Prevalence and Burden of Osteoarthritis: Results from a Population Survey in Norway

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ABSTRACT. ***Objective.*** To investigate the prevalence of osteoarthritis (OA) in knee, hip, and hand in a general population in Norway and the burden of disease in terms of associations between the report of OA and health-related variables.

Methods. In 2004, postal questionnaires were sent to all people in a local community born in 1928–30, 1938–40, 1948–50, 1958–60, 1968–70, and 1978–80. A total of 3266 (56.7%) responded. The prevalence of hip, knee, and/or hand OA was obtained by the item "Have you ever been diagnosed with osteoarthritis in hip/knee/hand by a medical doctor or by x-ray?".

Results. The overall prevalence of OA was 12.8% (95% CI 11.7–14.0), being significantly higher among women [14.7% (95% CI 13.1–16.4)] than men [10.5% (95% CI 9.0–12.1)]. The prevalence for hip OA was 5.5% (95% CI 4.7–6.3), knee OA 7.1% (95% CI 6.3–8.0), and for hand OA 4.3% (95% CI 3.6–5.0). OA was significantly (all $p < 0.001$) associated with higher age, less than 12 years of education, being out of work, pain duration > 1 year, pain in several body sites, sick leave for more than 8 weeks, emotional distress, poor sleeping quality, fatigue, and with frequent use of healthcare providers in primary health care. A significant ($p = 0.001$) dose-response relationship between increasing body mass index and OA was found.

Conclusion. The overall prevalence of OA was 12.8% and higher prevalence was found among women and older people, people with less than 12 years of education, those out of work, and those overweight. OA was associated with pain, disability, and poor health status, and frequent use of healthcare providers. (First Release Feb 15 2008; J Rheumatol 2008;35:677–84)

Key Indexing Terms:
PREVALENCE OSTEOARTHRITIS EPIDEMIOLOGY
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Osteoarthritis (OA) is a term used to describe a process or condition affecting the synovial joints and is frequently accompanied by pain, stiffness, disability, and radiographic changes[1]. OA is the most common cause of chronic pain in older people, is associated with activity limitations in older adults[2], and has a great influence on several aspects of individuals' lives[3,4]. The increasing proportion of both older and overweight people in the population, combined with a decrease in physical activity, indicate that OA will be an increasing public health problem in the future[3,4].

Overall prevalence figures for OA show a great variation depending on the population studied, the definition of OA, and the research methods used. For example, in older age groups (> 50 yrs) the prevalence of symptomatic OA in hip and/or knee joints has been estimated to be approximately 7%–11%[5-7]. Considerably higher estimates have been reported for hand OA; radiographic hand OA (in any finger joint) was found in 44.8% of a Finnish population[8] and in 23%–51% of disabled older women in the UK[9].

The prevalence of OA in the general population in Norway has not been previously explored[10]. Population-based studies are important as they present a simple picture of the burden of a problem in terms of prevalence, severity, and impact on health status, thus offering insight into the need for healthcare or prevention strategies. Further, population-based studies are important as the cases are unselected for severity in comparison with hospital-based populations, where referral of the more severe cases leads to referral bias.

Our main purpose was to estimate the prevalence of knee, hip, and hand OA in a general population in Norway. We investigated, second, how the prevalence of OA is related to subgroups based on sociodemographic and lifestyle variables, and third, how presence of OA was associated with health-related variables as well as healthcare use.

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MATERIALS AND METHODS

Study sample and setting. Our study is part of longterm followup of musculoskeletal pain in a population formerly surveyed in 1990 and 1994. In a new survey in 2004, questions on OA were included, and the study population for our study consisted of people enrolled in a cross-sectional survey in the Ullensaker municipality, a community 40 kilometers northeast of Oslo with 23,500 inhabitants. Ullensaker is a rural community, with many commuters to Oslo, the capital of Norway, and it has expanded in the last decade due to the building of the new Oslo Airport Gardermoen. The population is now a little younger than the general Norwegian population due to this expansion. In 2004 an 8-page postal questionnaire was sent simultaneously to all inhabitants in Ullensaker born in 1918-20, 1928-30, 1938-40, 1948-50, 1958-60, 1968-70, and 1978-80. Information on the residential locations was taken from the Norwegian Population Register. We sent a second mailing of the questionnaire to nonresponders after 6 weeks. The complete birth cohorts comprised 6108 people. The oldest people, born 1918-20 (n = 59), were excluded due to low number and response.

The Regional Committee for Medical Research Ethics and The Norwegian Data Inspectorate approved our study.

Report of OA in hip, knee, and hand. The presence of OA in hip, knee, and/or hand was obtained by the question "Have you ever been diagnosed with osteoarthritis in hip/knee/hand by a medical doctor and/or by x-ray?". Respondents could mark for yes in hip, knee, and/or hand. There was no explicit alternative for no, and when a subject did not report yes, the response was defaulted to no. This has the benefit of reducing the effort required to complete the form, but also has the effect that we cannot distinguish between a no and a missing value.

Sociodemographic and lifestyle variables. The sociodemographic variables were sex, age (grouped in age cohorts from 1928 until 1970), marital status (married/partnership and separated/divorced/widowed/single), level of education (≤ 9 yrs, 9–12 yrs, > 12 yrs), and work status [employed, homemaker, out of work (unemployed, early retirement), and age pensioned].

Three lifestyle variables were included: Smoking status was recorded as any current daily smoking (yes) or not (no). Body mass index (BMI; weight/height^2) was calculated based on self-reported body weight and height and classified in categories (< 20, 20–25, 26–30, > 30). Frequency of leisure physical activity was classified into 3 categories; none, 1–4 times per week, and > 4 times per week.

Health-related variables. Musculoskeletal symptoms were registered using a Standardized Nordic Pain Questionnaire (SNQ)[11]. The respondents were asked to report whether they had experienced any pain or discomfort from the following 10 areas during the previous year (and previous week): head, neck, shoulder, elbow, hand/wrist, upper back, lower back, hip, knee, and ankle/foot (with yes/no response categories for each location). A summary variable of number of pain sites reported in the SNQ was computed and categorized (0, 1–2, 3–4, and 5–10). Duration of musculoskeletal pain was registered by the question "For how long have you had your pain?" (no pain, < 1 yr, 1–5 yrs, 6–10 yrs, > 10 yrs) referring to musculoskeletal pain in general. Sick leave during the last year was classified into no, 1–8 weeks, > 8 weeks.

Emotional distress was assessed by the 20-item General Health Questionnaire, scored from 0 to 3, with high score indicating good health[12]. Sleeping quality was assessed by one question, "How well do you sleep?", with the response categories good, moderate, and bad. Fatigue was assessed by the question "To which extent have you been bothered with fatigue during the last 30 days?", scored from 1 to 4, with high score indicating "seriously bothered."

Health-related quality of life was assessed using the COOP-WONCA instrument[13,14], which has a 5-response option (not at all, very little, light, moderate, strong). In order to ease the interpretation of the results, the response options were reduced to 3 by pooling the first 2 options (not at all/very little) and the last 2 (moderate/strong).

Use of healthcare (doctor, physiotherapist, chiropractor, other) was self-reported as yes/no variables. In addition, number of consultations by doctor, physiotherapist, chiropractor, and/or others (acupuncture, etc.) was recorded. The questions regarding use of healthcare was not specified according to any particular disease.

Data analysis and statistical methods. A brief description of the demographic differences between respondents and nonrespondents is presented. Missing data were assumed to indicate a negative response to the question about OA or pain in the different body regions.

The prevalence of OA in hip, knee, and/or hand, respectively, was calculated and presented with 95% confidence intervals (CI) for the total population and stratified by age and sex[15]. Differences in prevalence of OA across sociodemographic groups were tested with logistic regression analysis adjusting for age and sex.

Burden of disease was analyzed by exploring potential associations between health-related variables (independent) and the report of OA in general (hip, knee, and/or hand) and OA in hip, knee, and hand, respectively (dependent variables) in logistic regression analyses adjusting for age and sex.

Analyses were performed using the SPSS software, version 14.0 (SPSS Inc., Chicago, IL, USA). All p values are 2-sided and the significance level was 5%.

RESULTS

Difference between respondents and nonrespondents. For our cross-sectional study a total of 3266 respondents completed the questionnaire and were included in the analysis, giving a response rate of 56.7%. The response rate was lowest in the youngest cohort (Table 1). The respondents were 55% women with median age of 45 years (interquartile range 21) for both women and men. Mean body height and weight was 167 cm (6.0) and 70 kg (13.4) among the women and 180 cm (6.5) and 85 kg (13.3) among the men, respectively. The majority of the respondents were employed (70.6%) and married or living in a partnership (75.3%). About one-third of respondents reported having more than 12 years of education (34.5%).

Prevalence of OA in knee, hip, and hand. Among the 3266 respondents, 12.8% (95% CI 11.7–14.0) reported having OA in the hip, knee, and/or hand. The overall prevalence of OA was 14.7% (95% CI 13.1–16.4) in women and 10.5% (95% CI 9.0–12.1) in men. The total prevalence for hip OA was 5.5% (95% CI 4.7–6.3), knee OA 7.1% (95% CI 6.3–8.0), and hand OA 4.3% (95% CI 3.6–5.0). The majority of those reporting OA did so for only one body part (n = 318), whereas 68 reported OA for 2 body parts and 33 for all 3 body parts. Of those who reported OA for 2 body parts the combination hip and knee OA was the commonest (n = 65).

The prevalence of OA in all locations increased significantly with age ($p < 0.001$) and was higher among women than men (Table 2). Compared to the men, women were more likely to report OA in hip [odds ratio (OR) 1.53; 95% CI 1.11–2.12, p = 0.009] and knee (OR 1.42; 95% CI 1.07-1.88, p = 0.015), as well as in hand(s) (OR 2.66; 95% CI 1.80–3.91, $p < 0.001$), after adjustment for age.

In order to compare the responses of the OA questions with the SNQ report of nonspecific pain in the same body regions, we also analyzed the prevalence of reported pain in the sample (n = 3266). The results showed that the preva-

Table 1. Percentage of respondents according to sex and age groups.

Group	Female			Male			All		
	Respondents	%	Total no. Receiving the Survey	Respondents	%	Total no. Receiving the Survey	Respondents	%	Total no. Receiving the Survey
1928–30	131	63.9	205	121	63.7	190	252	63.8	395
1938–40	236	70.0	337	222	68.1	325	458	69.2	662
1948–50	372	71.4	521	313	59.3	526	685	65.4	1047
1958–60	324	61.8	524	278	47.4	586	602	54.2	1110
1968–70	543	58.6	928	407	45.2	902	950	51.9	1830
1978–80	180	40.1	451	139	31.1	449	319	35.6	900

Table 2. Prevalence (frequency with percentage in parentheses) of osteoarthritis (OA) in hip (n = 179), knee (n = 233), and/or hand (n = 141) according to sex and age groups (n = 3266).

Group	Age, yrs	Male, n = 1480			Female, n = 1786		
		Hip OA, n = 68	Knee OA, n = 92	Hand OA, n = 37	Hip OA, n = 111	Knee OA, n = 141	Hand OA, n = 104
1928–30	74–76	23 (19.0)	18 (14.9)	6 (5.0)	28 (21.4)	37 (28.2)	14 (10.7)
1938–40	64–66	20 (9.0)	31 (14.0)	16 (7.2)	33 (14.0)	38 (16.1)	31 (13.1)
1948–50	54–56	17 (5.4)	26 (8.3)	9 (2.9)	37 (9.9)	39 (10.5)	42 (11.3)
1958–60	44–46	5 (1.8)	10 (3.6)	5 (1.8)	10 (3.1)	16 (4.9)	13 (4.0)
1968–70	34–36	3 (0.7)	7 (1.7)	1 (0.2)	1 (0.2)	10 (1.8)	4 (0.7)
1978–80	24–26	0	0	0	2 (1.1)	1 (0.6)	0
Total	All age groups	68 (4.6)	92 (6.2)	37 (2.5)	111 (6.2)	141 (7.9)	104 (5.8)

lence of pain during the last 12 months was 28.5% for hip, 35.5% for knee, and 32.2% for hand. Of those reporting pain in last 12 months in hip, knee, and/or hand, a proportion of 18.1% (hip), 18.9% (knee), and 12.8% (hand) also reported OA in the respective body regions. As expected, almost everybody who reported OA in hip, knee, and/or hand, also reported pain in the respective body regions: 99.3%, 98.8%, and 99.5%, respectively.

Associations to demographic and lifestyle variables. Associations are shown in Table 3. People with less than 12 years of education were 2–3 times more likely to report hip OA and knee OA compared to people with more than 12 years of education ($p = 0.001$), whereas level of education was not significantly associated with presence of hand OA. Further, OA in hip, knee, and/or hand was 2–3 times more common among people who were out of work compared to employed individuals ($p < 0.001$).

High BMI (> 30) was significantly associated with hip OA and knee OA, but not with hand OA, as compared to people with normal BMI (between 20 and 25). A dose-response relationship was found for the association between BMI and overall OA as well as for BMI and knee OA. Smoking was found to be significantly associated with hip OA. Marital status and leisure physical activity were not significantly associated with OA.

Burden of disease in OA. In general, the report of OA showed strong and significant associations with all the health-related variables included in the analyses (number of pain sites, duration of musculoskeletal pain, sick leave, emotional distress, sleeping quality, fatigue, and health-related quality of life; Table 4). Further, the people with OA reported significantly poorer health and function according to all 6 dimensions of the COOP-WONCA measure. In particular, people with hip OA reported more limitations in daily activities and poor self-rated health, with an OR of about 5 (Table 4).

The pattern of healthcare use among different subgroups of the general population is presented in Table 5. People with OA had a statistically significant higher frequency of consulting medical doctors and physiotherapists during the last year as compared to people without OA. There was no significant difference between people with and without OA in seeking chiropractic treatment or other types of treatments.

DISCUSSION

We have 3 main findings: (1) The overall prevalence of OA in this general population was 12.8%, ranging from 4.3% for hand OA to 7.1% for knee OA, and it was higher among women and increased with increasing age and BMI. (2) An increased occurrence of OA was observed in people with less than 12 years of education and in those out of work. (3) Persons reporting OA had consistently more pain, disability, and poor health status, and used primary healthcare services more frequently, in particular medical doctors and physiotherapists.

Table 3. Associations between sociodemographic and lifestyle variables and osteoarthritis (OA) presented as adjusted* odds ratios (95% confidence intervals).

	OA, n = 419	Hip OA, n = 179	Knee OA, n = 233	Hand OA, n = 141
Marital status				
Married/partnership	1	1	1	1
Living alone	1.08 (0.83–1.39)	0.92 (0.63–1.33)	1.21 (0.88–1.65)	1.01 (0.68–1.51)
Education, yrs				
≤ 9	2.15 (1.52–3.05)	2.85 (1.65–4.93)	2.25 (1.43–3.57)	1.50 (0.88–2.56)
9–12	2.12 (1.56–2.88)	2.70 (1.62–4.49)	2.32 (1.54–3.50)	1.48 (0.93–2.37)
> 12	1	1	1	1
Work status				
Employed	1	1	1	1
Homemaker	0.76 (0.40–1.44)	0.86 (0.33–2.23)	0.62 (0.26–1.46)	1.18 (0.54–2.61)
Out of work	2.65 (1.98–3.53)	3.34 (2.19–5.11)	2.47 (1.72–3.53)	1.86 (1.19–2.89)
Age pensioned	0.89 (0.61–1.30)	1.18 (0.68–2.07)	0.75 (0.46–1.22)	0.44 (0.23–0.82)
Smoking				
No	1	1	1	1
Yes	1.14 (0.89–1.47)	1.58 (1.11–2.24)	0.99 (0.72–1.38)	1.13 (0.76–1.68)
Body Mass Index†				
< 20	0.94 (0.49–1.78)	1.18 (0.51–2.11)	0.74 (0.29–1.92)	0.70 (0.24–1.99)
20–25	1	1	1	1
26–30	1.15 (0.89–1.48)	0.85 (0.59–1.22)	1.51 (1.09–2.08)	1.00 (0.69–1.48)
> 30	1.90 (1.35–2.67)	1.72 (1.08–2.74)	2.43 (1.60–3.67)	1.57 (0.93–2.64)
Leisure physical activity, h/wk				
None	1	1	1	1
1–4	1.03 (0.71–1.49)	1.23 (0.70–2.15)	1.06 (0.67–1.66)	0.76 (0.45–1.28)
> 4	1.04 (0.68–1.58)	1.88 (1.02–3.46)	0.89 (0.53–1.52)	0.72 (0.39–1.35)

* Adjusted for age and sex. † We defined BMI of 20–25 as the reference category since this represents a normal weight.

Several methodological issues should be considered when interpreting these results. First, diagnosis of OA was based on self-report through the response to a written question and not on radiographic evidence. Poor agreement has been found between any pain reporting and the presence of OA[5,6,16,17]. The present outcome question referred to OA diagnosed by a medical doctor, and not only pain in the actual body regions. Not surprisingly, pain in a region is much more prevalent than OA in a joint, which was also observed in our study. Approximately 18% of those reporting pain also reported OA, which indicates that the OA question differentiated between OA and other pain conditions in the actual pain sites. In a British study of hip pain attendees[5] 6.8% of the men and 10.3% of women reported hip pain, assessed by questions and pain drawings. Of those who reported hip pain, 18% had severe and 55% mild to moderate hip OA. Although the prevalence of hip pain was much higher in our study compared to the British study (29% vs 8%), the proportion of people with OA was similar. This consistency may support that the respondents were able to differentiate between unspecific hip pain and OA. Moreover, the current prevalence estimates were similar to results from studies based on radiologically diagnosed OA in other Scandinavian populations (Table 6), which indicates that there is unlikely to be substantial overestimation of OA in our data. However, the OA question used in this survey needs validation in a future study. We had actually planned to contact individuals with and without reported OA in our study to perform this validation, but this contact was not allowed by the ethical committee since a potential approach to the patients after completion of the questionnaire was not included in the original information sheet.

A second methodological issue of concern is that the response to this survey was approximately 57%, which is slightly lower than in other similar recent postal surveys[26]. More nonrespondents among men and among the youngest and oldest age groups were observed. Therefore, the oldest age group, born 1918-20, was excluded, whereas the youngest age group (born 1978-80) was kept despite the low response rate. As expected, the prevalence of OA was low in this age group, and the results in our study are not likely to be influenced by the low response in this group. Different factors may contribute to the low response rate in this survey. For example, there may be a tendency of reduced willingness to respond to surveys in general due to increased use of questionnaires in public marketing and research. In our study, people with relevant complaints may have tended to respond more often. Among the youngest people it is likely that they did not respond due to less musculoskeletal pain. In the oldest age groups the opposite may be true, as the healthiest may have been more able to respond. If so, our results may have overestimated the prevalence of OA in the younger age groups and underestimated the prevalence in the oldest groups. Due to the lack of information regarding

Table 4. Associations between health-related variables and osteoarthritis (OA) presented as adjusted* odds ratios (95% confidence intervals).

	OA, n = 419	Hip OA, n = 179	Knee OA, n = 233	Hand OA, n = 141
Musculoskeletal pain, locations				
None	1	1	1	1
1–2	3.92 (1.73–8.87)	1.97 (0.55–7.05)	3.13 (1.07–9.13)	2.33 (0.67–8.14)
3–4	7.74 (3.48–17.18)	7.17 (2.18–23.58)	5.31 (1.88–15.05)	4.13 (1.24–13.76)
5–10	17.88 (8.15–39.20)	15.66 (4.86–50.48)	15.08 (5.46–41.67)	8.79 (2.73–28.32)
Duration of pain, yrs				
No Pain	1	1	1	1
< 1	2.16 (1.00–4.67)	3.26 (0.45–23.58)	1.80 (0.70–4.66)	2.24 (0.49–10.18)
1–5	5.88 (3.48–9.93)	21.54 (5.14–90.28)	3.51 (1.85–6.65)	6.92 (2.41–19.92)
6–10	8.00 (4.70–13.61)	23.75 (5.61–100.47)	6.57 (3.51–12.32)	9.37 (3.25–27.02)
> 10	8.19 (4.98–13.50)	32.82 (8.01–134.39)	5.32 (2.93–9.64)	10.81 (3.91–29.90)
Sick leave the last year, wks				
No	1	1	1	1
< 1	0.90 (0.49–1.67)	2.04 (0.84–4.91)	0.72 (0.30–1.73)	0.39 (0.09–1.66)
1–8	1.87 (1.23–2.86)	2.52 (1.23–5.14)	2.03 (1.20–3.44)	2.09 (1.11–3.94)
> 8	2.36 (1.51–3.67)	4.19 (2.12–8.28)	1.95 (1.08–3.50)	2.74 (1.44–5.23)
Emotional distress				
≤ 12	1	1	1	1
13–16	1.34 (0.93–1.95)	1.68 (0.94–2.99)	1.24 (0.78–1.95)	0.84 (0.45–1.57)
17–21	1.86 (1.32–2.63)	2.36 (1.38–4.02)	1.42 (0.93–2.18)	1.65 (0.98–2.79)
≥ 22	2.78 (1.98–3.91)	3.98 (2.36–6.72)	2.22 (1.47–3.37)	2.17 (1.30–3.65)
Sleeping quality				
Good	1	1	1	1
Moderate	2.05 (1.59–2.64)	2.32 (1.58–3.42)	2.04 (1.47–2.83)	1.94 (1.28–2.92)
Bad	3.60 (2.57–5.02)	4.48 (2.81–7.13)	3.64 (2.42–5.48)	2.91 (1.74–4.86)
Fatigue				
Not bothered	1	1	1	1
A little bit	1.30 (1.00–1.70)	1.40 (0.94–2.05)	1.17 (0.83–1.64)	1.67 (1.07–2.59)
Moderate	2.03 (1.49–2.76)	2.22 (1.43–3.44)	2.18 (1.50–3.17)	2.53 (1.55–4.11)
Serious	2.46 (1.36–4.43)	2.76 (1.21–6.32)	3.17 (1.62–6.20)	3.19 (1.39–7.34)
COOP-WONCA[13,14]				
Pain intensity				
Not at all/very little	1	1	1	1
Light pain	2.99 (2.12–4.21)	2.78 (1.59–4.86)	3.70 (2.35–5.82)	2.41 (1.35–4.31)
Moderate/strong	5.23 (3.88–7.04)	6.51 (4.07–10.41)	5.59 (3.73–8.38)	4.63 (2.83–7.57)
Physical health				
Excellent/good	1	1	1	1
Neither good nor poor	1.81 (1.37–2.39)	1.63 (1.07–2.48)	1.85 (1.29–2.65)	1.88 (1.22–2.90)
Poor/very poor	2.73 (2.02–3.69)	2.54 (1.65–3.91)	2.86 (1.96–4.18)	1.68 (1.03–2.76)
Emotional problems				
Not at all/very little	1	1	1	1
To some extent	1.27 (0.93–1.74)	1.40 (0.90–2.18)	1.23 (0.83–1.82)	1.22 (0.74–2.00)
Much/very much	1.78 (1.32–2.39)	2.02 (1.34–3.04)	1.73 (1.20–2.49)	2.10 (1.37–3.21)
Daily activities				
Not at all/very little	1	1	1	1
To some extent	2.74 (2.07–3.63)	3.34 (2.24–4.97)	2.72 (1.93–3.82)	1.75 (1.12–2.75)
Much/very much	3.19 (2.35–4.34)	5.34 (3.58–7.96)	3.00 (2.07–4.34)	2.60 (1.66–4.05)
Social activities				
Not at all/very little	1	1	1	1
To some extent	2.28 (1.65–3.13)	3.00 (1.99–4.55)	2.10 (1.42–3.09)	2.16 (1.36–3.43)
Much/very much	2.05 (1.35–3.12)	2.39 (1.37–4.17)	2.04 (1.24–3.36)	1.64 (0.87–3.12)
Self-perceived health				
Excellent/good	1	1	1	1
Neither good nor poor	2.58 (2.01–3.33)	3.16 (2.17–4.60)	2.28 (1.66–3.12)	2.48 (1.69–3.65)
Poor/very poor	3.00 (2.18–4.13)	4.94 (3.21–7.60)	2.79 (1.89–4.11)	2.20 (1.33–3.64)

* Adjusted for age and sex.

Table 5. Frequency of healthcare use during the last year presented as mean (SD) number of contacts.

	Hip OA, n = 179	Knee OA, n = 233	Hand OA, n = 141	Overall OA, n = 419	No OA, n = 2847	p**
Medical doctor	6.5 (5.6)	5.6 (4.3)	5.7 (5.2)	5.5 (5.1)	3.4 (4.4)	< 0.001
Physiotherapist	7.2 (13.4)	6.0 (12.9)	5.4 (12.7)	5.7 (12.3)	2.6 (8.4)	< 0.001
Chiropractor	0.5 (1.9)	0.5 (2.1)	0.5 (1.7)	0.5 (2.0)	0.8 (3.0)	0.055
Other treatments	1.4 (5.6)	1.5 (6.5)	1.2 (4.6)	1.2 (5.2)	1.0 (4.2)	0.443

* OA in general (hip, knee, and/or hand). ** Independent t-test for the comparison between overall OA and no OA.

Table 6. Studies of prevalent osteoarthritis (OA) in population-based epidemiological studies in Scandinavia: the prevalence for OA in hip, knee, and hand, respectively, is presented in percentages (95% confidence intervals) when provided.

Study	Year	Sample size	Age	Sex	Definition/ Classification	Hip OA	Knee OA	Hand OA
Denmark, Sonne-Holm[18]	2006	3355	18+	Men	Kellgren & Lawrence			4.0 (1st CMC)
				Women	≥ grade 2			7.4 (1st CMC)
Finland, Laine[19]	1962	539	55+	Men	X-ray +			12.9
				Women	symptoms			14.7
Finland[20]	1985	13700	0+	Men	Clinically defined		0.5 (0.3–0.6)	
				Women	OA		1.7 (1.5–1.9)	
				Both			1.1 (0.9–1.3)	
Finland (MFHS)[20]	1993	7220	30+	Men	Clinically defined	4.1 (3.6–4.6)		
				Women	OA	6.0 (5.5–6.6)		
				Both		5.1 (4.6–5.6)		
Finland, Haara[21]	2003	3595	30+	Men	Kellgren & Lawrence			41.1
				Women	grade 2 to 4			50.6
				Both				44.8 and 16.0 (symmetric DIP)
Iceland, Ingvarsson[22]	1998	1520	35+	Men	Kellgren & Lawrence	12		
				Women	≥ grade 2	10		
Sweden, Lindberg[23]	1985			Both	Kellgren & Lawrence			
					≥ grade 2	3.1–3.6		
Sweden, Bagge[24]	1992	340	75–79	Men	Kellgren & Lawrence		51.9	97.8
				Women	≥ grade 2		59.0	97.1
Sweden, Petersson[25]	1997		35–54	Both	Kellgren & Lawrence			
					≥ grade 2		10.0	

this topic, the nonresponse problem should be further evaluated in future studies.

Third, the questions regarding use of healthcare did not refer to any particular disease. Therefore, the results reflect a healthcare-seeking pattern without reference to a particular cause. Besides, this was a cross-sectional survey, which, by design, could not determine causality, so that attendance (for OA or other conditions) could be a cause or a consequence of the self-reported OA. Finally, another methodological weakness is the lack of validation of the sleeping and fatigue questions for the general population.

The prevalence of OA has not been studied in Norway before. Table 6 provides an overview of OA prevalence in previous population-based epidemiological studies in Scandinavia. If we compare our results of prevalence of hip OA (4.6% for men, 6.2% for women) these results are very similar to the Finnish study with roughly the same age group[20]. In a Swedish population study the prevalence of hip OA was lower[27], whereas the overall prevalence of hip OA among Icelandic people more than 35 years of age was higher[22].

The present average prevalence estimates of knee OA (6.2% for men, 7.9% for women) were considerably lower than the estimates reported in the Swedish surveys, despite their use of radiographically verified knee OA[25,28]. Some of the differences may be explained by the higher age groups in the Swedish studies. In contrast, the prevalence of knee OA in the whole general population (from 0 +) in Finland was considerably lower than both our results and those from Sweden. The large variance in the prevalence estimates of radiographic knee OA is supported in a previous review, where the authors found a variation from 3.8% in younger age cohorts (from 25 to 74) up to 14%–30% among people over age 45 years[7].

Table 6 shows that our prevalence of hand OA (2.5% for men, 5.8% for women) is considerably lower than that in the other Scandinavian countries. For example, the Finnish study reported presence of radiographic hand OA abnormalities in any finger joint in 44.8% and in at least 2 symmetrical pairs of distal interphalangeal joints in 16% of the general population age > 30 years[8]. The large differences in the estimates of hand OA may be due to different methods in study sample and outcome measurements.

We found that presence of OA was associated with less than 12 years of education and being out of work. Our results are in agreement with a previous large Norwegian epidemiological study, which showed that low level of education was the most important predictor of disability pensioning for people with rheumatoid arthritis and OA[29]. It has been argued that people with low education level may have higher risk of OA due to their type of work, which frequently involves heavy physical loads[30]. It is also likely that people with low education level will have more problems to continue performing manual work with OA. Holte, *et al*[31] found a strong association between manual work and disability pension among people with OA in Norway.

Obesity is considered to be one of the most important risk factor for knee OA, whereas the relationship with hand and hip OA is controversial[30]. Correspondingly, we found that high BMI (> 30) was associated with OA in the knee(s) and also the hip(s), but not in the hand(s). However, the weakness of the cross-sectional design of our study does not allow determination of a cause and effect relationship, so the results should be carefully interpreted. Further, our results did not show any significant associations between OA and marital status and leisure physical activity. Some previous studies have suggested that smoking may protect against knee OA[32] and hand OA[8], but others have not found associations between smoking and OA[33]. The latter results are consistent with our findings, but we found a significant relationship between smoking and hip OA. Obesity, smoking, and leisure physical activity are important variables, as they can be modified by changes in lifestyle and thus addressed in public health campaigns[34]. A recent World Health Organisation initiative has especially focused on the health consequences of obesity, and several initiatives are expected also on the political level to address physical activity and nutritional aspects that may be of importance to counteract the rising occurrence of OA[35].

The people who had OA — regardless of body region — reported a substantial burden of poor health and reduced function as measured by the COOP-WONCA instrument and the other health variables in our study. The most striking effects were seen for physical health, daily and social activities, pain intensity, and self-rated health. Most of the people reporting OA also had a frequent use of healthcare; in particular, they attended general practitioners and physiotherapists. Several other studies have shown that consequences of OA are not only restricted locomotor activity and functional disability[36-38], but that OA also should be considered as a multifaceted syndrome of chronic pain, poor general health, and emotional distress[37,39,40], with extensive comorbidity[41].

These multifaceted aspects imply special consideration of comorbidity and functional limitations in the management of OA. Since there are no consistently effective methods for preventing OA or slowing its progression, the impact of OA brings many challenges to health services. An important goal of contemporary management of OA should therefore be to optimize pain control and improvement in function and health-related quality of life. There is a great need for effective interventions providing knowledge and self-help management for OA.

Our study confirms that the knee is the most commonly affected osteoarthritic joint and that OA is more common among women than men and rises precipitously with age (> 55 yrs). Our study also highlights that most people with OA have considerable pain, disability, and poor health status. The overall implication is that OA should be specifically addressed in the planning of healthcare, including public health programs that focus on prevention of prevalent diseases with a major burden on the individual and society.

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