ABSTRACT

Objective. To investigate the occurrence of clinical, psychosocial and behavioural risk factors for cardiovascular diseases (CVD) among reindeer herding (RS) and non-reindeer herding Sami (NRS).

Study Design. A retrospective cohort study, comparing risk factors behind CVD between Sami and non-Sami, RS and NRS, and Sami men and women. Methods. A cohort of 611 Swedish Sami (276 men and 335 women) was constructed from national population registers. A twice as large control cohort of non-Sami was created, matched by age, gender and area of residence. Information on risk factors was obtained from a database containing clinical and psychosocial-behavioural data from a regional CVD preventive programme for the period 1990-2001. Results. The Sami and the non-Sami showed similar risk factor patterns. The main differences were related to working conditions and lifestyle factors of the RS. The RS men had lower blood pressure, were more physically active and had higher job demand and decision latitude. The RS women showed more negative scores on the indices of the job strain model. Conclusions. Previously reported differences in CVD mortality between Sami and non-Sami, and Sami men and women, can only partly be explained by different exposure to the psychosocial and behavioural risk factors investigated in this study.

Key words: cardiovascular diseases, risk factor, Sami, reindeer herder, psychosocial, behavioural

INTRODUCTION

The Sami people are the oldest ethnic group in northern Scandinavia. While the majority of Sami are fully assimilated into the Swedish society, there is a small group (approximately 2,000 – 3,000 in Sweden (2)) that has kept a more traditional lifestyle based on reindeer herding, hunting and fishing. The genetic differences between Sami and other Scandinavians (1), together with the different dietary habits and working conditions among the reindeer herding Sami (3,4), suggest that the incidence of multifactorial diseases and their causes are different among Sami than among non-Sami.

In previous studies on mortality from cardiovascular diseases (CVD), it has been indicated that the mortality risk might be lower among Sami men than among other men in the same region (5,6,7). In Norway, Sami women have been reported to have similar mortality risks as their non-Sami neighbours, while the risk of mortality from cerebrovascular diseases was higher among women in Swedish reindeer families than among their non-Sami counterparts (5,7).

The objective of the present study was to investigate whether Sami and non-Sami, reindeer herding Sami (RS) and non-reindeer herding Sami (NRS), and Sami women and men, were exposed to different risk factors for CVD, with particular emphasis on psychosocial and behavioural factors. Thereby we hoped to shed light on possible explanations for the previously indicated differences in CVD mortality.
MATERIAL AND METHODS

From a database on the health and living conditions of Swedish Sami (2), a cohort was constructed containing participants of a regional CVD preventive programme between 1990 and 2001 (see below). A total of 611 (276 men and 335 women) Sami were identified, of whom 170 were RS and 441 NRS. A twice as large control cohort of non-Sami was constructed to match the Sami cohort by age, gender and area of residence (Table 1).

The CVD preventive programme was designed to clarify the pattern of risk factor for CVD, and to reduce the high regional incidence of CVD by enhancing the participants’ knowledge on factors that increase the risk for CVD (8,9). Every year since 1990, all residents of the county of Västerbotten, 30, 40, 50 and 60 year of age, are invited to participate in the programme. A number of clinical risk factors are measured, and the participants answer a 200-item questionnaire on psychosocial and behavioural risk factors (see below). Following the examination, the participants get individual feedback and advice based on their specific risk profiles.

The following potential risk factors were analysed in the present study: blood pressure, cholesterol, triglycerides, body mass index (BMI), glucose tolerance, and self-reported data on health status, social support, quality of life, job strain, physical activity, dietary habits, familial history of CVD and diabetes (i.e. parents or siblings), and tobacco and alcohol consumption (cf. Table II). The methods used for clinical measurements, and the validity and reliability of the inventories, have been described elsewhere (8-13).

Chi-square test was used to explore differences between groups of dichotomous variables and one-way analysis of variance (ANOVA) was used to compare numerical variables. For both statistical tests, p<0.05 was considered significant.

RESULTS

The results show that the Sami and the non-Sami control population demonstrated similar risk factor patterns (Table II). Yet, slightly but statistically significantly lower blood pressure, HDL-cholesterol and triglycerides were shown among the Sami. There were also fewer Sami who reported parents and/or siblings with CVD than among the non-Sami. A history of diabetes within the family was more common among the Sami than among the non-Sami, and the Sami assessed their quality of life as significantly lower. The Sami consumed more saturated fat and reported larger demand and intellectual discretion at work. No differences were observed regarding smoking habits, alcohol consumption and social support.

Significantly smaller social networks were found among NRS men, while job demand and decision latitude was larger for RS than for both the non-Sami and the NRS. The consumption of saturated fat was higher among the RS men, but they showed significantly lower systolic and diastolic blood pressure (127/78 mm Hg vs. 134/83 mm Hg), and were more physically active. The RS men also scored significantly lower on physical well-being compared to the men in the control population.

The RS women reported significantly lower scores on social and physical well-being and on emotional support than the non-Sami women. Significantly lower glucose concentrations were
observed among the RS women (4.8±0.8 mmol/l) as compared to both the control (5.1±0.7 mmol/l) and the NRS women (5.1±0.7 mmol/l).

A comparison of the risk factors between Sami men and women showed significantly higher LDL cholesterol and alcohol consumption among RS men, while the RS women demonstrated lower glucose concentrations. The work strain factors among the RS were characterised by significantly higher work demand among men and significantly lower intellectual discretion and decision latitude among women.
The NRS men had significantly higher systolic blood pressure, consumption of alcohol and saturated fat than the NRS women, but lower triglycerides and glucose concentrations (Table III). A history of diabetes among parents and siblings was significantly more common for the NRS women than for the men and the non-Sami women (26% vs. 19%). In comparison to the NRS men, the NRS women reported higher emotional support but lower intellectual discretion and physical activity.

**DISCUSSION**

This study indicates that the patterns of psychosocial-behavioural risk factors for CVD are similar for Sami, both RS and NRS, and non-Sami in the same region. The differences observed were probably related to lifestyle factors and the working conditions of the RS, although genetic and other factors cannot be excluded. It was concluded that previously reported differences in CVD mortality between Sami and non-Sami and Sami men and women can only partly be explained by

| Table III. Comparison of potential clinical and psychosocial-behavioural risk factors for CVD among reindeer herding Sami (RS) and non-reindeer herding Sami (NRS). |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| **Risk factors**| **Women** | **RS** | **Men** | **NRS** | **Women** | **Men** | **p** |
| **Clinical measures** | | | | | | | |
| height (cm) | 157 ± 6.7 | 171 ± 8.1 | 0.000 | 162 ± 6.3 | 177 ± 7.3 | 0.000 |
| weight (kg) | 63.8 ± 11.3 | 76.5 ± 12.7 | 0.000 | 65.9 ± 10.6 | 81.0 ± 13.1 | 0.000 |
| BMI (kg/m²) | 25.9 ± 4.4 | 26.2 ± 3.5 | 0.000 | 25.1 ± 3.8 | 25.8 ± 3.3 | 0.000 |
| Total cholesterol (mmol/l) | 5.7 ± 1.1 | 6.0 ± 1.1 | 0.000 | 5.7 ± 1.3 | 5.7 ± 1.4 | 0.000 |
| HDL-cholesterol (mmol/l) | 1.4 ± 0.3 | 1.2 ± 0.3 | 0.000 | 1.4 ± 0.4 | 1.3 ± 0.7 | 0.000 |
| LDL-cholesterol (mmol/l) | 3.9 ± 1.1 | 4.4 ± 0.9 | 0.000 | 3.8 ± 1.2 | 4.1 ± 1.4 | 0.000 |
| Triglycerides (mmol/l) | 1.2 ± 0.5 | 1.5 ± 1.1 | 0.000 | 1.3 ± 0.8 | 1.5 ± 0.7 | 0.000 |
| Systolic blood pressure (mm Hg) | 126 ± 24 | 127 ± 16 | 0.000 | 124 ± 18 | 128 ± 15 | 0.000 |
| Diastolic blood pressure (mm Hg) | 76 ± 12 | 78 ± 10 | 0.000 | 77 ± 11 | 79 ± 11 | 0.000 |
| Glucose 0h (mmol/l) | 4.8 ± 0.8 | 5.1 ± 0.8 | 0.006 | 5.1 ± 0.7 | 5.3 ± 1.3 | 0.000 |
| Glucose 2h (mmol/l) | 6.6 ± 1.1 | 6.0 ± 1.8 | 0.000 | 6.8 ± 1.7 | 6.0 ± 1.9 | 0.000 |
| **Family history** | | | | | | | |
| Diabetes Mellitus (%) | 24 | 21 | 0.006 | 26 | 15 | 0.006 |
| CVD (%) | 16 | 13 | 0.000 | 15 | 15 | 0.000 |
| **Psychosocial factors** | | | | | | | |
| Quality of life - social | 5.3 ± 1.2 | 5.4 ± 1.1 | 0.000 | 5.7 ± 1.1 | 5.4 ± 1.0 | 0.000 |
| - physical | 5.4 ± 1.0 | 5.1 ± 0.9 | 0.000 | 5.5 ± 1.0 | 5.3 ± 0.9 | 0.000 |
| - mental | 5.2 ± 1.3 | 5.5 ± 1.2 | 0.000 | 5.5 ± 1.0 | 5.3 ± 0.9 | 0.000 |
| Social support - social network | 11.5 ± 1.9 | 11.8 ± 1.9 | 0.000 | 11.7 ± 2.0 | 11.6 ± 2.3 | 0.000 |
| - emotional support | 10.7 ± 2.2 | 10.2 ± 2.5 | 0.000 | 11.3 ± 1.5 | 10.7 ± 1.9 | 0.000 |
| Work strain - work demand | 12.3 ± 2.7 | 13.4 ± 2.3 | 0.000 | 12.2 ± 2.6 | 12.1 ± 2.3 | 0.000 |
| - intellectual discretion | 11.2 ± 2.2 | 12.0 ± 1.5 | 0.000 | 11.3 ± 2.1 | 11.8 ± 2.0 | 0.000 |
| - decision latitude | 6.6 ± 1.5 | 7.3 ± 1.2 | 0.000 | 6.5 ± 1.4 | 6.5 ± 1.5 | 0.000 |
| - job strain ratio | 0.72 ± 0.20 | 0.71 ± 0.15 | 0.000 | 0.70 ± 0.19 | 0.68 ± 0.20 | 0.000 |
| - social support | 15.1 ± 3.10 | 16.29 ± 2.97 | 0.000 | 15.20 ± 2.97 | 16.01 ± 2.97 | 0.000 |
| **Behavioural factors** | | | | | | | |
| Physical activity | 2.8 ± 0.7 | 2.9 ± 0.5 | 0.000 | 2.6 ± 0.5 | 2.8 ± 0.6 | 0.000 |
| Smoking, daily (%) | 20 | 19 | 0.000 | 24 | 20 | 0.000 |
| Consumption of alcohol | 1.1 | 1.4 | 0.000 | 1.0 | 1.5 | 0.000 |
| Consumption of saturated fat | 2.8 | 3.1 | 0.000 | 2.2 | 2.6 | 0.000 |

* for description and references, see Table II.
different exposure to the psychosocial and behaviour risk factors investigated in this study.

High work demand and decision latitude, which was typical for RS men, have previously been reported for Swedish farmers (14). Also, low intellectual discretion and decision latitude at work among women, in comparison to among men, seems to be a common trait both in reindeer herding and farming families (15). This might indicate that the RS women have a more stressful working situation (4). This was somewhat supported by the observation that the RS women assessed their social and physical quality of life as low. A higher psychosocial stress at work, which for the RS women often implies a combination of reindeer breeding, household work and a ‘regular’ employment (4), might contribute to their increased mortality risk from CVD in comparison to Sami men (5,7).

Smoking and large consumption of alcohol, both well-recognised risk factors behind CVD, were not more common among Sami than among non-Sami. This is basically in agreement with earlier studies on Finnish reindeer herders (16), and shows that high consumption of alcohol is a characteristic of most men in the northern parts of Scandinavia, regardless of ethnicity and occupation.

The finding of high consumption of saturated fat among the RS was in conformity with earlier studies (3). However, it was somewhat unexpected that the large fat consumption did not induce any increased blood lipids. A possible explanation could be e.g. that the fat is metabolised due to high levels of physical activity, or that the there are different intestinal mechanisms of fat absorption.

The RS men had lower blood pressure than the non-Sami men. This is in agreement with data from Sami men in northern Norway demonstrating lower blood pressure and incidence of myocardial infarction than among Finns and Norwegians (17). It has been suggested that a more physically active lifestyle might be the main reason for the lower blood pressure, low incidence of infarction and the reduced mortality in CVD (18). The present data demonstrated no difference in physical activity between Sami and non-Sami, and only small differences in concentrations of cholesterol and triglycerids.

The overall similarities in exposure to psychosocial-behavioural factors among Sami and non-Sami suggest that the main reasons for the differences in reported CVD mortality are to be found in other risk factors. It is of course possible that other psychosocial-behavioural risk factors, not included in the present study, could have significant effects on the mortality. Yet, it seems more likely that genetic and socio-cultural factors are important for the mortality differences. The observation that the prevalence of CVD within the family was more uncommon among the Sami than the non-Sami has previously also been reported among Norwegian Sami (19), and could indicate that the Sami are less genetically predisposed to develop CVD.

Finally, it should be inferred that psychosocial-behavioural parameters that are currently established as risk factors for CDV have mostly been identified through studies on Caucasian populations. These risk factors might not necessarily have the same impact on different ethnic groups, depending e.g. on differences in genetic predisposition, environmental and culture exposure. Thus, CVD might be induced by different risk factors in different ethnic groups, and a risk factor that causes CVD in one ethnic group might induce no or different symptoms in another population (cf.(20)). An example of this is the finding that traditional risk factors for CVD are of minor importance for the high mortality in cardiovascular diseases in the Arkhangelsk region (21).

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