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MUSCULOSKELETAL DISORDERS AND DISEASES IN FINLAND

Results of the Health 2000 Survey

Helsinki
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Results of the Health 2000 Survey

Leena Kaila-Kangas, ed.

National Public Health Institute, Finland
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University of Helsinki, Finland
University of Kuopio, Finland

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Leena Kaila-Kangas, ed.
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ABSTRACT

Out of a nationally representative sample of 8,028 persons aged 30 years and over, 80% participated in a comprehensive health examination which included a standard clinical examination by a physician. Using standard criteria based on medical history, symptom history and physical status, chronic low-back syndrome was diagnosed in 10.8% of men and 11.0% of women, neck syndrome in 5.7% of men and 7.3% of women, hip osteoarthritis in 5.5% of men and 4.6% of women, knee osteoarthritis in 6.1% of men and 8.3% of women, and rheumatoid factor positive polyarthritis in 0.3% of men and 0.7% of women. In comparison with the Mini-Finland health survey carried out 20 years earlier, the prevalence of low-back and neck syndromes was found to have decreased in both sexes; the prevalence of knee osteoarthritis had decreased in women but not in men. Quantitative ultrasound measurements made at the heel showed that low bone density is common in the Finnish population, whereas the prevalence of self-reported osteoporosis is low and the prevalence of those being monitored by a doctor due to their osteoporosis is even lower. The length of education was inversely associated with the prevalence of common musculoskeletal syndromes. Self-rated disability at work and during leisure time was strongly associated with the presence of musculoskeletal disorders or diseases. A musculoskeletal disease or complaint was the principal reason for the most recent visit to a physician in 12% of Finnish adults, which indicates the proportion of all the visits attributable to this disease group. In addition to public registers and national interview surveys, repeated health examination surveys are necessary for studying the prevalence of common musculoskeletal disorders and for monitoring their development.

Keywords: Musculoskeletal syndromes, epicondylitis, osteoarthritis, rheumatoid arthritis, osteoporosis, pain, self-rated disability, gender, education, occurrence, population survey

PREFACE

The main target of this report is to present an overview of musculoskeletal health in Finland and to illustrate the change in occurrence of the most common chronic musculoskeletal disorders from 1980 to 2000. This project has been made possible only by the unique datasets of the Health 2000 and the Mini-Finland Health Surveys. The Health 2000 Survey was conducted in the period 2000–2001 and the questionnaires and health examinations were planned and executed to a great extent to be comparable with the Mini-Finland Health Examination Survey of 1978–1980. The combined findings of these datasets provide a more in-depth picture of the development of health in Finland than any dataset so far.

The Health 2000 Survey is a result of the fruitful co-operation of the National Public Health Institution and following expert-Institutions in Finland: Statistics Finland, the Social Insurance Institution, the National Research and Development Centre for Welfare and Health and the Finnish Institute of Occupational Health. A total of 130 researchers and experts from different organisations were involved in planning and coordinating the project, headquartered at the National Public Health Institute, KTL. The participation rate was high; at least some information was obtained on 93% of the study sample. The rate of participation among old people was over 80%, which is exceptional and mainly attributable to the home health examinations.

Many staff members from the KTL Department of Health and Functional Capacity have helped us manage the data. We would like to express our warmest thanks to them and to all those who have contributed to this work. We hope that this report will be useful for all those practising in the field of musculoskeletal health and of interest to those who would like to know more about this subject in general.

Authors

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INTRODUCTION

Leena Kaila-Kangas

Musculoskeletal disorders are a major health problem in the industrialised world, causing significant problems for individuals and considerable health care and invalidity costs to society. The purpose of this study is to offer information on the present state and development of musculoskeletal health in Finland.

Most epidemiological studies on musculoskeletal disorders are based on data regarding self-reported symptoms gathered by questionnaires or interviews. Research on clinically verified musculoskeletal diseases has been scarce. This may be partly because of the high costs of arranging clinical examinations for research purposes, and also because it is a very taxing and time-consuming process.

This study presents the occurrence of all common musculoskeletal symptoms and diseases in the Finnish population as a whole and according to socioeconomic status indicated by level of formal education. The analyses are based on the nationally representative data of the Health 2000 Survey. The collection of data was coordinated by the National Public Health Institute in Finland. This unique survey includes an extensive self-administered questionnaire, several interviews and a clinical examination conducted by specially trained physicians who followed detailed written instructions with uniform diagnostic criteria. In addition, most of the results from the health examination are comparable with the results of the Mini-Finland Health Survey that was carried out in Finland just twenty years earlier.

We analysed the prevalence's of the most common musculoskeletal symptoms and the following musculoskeletal syndromes: chronic low-back syndrome, chronic neck syndrome, chronic shoulder syndrome, epicondylitis, carpal tunnel syndrome, hip and knee osteoarthritis and rheumatoid arthritis. Three kinds of prevalence's of symptoms were observed: pain ever, pain during the past month and pain during the past seven days. The prevalence's of symptoms were calculated for subjects aged 18 or over, and of syndromes for those aged 30 or over, separately for men and women. One chapter was reserved for comparing the occurrence of serious musculoskeletal morbidity in the Mini-Finland Health Survey with those in the Health 2000 Survey. The comparison was possible because the diagnostic criteria for syndromes were similarly assessed in both of these surveys. Furthermore, we give basic information about the occurrence of osteoporosis, falls and fractures, self-rated disability associated with musculoskeletal disorders and the use of health services because of them.

STUDY POPULATION AND METHODS

Sami Heistaro, Erkki Nykyri, Leena Kaila-Kangas, Olli Impivaara and Markku Heliövaara

The Health 2000 Survey was carried out in Finland between August 2000 and July 2001. The survey consisted of several questionnaires, an extensive interview, and a health examination. The survey methodology has been described in more detail in recent reports (Aromaa and Koskinen 2004, Heistaro 2005). The methodology report (Heistaro 2005), published in Finnish, will also be published in English on the Internet (www.ktl.fi/health2000).

Sample

A nationally representative two-stage stratified cluster sample, planned by Statistics Finland, was drawn by stratifying mainland Finland into 20 strata consisting of the 15 biggest cities and five university hospital districts. The 15 cities and 65 out of the 234 municipalities or groups of municipalities with joint primary care (within the five university hospital districts), which were drawn by systematic sampling, formed 80 clusters.

At stage two, a total of 8,028 persons aged 30 years or over were sampled from the clusters. Persons aged 80 years or over were over sampled by doubling the sampling fraction. Furthermore, a separate sample of persons aged 18 to 29 years (N=1,894) was drawn using the same sampling design.

Structure of the survey and training of the staff

The Health 2000 Survey consisted of two main parts: a health interview and health examination, the latter being carried out only on those aged 30 years or over. Additionally, the participants completed several questionnaires at different stages of the survey.

The health interview was conducted by Statistics Finland's interview organisation, with a total of 158 interviewers. A few weeks after the interview the participants were invited to a comprehensive health examination organised by the National Public Health Institute. Five health check teams, each working in different parts of the country, carried out the health examinations usually at local health care centres or corresponding pre-booked venues. Each team comprised 16 to 17 specially trained members: study nurses, a dental nurse, a dentist, and a physician.

Two pilot surveys were conducted during the planning and preparation period – seven and three months prior to the survey. The field work staff had a three-week training session before the start of the field work proper. The Statistics Finland interviewers also had special training sessions to prepare them for the computer-assisted health interview.

Health interview

The mean duration of the health interview, usually conducted at home, was 95 minutes, and it included questions related to socioeconomic factors and other background information, previous illnesses and health care use, medications, health behaviour, and living environment, etc. The participants were also given a questionnaire to be completed and returned at the health examination. Furthermore, the date and time for the participant's health examination was scheduled during the interviewer's visit.

The contents of the health interview, as well as most of the other material used in the survey, can be found on the KTL website: www.ktl.fi/health2000.

Health examination

The health examination comprised nine phases. Its total duration was about 4 hours, and it included the following components: standardised symptom interview conducted by a trained nurse; anthropometric, blood pressure, ECG, and heel-bone density measurements; laboratory sampling; oral examination; functional capacity tests; clinical examination; and mental health interview.

The symptom interview concerned symptoms in the back, neck, elbow, wrist, fingers, hip, and knee. The duration of the clinical examination was about 30 minutes, and it was performed by a specially trained physician. The diagnoses made were based on clinical findings and on the history of the participant's diseases and symptoms (Table 1).

Whenever appropriate, the questions and methods used were designed to be comparable with those used in the Mini-Finland Health Examination Survey that was carried out over the period 1978–1980. As part of the survey protocol, separate datasets were collected to assess the quality of the data.

Participation

Maximising the participation rate was a key issue in the survey, and various methods were used to achieve this goal. These included use of the media, supportive contacts from the staff, home visits, telephone calls, and mailed reminders. Of the purified sample of people aged 30 years or over (N=7,979), 89% were interviewed and 80% participated in the health examination. If the people who were given a shorter health examination at home are included, then a total of 85% participated in the health examination. The health examination was performed at home, or at an institution, if the participant was too ill or otherwise unable to come to the health examination proper. This home health examination also included the symptom interview but the examination was conducted by a trained nurse and did not include a clinical examination by a physician.

Of the study population aged 18 to 29 years, 79% participated in the health interview, which included the symptom interview. Overall, the participation rates were high so the results are therefore likely to give a representative picture of the target population's health.

Statistical methods

The results were tabulated as prevalence's using SUDAAN procedures (Research Triangle Institute 2001) that take into account the sampling design. Directly adjusted rates were calculated weighted by the age distribution of the year's 2000 population. In comparisons with the results of the Mini-Finland Survey, the 1980 population was used as weighting so that the results could be directly comparable.

Presenting the results

Data on musculoskeletal issues were collected mainly at the health interview, symptom interview, and clinical examination. The preliminary results have been presented earlier in a separate report (Riihimäki et al. 2004). Potential minor differences compared with the results presented now are mainly due to further corrections made to the research database.

When presenting the results of the diagnoses from the clinical examination in this report, subjects with either a probable or definite diagnosis have been combined in one group, i.e. having the diagnosis. The criteria for the diagnoses are presented in Table 1. Education as a background variable has been applied only to those who are 30 years of age or over. The results are presented separately for men and women.

Table 1. Diagnostic criteria for musculoskeletal disorders and diseases in the clinical examination of the Health 2000 Survey.

Knee osteoarthritis	
Definite	*Probable*
Documented history of previously diagnosed knee osteoarthritis or knee arthroplasty due to osteoarthritis based on convincing findings. OR At least moderately restricted mobility (flexion contracture over five degrees or maximal range of flexion less than 100 degrees), especially if combined with deformations and tenderness associated with movement. OR Slightly restricted mobility: maximal range of flexion less than 130 degrees AND either of the following: • documented history of previously diagnosed knee osteoarthritis but no convincingly presented grounds for the diagnosis; • typical symptoms of knee osteoarthritis (stiffness, pain when moving after inactivity, pain under prolonged strain).	Documented history of previous knee arthroplasty but no convincing evidence of diagnosed knee osteoarthritis. OR Typical symptoms of knee osteoarthritis AND either of the following (even in the absence of clinical findings in the current examination): • history of previously diagnosed knee osteoarthritis without documentation; • documented previous diagnosis of knee osteoarthritis but no grounds for the diagnosis given. OR Minor findings (restricted mobility, tenderness associated with movement, deformations) in the clinical examination suggesting knee osteoarthritis but no corresponding history.
Hip osteoarthritis	
Definite	*Probable*
Documented history of previously diagnosed hip osteoarthritis or hip arthroplasty due to osteoarthritis based on convincing findings. OR At least moderate restrictions in extension (limitation over five degrees) or in inner rotation (maximal range less than 20 degrees) or in outer rotation (maximal range less than 30 degrees), especially if combined with tenderness associated with movement. OR Slight restrictions in extension (limitation less than five degrees) or in inner rotation (maximal range 20–30 degrees) or in outer rotation (maximal range 30–40 degrees) or at least moderately restricted abduction-adduction (maximal range less than 50 degrees) AND either of the following: • documented history of previously diagnosed hip osteoarthritis but no grounds for the diagnosis given; • typical symptoms of hip osteoarthritis (stiffness, pain when moving after inactivity, pain during prolonged strain).	Documented history of previous hip arthroplasty but no convincing evidence of diagnosed hip osteoarthritis. OR Typical symptoms of hip osteoarthritis AND either of the following (even in the absence of clinical findings in the current examination): • history of previously diagnosed hip osteoarthritis without documentation; • documented previous diagnosis of hip osteoarthritis but no grounds for the diagnosis given. OR Clinical findings suggesting hip osteoarthritis (slightly restricted extension or inner or outer rotation or at least moderately restricted abduction-adduction) but no corresponding history.

Chronic low-back syndrome	
Definite	*Probable*
Typical low-back symptoms during the past month AND at least three months overall AND either of the following: • documented history of previously diagnosed low-back syndrome based on convincing findings (even in the absence of clinical findings in the current examination); • at least moderate tenderness associated with movement of the lower back or at least moderately restricted mobility of the spine or at least one clearly abnormal clinical finding in the lower back or in the lower extremities supporting the diagnosis.	Typical low back symptoms during the past month AND at least three months overall AND either of the following: • documented history of previously diagnosed low-back syndrome but no convincingly presented grounds for the diagnosis; • mild tenderness associated with movement of the lower back or slightly restricted mobility of the spine or at least one minor abnormal clinical finding in the lower back or in the lower extremities suggestive of the diagnosis. OR Typical low-back symptoms at least three months overall (but not during the past month) AND documented history of previously diagnosed low-back syndrome but without convincing grounds for the diagnosis AND at least one clearly abnormal clinical finding in the lower back or in the lower extremities supporting the diagnosis.
Chronic neck syndrome	
Definite	*Probable*
Typical neck symptoms during the past month AND at least three months overall AND either of the following: • documented history of previously diagnosed neck syndrome based on convincing findings (even in the absence of clinical findings in the current examination); • at least moderate tenderness or at least moderately restricted mobility in the neck.	Typical neck symptoms during the past month AND at least three months overall but no clinical findings to support the diagnosis. OR Vague neck-shoulder symptoms during the past month AND at least three months overall AND either of the following: • at least moderate tenderness associated with movement of the neck; • at least moderately restricted mobility in the neck. OR Vague neck-shoulder symptoms during the past month AND at least three months overall AND documented history of previously diagnosed neck syndrome AND either of the following: • at least mild tenderness associated with movement of the neck; • at least slightly restricted mobility in the neck.

Chronic shoulder syndrome	
Definite	*Probable*
Typical symptoms in the shoulder during the past month AND at least three months overall AND either of the following: • documented history of previously diagnosed shoulder syndrome based on convincing findings; • at least moderately restricted mobility in the shoulder.	Typical symptoms in the shoulder during the past month AND at least three months overall AND either of the following: • documented history of previously diagnosed shoulder syndrome but no convincingly presented grounds for the diagnosis; • slightly restricted mobility in the shoulder joint.
Lateral epicondylitis	
Definite	
Pain in the elbow during the preceding 30 days AND pain in the lateral humeral epicondyle region during resisted extension of the wrist with the elbow extended.	
Carpal tunnel syndrome	
In the absence of electrodiagnostic verification of carpal tunnel syndrome, diagnosis was based on physical examination. Two levels of certainty were defined.	
Probable	*Possible*
The classic or probable Katz hand diagram (numbness, tingling, burning sensation or pain symptoms present in two of the digits 1, 2 and 3 during the preceding 7 days) and a positive finding in at least two of the following four clinical tests: decreased sensation of touch in the fingers innervated by the median nerve, weakness of thumb abduction or wasting of the thenar eminence, Tinel's median nerve tapping test, and combined wrist flexion and carpal compression.	Possible Katz hand diagram (numbness, tingling, burning sensation or pain symptoms present in one of the digits 1, 2 and 3 during the preceding 7 days) AND a positive finding in one of the aforementioned four clinical tests.
Seropositive rheumatoid arthritis	
Definite	
Serum rheumatoid factor > 50 U/ml AND either of the following: • findings of inflammatory polyarthritis in clinical status; • convincing medical history of inflammatory polyarthritis.	

BACK PAIN AND CHRONIC LOW-BACK SYNDROME

Sami Heistaro, Jari Arokoski, Heikki Kröger, Päivi Leino-Arjas, Hilkka Riihimäki, Erkki Nykyri and Markku Heliövaara

Life-time cumulative occurrence of back pain was 76.7% in men and 75.8% in women, and of sciatic pain, 30.4% in men and 39.5% in women. The prevalence of back pain during the past month was 28.2% in men and 33.1% in women (age-adjusted, 18+ years). Chronic low-back syndrome was clinically diagnosed in 11% of the participants (age-adjusted, 30+ years).

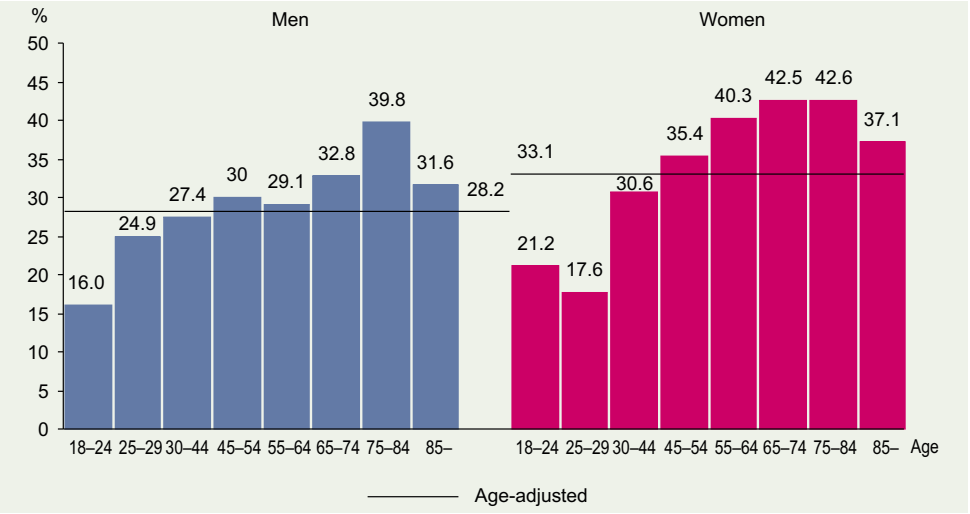
Back disorders are a major cause of early retirement, sick leave, and the use of health services. Several factors are known to be associated with back pain, including socioeconomic background, physical workload, mental distress, and many life-style variables (Heistaro et al. 1998, Riihimäki and Viikari-Juntura 2000). The partly unknown etiology of many common back-related complaints makes their prevention a challenging task. This chapter presents the key findings regarding back symptoms and disorders in the cross-sectional Health 2000 Survey.

Results

The life-time cumulative occurrence of back pain among all respondents was 76.7% among men and 75.8% among women (Table 2). Even in the youngest age group, 18 to 24 years, nearly two-thirds of the respondents reported that they had suffered back pain some time during their lives. There were only minor gender differences in the prevalence rates.

The prevalence of back pain experienced during the previous 30 days (Figure 1) increased with age among both genders until the age of 45 to 54 in men and 65 to 74 in women. However, men had the peak prevalence 39.8% in the age group 75 to 84 years, the prevalence otherwise being closer to 30% after the age of 29. The gender differences were most obvious between 55 and 74 years, late middle-aged women reporting back pain more frequently than men of the same age. In those years, more than 40% of women reported they had suffered back pain during the previous 30 days, and one of three women aged 55 or over had suffered back pain during the previous seven days (Table 2).

Figure 1. Prevalence (%) of back pain during the past month in the Health 2000 Survey.



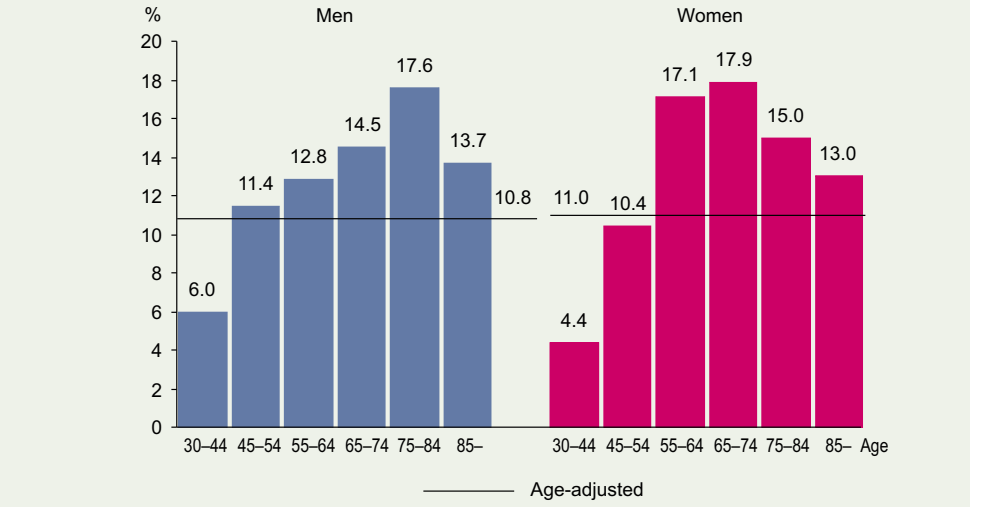
A higher level of education measured by years of schooling seemed to protect against back pain in both genders. Among men, however, there were only minor differences between the two lower educational groups.

The life-time cumulative occurrence of self-reported sciatic pain (Table 2) showed – as one may expect – lower rates among the youngest age groups, increasing thereafter until the age of 45 to 54 in men and 55 to 64 in women. In all age groups under 75 years, the life-time occurrence of sciatic pain was greater among women. By the age of 55 to 64 years, 41.3% of men and 56.7% of women had experienced sciatic pain.

Of all the men interviewed, 29.7% reported that a physician had earlier diagnosed them as having some kind of back disease (Table 2), and among women the corresponding rate was 26.9%. The prevalence obviously increased with age – however, the oldest participants again had somewhat lower prevalence rates, which could be explained by selective mortality. Education was protective only for men with 13 or more years of education (Table 4).

In the clinical examination, chronic low-back syndrome (Figure 2) was diagnosed in 11% of the participants in both genders. Among men, the prevalence increased until the ages of 75 to 84, whereas among women the peak prevalence (17–18%) was between the ages of 55 and 74. Among those with 13 or more years of education, chronic low-back syndrome was less prevalent (Table 4).

Figure 2. Prevalence (%) of chronic low-back syndrome in the Health 2000 Survey.



The vibration test of the lumbar spine and SI articulations was carried out to reveal potential painful ruptures within the discs (Yrjamä et al. 1994). The test was positive (i.e. caused pain) for 4% of the men and 8% of the women examined (Table 3). The prevalence of positive findings increased steadily with age among men, whereas among women the test was most frequently (11.8%) positive in the age group 55 to 64 years. The test was found to be positive considerably more often among the less educated participants (Table 4).

Discussion

Back pain is a common symptom in the Finnish population as a whole, and life-time cumulative occurrence rates are very similar in both genders – however, the episodes seem to be somewhat more frequent among women. Among men, in their early middle-age years, the prevalence of back pain reaches a level that more or less remains the same throughout the rest of their lives. Chronic low-back syndrome was diagnosed as being equally common in both genders. The life-time cumulative prevalence of self-reported sciatic pain was greater among women.

A higher educational level also seems to be protective regarding back problems. This finding complies with earlier studies on the issue (Heistaro et al. 1998). The 30-day prevalence of back pain in the working-age population in the present study was lower than in another Finnish paper using population samples drawn from eastern Finland between 1972 and 1992 (Heistaro et al. 1998). Those earlier results were

not, however, nationally representative and were collected by questionnaires instead of interviews.

The high participation rate in the Health 2000 Survey underlines the fact that the present results reliably represent the burden of back symptoms and disorders on the Finnish population as a whole. The present data on the prevalence of back symptoms and morbidity, especially the clinical findings, are internationally unique because most of the methods used (Heistaro 2005) are comparable with the Mini-Finland Health Survey (Heliövaara et al. 1993) conducted in the early 1980s. The time trends for back morbidity are discussed in more detail in chapter 13.

Table 2. Prevalence (%) of back symptoms and a self-reported back disease that a physician had earlier diagnosed in the Health 2000 Survey.

	18–24	25–29	30–44	45–54	55–64	65–74	75–84	85 +	18 +[1]
Back pain ever									
Men	63.6	69.2	79.0	80.3	76.7	80.9	82.0	71.1	76.7
Women	65.9	65.4	75.2	78.8	82.9	80.8	78.7	60.8	75.8
Sciatic pain ever									
Men	5.8	14.9	25.6	41.0	41.3	40.0	38.2	31.7	30.4
Women	13.0	23.4	37.3	49.0	56.7	47.9	37.0	27.6	39.5
Back pain during the past 7 days									
Men	9.2	13.9	18.3	22.8	21.5	25.7	34.7	29.0	20.4
Women	11.7	10.2	20.9	27.6	31.5	33.7	34.8	33.1	24.4
Self-reported back disease									
Men	11.3	16.0	27.2	35.2	34.5	37.2	46.4	36.7	29.7
Women	15.1	11.7	21.9	29.8	37.9	38.0	34.1	28.5	26.9

[1]age-adjusted: direct standardisation, with the 2000 population of Finland as the standard

Table 3. Prevalence (%) of irritation symptoms in the lumbar nerves in the Health 2000 Survey.

	30–44	45–54	55–64	65–74	75–84	85 +	30 +[1]
Men	2.1	3.3	5.0	4.8	7.9	8.9	3.9
Women	5.3	7.6	11.8	9.6	9.0	5.9	7.9

[1]age-adjusted: direct standardisation, with the 2000 population of Finland as the standard

Table 4. Age-adjusted proportion (%) of back pain during the past month, chronic low back syndrome, self-reported back disease and irritation symptoms in the lumbar nerves among persons aged 30 or over, by length of education, in the Health 2000 Survey.

Length of education, years	0–9	10–12	13+	Total [1]	p [2]
Back pain					
Men	31.8	31.0	25.9	29.7	0.011
Women	40.1	36.3	32.3	36.5	0.004
Chronic low back syndrome					
Men	12.7	11.1	6.7	10.5	< 0.001
Women	12.3	12.3	8.6	11.2	0.020
Self-reported back disease					
Men	36.8	35.2	26.5	33.1	< 0.001
Women	31.9	30.9	27.9	30.4	0.135
Irritation symptoms in the lumbar nerves					
Men	5.5	2.8	1.8	3.6	< 0.001
Women	10.9	7.5	5.1	7.9	< 0.001

[1] age-adjusted using separate models for men and women, [2] difference between educational groups

NECK PAIN AND CHRONIC NECK SYNDROME

Päivi Leino-Arjas, Eira Viikari-Juntura, Leena Kaila-Kangas, Erkki Nykyri and Hilkka Riihimäki

Neck pain was very common, with a gender difference that emphasized the occurrence in women. Neck pain during the past 30 days was reported by 24% of men and 37% of women. Chronic neck syndrome was diagnosed in 5.5% of men and 7.3% of women. The age-gradients were steeper in men than in women. The length of education was inversely associated with the occurrence of neck pain in both genders and with chronic neck syndrome among men.

Neck pain is among the most common musculoskeletal symptoms in the population and second only to low-back pain in previous population surveys (Ferrari and Russell 2003). Its course is often chronic with periods of remission and exacerbation (Côté et al. 2004). The risk factors for neck pain include psychosocial and physical work-related factors, mental distress, being overweight, other musculoskeletal pain, and genetic influences (Ariëns et al. 2001, Ferrari and Russell 2003, MacGregor et al. 2004). Clinically verified neck syndrome has rarely been studied in large population samples. In the Mini-Finland Health Survey, injury to the neck or back, mental and physical stress at work, being overweight, and parity were associated with chronic neck syndrome (Mäkelä et al. 1991).

Results

• Overall occurrence of neck pain by gender

Neck pain was very common. Women experienced neck pain more often than men. Neck pain during the past month was reported by 37% of women and 24% of men (Figure 3), and quite recent neck pain, i.e. during the past week, by 27% of women and 17% of men (Table 5). About two-thirds (68%) of all women and about one half (54%) of all men aged 18 years and over had experienced neck pain sometimes during their life (neck pain ‘ever’).

• Occurrence by age-group

Among men, the occurrence of neck pain experienced during the past month increased with age from 13% in the youngest group aged 18–24 years to 36% in the oldest group aged 85 years and over (Figure 3). The same was true regarding neck pain experienced during the past week, where the increase ranged from 6% to 30%.

Figure 3. Prevalence (%) of neck pain during the past month in the Health 2000 Survey.

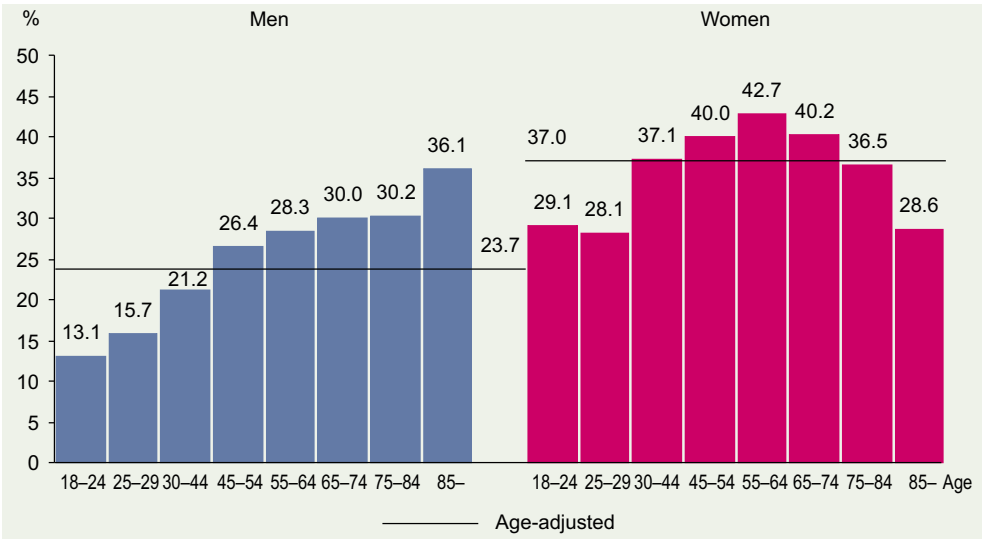
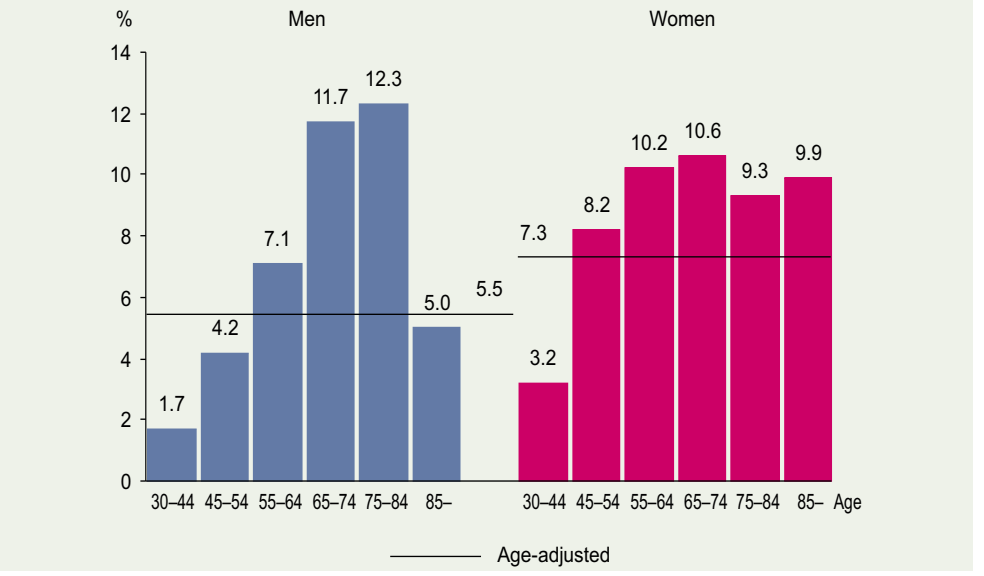


Figure 4. Prevalence (%) of chronic neck syndrome in the Health 2000 Survey.



The pattern was different among women. Of the youngest women, 29% reported neck pain during the past month – the same figure for the oldest age-group. An increase in prevalence to 43% occurred within the age-range 30–65 years, while there was a decrease in higher age-groups. A similar phenomenon was observed with regard to neck pain experienced during the past week, where an increase in occurrence was seen up to the age-group of 65–74 years, and there was a decrease thereafter.

When neck pain ever was considered, differences by age-group were considerably smaller than with the other recall periods in both genders.

• Occurrence by length of education

Among subjects aged 30 years and over, the age-adjusted one-month prevalence of neck pain decreased with increasing length of education in both genders (Table 6).

• Chronic neck syndrome

The subjects aged at least 30 years participated in a medical examination assessing the clinical status of the neck. Clinical findings in the neck were clearly less frequent than the percentage experiencing subjective symptoms in the region. A chronic neck syndrome was diagnosed in 7.3% of the women and in 5.5% of the men (Figure 4). In the age-groups between 30 and 64 years, and among the eldest subjects of 85 years and over, the syndrome was more frequent in women. However, in those aged 65–84 years, chronic neck syndrome was more common in men.

The prevalence of chronic neck syndrome increased with age until the ages 65–74 years for women and 75–84 for men. The prevalence was lowest of all in men aged 30–44 years (1.7%) and highest of all in men aged 74–84 years (12.3%). In women the peak prevalence (10.6%) was observed in the 65–74-year-old category.

In men, the length of education was associated with the occurrence of chronic neck syndrome, so that 6.3% of those with less than 10 years of education, 4.7% of those with intermediate-level education, and 3.2% of those with at least 13 years of education received the diagnosis. In women there was a similar tendency (variation between 6.3% and 8.1%) that did not reach statistical significance.

Discussion

Overall, women had more pain symptoms in the neck and were more often diagnosed with chronic neck syndrome than men. The age-gradients were steeper for men than for women. The proportion of men experiencing pain increased mostly monotonically with age over the whole age range (or until the second oldest age-group), while in women the age-relationship was an inverse U-shape. Among the oldest subjects aged 85 years and over, men had a higher occurrence of neck pain for all recall periods. The gradient of morbidity against length of education, our indicator of socioeconomic stratification, was somewhat clearer in men than in women. It seems, then, that factors connected with gender and age – perhaps also with the different mortality patterns of the genders – as well as environmental loading and other factors connected with the socioeconomic position of the subjects,

are determinants of the occurrence of neck pain and of chronic neck syndrome among Finnish adults.

Table 5. Prevalence (%) of neck pain with the recall periods 'ever' and 'during the past 7 days' in the Health 2000 Survey.

	18–24	25–29	30–44	45–54	55–64	65–74	75–84	85 +	18 +[1]
Neck pain ever									
Men	42.4	47.1	54.1	56.9	58.0	55.3	56.2	59.1	53.7
Women	65.3	62.8	66.2	70.5	72.6	69.3	65.8	45.6	67.5
Neck pain during the past 7 days									
Men	6.2	8.5	14.2	19.5	22.9	24.4	25.8	29.9	17.3
Women	16.8	17.0	25.5	30.9	31.6	34.7	31.0	23.5	27.2

[1]age-adjusted: direct standardisation, with the 2000 population of Finland as the standard.

Table 6. Age-adjusted proportion (%) of neck pain during the past month, and of chronic neck syndrome, among persons aged 30 or over, by length of education, in the Health 2000 Survey.

Length of education, years	0–9	10–12	13 +	Total[1]	p[2]
Neck pain					
Men	31.0	24.7	20.2	25.7	< 0.001
Women	43.3	38.1	35.4	39.2	0.003
Chronic neck syndrome					
Men	6.3	4.7	3.2	5.1	0.022
Women	8.1	7.5	6.3	7.4	0.350

[1]age-adjusted using separate models for men and women, [2]difference between educational groups

SHOULDER PAIN AND CHRONIC SHOULDER SYNDROME

Eira Viikari-Juntura, Erkki Nykyri and Esa-Pekka Takala

Shoulder pain experienced during the past month was reported by 20.1% of the subjects and chronic shoulder syndrome was diagnosed in the right shoulder for 5.3% of the subjects and in the left shoulder for 3.2% of the subjects. Chronic shoulder syndrome occurring more often on the right side compared with the left suggests a link with physical activities.

Shoulder pain and disorders have been addressed in the Mini-Finland Health Survey (Mäkelä et al. 1999) and in a larger population survey carried out in the UK (Walker-Bone et al. 2004). In the Mini-Finland study, shoulder pain experienced during the preceding month was reported by 30% of Finns over the age of 30, and shoulder impairment (pain during active or passive movement or limited mobility of the shoulder joint) in 8.8%. In the UK study, any specific shoulder disorder was diagnosed for 9.7% of the men and 10.9% of the women between the ages of 25 and 64.

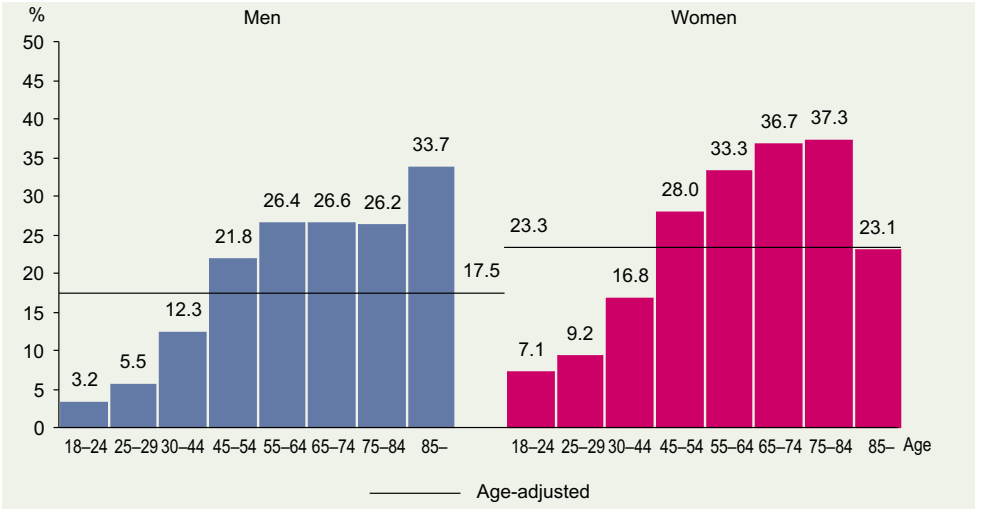
Results

Lifetime prevalence of shoulder pain (Table 7) was 46.8% and this was somewhat higher for women (50.8%) than men (42.5%). The proportion of those suffering from shoulder pain during the preceding month (Figure 5) was 20.6% and this was higher among women (23.3%) than men (17.5%). The proportion increased with age up to 55–64 years and then levelled off. The risk of shoulder pain decreased with increasing years of education, especially among men. The prevalence of shoulder pain experienced during the preceding seven days (Table 7) was 16.6% (13.9% for men and 18.9% for women).

Chronic shoulder syndrome was diagnosed in 5.3% of the subjects for the right shoulder and in 3.2% for the left. The prevalence was slightly higher among men (Figure 6) than women (5.8% vs. 5.1% on the right and 3.7% vs. 2.9% on the left). The syndrome rarely occurred among those aged 30–44 years. There was a sharp increase with age, the prevalence being triple on the right side comparing those aged 45–54 years with those aged 30–44 years, both among men and women. In age groups older than 55 there was a less steep increase with age, and a slight decrease in prevalence on the left side for the oldest women. In men, the highest prevalence (24.9% on the right, 18.7% on the left side) occurred in the oldest groups. There

was an approximately two-fold right side v. left side difference in the prevalence of the syndrome in the working-age groups that levelled off after working age among men but not until 85 years in women. There was a clear decrease of chronic shoulder syndrome with increasing years of education (Table 8) both for men (6.7% on the right side for less than 10 years, 3.2% for 13 years or more of education) and women (5.5% vs. 3.3%).

Figure 5. Prevalence (%) of shoulder pain during the past month in the Health 2000 Survey.



Discussion

Compared with the earlier Mini-Finland Health Survey, shoulder pain experienced during the past month was reported less frequently. The present study also included age groups younger than 30 years, so a direct comparison between the overall prevalence cannot be made. In those older than 30 years, the prevalence was about one third lower in the present study in most age groups except the oldest in which there was no clear difference. The prevalence of both shoulder pain and chronic shoulder syndrome increased with age, but age had a greater impact on chronic shoulder syndrome. Chronic shoulder syndrome occurring more often on the right side compared with the left in the working-age groups, suggests a link with physical activities.

Figure 6. Prevalence (%) of chronic shoulder syndrome on the right side and on the left side in the Health 2000 Survey.

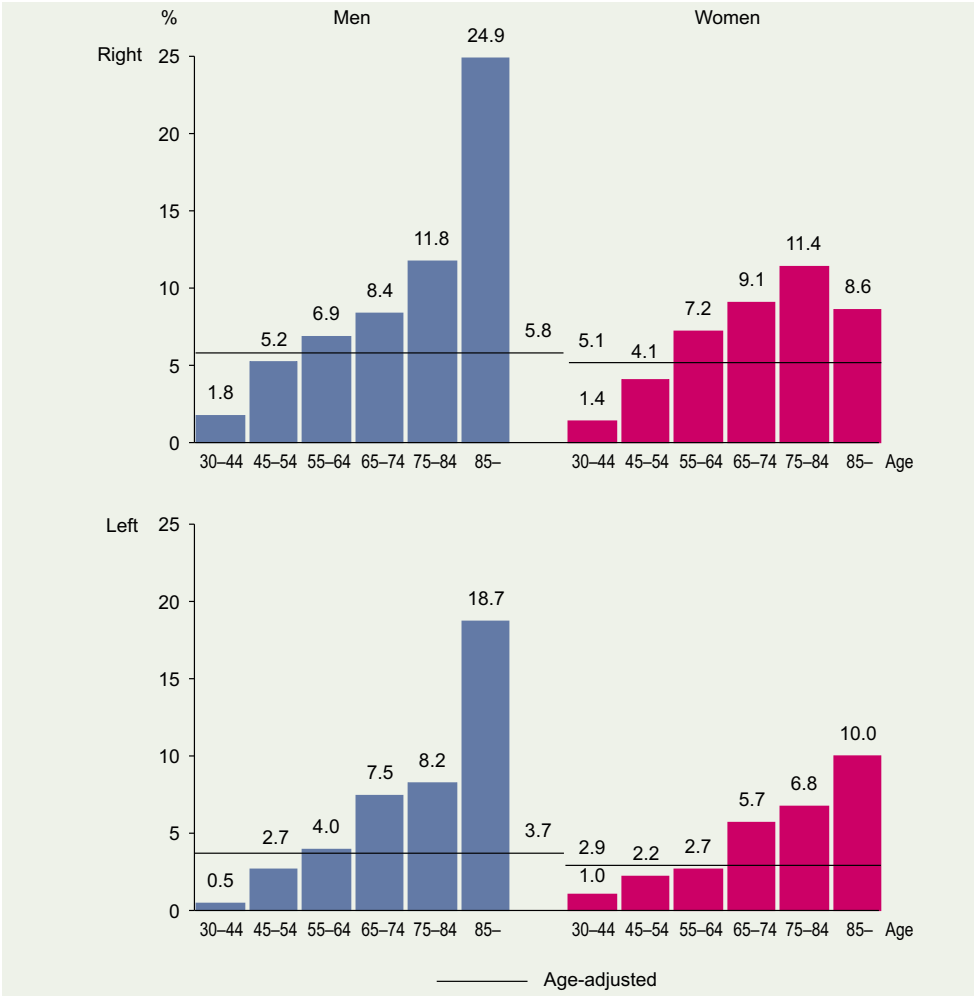


Table 7. Prevalence (%) of shoulder pain in the Health 2000 Survey.

	18–24	25–29	30–44	45–54	55–64	65–74	75–84	85 +	18 +[1]
Shoulder pain ever									
Men	21.2	32.2	38.0	49.1	53.1	50.9	48.6	56.8	42.5
Women	30.2	35.7	43.7	57.6	65.3	63.4	61.6	45.5	50.8
Shoulder pain during the past 7 days									
Men	1.5	3.9	9.3	16.9	21.8	22.3	21.8	28.7	13.9
Women	5.4	5.9	12.7	23.3	26.5	31.2	33.4	20.7	18.9

[1]age-adjusted: direct standardisation, with the 2000 population of Finland as the standard

Table 8. Age-adjusted proportion (%) of shoulder pain during the past month and chronic shoulder syndrome among persons aged 30 or over, by level of education, in the Health 2000 Survey.

Length of education, years	0–9	10–12	13 +	Total [1]	p [2]
Shoulder pain					
Men	24.5	19.9	14.3	20.1	< 0.001
Women	31.4	27.1	21.9	27.2	< 0.001
Chronic shoulder syndrome on the right side					
Men	6.7	4.0	3.2	5.1	0.005
Women	5.5	6.2	3.3	5.1	0.031
Chronic shoulder syndrome on the left side					
Men	4.2	1.5	2.2	3.1	0.014
Women	3.3	3.3	1.5	2.8	0.038

[1] age-adjusted using separate models for men and women, [2] difference between educational groups

DISTAL UPPER EXTREMITY PAIN AND SYNDROMES

Eira Viikari-Juntura, Erkki Nykyri and Esa-Pekka Takala

Lateral epicondylitis was diagnosed in 1.1% and carpal tunnel syndrome in 3.8% of subjects. The prevalence of lateral epicondylitis was higher on the right side than the left in women of active working age. The right wrist had been operated on due to carpal tunnel syndrome more frequently than the left in women, whereas there was no side difference in clinically diagnosed carpal tunnel syndrome for either men or women.

Distal upper extremity pain and syndromes have been addressed in only few population studies. In addition to elbow, wrist and finger joint pain, specific tests for two specific syndromes, viz. lateral epicondylitis and carpal tunnel syndrome, were included in the physical examination. The symptoms of carpal tunnel syndrome, i.e. numbness, tingling, burning or pain in the fingers, were investigated in the interview using the Katz hand diagram (Katz et al. 1990).

Results

• Elbow pain and epicondylitis

The prevalence of elbow joint pain during the preceding month (Figure 7) was 5.1% on the right and 4.0% on the left side and higher among women (6.0% on the right and 4.5% on the left) compared with men (4.0% and 3.4%). The prevalence increased with age up to 45–54 years and then levelled off. The prevalence was slightly higher on the right side than the left, both in men and women and in most age groups. The prevalence of elbow joint pain experienced during the preceding seven days (Table 9) was 3.5% (2.4% for men and 4.4% for women) on the right and 2.9% (2.3% for men and 3.3% for women) on the left side. There was a tendency for pain in the right elbow joint to increase with decreasing years of education in both men and women (Table 10). In men, pain in the left elbow joint increased with decreasing years of education, whereas in women there was no association.

Lateral epicondylitis was diagnosed in 1.1% of the subjects, 0.7% on the right and 0.5% on the left side (Figure 8). There was no difference in prevalence between the genders. Peak prevalence occurred between the ages of 45 and 64, and prevalence decreased in the older age groups. The prevalence was higher on the right side than the left in women of active working age, but not in men (Figure 8). The prevalence of lateral epicondylitis in the right elbow decreased with increasing years of education

in women. No relationship was seen between length of education and epicondylitis in men (Table 11).

The prevalence of epicondylitis has not been studied earlier in the Finnish population as a whole. In a British population study, the prevalence was 1.3% for men and 1.1% for women (Walker-Bone 2004) which is very close to the prevalence of 1.1% obtained in this study. The peak prevalence occurring in middle age also confirms the findings of earlier studies. A higher prevalence was observed on the right side than the left in working-age women but not men, A higher prevalence was observed on the right side than the left in working-age women but not men, suggesting a different link with physical activities between the genders

• Wrist and finger joint pain

The prevalence of wrist joint pain experienced during the preceding month (Figure 9) was 7.4% on the right and 6.7% on the left side and two-fold for the women (9.7% on the right and 8.9% on the left) compared with men (4.8% and 4.2%). There was a steady increase in the prevalence after the age of 30 for both the right and left wrist in men. There was a similar increase for women, followed by a decrease in prevalence after the age of 85. The prevalence was slightly higher on the right side than the left both in men and women and in most age groups. Right wrist joint pain increased with decreasing years of education in both men and women (Table 10). In women, left wrist joint pain increased with decreasing years of education, whereas in men there was no association. The prevalence of wrist joint pain during the preceding seven days was 4.7% (2.9% for men and 6.2% for women) on the right and 4.4% (2.7% for the men and 5.9% for the women) on the left side (Table 9).

The prevalence of finger joint pain during the preceding month (Figure 10) was 9.7% on the right and 8.8% on the left side and over two-fold in women (13.1 on the right and 11.9% on the left) compared with men (5.8% and 5.3%). There was a steady increase in the prevalence after the age of 30 for both the right and left fingers in the men. In women, a similar increase was seen initially and this was followed by a decrease in prevalence after 65 years. The prevalence was slightly higher on the right side than the left both in men and women and in most age groups. In women, finger joint pain increased with decreasing years of education (Table 10). In men, there was a tendency for finger joint pain to increase with decreasing years of education on the right side, whereas on the left side there was no association. The prevalence of finger joint pain during the preceding seven days was 6.8% (3.9% for men and 9.4% for women) on the right and 6.3% (3.5% for men and 8.7% for women) on the left side (Table 9).

- ## Symptoms suggesting carpal tunnel syndrome and clinically diagnosed carpal tunnel syndrome

Numbness, tingling, burning or pain during the past 12 months was reported in the interview by 9.6% of subjects in at least two of the 1st to 3rd fingers of the right and by 9.2 on the left side. Women showed a higher prevalence (11.2% on the right and 10.5% on the left) than men (7.7% on the right and 7.8% on the left). The prevalence increased after the age of 45 in both genders, then remained relatively stable until it reached it's a peak in the oldest age group. In women, there was a sharp increase between 30–44 and 45–54 years of age, the prevalence becoming almost double.

Carpal tunnel syndrome was diagnosed in 3.8% of subjects, 2.4% on the right and 2.5% on the left side. The prevalence (Figure 11) was almost three-fold in women (3.5% and 3.5%) than men (1.2% and 1.4%). The prevalence showed a 2-peak pattern in women: it was low in the youngest age group and showed a sharp increase after the age of 45, was then lower among those aged 65-74 and showed a second peak in the oldest groups. A similar pattern was seen in men on the right side, but carpal tunnel syndrome was rare in the oldest men on the left side. In addition, 1.2% of the subjects (0.7% of men and 1.6% of women) reported that they had been operated on due to carpal tunnel syndrome. The right wrist had been operated on more frequently than the left in women ($p=0.008$). The prevalence of carpal tunnel syndrome decreased with increasing years of education. This result did not reach statistical significance in men on the left side (Table 11).

The prevalence of carpal tunnel syndrome has not been previously studied in the Finnish population as a whole. Earlier studies in the Netherlands (de Kromet al. 1992) and Sweden (Atroshi et al. 1999) have found considerably higher prevalence rates based on symptoms and nerve conduction studies. In our study we used relatively strict criteria based on physical examination. It was not feasible to perform nerve conduction measurements in our study, due to the large sample. A positive Katz hand diagram was relatively common compared with clinically diagnosed carpal tunnel syndrome, suggesting that some of the symptoms may have been of some other origin, e.g. cervical. There was no difference relating to the side in clinically diagnosed carpal tunnel syndrome.

Figure 7. Prevalence (%) of elbow joint pain on the right side and on the left side during the past month in the Health 2000 Survey.

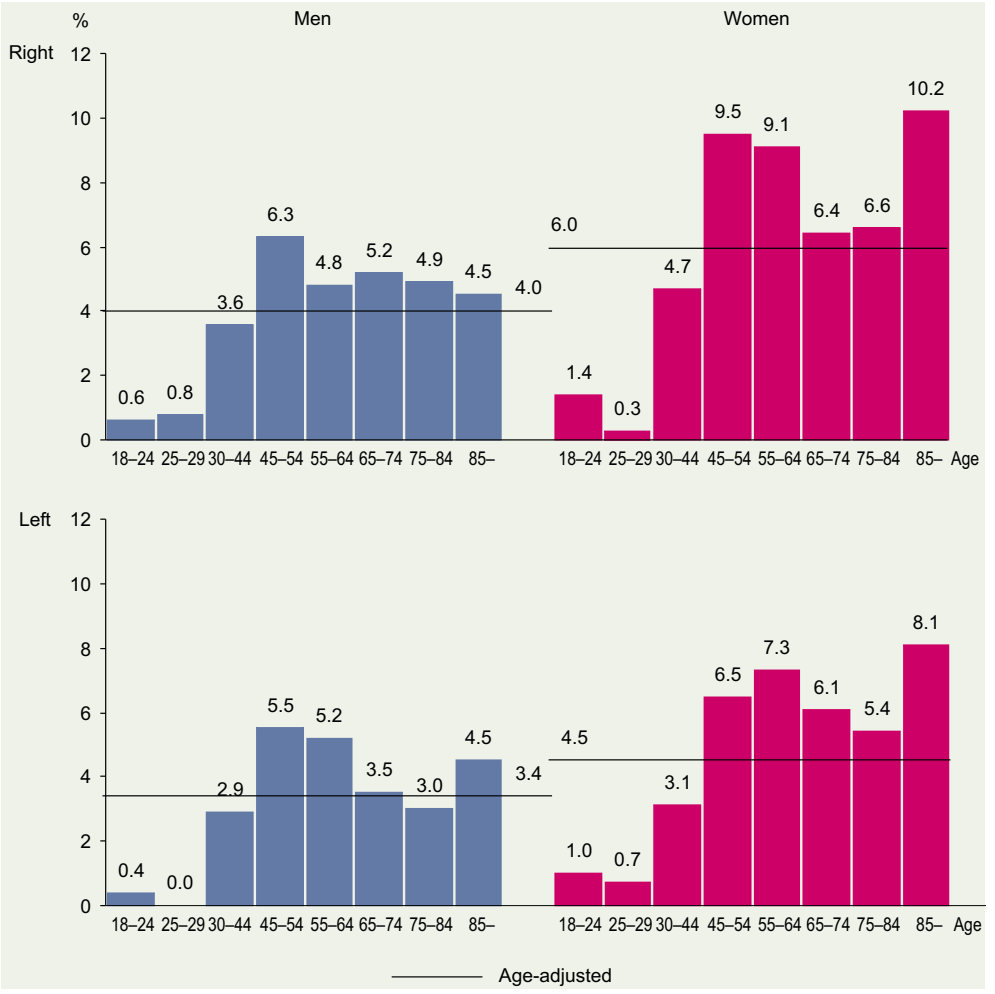


Figure 8. Lateral epicondylitis on the right side and on the left side in the Health 2000 Survey.

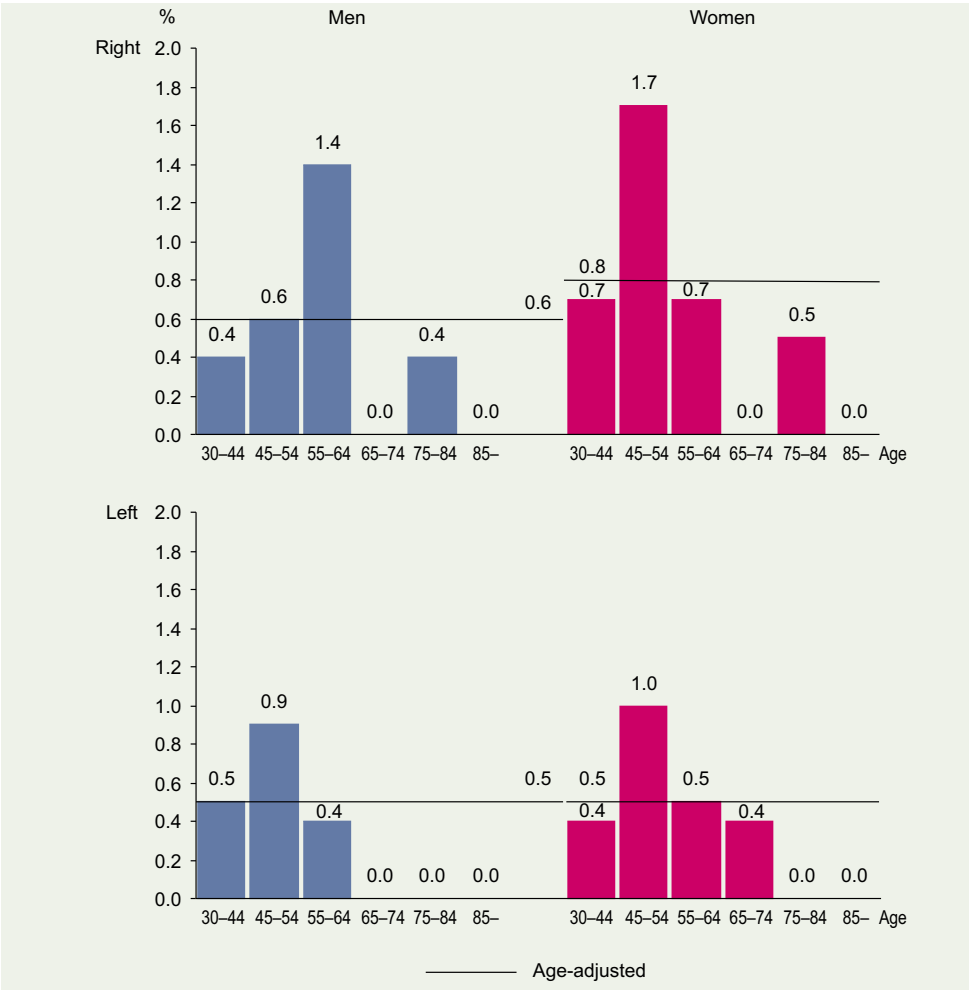


Figure 9. Wrist joint pain on the right side and on the left side during the past month in the Health 2000 Survey.

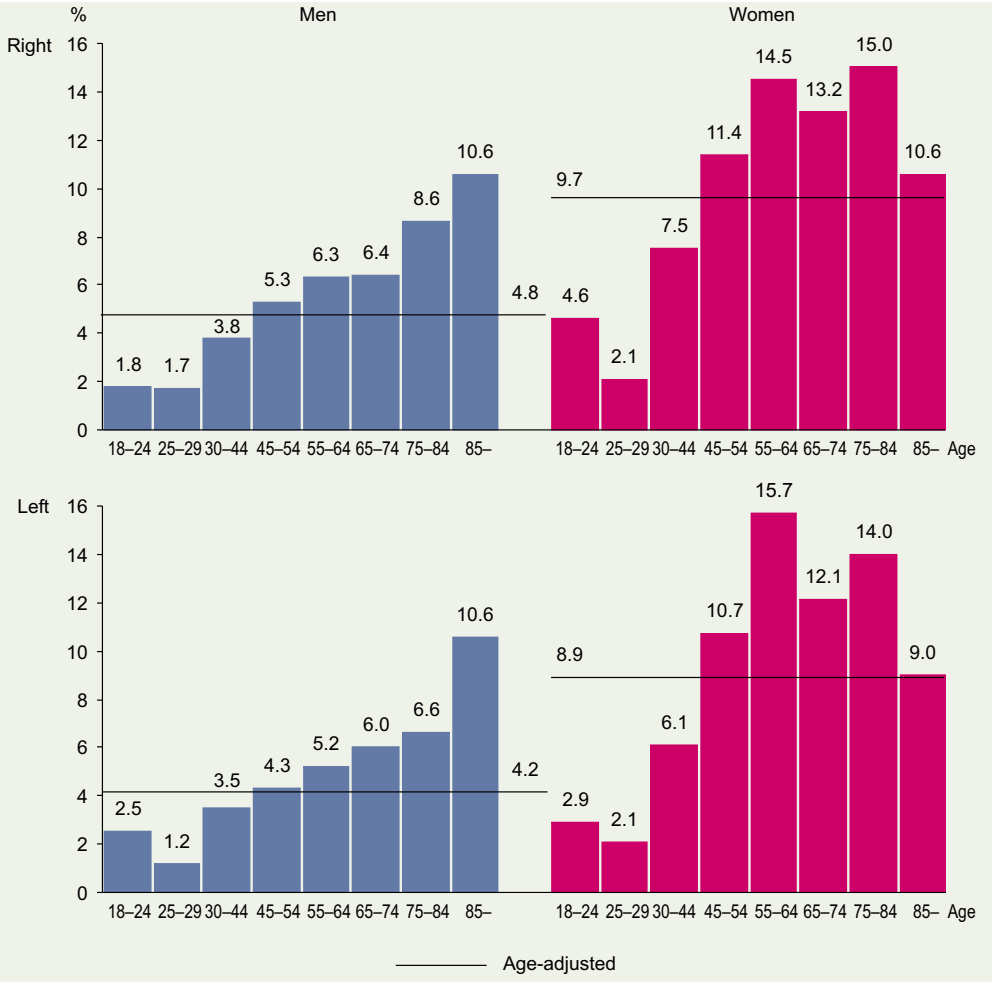


Figure 10. Finger joint pain on the right side and on the left side during the past month in the Health 2000 Survey.

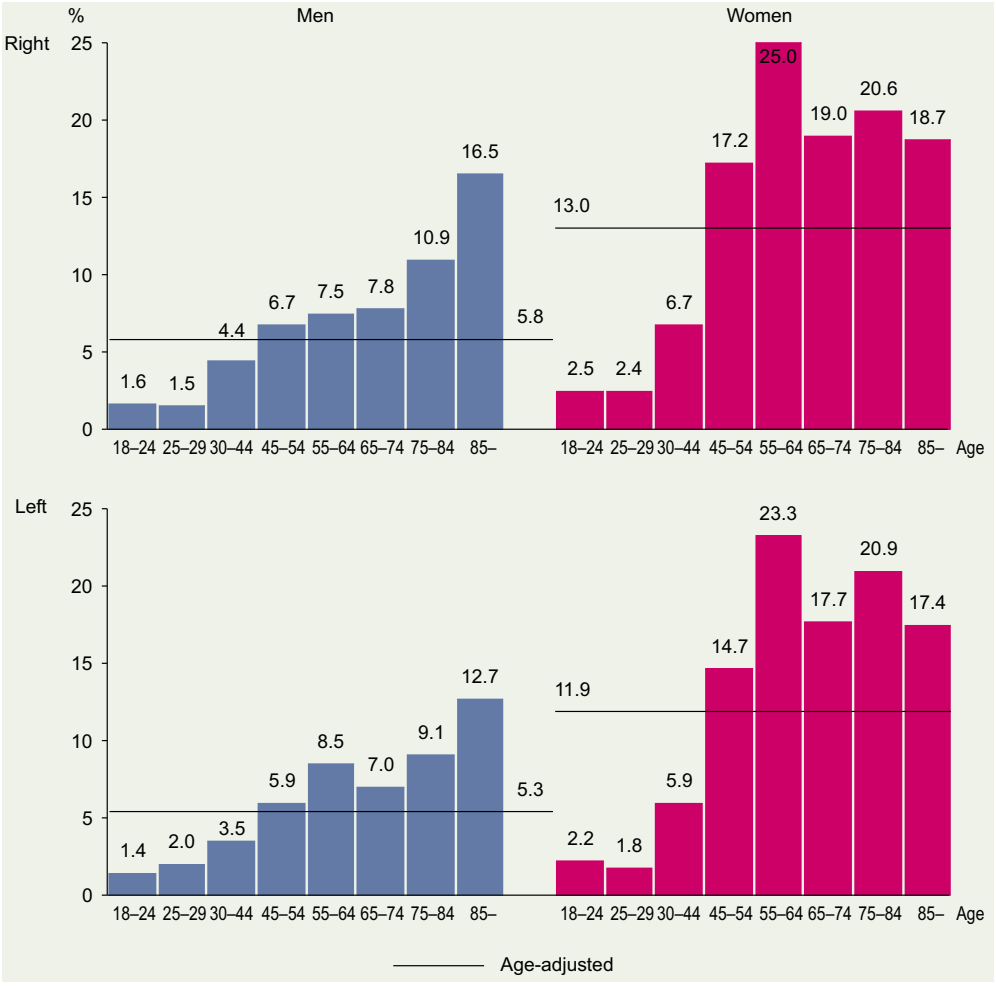


Figure 11. Carpal tunnel syndrome on the right side and on the left side in the Health 2000 Survey.

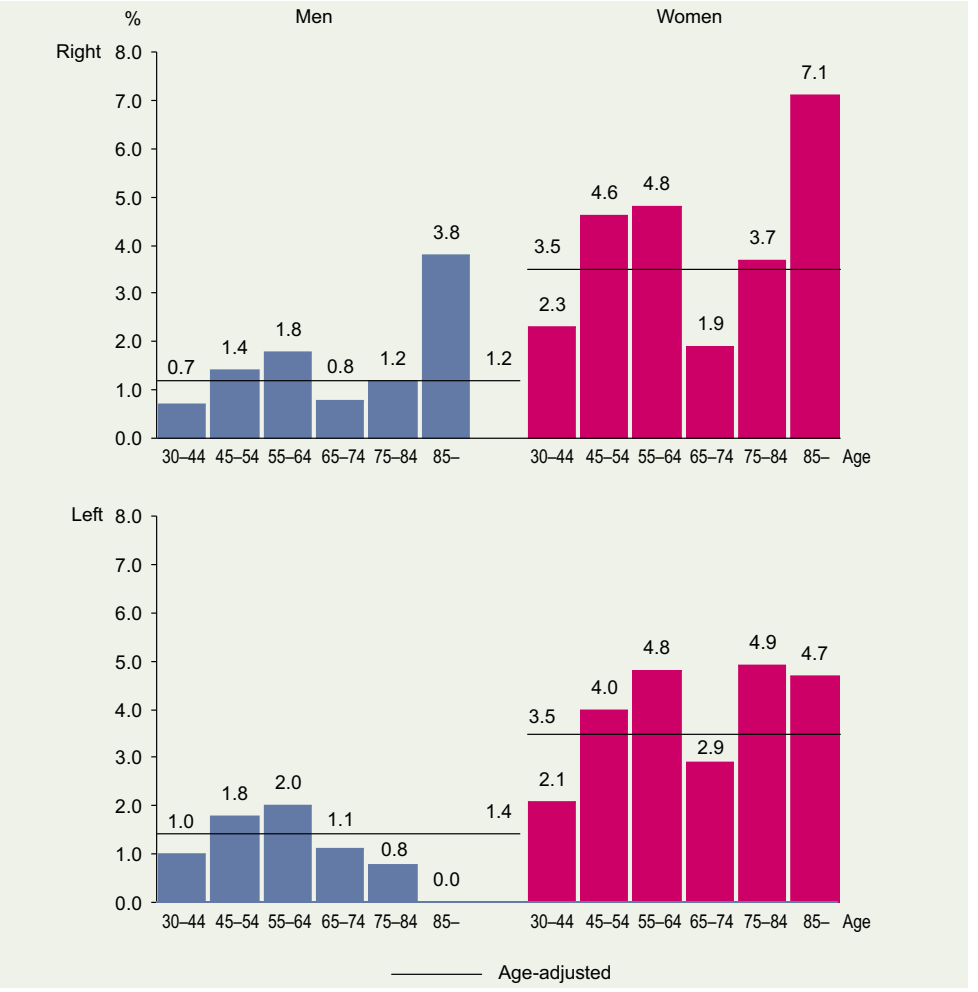


Table 9. Prevalence of elbow, wrist and finger joint pain during the past 7 days in the Health 2000 Survey.

	30–44	45–54	55–64	65–74	75–84	85 +	30 + [1]
Elbow joint pain on the right side							
Men	2.3	3.8	3.5	3.9	0.8	2.8	2.4
Women	3.7	7.3	7.0	4.8	5.0	4.8	4.4
Elbow joint pain on the left side							
Men	2.0	3.7	3.5	2.8	1.7	2.7	2.3
Women	2.2	5.4	5.9	4.3	4.1	4.3	3.3
Wrist joint pain on the right side							
Men	2.0	4.1	4.4	4.6	5.4	3.9	2.9
Women	4.6	8.6	10.0	9.7	10.4	4.9	6.2
Wrist joint pain on the left side							
Men	2.6	2.8	3.3	4.2	5.5	8.7	2.7
Women	3.5	7.7	11.7	9.3	10.3	2.8	5.9
Finger joint pain on the right side							
Men	2.8	4.2	6.4	5.8	8.2	10.9	3.9
Women	4.3	13.5	19.5	13.6	16.4	10.7	9.4
Finger joint pain on the left side							
Men	2.3	3.6	6.8	5.8	7.5	6.8	3.5
Women	3.7	11.7	18.8	13.3	15.9	10.5	8.7

[1] age-adjusted: direct standardisation, with the 2000 population of Finland as the standard.

Table 10. Age-adjusted proportion (%) of elbow-, wrist and finger joint pain during the past month among persons aged 30 and over, by level of education, in the Health 2000 Survey.

Length of education, years	0–9	10–12	13 +	Total [1]	p [2]
Elbow joint pain on the right side					
Men	5.4	5.3	3.4	4.7	0.086
Women	8.1	7.8	5.6	7.2	0.072
Elbow joint pain on the left side					
Men	4.7	4.8	2.4	4.0	0.020
Women	5.5	6.0	4.7	5.3	0.461
Wrist joint pain on the right side					
Men	6.3	5.7	3.5	5.3	0.026
Women	13.4	12.3	7.7	11.2	< 0.001
Wrist joint pain on the left side					
Men	5.5	4.0	3.5	4.5	0.157
Women	13.3	11.6	6.2	10.5	< 0.001
Finger joint pain on the right side					
Men	7.4	6.4	4.8	6.4	0.075
Women	17.6	16.5	12.8	15.8	0.015
Finger joint pain on the left side					
Men	6.3	5.7	5.0	5.8	0.544
Women	16.6	13.9	11.7	14.5	0.020

[1] age-adjusted using separate models for men and women, [2] difference between educational groups

Table 11. Age-adjusted proportion (%) of lateral epicondylitis and carpal tunnel syndrome on the right side and on the left side among persons aged 30 or over, by level of education in the Health 2000 Survey.

Length of education, years	0–9	10–12	13+	Total [1]	p [2]
Lateral epicondylitis on the right side					
Men	0.6	0.6	0.5	0.6	0.968
Women	2.0	0.9	0.3	0.8	0.006
Lateral epicondylitis on the left side					
Men	0.6	0.6	0.3	0.5	0.559
Women	0.6	0.4	0.6	0.5	0.779
Carpal tunnel syndrome on the right side					
Men	1.4	1.7	0.3	1.1	0.016
Women	4.9	3.3	2.1	3.5	0.001
Carpal tunnel syndrome on the left side					
Men	1.8	1.7	0.8	1.4	0.110
Women	5.2	2.6	2.1	3.5	0.001

[1] age-adjusted using separate models for men and women, [2] difference between educational groups

HIP AND KNEE PAIN AND OSTEOARTHRITIS

Jari P.A. Arokoski, Pirjo Manninen, Heikki Kröger, Markku Heliövaara, Erkki Nykyri and Olli Impivaara

The prevalence of hip and knee pain symptoms and OA increases with age in both genders. A higher prevalence of OA was seen in those with minimal or short formal education compared with the more educated.

The hip and knee are among the joints most commonly affected by osteoarthritis (OA). The symptoms of hip and knee OA, such as pain and stiffness of the joints and impaired muscle strength in the lower extremities restrict locomotion and reduce quality of life (Gorevic 2004). OA constitutes a major social and health problem in the elderly imposing an increasingly heavy economical burden on the social welfare and health care systems in modern societies.

The etiology of OA is unknown but there are several risk factors that predispose to OA. These include obesity, injuries to the joints, and – most importantly – old age (Felson and Zhang 1998). The prevalence of hip and knee OA starts to increase already in middle age. Environmental factors, especially those related to work-load or other activities causing physical stress influence joint health. The role of these contributing factors in the initiation and progression of OA is still poorly understood. Better insight into the pathogenesis of OA would open new opportunities for prevention and more targeted use of healthcare resources.

Results

The participants were asked whether they had experienced hip and knee pain in the past month. The clinical diagnosis of hip and knee OA in a patient is usually made on the basis of symptoms, a clinical examination and radiography of the joints. Radiographic assessment of OA was not included in this study. Instead, specially trained physicians diagnosed clinical hip and knee OA on the basis of physical status, symptoms and medical history in the same way as it had been in the Mini-Finland Health Survey 20 years earlier (Heistaro 2005). The agreement between the clinical diagnosis of knee OA and radiological grading is moderate (Toivanen et al. 2006).

Figure 12. Prevalence (%) of hip pain during the past month in the Health 2000 Survey.

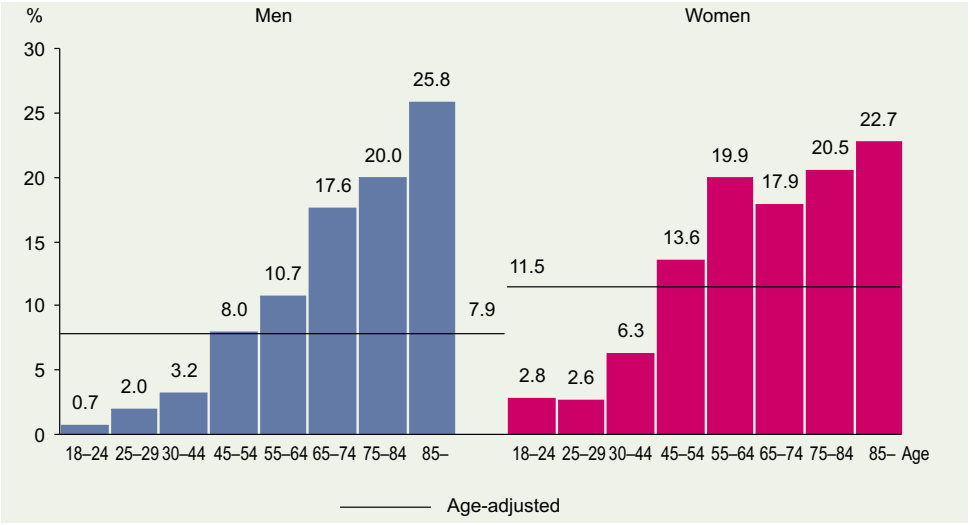
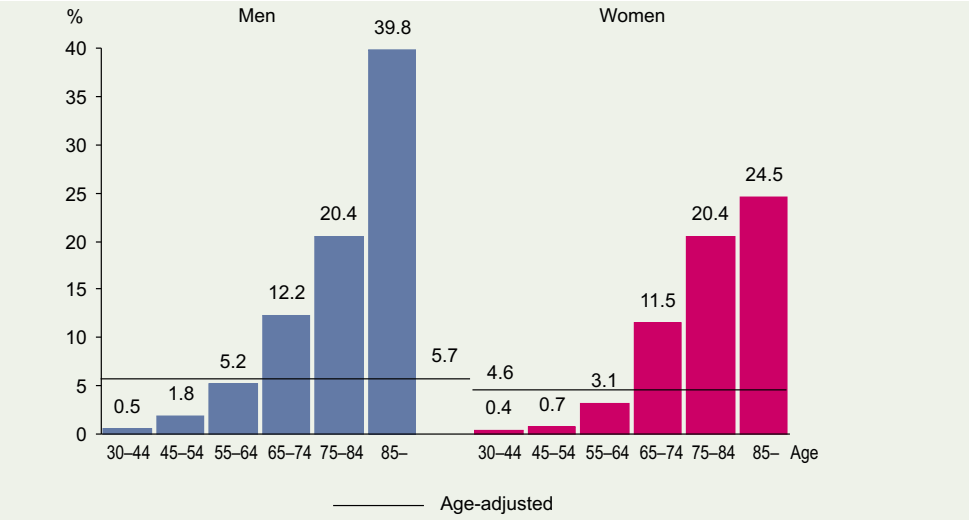


Figure 13. Prevalence (%) of hip osteoarthritis in the Health 2000 Survey.



• Hip pain and osteoarthritis

The prevalence of hip pain increased with age in both genders (Figure 12). The age-adjusted prevalence of hip pain experienced during the past month was 7.9% in men and 11.5% in women. Hip pain was generally more common in women than in men aged 18 to 64. The prevalence was significantly related to years of education

in women but not in men (Table 12). The highest prevalence was observed in those with the shortest education and the lowest in those with the longest education.

The age-adjusted prevalence of clinically diagnosed hip osteoarthritis (OA) was 5.7% in men and 4.6% in women (Figure 13). The prevalence of hip OA increased with age in both men and women. The prevalence was slightly higher in men, not including those aged 75 to 84, when it was the same for men and women. In men the prevalence of hip OA ranged from 0.5% in the youngest age group to 39.8% in the oldest (those aged 85 years or more), and in women from 0.4% in the youngest to 24.5% in the oldest. The age-adjusted prevalence of hip OA was significantly associated with years of education in both genders (Table 12). Higher prevalence was observed among those with the least education and vice versa.

• Knee pain and osteoarthritis

The age-adjusted prevalence of knee pain during the past month was 18.1% in men and 21.0% in women (Figure 14). The prevalence increased with age in both genders. However, the increase was not linear: it was steeper after 55 years of age. In men the highest prevalence (36.5%) was observed in the 85 years or over age group, whereas in women the highest prevalence (42.0%) was found in those aged 75–84 years. The prevalence of knee pain was significantly related to years of education in both genders (Table 12). It was highest in those with the shortest education and lowest in those with the longest education.

The age-adjusted prevalence of clinically diagnosed knee osteoarthritis (OA) was 6.1% in men and 8.0% in women (Figure 15). Similarly to hip OA, the prevalence of knee OA also increased with age. It ranged from 0.3% in men in the youngest age group to 44.2% in the oldest, and from 0.4% to 35.6% in women. As with knee pain, knee OA also showed nonlinear increase in prevalence with age. This increase took place in two steps. The first step emerged around the age of 55 years in both genders and the second after the age of 85 years in men and 75 years in women. Similarly to hip OA, the age-adjusted prevalence of knee OA was also significantly associated with years of education in both genders, showing the same pattern of dependence as observed for hip OA (Table 12).

Discussion

The prevalence of hip and knee pain symptoms increases dramatically with age in both genders. Our results suggest that these pain symptoms are more common among women than among men. In both genders, the prevalence of reported knee pain seems to be about two-fold compared with the prevalence of hip pain. These

results agree with earlier studies indicating higher prevalence of musculoskeletal pain and probably also more severe pain in women than men (Bingefors and Isacson 2004). The causes of these differences between men and women in pain prevalence and sensitivity are unknown. Because joint pain is most often due to OA, the higher prevalence of knee pain, compared with that of hip pain, apparently reflects the simple fact that knee OA is more common than hip OA. However, knee pain may also result from a ruptured degenerative meniscus, for example, and this is indistinguishable from the pain caused by the early stages of OA.

The increase in the prevalence of hip and knee pain with age may also largely be explained by higher prevalence of OA of the hip and knee as the population ages. Our results are consistent with earlier studies which show that OA diagnosed in the hip and knee become more common with age (Felson and Zhang 1998). Nevertheless, this increase is not linear across the age groups in the population. We found a generally higher prevalence of hip OA among men than among women. The difference was especially prominent in the oldest age group. In contrast, knee OA proved to be generally more common in women, although even here the prevalence in the oldest age group was higher in men. The higher prevalence of OA in those with a minimal or short formal education (as compared with the more educated) is in line with earlier results (Heliövaara et al. 1993). These findings are probably attributed to a more physically strenuous work load carried out by the less educated (Manninen et al. 2002).

Figure 14. Prevalence (%) of knee pain during the past month in the Health 2000 Survey.

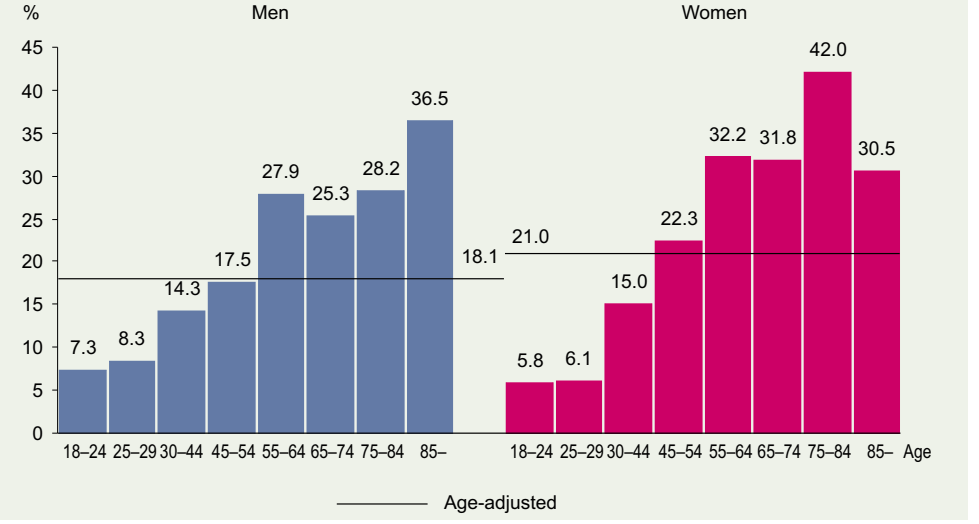


Figure 15. Prevalence of knee osteoarthritis in the Health 2000 Survey.

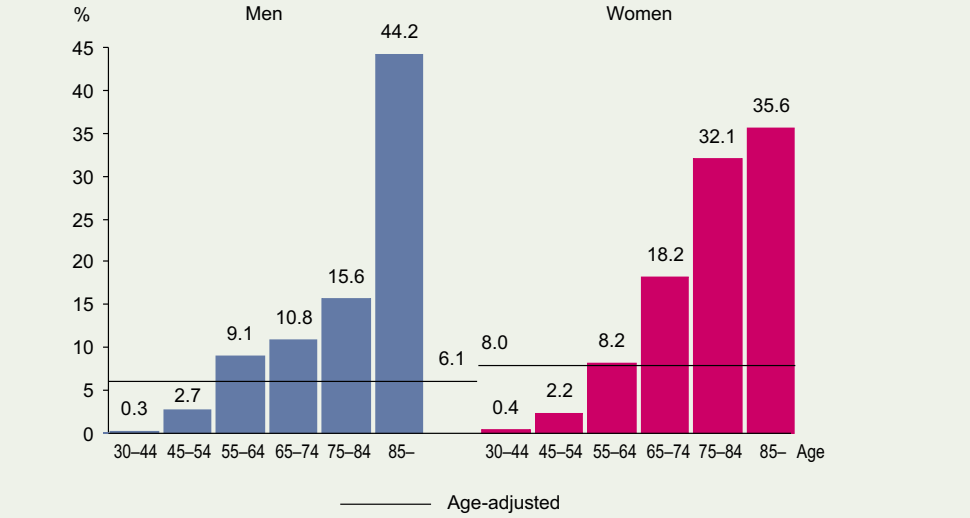


Table 12. Age-adjusted proportion (%) of hip and knee pain during the past month and hip and knee osteoarthritis among persons aged 30 or over, by level of education, in the Health 2000 Survey.

Length of education, years	0–9	10–12	13 +	Total [1]	p [2]
Knee pain					
Men	24.1	18.8	15.2	19.9	< 0.001
Women	28.4	23.5	21.4	25.0	0.005
Hip pain					
Men	9.9	7.3	7.4	8.7	0.093
Women	15.2	14.5	11.0	13.8	0.019
Knee osteoarthritis					
Men	5.9	3.0	3.1	4.7	0.009
Women	9.0	6.4	4.3	7.7	< 0.001
Hip osteoarthritis					
Men	4.7	4.8	2.3	4.3	0.049
Women	5.1	2.4	3.3	4.4	0.018

[1] age-adjusted using separate models for men and women, [2] difference between educational groups

RHEUMATOID ARTHRITIS

Markku Heliövaara, Erkki Nykyri and Olli Impivaara

The prevalence of rheumatoid factor positive chronic polyarthritis was 0.3% in men and 0.7% in women. The rates correspond to those published for other countries, but the statistical power is insufficient for reliable comparisons.

Rheumatoid arthritis is a chronic, systemic inflammatory disease. It is the most significant of all forms of inflammatory arthritis. Genetic and environmental determinants that mutually interact over time contribute to the disease (Silman and Hochberg 2001, Aho and Heliövaara 2004). Immune-mediated mechanisms play a major role in the pathogenesis, although the basic mechanisms that initiate and sustain the process are still obscure.

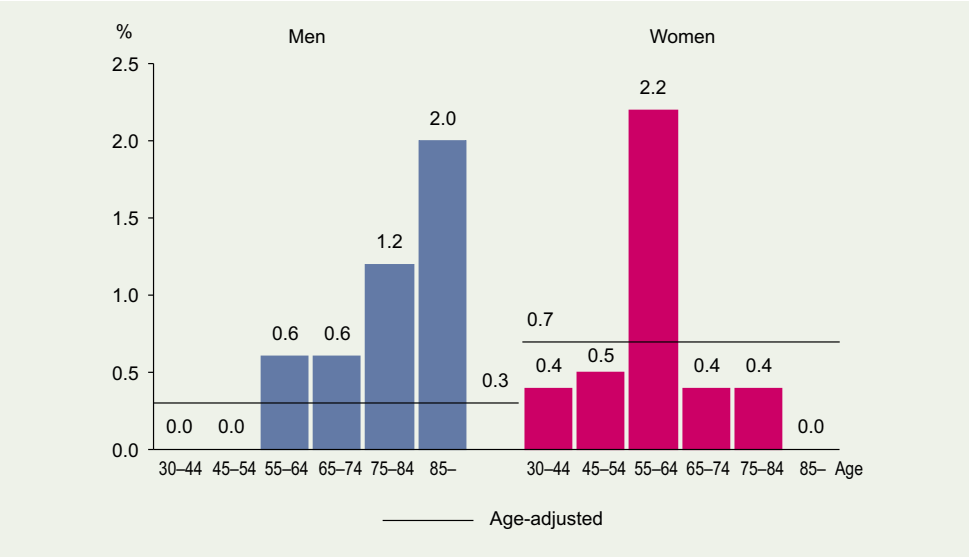
Rheumatoid arthritis is associated with several autoantibodies specific enough to serve as diagnostic and prognostic markers. Most attention has been paid to rheumatoid factor seropositivity. This marker has clearly predicted progression of the disease in clinical settings and determined disability in epidemiological follow-up (Silman and Hochberg 2001, Aho and Heliövaara 2004). In the Mini-Finland Health Survey, 3% of marked disabilities and 6% of severe disabilities were attributable to rheumatoid arthritis, mainly due to seropositive disease (Mäkelä et al 1993, Heliövaara et al 1993).

Rheumatoid arthritis was diagnosed by field physicians on the basis of physical status, symptoms and medical history, applying the same criteria that were used in the Mini-Finland Health Survey (Sievers et al 1985, Aho et al 1989). In the present report rheumatoid factor concentrations of 50 U/ml were considered to indicate seropositivity. This cut-off point yielded the same prevalence of falsely positive reactions (in the absence of arthritis) as in the Mini-Finland Health Survey (Heliövaara et al 1993).

Results

Among the 6,206 participants whose sera were analysed, 157 were diagnosed as having chronic inflammatory arthritis, 92 with rheumatoid arthritis. Of the rest, 15 had ancylosing spondylarthritis, 20 had gout, whereas 23 were diagnosed with other defined and 7 with undefined arthritis. Seropositivity was observed in 32 of those with rheumatoid arthritis, indicating a prevalence of 0.3% in men and 0.7% in women (Figure 16). The age-adjusted odds ratio for women was 2.5 (95% confidence interval 1.1–5.5). However, as the pattern of columns suggests, the disease appears to be too rare for any meaningful analysis of prevalence in the present sample.

Figure 16. Prevalence (%) of seropositive rheumatoid arthritis in the Health 2000 Survey.



In a clinical series, about one third of patients presenting with symptoms and signs compatible with rheumatoid arthritis were seronegative according to conventional tests (Aho et al. 1998). In accordance with the Mini-Finland Health Survey (Aho et al 1989, Heliövaara et al 1993), the proportion of seronegative cases in the Health 2000 Survey was much larger than one third. The prevalence of seronegative arthritis is therefore not described in this report. This group of diseases is likely to include chronic reactive arthritis with unknown trigger infections, psoriatic arthritis without skin affection, juvenile rheumatoid arthritis with adult onset, etc. A considerable decline in severe disability caused by rheumatoid arthritis has occurred recently (Aho et al 1998). Functional limitations can, however, be monitored by simple and reproducible methods (Mäkelä et al 1993, Heistaro et al 2005). Thus, comparisons between the Mini-Finland Health Survey and the Health 2000 Survey will prove useful for the assessment of approaches aimed at controlling rheumatoid arthritis and the ensuing disability. Thus far, comparable results from other surveys are not available for Finland or elsewhere.

OSTEOPOROSIS, FALLS AND FRACTURES

Olli Impivaara, Jari Arokoski, Heikki Kröger, Hilkka Riihimäki, Erkki Nykyri and Markku Heliövaara

Osteoporosis results in fragile bones which are susceptible to fracture. Fracture risk is also determined by the risk of falling. This chapter reports basic information on the epidemiology of osteoporosis, falls and fractures, for the first time derived from a nationally representative sample of adult Finns. Although they are not diagnostic, quantitative ultrasound (QUS) measurements made at the heel showed that low bone density (and therefore osteoporosis) is common in the Finnish population, especially in the elderly. In comparison, the prevalence of self-reported osteoporosis (diagnosed by a physician) was low and the prevalence of those whose osteoporosis was being monitored by a doctor was even lower. Osteoporosis thus appears to be underdiagnosed, and even when diagnosed, the patient may not receive adequate care and check ups. The health care system should place more emphasis on detecting patients who are at high risk of bone fracture, to evaluate them clinically, and offer them treatment and care as indicated.

Osteoporosis is defined as a systemic skeletal disease characterised by low bone mass and deterioration of bone tissue, with a consequent increase in the fragility of bones and their susceptibility to fracture. The clinical importance of osteoporosis and its significance for public health lies mainly in these fractures resulting in increased mortality, extensive disability and suffering, and high economic costs (Kanis 2002, Cummings and Melton 2002).

Fractures are significantly related to old age. Thus, the socio-economic burden of fractures will increase along with the number of old people in society as the population ages. Fractures of the hip (proximal femur) and wrist are typical examples of osteoporotic fractures (Cummings and Melton 2002). Hip fractures are especially costly and cause more disability than other types of fracture.

The risk of fracture is not determined by bone fragility alone. A number of non-skeletal factors, such as those related to the likelihood of falling, also contribute to the risk of fracture (Kanis 2002, Schuit, van der Klift, Weel et al. 2004). Ideally, all contributing factors should be considered in order to develop and evaluate strategies for the prevention of osteoporotic fractures (Compston 2004). This calls for up-to-date information on various factors related to osteoporosis, falls and fractures. Such information will also be required for the planning of the healthcare resources needed to deal with these health problems.

One of the main strengths of the Health 2000 Survey is that it is so comprehensive. The survey covers a wide variety of factors that can be related to the development of osteoporosis or the increased likelihood of falling and sustaining a fracture. Such a survey has practical limitations, of course. For instance, it was not possible to diagnose osteoporosis on the basis of dual energy X-ray absorptiometry (DXA), the recommended method of choice for this purpose (Kanis and Glüer 2000, Kanis 2002). Instead, bone density was evaluated by means of quantitative ultrasound (QUS) measurements at the heel. This method cannot be used to diagnose osteoporosis in the same way as DXA, but it has other assets. The ultrasound instrument is easily removable, the method does not involve ionising radiation, and it may provide information on bone structure (in addition to information on estimated bone density). It also appears to be suitable for predicting fractures (Hans, Schott, Duboeuf, Durosier, and Meunier 2004).

In this chapter, we report basic information on osteoporosis, falls and fractures in men and women aged 30 or over. This information is mainly based on health interviews. In addition, we describe the findings obtained in the quantitative ultrasound measurements for those participating in the health examination.

Study population and methods

The study population and the methods have been described in detail elsewhere (Heistaro 2005). In the health interview the participants were presented with a list of diseases and asked (among other questions) whether a doctor had ever diagnosed them as having osteoporosis (bone loss) or fractures (broken bones). If the participants answered affirmatively, they were asked further questions about the treatment and care of osteoporosis, and where the fractures were sustained. Moreover, a questionnaire was used to ask the participants whether they had experienced a fall within the previous 12 months while walking indoors or outdoors. If the answer was affirmative, they were further asked how many times this had happened (during the twelve-month period) and whether they had to seek medical care due to any of these incidents. Quantitative ultrasound (QUS) measurements were taken at the heel (calcaneus) by means of a Hologic Sahara instrument recording speed of sound (SOS) and broadband ultrasound attenuation (BUA), and calculating an estimated bone density (BMD).

Results and comments

Table 13 shows the prevalence of self-reported osteoporosis by age group in men and women. The age-adjusted prevalence in those aged 30 years or over was 0.9% in men and 4.1% in women. Based on the same interview, the table also shows corresponding figures for those whose osteoporosis is being monitored by a doctor and those taking some sort of medication because of it. By age group and adjusted for age, these figures were barely half of those for diagnosed osteoporosis. This suggests inadequate or deficient check ups and care for osteoporosis. Being on medication (especially among women) was more common than being monitored by a doctor presumably due to the relatively widespread use of over-the-counter medicines, such as those containing calcium and vitamin D. Also, women taking oestrogen replacements on a gynaecologist's prescription may perceive that they are using these medicines because of osteoporosis although they visit the doctor for other reasons.

The average estimated bone density (BMD) at the heel was roughly the same in men and women aged 30–54 (around 0.57 g/cm^2 in those aged 30–44 and around 0.56 g/cm^2 in those aged 45–54). Thereafter BMD declined with age, and this was more pronounced in women, as expected. In the age group 85+, the mean BMD was 0.32 g/cm^2 in women and 0.46 g/cm^2 in men. Table 14 shows the estimated BMD findings categorised according to three criteria based on BMD distributions in reportedly healthy men and women in the youngest age group (30–44). The prevalence of those with an estimated BMD below the gender-specific mean in this reference group increased with age in women from the youngest age group onwards, whereas in men the same was first observed at around the age of 75. The same clear-cut difference in the prevalence between men and women was also seen when applying the other two criteria. Especially with the latter of these (mean−2 SDs) there was a remarkable difference in the prevalence between men and women in the age groups 75–84 (6.2 vs. 36.8) and 85+ (14.7 vs. 62.8). Based on QUS, our estimated heel BMD values were on average about the same as those reported in other studies employing the same method (Frost, Blake and Fogelman 2001, Siris, Miller, Barrett-Connor et al. 2001). Moreover, the QUS values (BUA) correlated reasonably well with BMDs at the lumbar spine and at the femoral neck (Pearson's r=0.48 and 0.49, respectively) as measured by means of DXA (Lunar Expert) in 130 of the participants, aged from 42 to 92 years (Haara et al. 2005). Thus, although not diagnostic, our results strongly suggest that low bone density (and presumably also osteoporosis) is fairly common in the Finnish population.

The age-adjusted mean number of self-reported falls was 0.6 in men and 0.3 in women. Table 15 shows the prevalence of falls within the previous 12 months categorised according to the number of incidents. For those who reported at least

one fall, the prevalence was about the same in men and women in all age groups, and therefore also when adjusted for age: 18.9 in men and 18.0 in women. However, the picture was clearly different for multiple falls. In every age group the prevalence of these (at least three or five falls per 12-month period) was higher in men. Age-adjusted, the figure for men was about twice that of the figure for women. Table 15 also shows the prevalence of those who had to seek medical care for any fall within the same twelve-month period. This prevalence seemed to be higher in women, at least after the age of 55, and especially in the oldest age group (85+). The greater likelihood of men falling may be explained partly by differences in occupations and engaging in physical training and sports between men and women. Moreover, drinking habits certainly play a role in these incidents. The difference between men and women regarding the prevalence of multiple falls in the younger age groups apparently mainly results from harmless falls since a similar difference was not found in the prevalence of those who had to seek medical care because of a fall. A fracture was obviously one of the main reasons for seeking medical care after a fall.

Table 16 shows the prevalence of self-reported fractures, including all lifetime fractures, not only those considered osteoporotic (known as low energy fractures). Overall, fractures were more common among men. Nevertheless, in the age group 65–74 the prevalence was about the same in men and women; in younger age groups it was higher for men, whereas in the older age groups it was higher for women. The same holds true for the prevalence of self-reported hip fractures. In contrast, the prevalence of those reporting wrist fractures was higher in women, but even here the prevalence was higher in men in the younger age groups (30–44 and 45–54) and clearly higher in women from the age group 65–74 onwards. The higher prevalence of common osteoporotic fractures (hip /wrist) in elderly women, in spite of a lower prevalence of multiple falls compared with men, emphasizes the key role of osteoporosis in the pathogenesis of fractures.

The age-adjusted prevalence of self-reported osteoporosis was not related to years of formal education in either gender (Table 17). Similar results were obtained for self-reported medication for osteoporosis, fractures diagnosed by a physician and falls that required the respondent to seek medical care (Table 17). In contrast, attending regular medical check ups for osteoporosis (Table 17) was more likely the longer the education, but only in men ($p = 0.02$, age-adjusted). This is an interesting finding. Well-educated men may be more likely to take seriously the notion that osteoporosis also affects men.

Discussion

This is the first study on the epidemiology of osteoporosis and fractures in a nationally representative sample of the Finnish adult population. Although not strictly diagnostic, the QUS measurements that we carried out on about 6,200 men and women aged 30 or over suggest that low bone density and apparently also osteoporosis is fairly common in the population. Compared with the prevalence of self-reported osteoporosis in the same population, our findings lend support to the risk scenario alleging that osteoporosis is largely underdiagnosed, and that a considerable proportion of the population is therefore running an increased risk of sustaining fractures without knowing it. Moreover, our results raise the suspicion that even when osteoporosis is detected, the patient may not always receive adequate care and check ups for it. These findings call for a more active role of the health care system in order to detect those at high risk of sustaining fractures, to evaluate them clinically and provide them with care and check ups as required. Such high-risk patients include those with suspected or proven osteoporosis, the risk of falling, and those who have already sustained a low energy fracture, such as a wrist fracture.

Within the Health 2000 Survey, more detailed analyses of factors affecting the risk of osteoporosis, of falling and sustaining a bone fracture are under way. These analyses will thus centre on diseases, functional capacity, use of medicines, and a variety of living habits, among other things. Both cross-sectional and follow-up studies will be carried out.

Table 13. Prevalence (%) of self-reported osteoporosis (bone loss) in the Health 2000 Survey.

Age	30–44	45–54	55–64	65–74	75–84	85 +	30 +[1]
Osteoporosis diagnosed by a physician							
Men	0.4	1.0	1.1	0.2	2.5	4.2	0.9
Women	0.7	1.7	5.1	9.1	11.1	17.0	4.1
Attending regular check ups for osteoporosis							
Men	0.1	0.4	0.4	0.0	0.3	2.9	0.3
Women	0.1	0.5	1.4	3.0	5.3	5.9	1.4
Receiving medicines for osteoporosis							
Men	0.1	0.1	0.8	0.0	1.6	1.3	0.4
Women	0.4	0.6	2.1	4.9	6.8	7.4	2.0

[1]Age-adjusted: direct standardisation with the population of Finland in 2000 as the standard

Table 14. Prevalence (%) of ultrasonographic bone density (BMD) findings according to three criteria in the Health 2000 Survey.

Age	30–44	45–54	55–64	65–74	75–84	85 +	30 +[1]
BMD < the mean in healthy young adults[2]							
Men	56.3	56.7	57.8	56.8	67.4	78.0	58.1
Women	54.8	60.2	71.0	84.1	89.6	97.2	66.7
BMD < the mean as above –1SD[3]							
Men	14.7	22.8	16.8	19.6	30.2	49.2	19.8
Women	16.3	20.5	32.1	51.2	66.8	88.3	30.5
BMD < the mean as above –2SD[4]							
Men	0.6	2.9	2.6	3.3	6.2	14.7	2.7
Women	1.2	1.1	7.1	15.9	36.8	62.8	8.5

[1] Age-adjusted: direct standardisation with the population of Finland in 2000 as the standard

[2] Estimated bone density (BMD) lower than the mean in those with good or rather good perceived health in the age group of 30–44 of the same gender

[3] Estimated bone density (BMD) lower than the mean minus one standard deviation in those with good or rather good perceived health in the age group of 30–44 of the same gender

[4] Estimated bone density (BMD) lower than the mean minus two standard deviations in those with good or rather good perceived health in the age group of 30–44 of the same gender

Table 15. Prevalence (%) of self-reported falls within the previous 12 months in the Health 2000 Survey.

Age	30–44	45–54	55–64	65–74	75–84	85 +	30 +[1]
At least one fall							
Men	17.9	15.6	19.5	17.4	28.9	38.9	18.9
Women	13.5	15.4	20.2	20.4	29.3	42.9	18.0
At least three falls							
Men	5.6	4.8	6.2	5.4	14.6	22.3	6.6
Women	2.3	1.8	3.6	3.5	6.8	13.7	3.2
At least five falls							
Men	3.5	3.2	3.3	2.0	9.7	10.8	3.9
Women	0.8	0.5	1.5	1.7	3.4	8.3	1.4
Requiring medical care due to a fall							
Men	3.7	5.2	4.1	3.6	11.6	14.3	5.0
Women	3.5	3.2	6.2	7.9	11.1	20.9	5.5

[1] Age-adjusted: direct standardisation with the population of Finland in 2000 as the standard

Table 16. Prevalence (%) of self-reported fractures (broken bones) in the Health 2000 Survey.

Age	30–44	45–54	55–64	65–74	75–84	85 +	30 + [1]
Any fracture diagnosed by a physician							
Men	37.7	37.3	36.0	34.6	32.0	31.0	36.3
Women	20.2	20.6	26.8	35.4	39.4	48.3	25.7
Wrist fracture diagnosed by a physician							
Men	9.3	8.4	7.7	5.0	6.2	8.3	7.9
Women	5.5	6.3	8.7	15.3	18.9	22.8	9.1
Hip fracture diagnosed by a physician							
Men	0.7	1.4	1.5	0.8	2.4	4.5	1.3
Women	0.2	0.5	0.3	1.4	3.5	11.2	1.0

[1] Age-adjusted: direct standardisation with the population of Finland in 2000 as the standard

Table 17. Age-adjusted proportion (%) of subjects aged 30 or over with various self-reported items related to osteoporosis, bone fractures or falls, by level of education, in the Health 2000 Survey.

Length of education, years	0–9	10–12	13 +	Total [1]	p [2]
Osteoporosis diagnosed by a physician					
Men	0.6	0.8	1.2	0.8	0.477
Women	4.4	5.3	3.5	4.4	0.243
Attending regular check ups for osteoporosis					
Men	0.0	0.5	0.8	0.2	0.02
Women	1.4	2.6	1.2	1.5	0.112
Receiving medicines for osteoporosis					
Men	0.2	0.2	0.5	0.3	0.449
Women	2.2	2.7	2.2	2.3	0.688
Any fracture diagnosed by a physician					
Men	39.1	36.0	34.2	36.6	0.116
Women	26.6	25.4	25.7	26.1	0.815
Requiring medical care due to a fall					
Men	5.1	4.9	4.0	4.7	0.596
Women	5.4	5.6	5.1	5.4	0.906

[1] age-adjusted using separate models for men and women, [2] difference between educational groups

SELF-RATED DISABILITY DUE TO MUSCULOSKELETAL DISORDERS AT WORK AND DURING LEISURE TIME

Simo Taimela, Leena Kaila-Kangas, Erkki Nykyri and Markku Heliövaara

Self-rated disability at work and during leisure time was strongly associated with the presence of musculoskeletal disorders or diseases. In the Finnish population, aged 30 years or older, every fifth working subject and every third non-working subject, of working age, had some musculoskeletal disorder. The most common disorders among working subjects were low-back, neck and shoulder syndromes.

Besides pain, disability due to musculoskeletal disorders is an important determinant of human suffering, healthcare use, absenteeism from work and early retirement. To describe the prevalence of disability and its determinants, we will be using indicators based, first, on the standard interview regarding the self-rated disability; and second, on the physician's clinical examinations concerning the occurrence of chronic musculoskeletal syndromes or diseases.

Results

A total of 6,211 subjects, aged 30 years or over, participated in the health examination. Of those, 5,891 subjects (94.8%) reported some musculoskeletal symptoms and were subsequently interviewed about self-rated disability due to musculoskeletal disorders at work and during leisure time using a semi-continuous numerical scale from 0 to 10. They were asked two separate questions concerning work and leisure time, respectively: "Using the visual analog scale (VAS) from 0 to 10, assess how much disability you experience as a result of back, neck, shoulder or joint disorders". Persons, who rated their disability to be 6 or over, were classified as having severe disability because of their musculoskeletal complaints. Prevalence rates for self-rated disability at work are presented for those in gainful employment during the previous 12 months. Prevalence rates for self-rated disability during leisure time are presented for working and non-working subjects of working age and for those aged 65 years or over. Tables 18 and 19 present the crude prevalence of self-rated disability at work and during leisure time by the presence of some chronic musculoskeletal disorder.

Table 18. Crude prevalence (%) of self-rated disability at work among those in gainful employment (n=3861) during the previous 12 months, by the presence of some chronic musculoskeletal disorder, in the Health 2000 Survey.

VAS	0	1	2	3	4	5	6	7	8	9	10
No disorders	31.8	16.4	16.6	12.9	5.9	5.8	3.1	3.7	2.5	0.8	0.6
Some disorder	10.5	6.1	12.6	16.0	8.4	10.9	10.5	11.6	9.1	2.2	2.1
All	27.4	14.2	15.8	13.5	6.5	6.9	4.6	5.3	3.9	1.1	0.9

Table 19. Crude prevalence (%) of self-rated disability during leisure time among those in gainful employment during the previous 12 months and among non-working subjects of working age, by the presence of some chronic musculoskeletal disorder, in the Health 2000 Survey.

VAS	0	1	2	3	4	5	6	7	8	9	10
Working											
No disorders	36.0	16.4	16.0	11.7	5.9	5.3	2.8	2.7	2.2	0.7	0.4
Some disorder	11.7	9.1	14.1	14.2	9.7	10.3	8.9	10.9	8.2	1.6	1.4
All	31.0	14.9	15.6	12.2	6.7	6.3	4.0	4.4	3.4	0.9	0.6
Non-working											
No disorders	36.8	11.2	10.8	11.6	6.1	8.2	4.9	4.8	3.1	0.8	1.6
Some disorder	10.6	4.3	8.2	11.8	11.2	18.0	9.3	10.2	10.3	3.2	2.9
All	24.8	8.1	9.6	11.7	8.5	12.7	7.0	7.3	6.4	1.9	2.2

Of those subjects, aged 30 years or over, who had reported some musculoskeletal symptoms or diseases in the interview, a physician's standardised clinical examination confirmed at least one diagnosis of the following musculoskeletal disorders in 28.5% of the cases: chronic low-back syndrome, chronic neck syndrome, chronic shoulder syndrome, hip osteoarthritis, knee osteoarthritis, epicondylitis, carpal tunnel syndrome or rheumatoid arthritis. The population prevalence for at least one musculoskeletal disease or syndrome was thus 27.8%.

Among the working population, aged 30 years or over, the prevalence of self-reported severe disability at work was 13% in men and 21% in women, and during leisure time it was 12% and 17%, respectively (Table 20). It was more common in women than in men in all age groups, and the prevalence increased substantially with musculoskeletal disorder and with age in both genders.

For both men and women, the prevalence of severe disability at work and during leisure time did not vary much by age group among those who did not report any musculoskeletal disorder.

Table 20. Prevalence (%) of self-rated severe disability (6 or over on a scale from 0 to 10) at work and leisure time among those in gainful employment during the previous 12 months, by the presence of some chronic musculoskeletal disorder, in the Health 2000 Survey.

	At work				During leisure time			
	Age				Age			
	30–44	45–54	55 +	30 +[1]	30–44	45–54	55 +	30 +[1]
Men	9.1	14.3	15.6	13.1	9.1	13.0	14.0	12.1
No disorders	7.2	6.8	9.2	7.9	6.6	6.2	9.2	7.6
Some disorder	21.8	37.0	32.5	30.0	26.5	33.4	26.6	28.3
Women	15.8	22.9	24.0	21.0	12.5	17.3	20.8	17.1
No disorders	12.7	15.8	15.8	14.8	10.2	12.4	10.0	10.7
Some disorder	33.9	42.2	42.2	39.4	26.4	30.6	44.6	34.9

[1]age-adjusted: direct standardisation, with the 2000 population of Finland as the standard

Among non-working subjects without any musculoskeletal disorder, the prevalence of severe self-rated disability during leisure time increased slightly by age until the age of 75–84 years. The 45–54-year age-group was an exception with a notably high rate of self-rated disability. The non-working subjects of working age who had some musculoskeletal disorder reported high rates of self-rated disability overall. Men aged 85 years or over, reported disability in leisure time activities more frequently than women (Table 21).

Almost every fifth subject in gainful employment, aged 30–64 years, had some musculoskeletal disorder and more than every third one reported severe disability at work and during leisure time, The most common syndromes or diseases found among them were, in decreasing order, low-back, neck and shoulder syndromes (Table 22) .

Table 21. Prevalence (%) of severe self-rated disability (6 or over on a scale from 0 to 10) during leisure time among non-working subjects (n=2268), by the presence of some chronic musculoskeletal disorder, in the Health 2000 Survey.

Age	30–44	45–54	55–64	65–74	75–84	85 +	30 +[1]
Men	15.9	30.9	28.4	21.2	20.3	46.8	23.1
No disorders	8.6	22.4	13.9	15.1	15.4	38.1	14.7
Some disorder	50.2	44.4	46.0	28.8	24.2	50.1	42.3
Women	11.6	40.6	26.7	21.2	29.5	33.4	24.5
No disorders	8.6	33.3	14.8	11.2	24.4	11.8	17.4
Some disorder	32.3	51.1	41.8	30.6	32.4	43.8	38.0

[1]age-adjusted: direct standardisation, with the 2000 population of Finland as the standard

Table 22. Prevalence (%) of clinically diagnosed chronic musculoskeletal disorders among those in gainful employmentA, and the proportion (%) of them reporting severe disability (6 or over on a scale from 0 to 10) at work and during leisure time in the respective disease categoriesB in the Health 2000 Survey.

Disease/disorder	Working people with musculoskeletal disorder	Working people with serious impairment at work	Working people with severe physical impairment during leisure time
	%[A]	%[B]	%[B]
Low-back syndrome	7.8	44.5	39.2
Neck syndrome	4.4	45.9	36.8
Shoulder syndrome	3.9	43.4	38.7
Carpal tunnel syndrome	3.2	39.2	38.4
Epicondylitis	1.6	28.7	23.9
Knee osteoarthritis	1.6	29.1	30.7
Hip osteoarthritis	0.8	25.4	28.6
Seropositive rheumatoid arthritis	0.2	28.9	57.8
Any of the above-mentioned musculoskeletal disorders	18.6	36.8	32.6

[A]prevalence rates were calculated among all participants.
[B]proportion rates were calculated among those reported some musculoskeletal complaints.

Table 23. Prevalence (%) of clinically diagnosed chronic musculoskeletal disorders among non-working subjects, and the proportion (%) of them reporting severe self-rated disability (6 or over on a scale from 0 to 10) during leisure time in the Health 2000 Survey.

Disease/disorder	Non-working subjects with musculoskeletal disorder		Those with severe physical impairment during leisure time	
Age	30–64	65 +	30–64	65 +
	%	%	%	%
Low-back syndrome	16.0	16.5	46.8	34.1
Neck syndrome	8.2	11.0	48.9	38.7
Shoulder syndrome	9.4	13.8	46.6	40.8
Carpal tunnel syndrome	5.5	4.1	40.9	42.7
Epicondylitis	1.5	0.1	44.6	14.5
Knee osteoarthritis	8.3	19.2	35.5	30.6
Hip osteoarthritis	4.4	14.8	44.8	31.2
Seropositive rheumatoid arthritis	1.7	0.7	79.6	59.7
Any of the above-mentioned musculoskeletal disorders	35.4	52.3	45.0	31.0

Lower back, shoulder and neck syndromes and knee osteoarthritis were the most common disorders diagnosed among working-age persons outside the workforce (Table 23). In the age group 65+ the prevalence of hip osteoarthritis was also notably

high. Most of those with seropositive rheumatoid arthritis reported severe disability at work and during leisure time.

Severe self-rated disability at work occurred most frequently among persons with basic education or less, and least frequently among those with the highest level of education in both genders (Table 24).

No statistically significant difference was found between the groups in the prevalence of severe self-rated disability during leisure time based on the level of education among those in gainful employment (Table 25).

Among those outside the workforce, severe self-rated disability during leisure time occurred most frequently in women with basic education or less, and least frequently in women with the highest level of education. No such association was found in men (Table 26).

Table 24. Age-adjusted proportion (%) of severe self-rated disability (6 or over on a scale from 0 to 10) at work among those in gainful employment during the previous 12 months, by the level of education and presence of some chronic musculoskeletal disorder in the Health 2000 Survey.

Length of education, years	0–9	10–12	13 +	Total [1]	p [2]
Men	17.1	13.8	6.9	11.8	< 0.001
No disorders	9.6	9.4	4.3	7.2	0.003
Some disorder	40.0	30.3	21.3	31.1	0.022
Women	25.2	22.6	15.3	19.6	< 0.001
No disorders	17.8	16.3	11.7	14.2	0.051
Some disorder	47.8	42.8	30.5	39.4	0.008

[1] age-adjusted using separate models for men and women, [2] difference between educational groups

Table 25. Age-adjusted proportion (%) of severe self-rated disability (6 or over on a scale from 0 to 10) during leisure time among those in gainful employment during the previous 12 months by the level of education and presence of some chronic musculoskeletal disorder in the Health 2000 Survey.

Length of education, years	0–9	10–12	13 +	Total [1]	p [2]
Men	13.6	11.5	9.6	11.2	0.171
No disorders	8.8	7.0	5.7	6.8	0.244
Some disorder	29.5	28.6	31.3	29.7	0.889
Women	16.8	17.1	13.9	15.5	0.204
No disorders	13.5	11.4	10.0	11.0	0.329
Some disorder	29.5	28.6	31.3	29.7	0.890

[1] age-adjusted using separate models for men and women, [2] difference between educational groups

Table 26. Age-adjusted proportion (%) of severe self-rated disability (6 or over on a scale from 0 to 10) during leisure time among non-working subjects, by level of education and presence of some chronic musculoskeletal disorder in the Health 2000 Survey.

Length of education, years	0–9	10–12	13 +	Total [1]	p [2]
Men	25.7	24.1	20.2	24.7	0.507
No disorders	17.0	13.8	11.3	15.5	0.426
Some disorder	35.1	38.6	39.0	36.0	0.839
Women	29.6	20.5	12.6	25.1	< 0.001
No disorders	18.4	15.5	7.9	15.3	0.040
Some disorder	39.5	26.5	22.2	35.8	0.006

[1] age-adjusted using separate models for men and women, [2] difference between educational groups

Discussion

We selected an arbitrary cut-off limit of 6 or higher in order to outline a subgroup of people with severe self-rated disability. It is widely recognized that a small subgroup of patients generate the majority of costs related to musculoskeletal disorders as a result of their dependence on healthcare utilization and disability for work.

In the Finnish population aged 30 or older, roughly one out of four people had at least one diagnosed musculoskeletal disease or syndrome. 16% of the working population reported severe physical impairment at work, and the prevalence increased with age in both genders. Working age women reported severe disability at work more frequently than men.

The presence of any musculoskeletal disease substantially increased the prevalence of severe self-rated disability both at work and during leisure time. Our study revealed that about a third of working subjects who had a musculoskeletal disorder reported severe physical impairment at work and during leisure time, and that even more of the non-working subjects reported impairment during leisure time.

Low-back, neck and shoulder syndromes were the most common disorders found among persons in gainful employment who reported significant physical impairment at work or during leisure time.

The level of education was strongly associated with severe self-rated disability at work, such that the lower the level of education the more frequent the reports of severe impairment in both men and women. This is most probably explained by the fact that a lower level of education is associated with more strenuous jobs and detrimental health habits.

In conclusion, the prevention of chronic musculoskeletal disorders is important in order to avoid severe disability at work and during leisure time.

USE OF HEALTH SERVICES

Markku Heliövaara, Jari Arokoski, Erkki Nykyri and Heikki Kröger

12% of both men and women reported a musculoskeletal disease or complaint as the principal reason for their last visit to a physician, which indicates the proportion of all visits attributable to this disease group.

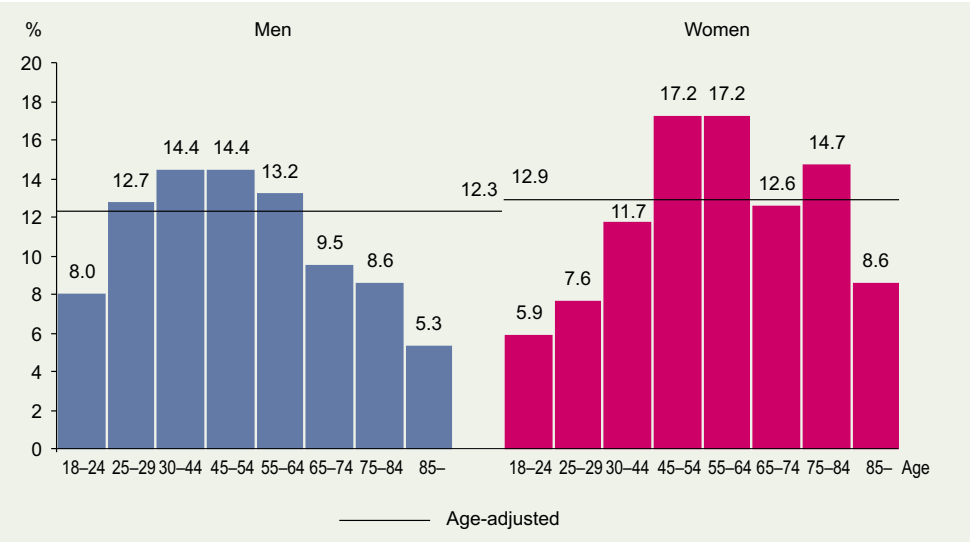
The burden of musculoskeletal diseases on the need for and use of health services is heavy in affluent societies, as shown by routine statistics collected and published regularly in many countries (Silman and Hochberg 2001). A health examination survey can, however, significantly add to that information by both describing summarized rates that are difficult to obtain from public statistics, and by comparing rates between groups of people, for example, between those with and without chronic conditions (Heliövaara et al. 1993). In this report, we describe the visits to a physician and public health nurse that are specified to be a consequence of musculoskeletal complaints. As another approach we also present comparisons of hospitalisations, physician visits and overall use of physiotherapy between subjects with and without chronic musculoskeletal diseases. All the data on health service use were obtained at the home interview. The chronic conditions of the musculoskeletal system were diagnosed by a field physician at the standardised clinical examination.

Results

• Visits to a physician

Of the men with and without chronic musculoskeletal diseases 76% and 64%, respectively, had visited a physician during the past 12 months (Table 27). Among women the corresponding proportions were 87% and 77%. 16% of men and 21% of women reported that they had visited a physician during the past 12 months for some musculoskeletal disease or complaint in particular (Table 28). 12% of both men and women reported a musculoskeletal disease or complaint as the principal reason for their last visit (Figure 17). The percentage indicates the population attributable fraction of the disease group about physician visits. Comparable data are available from a multitude of national health interview surveys. Since the application of this question in health surveys is an economical way of obtaining useful information for monitoring temporal trends and spatial differences, it may prove valuable in future *ad hoc* studies on the use of health services.

Figure 17. Prevalence (%) of a musculoskeletal disease or complaint as the principal reason for the last visit to physician in the Health 2000 Survey.



• Visits to a nurse

Only 2% of men and 3% of women aged 30 or over had visited a nurse during the past 12 months for some musculoskeletal disease or complaint. In men and women aged 18 to 29 the corresponding proportions were manifold (Table 28), probably reflecting treatment practices of minor injuries and complaints in Finnish schools, colleges and other institutes.

• Physiotherapy

Musculoskeletal complaints are the main reason for physiotherapy. Out of the men with and without chronic musculoskeletal diseases 14% and 9%, respectively, had been prescribed physiotherapy by a physician during the past five years. Among women the corresponding proportions were 24% and 10% (Table 27). Thus a minor part of the use of physiotherapy seems attributable to chronic musculoskeletal diseases, which is in accordance with the experience that less serious or temporary complaints such as episodic neck pains is the most common cause of seeking physiotherapy.

• Hospitalisations

Among the subjects with and without chronic musculoskeletal diseases 15% and 10% to 11%, respectively, reported that they had been admitted to hospital during the past 12 months (Table 27.). The difference between the groups, however, partly reflects the influence of coexistent diseases rather than the impact of musculoskeletal

diseases *per se.* According to national hospital discharge statistics the proportion of musculoskeletal diseases of all hospitalisations in Finland is about 7%. The present descriptive results of the Health 2000 Survey provided no significant addition to that information, but in future studies the data can be applied to estimate the contributions of various conditions to hospitalisations.

Table 27. Proportion (%) of health service use associated with the presence of some musculoskeletal disease in the Health 2000 Survey.

	30–44	45–54	55–64	65–74	75–84	85 +	30 +[1]
Those hospitalised during the past 12 months							
Men							
No disease	5.1	5.0	10.1	15.5	19.9	72.1[2]	10.1
Some disease	12.0	12.7	12.8	16.8	24.3	53.0	14.9
Women							
No disease	10.5	6.1	10.8	14.4	15.3	38.5	11.0
Some disease	10.6	12.3	15.1	19.7	25.7	39.9	14.9
Those visited a physician for any disease during the past 12 months							
Men							
No disease	61.3	58.3	64.5	70.2	71.7	100.0	64.0
Some disease	69.4	75.9	77.6	82.2	84.9	80.5	75.7
Women							
No disease	76.0	76.7	73.8	75.4	88.2	82.3	76.8
Some disease	87.3	88.9	83.4	87.6	86.7	74.5	86.7
Those referred to physiotherapy during the past five years							
Men							
No disease	6.9	6.5	7.5	7.0	18.5	32.3	8.5
Some disease	15.2	12.0	11.1	9.0	24.5	10.4	13.5
Women							
No disease	9.9	9.9	11.2	10.8	8.7	8.1	10.1
Some disease	25.2	30.1	22.1	20.3	15.0	10.4	24.0

[1]age-adjusted: direct standardisation, with the 2000 population of Finland as the standard.
[2]only some cases

Table 28. Proportion (%) of those who visited a physician or a nurse because of a musculoskeletal disorder somewhere other than at a hospital as an in-patient during past 12 months in the Health 2000 Survey.

	18–24	25–29	30–44	45–54	55–64	65–74	75–84	85 +	18 +[1]
Visited a physician									
Men	13.5	17.1	17.6	18.2	17.1	16.0	11.8	6.9	16.4
Women	11.9	12.5	20.2	28.3	25.6	21.2	24.1	10.5	21.2
Visited a nurse									
Men	10.7	14.4	2.2	3.2	1.7	1.2	1.0	0.0	4.0
Women	5.2	5.5	3.0	3.7	2.6	1.7	2.7	0.8	3.3

[1]age-adjusted: direct standardisation, with the 2000 population of Finland as the standard

CHANGES IN MORBIDITY

Markku Heliövaara, Olli Impivaara, Erkki Nykyri and Hilkka Riihimäki

The prevalence of low-back and neck syndromes was found to have decreased during the past 20 years. The prevalence of knee osteoarthritis had decreased in women but not in men. None of the chronic musculoskeletal disorders showed increase in prevalence

To detect and describe changes in the prevalence of chronic musculoskeletal disorders, we will rely on the physician's clinical examination to diagnose chronic diseases such as low-back syndrome, neck syndrome, shoulder joint syndrome, inflammatory polyarthritis and osteoarthritis of the hip and knee joints. The diagnoses in the clinical examination were based on disease history, symptom history and findings. A specially trained physician diagnosed the syndromes using the same criteria that were applied in the Mini-Finland Health Survey carried out about 20 years earlier, from 1978 to 1980 (Sievers et al. 1985, Heliövaara et al. 1993, Riihimäki et al. 2002, Heistaro et al. 2005). The results of the two surveys are thus similar comparable. Corresponding nation-wide data are not available from Finland or any other country. It is thus not possible to make direct comparisons of our findings with those derived from other populations.

Results

• Chronic low-back syndrome

In the Health 2000 Survey, the age-adjusted prevalence of chronic low-back syndrome was 11% both in men and women (Figure 18). In the Mini-Finland Health Survey, this condition was diagnosed in 18% of men and 17% of women. Thus, the prevalence has clearly declined over the past 20 years. This downward trend was observed in men of all age groups below 75 and in women up to the age of 65.

• Chronic neck syndrome

Chronic neck syndrome was diagnosed in 6% of men and 7% of women (Figure 19). The corresponding figures in the Mini-Finland Health Survey were 10% in men and 14% in women. The prevalence of the neck syndrome thus showed a reduction of about 50% over the 20 years. This change was especially obvious in those under the age of 65.

• Shoulder syndrome

In men, the prevalence of chronic shoulder syndrome had increased overall from 5% to 8% (Figure 20). In men aged 75 years or over the prevalence had almost doubled. In contrast, no change in the prevalence was observed in women.

• Hip osteoarthritis

Hip osteoarthritis was diagnosed in 6% of men and 5% of women (Figure 21). In the Mini-Finland Health Survey these figures were 5% and 6%, respectively. The prevalence has thus remained about the same. In men aged below 75, practically no change was observed but in the older age groups there appeared to be some increase in the prevalence. In older women the prevalence of hip osteoarthritis had hardly undergone any change at all, whereas in younger women a slight decrease seemed to have taken place.

• Knee osteoarthritis

Knee osteoarthritis was diagnosed in 6% of men and 8% of women, whereas in the Mini-Finland Health Survey this diagnosis was made in 6% of men and 15% of women (Figure 22). Thus, among women the prevalence of knee osteoarthritis has been reduced by about 50% over 20 years. The reduction has occurred mainly in those aged less than 75 years. Among men, the prevalence of knee osteoarthritis increased in those aged 85 years or over. Difficulty in walking due to knee complaints had been experienced during the past month by 14% of men and 16% of women (Figure 23). Compared with the Mini-Finland Health Survey there was a clear-cut increase in the occurrence of knee problems reported by elderly men in the interview. This corresponded well with the findings of the clinical examination. Nevertheless, the overall prevalence of knee complaints did not show any marked change.

• Rheumatoid arthritis

No remarkable change was observed in the prevalence of rheumatoid factor positive rheumatoid arthritis (Figure 24).

Discussion

In general, as reflected by changes in the prevalence of the most common chronic musculoskeletal conditions, the health of the locomotor system in the Finnish population has improved during the past 20 years. The positive development is mainly attributable to a decrease in the prevalence of chronic low-back and neck syndromes in both men and women, and in the prevalence of knee osteoarthritis in women. There is no previous information on changes in the prevalence of these conditions in Finland or elsewhere.

The change in the prevalence during the past 20 years was similarly related to age in all of these conditions: health had improved in the young but not so much in the old. There has obviously been substantial improvement in the knowledge of the known risk factors for these conditions such as physical strain, accidents and living habits that have resulted in better health in the young. In the old, however, health is also influenced by risk factors that occurred much earlier in life (Heliövaara et al. 1993, Riihimäki and Viikari-juntura 2000, Silman and Hochberg 2001). Obesity in men has become increasingly common (Aromaa and Koskinen 2002). This may explain why the prevalence of knee osteoarthritis is decreasing more slowly in men than in women and why complaints in the knee joints have increased in elderly men.

In Finland, the incidence of rheumatoid factor positive rheumatoid arthritis has been decreasing since 1975, particularly in people under 55 years of age (Kaipiainen-Seppänen and Aho 2000). Comparisons of the results from the two surveys suggested no change in the prevalence of the rheumatoid factor positive rheumatoid arthritis. However, the disease may be too rare for adequate statistical analysis in this population.

Self-reported symptoms and complaints of the back, neck and weight-bearing joints in working-age Finns were equally common in the Health 2000 Survey as compared with the Mini-Finland Health Survey 20 years earlier (Riihimäki et al. 2002). Still, these health problems become more common in the old. These results disagree with some recent questionnaire and interview studies suggesting that both low-back pain and joint pain have become less frequent over the years (Leino et al. 1994; Manninen et al. 1996; Heistaro et al. 1998).

Great efforts were made to ensure that the clinical diagnoses and the symptoms reported in the interviews were comparable with those based on the Mini-Finland Health Survey. However, before drawing any final conclusions it is important to look at an even wider range of symptoms, diseases, and indicators of musculoskeletal function as well as the interrelationship of all these factors.

Figure 18. Prevalence (%) of chronic low-back syndrome in the Mini-Finland Health Survey (1978 to 1980) and in the Health 2000 Survey (2000 to 2001).

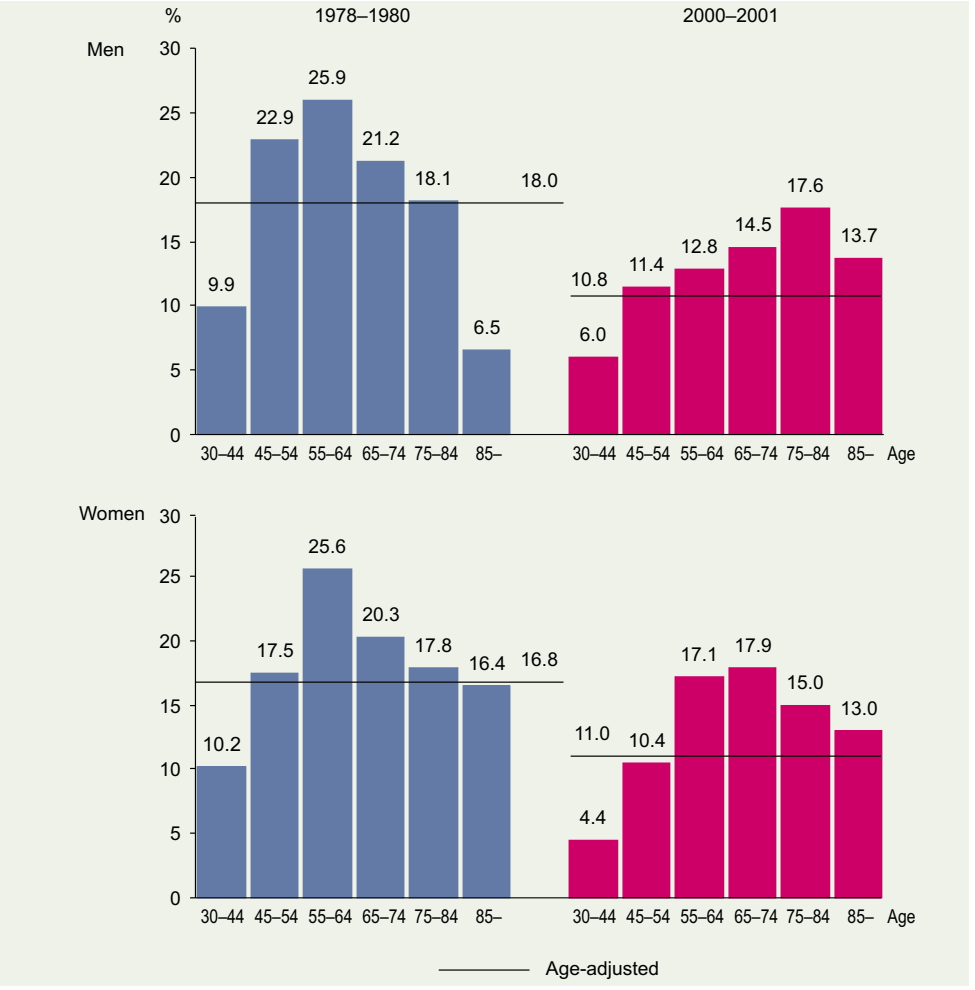


Figure 19. Prevalence (%) of chronic neck syndrome in the Mini-Finland Health Survey (1978 to 1980) and in the Health 2000 Survey (2000 to 2001).

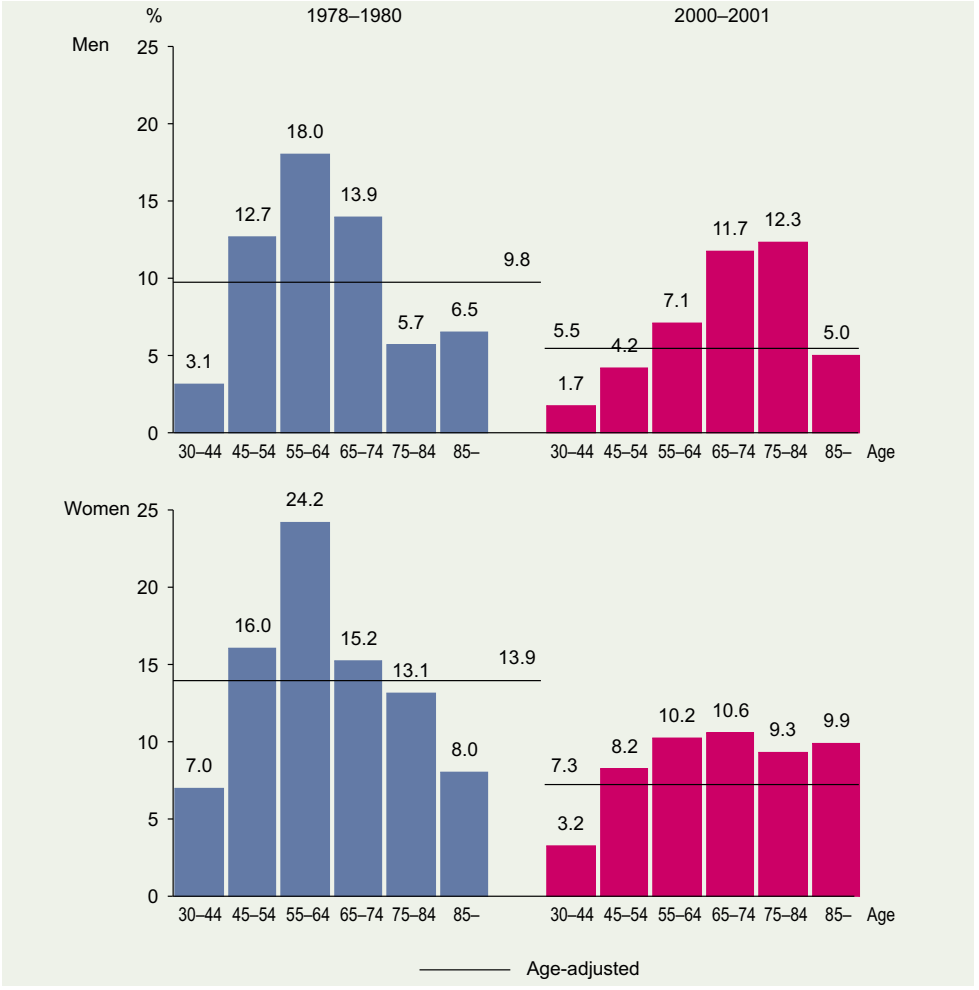


Figure 20. Prevalence of chronic shoulder syndrome in the Mini-Finland Health Survey (1978 to 1980) and in the Health 2000 Survey (2000 to 2001).

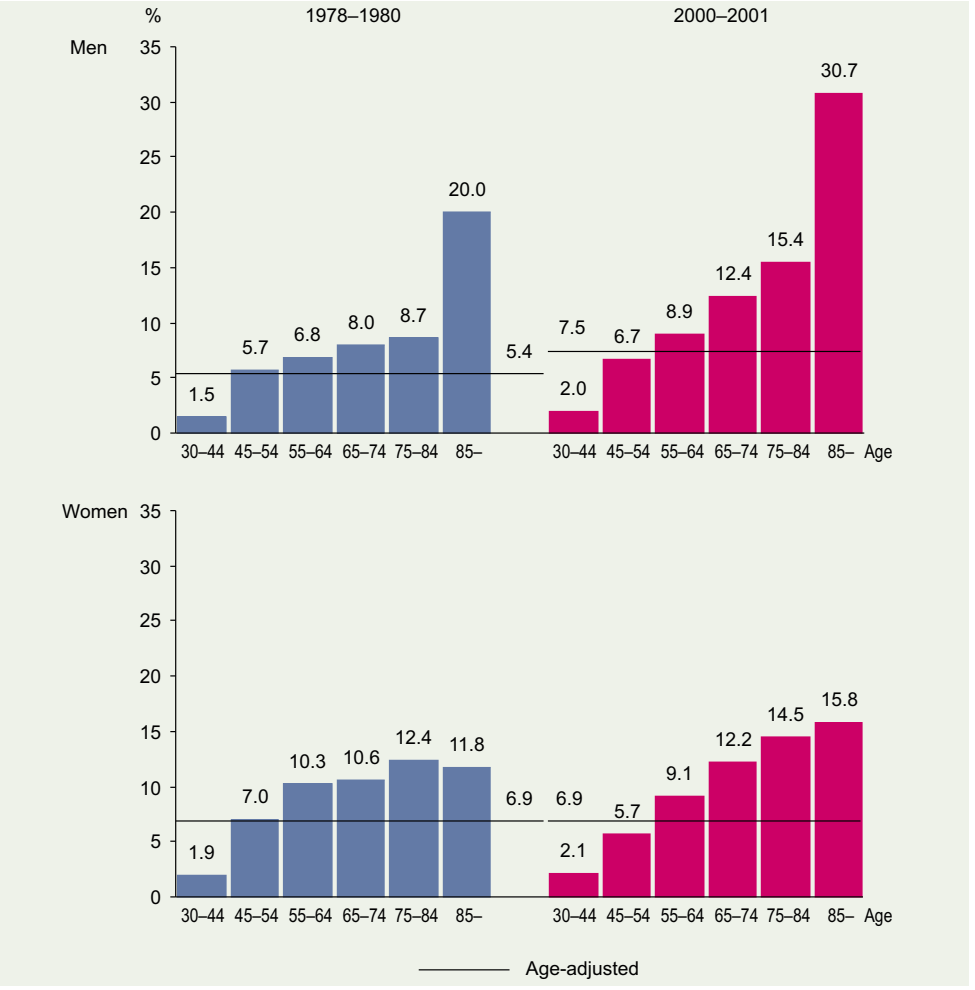


Figure 21. Prevalence of hip osteoarthritis in the Mini-Finland Health Survey (1978 to 1980) and in the Health 2000 Survey (2000 to 2001).

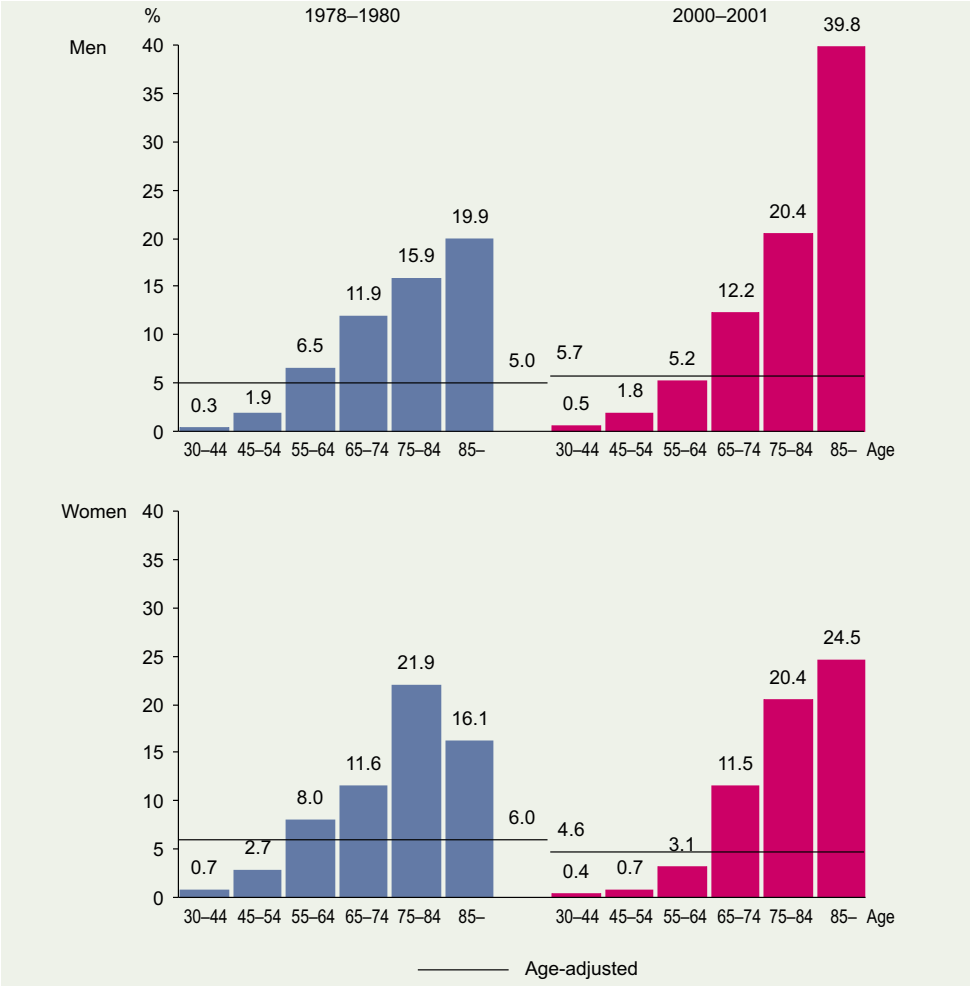


Figure 22. Prevalence (%) of knee osteoarthritis in the Mini-Finland Health Survey (1978 to 1980) and in the Health 2000 Survey (2000 to 2001).

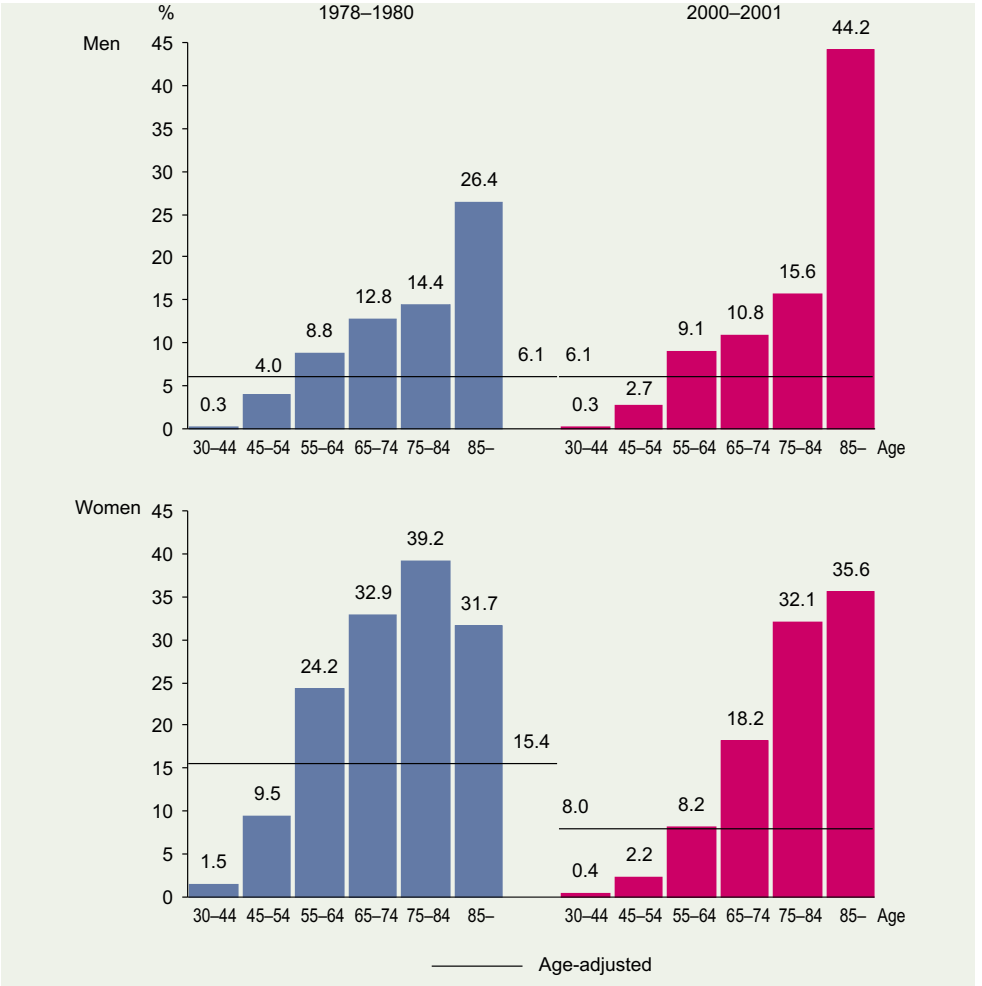


Figure 23. Prevalence (%) of difficulty in walking due to knee pain in the Mini-Finland Health Survey (1978 to 1980) and in the Health 2000 Survey (2000 to 2001).

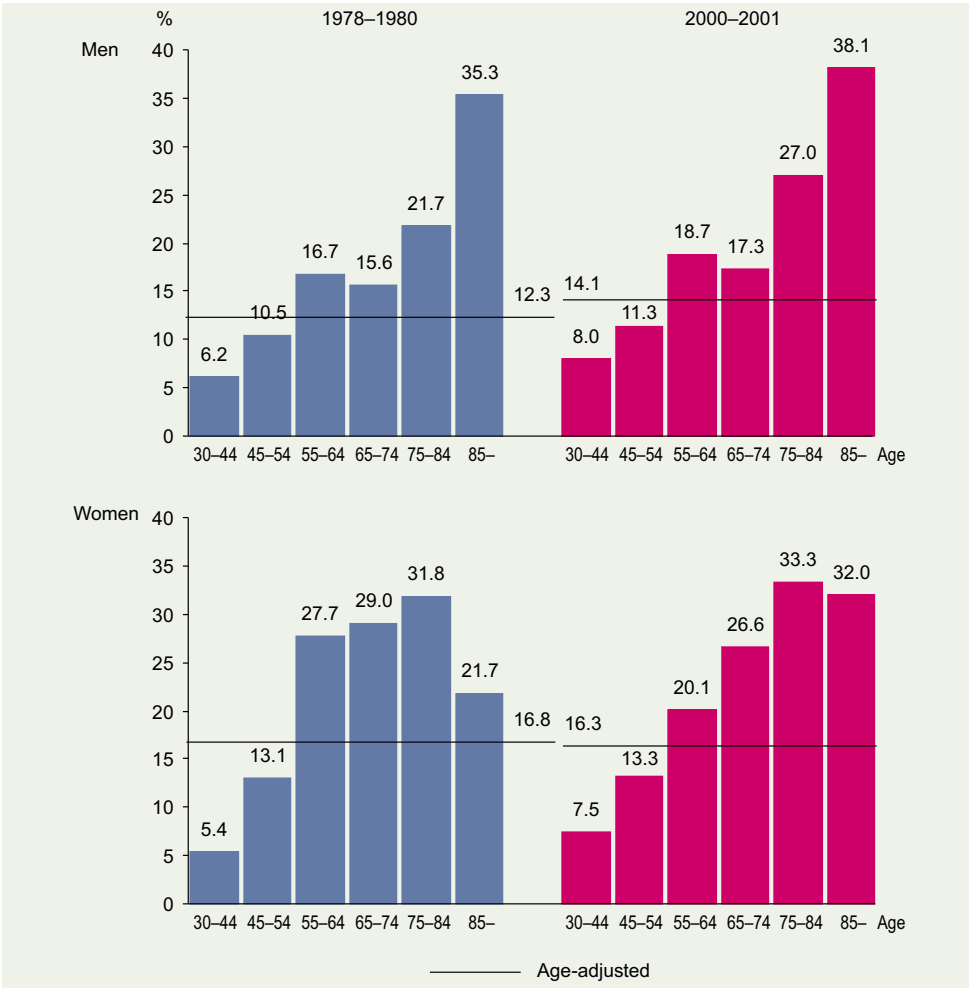
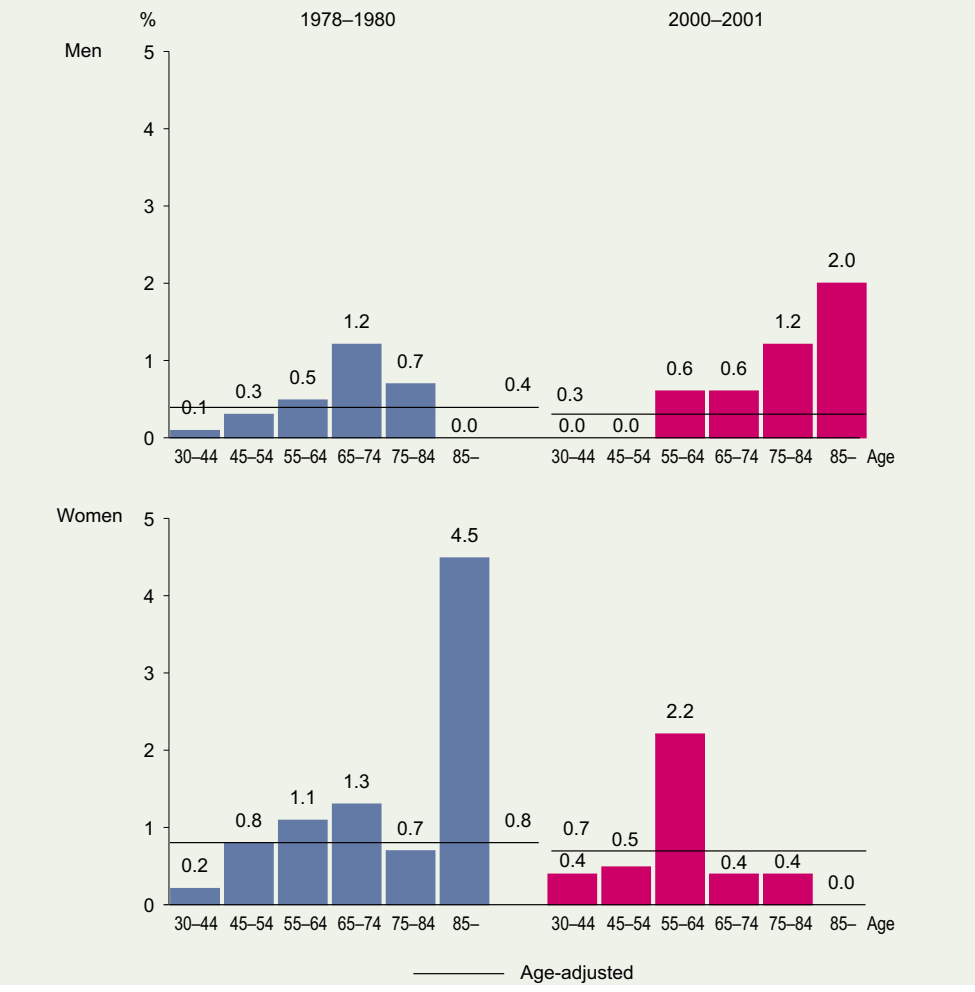


Figure 24. Prevalence (%) of rheumatoid factor-positive rheumatoid arthritis in the Mini-Finland Health Survey (1978 to 1980) and in the Health 2000 Survey (2000 to 2001).



DISCUSSION, KEY FINDINGS AND CONCLUSIONS

Markku Heliövaara, Jari Arokoski, Sami Heistaro, Olli Impivaara, Leena Kaila-Kangas, Heikki Kröger, Päivi Leino-Arjas, Pirjo Manninen, Hilkka Riihimäki, Simo Taimela, Esa-Pekka Takala and Eira Viikari-Juntura

In medical research in Finland much effort has traditionally been made regarding the execution of epidemiological surveys. Citizens' attitudes leading to high participation rates, representative study populations, and valid national registers create opportunities for studies that would not be feasible elsewhere. There have been a number of teams that represent a multidisciplinary approach. Since its planning stage the Health 2000 Survey has further promoted networking among Finnish researchers and research teams.

Certain aspects of the first national health examination survey, the Mini-Finland Health Survey, which was carried out from 1978 to 1980, were carried out in a different way to the current survey (Aromaa et al 1989, Heliövaara et al 1993, Aromaa et al 2004). First, no screening phase of health examination was constructed within the Health 2000 Survey, because it previously led to additional trouble and work after the field work stage. However, because of the careful control of the screening procedure (Heliövaara et al 1993) the comparability between the two surveys cannot be challenged in this respect. Second, the whole of previous health examination was carried out by only one team at the Social Insurance Institution's Mobile Clinic, whereas five regional teams with a total of 85 persons were temporarily recruited for the current survey. Using the data of various quality control measures, it will be possible to assess the effect of these factors on the prevalence estimates concerning the whole country and different regions.

High participation rates are crucial for the accuracy of prevalence estimates. In the Mini-Finland Health Survey, 90% of the sample participated in the health examination phase, whereas in this time the corresponding rate was only 78%. Although even the later rate can be considered high, it is important to realise that the group of non-participants in relation to the group of participants comprises a higher frequency of subjects with severe diseases and, in particular, moving difficulties (Sainio et al 2006). Selection may also have occurred according to occupation, education and behavioural factors, which determine the prevalence of musculoskeletal disorders. Thus, the prevalence of rheumatoid arthritis, osteoarthritis, osteoporosis and overall disability has probably been underestimated. For further studies based on the Health

2000 Survey it will, thus, be important to assess the effect of non-participation on each topic. Data obtained at home interviews and home health examinations are available for that purpose.

The current survey contained a problem related to the definition of each disorder or syndrome, because the criteria recommended for clinical studies and applied by leading medical journals are not applicable in an epidemiological survey. Most criteria in the Health 2000 Survey were taken from the Mini-Finland Health Survey to ensure comparability of the prevalence rates. In order to test and improve the methods, two pilot studies were carried out 7 and 3 months before the field work started. All staff members attended a 3-week training course. Quality assurance and quality control measures included training, written instructions, observation, video recording with feedback on examination technique, and repeated and parallel measurements. To study the repeatability of the physical examination of the upper extremities, a sub-sample of 94 subjects underwent the standard clinical examination by two field physicians. The level of agreement between the findings of the two examiners was satisfactory or good regarding a positive clinical sign of upper-extremity disorder (Shiri et al. 2006). In another sub-sample of 130 participants, the level of agreement between the field examination and standard radiological diagnosis regarding the clinical diagnosis of knee osteoarthritis was moderate (Toivanen et al. 2007). The results are in line with those from the Mini-Finland Health Survey (Heliövaara et al 1993) and suggest that the reliability of the diagnoses is generally satisfactory. Since the validity of diagnosis is, however, likely to differ between various disorders, a careful analysis of the data available on quality control measures will be necessary in forthcoming *ad hoc* studies.

During the past few years, epidemiologic research has gathered evidence on a multitude of risk factors for the common musculoskeletal diseases. For example, there is no longer any doubt about the causal role of obesity in osteoarthritis, or about the strong contribution of smoking to the development of rheumatoid arthritis (Felson and Zhang 1998, Silman and Hochberg 2001, Aho and Heliövaara 2004, Klareskog et al 2006). The list of other risk factors includes work-related physical loads for epicondylitis, carpal tunnel syndrome, rotator cuff syndrome, osteoarthritis and low-back and neck syndromes; low level of physical activity during leisure time for osteoporosis (alleged for low-back syndromes and osteoarthritis); and traumatic injuries for osteoarthritis (Felson and Zhang 1998, Riihimäki and Viikari-Juntura 2000, Silman and Hochberg 2001).

Thus far, a limitation in the Health 2000 Survey is its cross-sectional design. A risk factor is ideally defined in terms of incidence rather than prevalence. Even if exposure to risk factors such as previous injuries, physical and mental stress at work, smoking and obesity were assessed retrospectively, their temporal relation to the

development of musculoskeletal disorders cannot be demonstrated. Nevertheless, the Health 2000 Survey has proved useful for etiological research. Novel evidence has been achieved on the role of smoking and obesity in epicondylitis (Shiri et al 2006), diabetes and work-related loading in shoulder disorder (Miranda et al 2005), and hand dominance in upper extremity disorders (Shiri et al. 2007). For future prospective studies the Health 2000 data will be linked to national public registers to identify incident cases of common musculoskeletal disorders. Hospital discharge records, insurance data on diseases eligible for specially reimbursed medication and arthroplasty records will be of particular importance.

There seems to be no doubt that many future challenges can also be met, such as the clarification of the role of dietary factors in the etiology of common musculoskeletal diseases, the confirmation of hypotheses on alleged risk factors and creating new innovations to approach disease causation in appropriate study design. The main strength of the Health 2000 Survey in this respect is its comprehensiveness. Serum and DNA specimens have been stored in a freezer while waiting for future hypotheses that can be tested using nested case-control design. For example, the cohort of the Health 2000 Survey can provide unique opportunities to identify gene-environment interactions in the etiology, which will hopefully lead to a deeper understanding of the mechanisms in disease causation.

Most chronic diseases and disorders cannot be accurately identified by a self-administered questionnaire or an interview, or from records in public registers. Thus, national health examination surveys continue to be necessary for studying the prevalence of common musculoskeletal disorders and for monitoring their development.

Key findings and conclusions

In the Finnish adult population aged 30 years and over, the prevalence of chronic low-back syndrome is 11%. In comparison with the previous national health examination survey, the prevalence has decreased substantially over the past 20 years. Among Finnish adults aged 18 years and over, the life-time cumulative incidence of back pain is 77% in men and 76% in women, and that of sciatic pain 30% and 40%, respectively. The prevalence of back pain experienced during the previous month is 28% in men and 33% in women.

The prevalence of chronic neck syndrome is 6% in men and 7% in women, which shows a decrease of almost a half during the past 20 years. Neck pain experienced during the previous 30 days has occurred in 24% of men and 37% of women.

The prevalence of hip osteoarthritis is 6% in men and 5% in women. The prevalence has remained about the same over the 20-year period.

The prevalence of knee osteoarthritis is 6% in men and 8% in women. Among Finnish women the prevalence has been cut by half during the past 20 years, while no substantial change has taken place among men.

The prevalence of chronic shoulder syndrome is 7%, lateral epicondylitis 1% and carpal tunnel syndrome 4%.

Length of education is inversely associated with the occurrence of most site-specific musculoskeletal pains and the prevalence of common musculoskeletal syndromes.

This survey provides basic information on the epidemiology of osteoporosis, falls and fractures, for the first time derived from a nationally representative sample of adult Finns. Quantitative ultrasound measurements made at the heel show that low bone density (and thus osteoporosis) is common in the Finnish population, especially in the elderly. In comparison, the prevalence of self-reported osteoporosis is low and the prevalence of those being monitored by a physician for their osteoporosis is even lower. Osteoporosis thus appears to be underdiagnosed.

Self-rated disability at work and during leisure time is strongly associated with the prevalence of musculoskeletal disorders or diseases.

A musculoskeletal disease or complaint is the principal reason for the most recent visit to a physician in 12% of Finnish adults, which indicates the proportion of all the visits attributable to this disease group.

In addition to public registers and national interview surveys, repeated health examination surveys are necessary for studying the prevalence of common musculoskeletal disorders and for monitoring their development in the future.

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