**Different worlds, different tasks for health promotion: comparisons of health risk profiles in Chinese and Finnish rural people**

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**SUMMARY**

The aim of this study was to compare cardiovascular risk factors of working-aged people in Chinese and Finnish rural villages. The surveys were carried out in 1989 in Tianjin, China, and in Kuopio, Finland. Altogether, 897 Chinese inhabitants and 795 Finnish subjects participated in the surveys. Health behaviours were recorded, and height, weight, blood pressure, heart rate and serum lipids were measured. Generally Finns had a significantly higher mean body-mass index, systolic and diastolic blood pressures, and serum total cholesterol, low-density lipoprotein cholesterol, and total cholesterol/high-density lipoprotein ratio than the Chinese. However, no difference was seen between Chinese and Finnish women in diastolic blood pressure and serum triglycerides. Lower high-density lipoprotein cholesterol levels were observed in Finnish men than in Chinese men, whereas a higher mean level was shown in Finnish women than in Chinese women. There were significantly higher mean heart rates and prevalence of smoking in Chinese than in Finnish populations. More people who were overweight, obese and hypertensive were found in the Finnish than in the Chinese populations. Most of the Finns had two or more cardiovascular risk factors compared with the Chinese, the majority of whom were in the group with less than two risk factors. In conclusion, the risk profiles are clearly somewhat different in these two countries. A major task for the Chinese health policy and health care system is to decrease smoking and to prevent obesity and hypertension. In Finland, the biggest task seems to be the reduction of weight and lipid abnormalities, and the prevention of hypertension.

**Key words**: cardiovascular risk factors; China; comparison; Finland

**INTRODUCTION**

Cardiovascular diseases (CVD) are a major cause of death not only for economically developed countries, but also for developing countries such as China. Finland had the highest mortality in the world from CVD, in particular coronary heart diseases, at the beginning of the 1970s (Keys, 1970; Uemura and Pisa, 1988). However, Finland has shown reduced CVD mortality rates in recent years (Puska et al., 1998). The major risk factors for CVD, e.g. high serum total cholesterol, high blood pressure (BP) and smoking, have decreased (Vartiainen et al., 1994; Jousilahti et al., 1998). In contrast to trends in Finland, the incidence of CVD has risen significantly in China (Liu, 1986). In Tianjin, located in north China and being the third largest city in the country, CVD accounted for 51–56% of all deaths during 1985–1989 (Tianjin Public Health Bureau, 1993).
Lipid abnormalities, hypertension, smoking, high weight and obesity as risk factors for CVD have become serious public health problems worldwide (Vartiainen et al., 1994; Jousilahti et al., 1998; Yang et al., 1999). To prevent and control chronic diseases in rural areas, the Finnish Healthy Village Study began in 1985 in Finland, and the Tianjin Project was launched in 1984 in China. The Tianjin Project is the first major project aimed at prevention and control of chronic diseases in China. In 1989, a baseline survey was carried out in Tianjin, and a follow-up survey of the Finnish Healthy Village Study was performed in the North Savo countryside in Eastern Finland. The aim of this study was to compare cardiovascular risk factors of working-age people in China and Finland.

METHODS

The two independent cross-sectional surveys were carried out in autumn 1989 in three rural villages in Tianjin, and in spring 1989 in the North Savo countryside of Finland. Random stratified cluster sampling was employed in Tianjin. First, communities were selected from the nine counties. Then, a village was chosen from each community for the survey. Finally, individuals were drawn from the local population registers in the sampled resident village. A total of 950 rural Chinese people aged 15–64 years completed the survey. In the Finnish Healthy Village Study, 843 subjects aged 20–67 years participated from six villages. The Finnish data were gathered as a follow-up for the Finnish Health Village Study. The villages were selected by the County Council of North Savo to ensure that they represented typical rural villages in Eastern Finland. Every inhabitant in the selected villages was invited to participate in the survey. The response rates were 95 and 64% in rural Tianjin and the Finnish villages, respectively. The present analysis was carried out using data from people aged 20–64 years. Altogether, 897 rural Chinese inhabitants and 795 Finnish persons participated in the surveys.

The surveys were conducted using a self-administered questionnaire, which dealt mainly with aspects of health status and health behaviour. Height, weight, blood pressure, heart rate and serum lipids were measured. Similar methods were used in the data collection in these two surveys.

Height and weight measurements were taken using a stadiometer and beam balance scale, with subjects wearing usual light indoor clothing without shoes. Height and weight were measured twice and the mean values of the readings were used for the analysis. Body-mass index (BMI) was calculated by dividing the subject’s weight (kg) by the square of the height (m). Overweight was defined as BMI ≥25. Obesity was defined as BMI ≥30. In accordance with the WHO MONICA Project methodology, blood pressure was measured twice, and the mean of the two measurements was used for the analysis. Hypertension was defined as systolic blood pressure (SBP) ≥140 mmHg and/or a diastolic blood pressure (DBP) ≥90 mmHg. Information on smoking habits (‘never smoked’ and ‘ex-smokers’, or ‘current’) were assessed using a set of questions in the self-administered questionnaire.

Serum total cholesterol and triglycerides were measured by enzymatic methods with CHOD-PAP reagents (Boehringer Mannheim, Mannheim, Germany). High-density lipoprotein (HDL) cholesterol was measured by the same enzymatic method after precipitation with dextran sulphate/magnesium chloride. Low-density lipoprotein (LDL) cholesterol was calculated using the formula of Friedewald et al. (Friedewald et al., 1972). Hypercholesterolemia was defined as serum total cholesterol ≥6.5 mmol/l.

The data were analysed using the SPSS program. The differences in CVD risk factors between Chinese and Finnish populations were tested by general factorial ANOVA (adjusted for age).

RESULTS

The mean age was 44 years in the Finn and 42 years in the Chinese populations. After adjustment for age, the Finns had significantly higher mean values for height, weight, BMI, SBP and DBP, and lower mean values for heart rate than the Chinese (Table 1). Only DBP was found to be similar in Chinese and Finnish women. The age-adjusted prevalences of high weight, obesity and hypertension were significantly higher in the Finns than in the Chinese.

A higher mean serum total cholesterol, LDL-cholesterol and triglyceride levels, and total cholesterol/HDL cholesterol ratio was observed in the Finns than in the Chinese. With respect to serum triglycerides, there was no difference between Chinese and Finnish women. There was a significantly lower mean level of HDL-cholesterol in Finnish men than in Chinese men,
but a significantly higher level in Finnish women compared with Chinese women. The prevalence of hypercholesterolemia was four to 12 times higher in Finnish than in Chinese people.

Finnish men smoked more cigarettes per day than Chinese men, but the percentage of male smokers in Finland (26%) was significantly lower than in China (73%).

After adjustment for age, we can see from the figures that most of the Finns had two or more risk factors compared with the Chinese, the majority of whom were in the group with less than two risk factors (Table 2).

### DISCUSSION

The Finnish villages selected for this study were chosen by the County Council of North Savo to represent typical rural villages of Eastern Finland. The villages were located ~50 km from Kuopio, the capital of the North Savo District.

Three Chinese rural villages, all of which were 20–70 km from Tianjin, represented typical villages in Northern China. The proportion of different occupations was similar in both the Chinese and Finnish study samples.

CVD is the leading cause of death in both China and Finland (Liu, 1986; Statistics Finland, 1987–89; Tianjin Public Health Bureau, 1993; Puska et al., 1998). The mean annual mortality rate (per 100 000 population) for CVD was 168 in Tianjin from 1984 to 1989, and 496 in Finland during 1987–1989. Major risk factors for CVD, high total serum cholesterol, low serum HDL-cholesterol, hypertension, smoking, high weight and obesity, differed very markedly between Chinese and Finnish people in the present study.

The present study found that the Finns had a higher level of serum total cholesterol, serum LDL-cholesterol and serum triglycerides, and a higher serum total cholesterol/HDL-cholesterol ratio than the Chinese. Hypercholesterolemia was four to 12 times more prevalent in the Finnish
than in the Chinese population. This serum lipid pattern may contribute to the lower incidence of CVD in the Chinese population compared with the Finnish population. High consumption of dietary total and saturated fat, and low consumption of polyunsaturated fat may be the main determinant of serum lipid concentrations in Finns. The proportions of total fat, saturated fat and polyunsaturated fat in the total energy intake in Finns, respectively, were 38, 20 and only 4% in 1982, and 34, 16 and 5% in 1992 (Pietinen et al., 1996). The mean values of serum total cholesterol were about 6.2 and 5.9 mmol/l in 1982 and 1992, respectively (Pietinen et al., 1996). Dietary fat pattern change in Finland from 1982 to 1992 has most likely resulted in a decrease in serum total cholesterol levels. Dietary intake of fat, saturated fat and polyunsaturated fat are not yet at the level of the dietary guidelines and recommendations of the Finnish National Nutrition Council (National Nutrition Council, 1998), and serum lipid levels were still higher among Finns than Chinese.

The Chinese serum lipid profiles were perhaps determined by Chinese dietary pattern. The Chinese eat more cereal products, vegetables, fruits and fish than the Finnish population, and Finns eat more meat products, butter, cheese, milk and other animal food than the Chinese. Only a few Chinese eat butter and cheese. Finns also get more energy from fat than the Chinese. Tian et al. reported that Chinese total fat intake accounted for ~29% of the total energy intake, and saturated fat and polyunsaturated fat intake accounted for about 7 and 8%, respectively (Tian et al., 1995). The dietary pattern difference between Finns and Chinese may be the main factor influencing serum lipid level differences.

High mean values of BMI and blood pressure, and a high prevalence of overweight, obese and hypertensive people were observed in the Chinese population. Ethnic differences may be one of the major determining factors in the height, weight and blood pressure differences found between the Finns and the Chinese. Other factors may also influence differences in weight. Higher energy intake, especially from fat, in the Finns may be a more important determinant of body weight than in the Chinese. From 1982 to 1992, daily energy and fat intake decreased in the Finnish population, but the prevalence of overweight people increased at the same time. The declined energy expenditure may be the main cause of the increased prevalence of high weight and obesity (Fogelholm et al., 1996). A sedentary lifestyle, decreased work energy expenditure, and a low level of physical activity when travelling to and from work are common in some western countries. The Chinese usually go to work by bike or on foot. Only a few people have private cars. The higher prevalences of obesity and overweight people in Finland may contribute to the higher mean blood pressure, and also to the higher rate of morbidity and mortality from CVD.

China is now the largest tobacco-producing and -consuming country in the world. More than 300 million men and 20 million women are smokers. Data from the 1996 National Prevalence Survey showed that >60% of Chinese men aged 15–69 years were current smokers (Yang et al., 1999). Several studies have documented that tobacco consumption is a major cause of death in China. In China, heavy smokers or those who had ever smoked had an increased risk of death compared with non-smokers, with increased mortality from lung cancer, coronary heart

<table>
<thead>
<tr>
<th>Number of risk factors</th>
<th>Finns (n = 414)</th>
<th>Chinese (n = 430)</th>
<th>Significance</th>
<th>Finns (n = 381)</th>
<th>Chinese (n = 467)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>15</td>
<td>15</td>
<td>n.s.</td>
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<td>36</td>
<td>***</td>
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<tr>
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<td>29</td>
<td>49</td>
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<td>Two</td>
<td>35</td>
<td>29</td>
<td>*</td>
<td>32</td>
<td>22</td>
<td>**</td>
</tr>
<tr>
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<td>17</td>
<td>7</td>
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<td>11</td>
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<td>Four</td>
<td>4</td>
<td>1</td>
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<td>1</td>
<td>0</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

aData are presented as frequencies (%). Risk factors include high weight or obesity, hypertension, hypercholesterolemia and smoking.

*p < 0.05; **p < 0.01; ***p < 0.001.
Vartiainen, North Karelia and in the whole of Finland decreased markedly between 1972 and 1997 in cholesterol, blood pressure and smoking, have been successful since 1972 (Puska et al., 1994). In North Karelia, the community-based strategy to decrease the risk of CVD has been successful since 1972 (Puska et al., 1998). Cardiovascular risk factors, e.g. serum total cholesterol, blood pressure and smoking, have decreased markedly between 1972 and 1997 in North Karelia and in the whole of Finland (Vartiainen et al., 1994; Jousilahti et al., 1998; Vartiainen et al., 2000), whereas an increased prevalence of obesity among Finns has been observed over the same period (Vartiainen et al., 2000). Further reductions in BMI, blood pressure and serum lipid levels still hold great potential for improved public health (Vartiainen et al., 2000).

In conclusion, the present study has shown that the Finns have significantly higher mean levels of BMI, SBP, DBP, serum total and LDL-cholesterol and triglycerides, and a higher total cholesterol/HDL-cholesterol ratio than the Chinese. The Chinese had higher frequencies of smoking than the Finns. There were significantly higher prevalences of high weight, obesity, hypertension and hypercholesterolemia in the Finnish population than in the Chinese. A major task for the Chinese health policy and health care system is to decrease smoking and prevent people gaining too much weight and becoming hypertensive.

In China, the biggest task seems to be weight reduction, and the prevention of lipid abnormalities and hypertension.

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