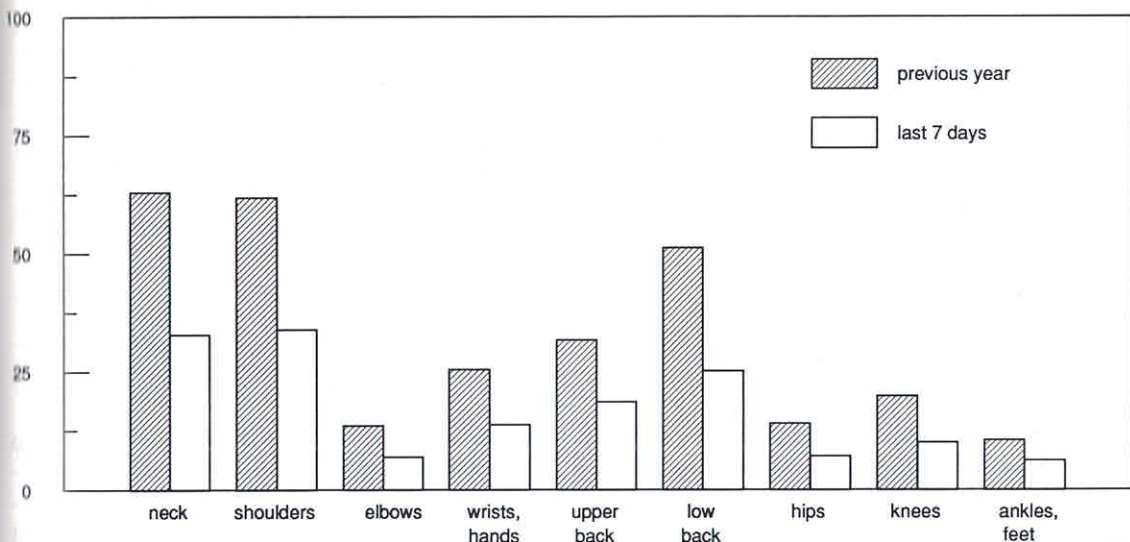


Fig. 1. Prevalence rates of musculoskeletal pain experienced some time during the previous year respectively during the last 7 days ($n=420$).

information gained by the 6 point scales showed that 32 and 29% suffered neck and shoulder pain only on occasional days whereas 15 and 17% respectively suffered almost constant pain (Fig. 2).

The question was asked whether the pain had at

any time during the previous year prevented the performance of daily duties at home or at work. Of those who had experienced neck and shoulder pain some time during the previous year (Fig. 1), 13% reported that neck pain had prevented them from performing

% of responders

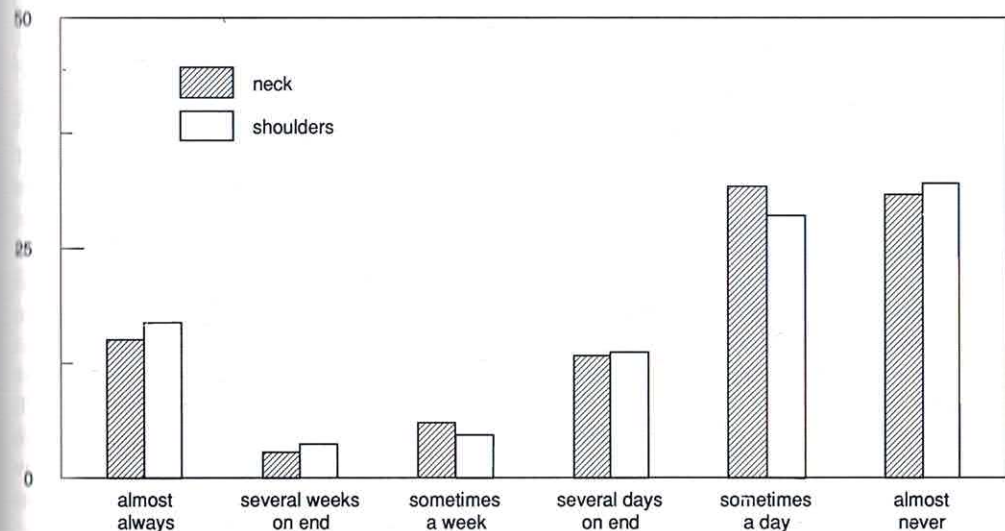


Fig. 2. Distribution of experienced pain in the neck and shoulders during the previous year ($n=420$).

Table II. Relationship of neck and shoulder pain with age

Pain site	Pain category	Age (years)				χ^2	d.f.	p
		< 30 n	30–40 n	41–50 n	> 50 n			
Neck	Often	11	25	15	24	21.38	6	0.002
	Sometimes	16	28	20	17			
	Seldom	96	72	50	45			
Shoulders	Often	14	30	16	27	23.09	6	0.001
	Sometimes	16	31	16	15			
	Seldom	93	64	53	44			

their daily duties while another 13% reported shoulder pain to be the cause. Of those reporting pain in the lower back, 19% reported that they had been prevented from fulfilling their daily duties.

Age, length, and extent of employment

Neck and shoulder pain increased significantly with age (Table II). Likewise there was a significant association with length of secretarial employment (Table III). Since age and length of employment were likely to be interrelated, i.e. age acting as a confounding factor, the secretaries were stratified according to age, and those having worked 5 years or less were compared with those having worked more than 5 years. The dicotomized 6 point scale, as previously described, was used. When age was thus controlled for, working more than 5 years significantly increased the risk for shoulder pain (OR/MH = 1.94, 95% CI=1.13–3.36) but not for neck pain (OR/MH = 1.61, 95% CI=0.93–2.79).

Headache, did not show any significant relationship with either age, length, or extent of employment.

Furthermore, there was no significant relationship between neck or shoulder pain and the extent of employment. Thirty-five percent of the part-time workers experienced neck pain and 38% experienced shoulder pain often or sometimes during the previous year. For full-time workers the rates were 39% (neck) and 41% (shoulders).

Hours spent sitting respectively working with office machines

The frequency (often, sometimes, seldom) of experienced neck and shoulder pain was not significantly associated with sitting five hours or more per day. Nor was there any significant association between experienced headache or low back pain and sitting five hours or more. When odds ratios were calculated they were elevated but not significant for neck pain (OR=1.49, 95% CI=0.86–2.61) and for shoulder pain (OR=1.55, 95% CI=0.90–2.67). Odds ratios for headache (OR=0.93, 95% CI=0.57–1.51) and low back pain (OR=0.92, 95% CI=0.58–0.44), were neither elevated nor significant.

Table III. Relationship of neck and shoulder pain with length of secretarial employment

Pain site	Pain category	Length of employment (months)				χ^2	d.f.	p
		0–60 n	61–120 n	121–180 n	> 180 n			
Neck	Often	17	22	16	20	16.54	6	0.011
	Sometimes	27	27	14	13			
	Seldom	116	77	33	38			
Shoulders	Often	20	24	20	23	20.43	6	0.002
	Sometimes	28	23	14	13			
	Seldom	112	79	29	35			

Table IV. Relationship of headache, neck, shoulder, and low back pain with a "good" versus a "poor" psychosocial work environment

Pain site	Pain category	Psychosocial environment		χ^2	d.f.	p
		"Good" n	"Poor" n			
Neck	Often	40	31	11.4	2	0.004
	Sometimes	46	29			
	Seldom	181	61			
Shoulders	Often	44	36	12.89	2	0.002
	Sometimes	46	27			
	Seldom	177	58			
Low back	Yes	125	76	9.15	1	0.003
	No	140	43			
Headache	Yes	76	48	4.64	1	0.031
	No	187	72			

On the other hand, work with office machines five hours or more per day was significantly associated with the frequency of experienced shoulder pain ($\chi^2(2)=6.32$, $p=0.043$) and headache ($\chi^2(1)=6.55$, $p=0.011$), but not with low back pain. For neck pain there was a tendency for secretaries, who worked five hours or more, to experience neck pain more frequently, but the association was not significant ($\chi^2(2)=3.84$, $p=0.147$). When odds ratios were calculated they were found to be elevated and significant for neck pain (OR=1.65, 95% CI=1.02–2.67), shoulder pain (OR=1.87, 95% CI=1.18–2.98) and headache (OR=1.77, 95% CI=1.14–2.75) but not for low back pain (OR=0.93, 95% CI=0.62–1.39).

Psychosocial work environment

The psychosocial work environment was dominated by three positive findings: 1) 73% of the secretaries reported that they usually experienced good contact with supervisors, 2) 73% experienced good cooperation with fellow workers, and 3) 64% felt that they usually received help and support when they encountered problems with their work. On the other hand 44% experienced that they seldom or never were told if they did a good job and 39% felt that they seldom or never could influence their work.

When the 10 psychosocial questions were summed to an index, 69% of the secretaries experienced a "good" environment whereas the remaining 31% experienced a "poor" psychosocial environment.

Headache and a higher frequency of neck and

shoulder pain as well as the prevalence of low back pain was found to be significantly related to a poorly experienced psychosocial work environment (Table IV).

When the 10 psychosocial questions were examined separately the three categories usually, at times and seldom/never were used. Significant associations with pain were found for 6 of the questions (Table V). The ability to influence one's working conditions was significantly associated with neck, shoulder, low back pain, and headache.

DISCUSSION

While the results of this study showed a high, approximately 60% period prevalence for experienced neck and shoulder pain in medical secretaries, and some 15% were found to suffer from frequent pain, approximately 30% experienced only occasional pain. Age, length of employment, hours working with office machines, and a poor psychosocial work environment were risk factors significantly associated with pain.

The prevalence rates correspond to those reported by Gerner-Björkstén & Jonsson (3), showing the highest rates for neck and shoulder pain, followed closely by that of low back pain. This is an important replication since both studies used the Nordic Muscular Pain Questionnaire with medical secretaries. The present study also showed that although the prevalence was as high as 60%, the majority of the sufferers did not experience pain frequently. Of those actually

Table V. Relationship of psychosocial questions and pain

Psychosocial questions	Pain site			
	Neck	Shoulder	Low back	Headache
Do you regard your work as interesting and stimulating?	NS	NS	$\chi^2(2)=6.24$ $p=0.044$	NS
Is there enough variation in your work?	NS	NS	$\chi^2(2)=6.36$ $p=0.041$	NS
Is there a friendly spirit of cooperation between you and your fellow workers?	$\chi^2(4)=12.57$ $p=0.013^a$	$\chi^2(4)=10.88$ $p=0.028^a$	NS	NS
Do you get help and support if you run into difficulties in your work?	NS	NS	$\chi^2(2)=10.65$ $p=0.005$	NS
Are you able to influence your working conditions?	$\chi^2(4)=18.08$ $p=0.001$	$\chi^2(4)=16.07$ $p=0.003$	$\chi^2(2)=9.03$ $p=0.011$	$\chi^2(2)=6.13$ $p=0.047$
Are you given too much to do?	$\chi^2(4)=13.37$ $p=0.010$	$\chi^2(4)=9.32$ $p=0.054$	NS	NS

^a Expected frequencies <5: 2 of 9 cells.

experiencing pain, only 13% were prevented from performing their daily duties due to neck or shoulder pain. Thus, for the majority, the pain was not of a disabling nature. However, early neck and shoulder pain may be a predictor of future pain development and could possibly be a warning signal. It has been shown that previous low back pain may indeed predict future low back pain (2, 5). Further studies of a long-term prospective nature would be necessary to shed light on this question.

The amount of time spent sitting down did not appear to be related to pain. Although the odds ratios for neck and shoulder pain were elevated, they were not significant. On the other hand five or more hours work with office machines significantly increased the risk primarily for shoulder pain and headache. While this may at first appear contradictory, it indicates that the mere act of sitting was not necessarily the crucial variable, but that the content of the work while sitting was important. For example, although a particular job may be classified as a "sitting job" it may nevertheless include a variety of tasks making the work "dynamic" for the neck and shoulders rather than "static". On the other hand, when office machines are used during the greater part of the day the worker may be forced to adopt more static postures (7). It must also be pointed out that there could be individual differences in the actual posture adopted for a given task. In order then, to better understand the different aspects of physical work load risk factors, a more

detailed study of the frequency of postural changes as well as an observation of individually adopted postures would be necessary.

Although the psychosocial work environment on the whole was judged to be fairly good, a correlation was found between a poor psychosocial work environment and experienced pain. This is consistent with other studies. Bergenudd et al. (1), for instance, found that subjects with a history of shoulder pain were less satisfied with their jobs, and Linton (11) reported that a "poor" psychosocial work environment was associated with an increased risk for both neck and back pain. Two psychosocial questions of importance appeared to be the ability to influence one's work and "having too much to do".

The cross-sectional nature of this study does not allow us to draw any cause-effect conclusions. However, the results do suggest the need for further studies concerning the role of office machines and the psychosocial work environment in the development of neck and shoulder pain in medical secretaries.

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REFERENCES

1. Bergenudd, H., Lindgärde, F., Nilsson, B. & Petersson, C. J.: Shoulder pain in middle age. A study of prevalence and relation to occupational work load and psychosocial factors. *Clin Orthop* 231: 234-238, 1988.
2. Biering-Sörensen, F.: Physical measurements as risk indicators for low-back trouble over a one-year period. *Spine* 9: 106-119, 1984.
3. Gerner-Björkstén, M. & Jonsson, B.: Besvär från rörelseorganen bland läkarsekreterare (Musculoskeletal complaints in medical secretaries). Arbete och Hälsa, National Institute of Occupational Health, Stockholm, 1987.
4. 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.
5. Hellsing, A.-L., Nordgren, B., Schéle, R., Ahlberg, B. & Paulsson, L.: Individual predictability of back trouble in 18-year-old men. A prospective study during military service. *Manual Med* 2: 72-76, 1986.
6. Hane, M., Berggren, T., Eriksson, A. & Ivegård, G.: Utveckling av ett frågeformulär rörande psykosocial arbetsmiljö (The development of a questionnaire for the psychosocial work environment). Stiftelsen för yrkesmedicinsk och miljömedicinsk forskning och utveckling (The Foundation for Occupational and Environmental Research). Örebro, 1984. (In Swedish)
7. Hünting, W., Läubli, T. & Grandjean, E.: Postural and visual loads at VDT workplaces. I. Constrained postures. *Ergonomics* 24: 917-931, 1981.
8. Kilbom, Å. & Broberg, E.: Health hazards related to ergonomic work conditions. *Women Health* 13: 81-93, 1988.
9. Knave, B. G., Wibom, R. I., Voss, M., Hedström, L. D. & Bergqvist, U. O.: Work with video display terminals among office employees. *Scand J Work Environ Health* 11: 457-466, 1985.
10. Kuorinka, I., Jonsson, B., Kilbom, A., Vinterberg, H., Biering-Sörensen, F., Andersson, G. & Jørgensen, K.: Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Appl Ergon* 18: 233-237, 1987.
11. Linton, S. J.: Risk factors for neck and back pain in a working population in Sweden. *Work Stress* 4: 41-49, 1990.
12. Maeda, K.: Occupational cervicobrachial disorder and its causative factors. *J Hum Ergol* 6: 193-202, 1977.
13. Malmer, B. & Blomgren, U.-B.: Arbetssjukdomar 1985 (Occupational diseases 1985). Arbetskyddsstyrelsen och Statistiska Centralbyrån (Swedish National Board of Occupational Safety and Health and Statistics Sweden). Stockholm, 1989. (In Swedish.)
14. Oxenburgh, M.: Musculoskeletal injuries occurring in word processor operators. Proceedings of the 21st Annual Conference of the Ergonomics Society of Australia and New Zealand, pp. 137-143. Sydney, 1984.
15. Smith, M. J., Cohen, B. G. F. & Stammerjohn, L. W.: An investigation of health complaints and job stress in video display operations. *Hum Factors* 23: 387-400, 1981.
16. Tola, S., Riihimäki, H., Videman, T., Viikari-Juntura, E. & Hänninen, K.: Neck and shoulder symptoms among men in machine operating, dynamic physical work and sedentary work. *Scand J Work Environ Health* 14: 299-305, 1988.

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