Chronic neck pain of traumatic and non-traumatic origin

A population-based study

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ABSTRACT Chronic neck pain is a common cause of disability. The effect of neck trauma on the development of chronic neck pain has been debated. In this population-based study, 8,356 persons (25–79 years) were randomly selected from a geographically well-defined area in northern Sweden. 6000 answered a self-administered questionnaire. We evaluated the data from all participants in the age range 25–64 years, a total of 4,392 persons. 18% reported chronic neck pain, defined as continuous pain of more than 6 months duration. 5% had a history of neck trauma and 13% had no such history. Of all patients with chronic neck pain, 30% had a history of neck injury.

We divided all subjects with a chronic neck pain into two groups: those with or without a history of neck trauma. When studying the effect of sociodemographic data, self-perceived health and working conditions, multiple regression analysis showed that the trauma group consisted of significantly more younger men, who were more frequently on sick-leave and that their perceived health was worse than those without a neck injury.

We found no significant differences concerning BMI, marital status, educational level, smoking habits, psychosocial work situation on the Karasek questionnaire or physical activity during leisure time or at work.

The prevalence of chronic neck pain in Europe is high (Cote et al. 1998, Guez et al. 2002), but differences in cultural, social, economic, and health care systems make comparisons difficult. The low prevalence in Asia, for instance, has been ascribed to cultural differences (Lau et al. 1996). Neck pain has been associated with previous neck injury, self-reported poor health and occupational tasks (Mäkelä et al. 1991, Ariens et al. 1999, Fredriksson et al. 1999). It is still disputed whether a history of cervical spine trauma is important for the development of chronic neck pain. Bovim et al. (1994) reported that neck pain in the general population was about the same as the prevalence of neck pain in unselected trauma cases. In another study, the prevalence of chronic neck pain after whiplash injury was as common as that in the general population (Schrader et al. 1996). Cross-sectional and longitudinal population studies have shown that a history of cervical spine injury is a risk factor for persistent neck pain (Marshall et al. 1995, Croft et al. 2001).

We compared two groups with chronic neck pain, one with a history of neck injury and the other without, concerning sociodemographic data, self-perceived health and work load.

Patients and methods

The two northern-most counties in Sweden together form one of the 38 collaborating centers in the World Health Organization (WHO) MONICA (MONItoring of trends and determinants in CArdiovascular disease) project. The MONICA questionnaires contain mainly data on cardiovascular risk factors and sociodemography. The participants filled in the questionnaires and they also underwent a health examination, including measurements of blood pressure, weight, height and laboratory tests. 4 population surveys have been performed and at the survey in 1999, questions were also asked

about the occurrence of cervical pain.

The Northern Sweden WHO MONICA study covers an area of 154,000 km^2, with a total population of 510,000 and a target population of 310,000 in the age range 25 through 74 years. Most of the inhabitants live in municipalities in the coastal area. According to the MONICA study protocol, the subjects were selected by stratified randomization for age and sex (MONICA Manual, revised edition, 1990).

8,356 subjects were invited to the survey in 1999, and 6,000 (72%) participated and answered the self-administered questionnaires. In the present study, all participants in the age range 25–64 years are included, a total of 4,392 men and women. 14 participants did not answer the questions concerning trauma. Persons seeking medical attention after a cervical spine injury were included in the trauma group. The alternatives in the questionnaire were whiplash, or other neck or head injury, or no injury. Each person could report more than one alternative.

Chronic neck pain was defined as continuous neck complaints of more than 6 months duration.

The following variables were assessed: age, sex, married/cohabitant, education, body mass index (BMI), regular smokers, community size (number of inhabitants), sick-leave due to neck pain, heavy load work, demanding physical activities during leisure, and self-perceived health (compared to others during the last year). The analysis of the psychosocial work situation was done with Karasek and Theorell's method (1990). Of the 4,415 participants, 167 students, 291 unemployed, and 485 retired people did not fill in the Karasek questionnaire.

Information on the nonresponders was evaluated. We tried to contact all nonparticipants by telephone or questionnaires and obtained basic information about 50% of them.

Table 1. Descriptive statistics in persons with chronic neck pain

Variable	Chronic neck pain Trauma (n=249)	Chronic neck pain No trauma (n=565)	P-value	Odds ratio	95% CI for OR
Men (%)	43	37	0.1	1.27	0.94–1.72
Average age (years)	51	53	0.004	0.98	0.96–0.99
Married/cohabitant (%)	84	80	0.2	1.27	0.86–1.88
Education					
Primary school (%)	50	57			
Secondary (%)	34	27	0.05	1.40	1.00–1.97
University (%)	16	16	0.4	1.19	0.78–1.82
BMI (kg/m^2)	26	26	0.4	0.99	0.95–1.02
Regular smokers (%)	20	23	0.4	0.87	0.60–1.25
Sick-leave due to neck pain (%)	39	25	0.001	1.87	1.36–2.57
Heavy work load (%)	26	31	0.2	0.80	0.57–1.12
Demanding physical activity during leisure time (%)	18	19	0.9	0.98	0.67–1.44
Self-perceived health compared to others (%)					
Better	11	11			
Worse	39	25	0.01	1.33	1.11–2.17
Equal	50	64	0.001	2.14	1.40–3.28

Statistics

The chronic neck pain group with a history of neck trauma was compared to the chronic group having no trauma, using multiple logistic regression, modeling the probability of trauma. The variables were included as co-variates, and a stepwise forward likelihood ratio selection procedure was used to identify statistically significant co-variates. Odds ratios and corresponding 95% confidence intervals (CI) were calculated by univariate logistic regression.

Results

4,392 persons were included in the analyses. 814 reported chronic neck pain, of whom 249 had a history of neck trauma and 565 had not.Thus, 30% of the cases with chronic neck pain had a history of neck injury (Table 1).

Persons with chronic neck pain and a history of neck trauma were younger, more often men, more on sick-leave due to neck problems and had poorer self-perceived health (Table 2). We found no diffeences between the groups in psychosocial factors and social support at work. Moreover, no sig-

Table 2. Multiple logistic regression, modeling trauma

Co-variate Trauma/no trauma	P-value	Odds ratio	95% CI for OR
Men compared to women	0.02	1.47	1.07–2.02
Age	<0.001	0.97	0.95–0.98
Sick-leave	<0.001	2.01	1.41–2.87
Self-perceived health last year			
Good/very good	0.02		
OK	0.03	1.48	1.05–2.09
Bad/very bad	0.01	1.78	1.13–2.78

nificant differences were noted between the groups concerning BMI, marital status, educational level, smoking habits, heavy work load, and demanding physical activity during leisure or at work.

Discussion

It is important to determine differences between those persons with chronic neck pain due to trauma and those due to other causes. The findings may affect treatment and rehabilitation strategies as well as insurance issues. The variables used in the present study have been associated with spinal pain disorders in previous reports (SBU 2000). The group with chronic neck pain and a history of trauma was more disabled than the no trauma group. We know that sick-leave is a crude parameter of disability and that this variable varies in different countries according to each social welfare system, but it was used equally by both groups in this study. The patients in the trauma group were more likely to be on sick-leave, but they probably had severer symptoms and their perceived health was worse. Another reason could be that it might be easier for the patient and the treating doctor to accept inability to work when the diagnosis was trauma-related. Insurance claims may also prolong sick-leave (Swartzman et al. 1996). The patients having chronic neck pain without trauma probably had an insidious onset of their symptoms often accompanied by other musculoskeletal pain and they therefore may have become more adapted to life with pain. The pain in the trauma group probably starts at the time of the trauma and persisted. This sudden change may have made the patient to perceive his health as worse than in others. Moreover, the trauma group, especially whiplash cases in Sweden, are encouraged to seek medical attention immediately to have the injury confirmed irrespective of the degree of trauma (Sterner 2001). This may increase the patient's tendency to have an exaggerated psychological reaction to the injury and the risk of illness behavior.

Chronic neck pain occurs more frequently in women (Andersson et al. 1993). More static and repetitive load in most female jobs (Lundberg et al. 1994, Björklund et al. 2000) as well as sociological and cultural differences (Lundberg and Frankenhaeuser 1999) are often given as explanations.

Whiplash injuries are also commoner in women (Spitzer et al. 1995), although more men were frequent in the trauma group. Several studies have found that men are more prone to expose themselves to trauma (Kraus and Nourjah 1989, Gregersen and Berg 1994), which suggests that types of neck trauma other than whiplash seem to be involved in the development of chronic neck pain in men.

Comparatively few patients (11%) with neck pain in the population have had a previous injury (Croft et al. 2001). In the present study, in particular about one third of the cases with chronic neck pain recalled a history of neck injury. Although lifestyle parameters, such as smoking, obesity, leisure activities, education and family circumstances have been associated with spinal pain (SBU 2000), none of these had any effect in our study. High work load combined with poor control of conditions at work are related to negative health effects, according to Karasek's model, but this model showed no differences in our groups. The analysis of the nonresponders also failed to find substantial differences and therefore had no effect on our findings.

We have no information about the interval from the injury to our survey nor do we know the exact type of trauma. There may be a recall bias since the "injury" can be affected by the presence of chronic neck pain. However, the definition of neck injury in the current study was an injury severe enough to seek a physician. This may exclude most of the slight injuries.

It has been thought that chronic pain is determined by cultural and psychological factors

irrespective of the type of the original acute injury. As regards neck injuries, prior neck injury appears to be a separate risk factor for long-term periodic neck pain independent of recall bias and not explained by psychological problems (Croft et al. 2001). Thus trauma-related chronic neck pain seems to be a separate entity, which may explain the differences we found between traumatic and non-traumatic chronic neck pain.

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Andersson I H, Ejlertsson G, Leden I, Rosenberg C. Chronic pain in a geographically-defined general population: Studies on differences in age, gender, social class, and pain localization. Clin J Pain 1993; 9: 174-82.

Ariens G A B, Borghouts J A J, Koes B W. Neck pain. In: Epidemiology of pain (eds Crombie I K, Croft P R, Linton S J, Le Resche L, Von Korff M). W A: IASP Press, Seattle 1999.

Björklund M, Crenshaw A G, Djupsjöbacka M, Johansson H. Position sense acuity is diminished following repetitive low-intensity work to fatigue in a simulated occupational setting. Eur J Appl Physiol 2000; 81 (5): 361-7.

Bovim G, Schrader H, Sand T. Neck pain in the general population. Spine 1994; 19: 1307-9.

Cote P, Cassidy J D, Caroll L. The Saskatchewan health and back pain survey. Spine 1998; 23 (15): 1689-98.

Croft R P, Lewis M, Papageorgio A C, Thomas E, Jayson M I V, Macfarlane G J, Silman A J. Risk factors for neck pain: a longitudinal study in the general population. Pain 2001; 93: 317-25.

Fredriksson K, Alfredsson L, Koster M, Thorbjornsson C B, Toomingas A, Torgen M, Kilbom A. Risk factors for neck and upper limb disorders: results from 24 years of follow-up. Occup Environ Med 1999; 56: 59-66.

Gregersen N P, Berg H Y. Lifestyle and accidents among young drivers. Accid Anal Prev 1994: 26; 297-303.

Guez M, Hildingsson C, Nilsson M, Toolanen G. The prevalence of neck pain. A population-based study from northern Sweden. Acta Orthop Scand 2002; 73 (4): 455-9.

Karasek R, Theorell T. Healthy work : stress, productivity, and the reconstruction of working life. Basic Books, New York 1990.

Kraus J, Nourjah P. The epidemiology of mild head injury. In: Mild head injury (eds. Levin H S, Eisenberg H M, Benton A L). Oxford University Press, New York 1989: 8-22.

Lau E M C, Sham A, Wong K C. The prevalence of and risk factors for neck pain in Hong Kong Chinese. J Public Health Med 1996; 18 (4): 396-9.

Lundberg U, Frankenhaeuser R M. Stress and workload of men and women in high-ranking positions J Occup Health Psychol 1999; 4 (2): 142-51.

Lundberg U, Mardberg B, Frankenhaeuser R M. The total workload of male and female white collar workers as related to age, occupational level, and number of children. Scand J Psychol 1994; 35 (4): 315-27.

Marshall P D, O'Connor M, Hodgkinson J P. The perceived relationship between neck symptoms and precedent injury. Injury 1995; 26 (1): 17-9.

Mäkelä M, Heliovaara M, Sievers K, Impivaara O, Knekt P, Aromaa A. Prevalence, determinants and consequences of chronic neck pain in Finland. Am J Epidemiol 1991; 134: 1356-67.

SBU report no. 145/1 2000.

Schrader H, Obelieniene D, Bovim G, Surkiene D, Mickeviciene D, Miseviciene I, Sand T. Natural evolution of late whiplash syndrome outside the medicolegal context. Lancet 1996; 347 (9010): 1207-11.

Spitzer W, Skovron M L, Salmi R, Cassidy D, Duranceau J, Suissa S, Zeiss E. Scientific monograph of the Quebec Task Force on whiplash-associated disorders: redefining "whiplash" and its management. Spine 1995; 20: 8S.

Sterner Y. Whiplash-associated disorders; acute and chronic consequences with some implications for rehabilitation, Thesis, Umeå University Medical, Sweden 2001.

Swartzman L C, Teasell R W, Shapiro A P, McDermid A J. The effect of litigation status on adjustment to whiplash injury. Spine 1996, 21: 53-8.

WHO MONICA Project. MONICA Manual, revised edition. Geneva: WHO, 1990. Cardiovascular Diseases Unit.