Work-related musculoskeletal pain among reindeer herding Sami in Sweden – a pilot study on causes and prevention

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ABSTRACT

Objective. To investigate the prevalence and to identify causes of musculoskeletal pain (MSP) among reindeer herding Sami, and to evaluate the impact on the MSP symptoms elicited by an intervention-prevention programme (IP programme). Study Design. A prospective cohort study in which alterations in MSP symptoms were documented over a two-year period. Methods. Data were collected from 51 reindeer herders (26 men, 25 women) before and after a two-year IP programme. Information on MSP characteristics (affected body regions, pain duration and pain intensity) and exposure to a number of physical and psychosocial risk factors were collected as part of comprehensive health examinations. Clinical examinations and interviews complemented self-reported data collected through questionnaires. Results. MSP symptoms were prevalent, both among women and men. High exposure to physical risk factors, to a large extent related to extensive use of snowmobiles and motorcycles, was the main cause of MSP among men, while psychosocial risk factors were suggested to be more important among women. About one-third of the reindeer herders reported fewer MSP symptoms as a result of the IP programme. Conclusions. This pilot study suggests that it is possible to reduce the number and the severity of the MSP symptoms among reindeer herders by implementing suitably tailored intervention-prevention measures.

Key words: Reindeer herders, Sami, musculoskeletal pain, prospective study, prevention, aetiology

INTRODUCTION

In the Scandinavian countries, commercial reindeer herding is characterised by moving the herds over large areas in search for grazing land, in the mountain areas during summer and in the forests during winter. The work is physically demanding and often executed in a harsh climate. The risk of dying from work-related accidents is almost twice as high among male reindeer herders in comparison to other people in the same region (1,2). In Finnish studies, it has been shown that the incidence of work-related accidents and musculoskeletal pain (MSP) is high among reindeer herders (3-6). Although it is reasonable to assume that this is common also among Swedish reindeer herders, there are no scientific data available so far.

In 2000, two Sami communities (Sameby) in the county of Västerbotten in Sweden approached our research department with a request to implement an intervention-prevention programme (IP programme) aimed at improving their physical status and reducing their MSP symptoms. In 2001 an IP programme was started in the Sami communities.

The objectives of this paper are to describe: 1. the prevalence of MSP complaints at the start of the IP programme, 2. the main causes of new MSP conditions observed between 2001 and
2003, and 3. potential preventive and curative effects of the IP programme two years after its introduction.

MATERIAL AND METHODS

Design
The investigation was designed as a prospective cohort study in which alterations in MSP among male and female reindeer herders were documented over a two-year period.

Material
Altogether 85 persons inhabited the two Sami communities. Thirty did not participate, mainly since they were not working with reindeer herding (mostly children and retired persons). Four persons dropped out over the two-year period (none due to changed occupation). Thus, data were collected from a total of 51 reindeer herders – 26 men (mean age, 50.2 years) and 25 women (mean age, 49.6 years). 23 of the men worked full-time as herders, whereas only three of the women did so. The other women participated periodically in the herding. All women had the main responsibility for the household. Twenty-two women worked part-time with another occupations, were part-time retired, unemployed or studied.

Data collection
Data on MSP and exposure to various risk factors were collected in 2001 and 2003 as part of comprehensive health examinations, which also included e.g. anthropometrics, BMI, blood lipids, blood pressure, aerobic capacity, glucose load test, lung functions tests and bone mass measurements.

Self-reported information on MSP in 10 different body regions (cf. Figure 1) over the last week was documented through a questionnaire (7). The outcome variables were: 1. number of body regions with MSP, 2. number of days with MSP in each region, 3. average pain intensity, and 4. strongest pain intensity. The intensity was assessed on a blank 100 mm visual analogue scale, where 0 mm represents ‘no pain’ and 100 mm ‘worst possible pain’. In addition, a physiotherapist and a GP made independent clinical examinations of those who reported MSP complaints.

Data on exposure were collected via questionnaires covering a number of physical and psychosocial risk factors (Table I). The questionnaires on psychosocial factors have previously been found to have acceptable reliability and validity (8-12). Self-reported data on potential risk factors were complemented by individual interviews.

The intervention-prevention programme
Based on the health problems and the risk factors identified in the initial health examination, an IP programme was designed with the aims to improve the general physical condition (e.g. aerobic capacity, strength, and co-ordination), to reduce the number of MSP conditions, and to prevent the appearance of new MSP. The IP programme was commenced early in 2001 and evaluated two years later. At the time of evaluation, the following activities had been organised within the IP programme: 1). 80 aerobic exercise sessions, supervised by a trained instructor, 2). 98 individual training programmes constructed by a physiotherapist, for altogether 47 persons, 3). 304 individual physiotherapeutic treatment sessions for altogether 44 persons, 4). 12 lectures on risk factors and diseases, prevention and health promotion, and 5). 5 demonstrations of applied ergonomics, cardio-pulmonary rescue and technical improvements for reduction of vehicle-related risk factors.

Analysis and statistics
Comparisons were made of the number of pain regions, pain duration and pain intensity, as well as of various measures of exposure. Chi-square test was used to explore differences between dichotomous variables, and one-way ANOVA to statistically compare numerical variables. Pearson’s correlation coefficient was calculated to explore possible associations.
between variables of exposure and of MSP. For all statistical tests, p<0.05 was considered significant.

**RESULTS**

In total, 39 (76%; 23 women and 14 men) of the herders reported at least one painful body region in 2001. A total of 155 pain regions were observed (61 among men, 94 among women). A significantly higher number of pain regions was reported by women (on average 3.8 regions, ±2.1 SD) than by men (2.4 regions, ±2.7 SD). For men, a prevalence of ≥30% was reported for the neck, shoulders, wrists/hands and knees (Figure 1). For women, the highest prevalence was observed for the head, neck, lower back, shoulders and wrist/hands. The number of painful days over the last week was non-significantly higher for women (4.0 days, ±2.5 SD) than for men (3.1 days, ±2.3 SD). The opposite was found for the average pain intensity (for women: 33 mm, ±15 SD; for men: 38, ±14 SD; p>0.05).

For both men and women, the prevalence of self-reported MSP conditions was similar in 2003 as in 2001 (Figure 1). Only non-significant differences were found in the prevalence for all body regions.

The analysis of possible correlation between variables of exposure and the MSP variables revealed only non-significant associations. However, significant differences between men and women regarding a number of physical risk factors were demonstrated (Table I). The interviews revealed, however, that the physical exposure was partly under-reported among the women.

Of the psychosocial risk factors only ‘work demand’ were significantly different for men and women, with higher demand reported by men (Table I). Highly significant positive correlations were found between hours on snowmobile and exposure to cold (i.e. winter), vibration, heavy lifts, static work, rotated head and bent back.

Twenty-one herders (11 men, 10 women) reported more pain regions in 2003 than two years earlier (Figure 2). Accidents or trauma caused 6 of the 34 new pain regions. The other 28 (82%) appeared slowly and were typically work-related.

A significantly larger number of the women participated in the aerobic exercise sessions (women: 20.8, ±18.4 SD; men: 11.1, ±12.3 SD;
The number of physiotherapeutic treatment sessions was about evenly distributed between men and women (women, 6.3, ±7.2 SD; men, 4.6, ±5.6 SD; p>0.05), as was the participation in the lecturers and demonstrations.

A total of 21 herders (9 men, 12 women) reported less pain regions in 2003 (Figure 2). According to the herders, 17 (46%) out of 37 lost pain regions were primarily due to activities of the IP programme. While men ascribed their reduced MSP to the exercise and self-managed training programmes, the women considered physiotherapy as being most important.

Non-significant associations were found p<0.05). The number of physiotherapeutic treatment sessions was about evenly distributed between men and women (women, 6.3, ±7.2 SD; men, 4.6, ±5.6 SD; p>0.05), as was the participation in the lecturers and demonstrations.

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between the number of training or treatment sessions and changes in the MSP variables. Yet, there was a non-significant trend towards fewer MSP complaints and less pain intensity for those who attended many training and treatment sessions.

Other effects that might have been due to the IP programme were e.g. that both men and women were significantly more satisfied with their endurance in 2003 than in 2001, and that the women regarded their general health condition and emotional support as significantly improved over the two-year period. Two herders stopped smoking, and several cut down their daily cigarette consumption.

DISCUSSION
The present study shows that MSP among reindeer herders is prevalent, both among women and men. It was indicated that high exposure to physical risk factors, to a large extent related to extensive usage of snowmobiles and motorcycles, was the main reason for MSP among men. Psychosocial risk factors might be important for the MSP conditions among both women and men. The evaluation of the IP programme suggests that it is possible to reduce the number and the severity of the MSP symptoms by applying suitably tailored intervention-prevention measures.

A high prevalence of MSP complaints has also been reported among Finnish reindeer herders (4,6). While a large number of MSP conditions among the Finnish herders were the result of accidents related to snowmobiles (3,6), the present data indicate that most of the pain conditions appeared progressively due to exposure to vibration, heavy lifts, static and/or awkward body postures. Yet, the highly significant correlations between exposure to snowmobile riding and most of the other physical risk factors suggest that extensive usage of snowmobiles and motorcycles strongly increases the risk of acquiring MSP. High prevalences of MSP have also been reported among farmers and drivers of logging vehicles (13,14), which strengthens the impression that there is a causal relation between driving terrain vehicles and MSP symptoms, particularly in the arms, legs and the back.

A somewhat surprising finding was that the women in the reindeer herding families reported a higher prevalence of MSP than the men. One might argue that this could have been caused by an underestimation of the number of pain regions among men, due to the ‘healthy workers effect’. This is unlikely, however, since it is uncommon that a herder leaves the occupation (see below). A more plausible reason is that the reindeer herding men have adopted an attitude in which physical shortcomings and health problems are kept to oneself. As a matter of fact, an underestimation of the prevalence of self-reported MSP symptoms among men was evident during the physical examinations and interviews. Moreover, in a controlled study on a larger population of reindeer herding Sami, we have shown that physical well-being is assessed as poor among the herders, particularly among men, indicating dissatisfaction with their physical health (15).

While it seems likely that the MSP symptoms among men are to a large extent caused by physical-ergonomic factors, the reason for the high prevalence among the women is not that obvious. In other studies it has been found that exposure to psychosocial risk factors is relatively more important for the development of low back pain in women than in men (16). The psychosocial conditions for the reindeer herding women appear vulnerable in several respects. They often hold two or three different occupations in parallel (reindeer herding, the household and an ordinary part-time employment), which reduces their decision latitude in comparison to the herding men who are working with reindeer only (Table I and (15)). The Swedish herders also have a difficult economic situation, mainly as a result of government policy since the 1970s, implying rationalisation and pressure to develop profitable enterprises out of the traditional Sami lifestyle (2,17). In addition, in Sweden commercial reindeer breeding is by law restricted to people of Sami origin. Since reindeer herding constitutes a most important carrier of the Sami culture, and since the herding profession is inherited, the reindeer herders often experience an ethno-cultural pres-
sure to continue the reindeer herding lifestyle and to pass it on to younger generations.

The cohort studied in the present investigation is clearly too small to allow any firm conclusions on the prevalence of MSP and their causes. Yet, the results were largely in conformity with previous results on larger populations of reindeer herders (3-6), indicating valid data.

The results of the IP programme suggest that the increasing number of MSP symptoms among the herders were stopped and partly reduced by the program. Since no control cohort was studied, potential causal relations between components of the IP programme and altered MSP symptoms could not be analysed. It should also be pointed out that two years is a short follow-up period. It is likely that preventive factors implemented through the IP programme (e.g. increased knowledge of risk factors and technical improvements of the snowmobiles to reduce exposure to vibration), could have a health promoting impact in the long run, effects that may be exposed in future evaluations.

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