
357 IN MEN, SEVERE SPINE OSTEOARTHRITIS IS ASSOCIATED WITH ABDOMINAL AORTIC CALCIFICATION AND ALL CAUSE MORTALITY – THE MINOS STUDY

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Purpose: A link between osteoarthritis (OA) and cardiovascular disease has been suggested previously. We have studied the association of spine OA with abdominal aortic calcification (AAC) severity and its progression rate as well as with all cause mortality in older men.

Methods: A cohort of 766 men aged 50–85 years was followed up prospectively for 7.5 years for AAC and for 10 years for all cause mortality. Spine OA was assessed at six intervertebral spaces using Lane’s score (Lane, J Rheumatol, 1995). Total score of disc space narrowing was calculated as the sum of disc space narrowing scores for each intervertebral level. Total scores of osteophytes, subchondral sclerosis and OA grade were calculated similarly. AAC was assessed in the abdominal aorta at the level of first four lumbar vertebrae using the semi-quantitative score (Kauppila, Atherosclerosis, 1997). AAC score ranged from 0 to 24. An AAC score > 6 was defined as severe AAC. During the follow-up, 182 men died.

Results: After adjustment for confounders (age, smoking, education, hypertension, diabetes, digestive diseases, treatment with vitamin K antagonists [VKA] or oral glucocorticoids, fat mass, lean mass, glomerular filtration rate and serum calcium [Ca], phosphorus [P], parathyroid hormone [PTH] [not measured], triglycerides and total cholesterol), the odds of severe AAC increased with total disc space narrowing score (OR: 1.26 per SD increase, 95%CI: 1.01–1.58). After similar adjustment, the odds of severe AAC were higher in the highest tertile of total disc narrowing score (OR: 2.39, 95%CI: 1.18–4.87) compared with the lowest tertile (OR: 1.04–3.42, p for trend < 0.05).

The association was similar for other thresholds (AAC score > 5: OR = 1.50; 95% CI: 1.05–2.35) or after additional adjustment for osteophytosis and subchondral sclerosis (AAC score > 6: OR = 2.39, 95%CI: 1.18–4.87). Osteophytosis and subchondral sclerosis were not associated with AAC severity. Prospective data on AAC progression were available in 613 men. In 148 men AAC remained stable during the follow-up. After adjustment for confounders (age, smoking, hypertension, diabetes, digestive diseases, treatment with VKA or oral glucocorticoids, fat mass, and serum levels of Ca, P, triglycerides, PTH and LDL-cholesterol), the probability of long-term AAC stability decreased with increasing total osteophyte score (OR: 0.76 per SD increase, 95%CI: 0.60–0.99). The probability of AAC stability was lower in men in the highest tertile of total osteophyte score compared with two lower tertiles combined (OR = 0.51, 95%CI: 0.30–0.86). These associations were robust and did not weaken after additional adjustment for baseline AAC or total disc space narrowing and subchondral sclerosis. Disc space narrowing and subchondral sclerosis were not associated with AAC severity. After adjustment for confounders (including AAC, total disc space narrowing score and total osteophyte score predicted all cause mortality (HR: 1.21 per 1 SD increase, 95% CI: 1.01–1.45 and HR = 1.23 per SD increase, 95% CI: 1.03–1.48, respectively). As expected, total OA grade, determined by disc space narrowing, osteophytes and subchondral sclerosis, was associated positively with all cause mortality after adjustment for confounders (HR = 1.25, 95%CI: 1.03–1.50). Higher total OA grade and severe AAC contributed jointly to the risk of death. After adjustment for confounders, men who had both higher total OA grade and severe AAC had higher risk of death (HR = 2.63, 95%CI: 1.48–4.65) compared with men who had lower total OA grade and less severe (or absent) AAC.

Conclusions: In older men severe spine OA is independently associated with greater AAC severity and with greater risk of prospectively assessed AAC progression, thus confirming the relationship between OA and cardiovascular disease. Severe OA and severe AAC contribute jointly and independently to higher all cause mortality in older men.

358 INCIDENCE OF CORONARY HEART DISEASE ASSOCIATED WITH ARTHRITIS: A CANADIAN POPULATION-BASED COHORT STUDY

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Purpose: While rheumatoid arthritis (RA) has been associated with increased heart disease morbidity & mortality, there is limited population-based evidence examining this relationship for other types of arthritis, particularly more prevalent types such as osteoarthritis (OA). The aim of the present study was to estimate the extent to which arthritis is associated with newly diagnosed-heart disease in a longitudinal Canadian population-based cohort.

Methods: The present study was a secondary analysis of the longitudinal Canadian National Population Health Survey (NPHS), a nationally representative community sample followed every 2 years for 18 years (1994/95 through 2010/11). Standardized questionnaires were administered at each cycle interview and included information on chronic conditions, socio-demographic variables and lifestyle/health behaviour. Deaths were linked to the Canadian Vital Statistics Database. Arthritis was ascertained by self-reported physician diagnosis. Heart disease was ascertained by self-reported physician diagnosis, or a report of death due to ischemic heart disease (ICD-10 codes I20–I29.5) or heart failure (ICD-10 codes I50.0–I50.9). Additional covariate information on risk factors for cardiovascular disease considered were: age, sex, education, body mass index (BMI), smoking, physical inactivity, activity limitation, self-reported physician-diagnosed diabetes and hypertension, and the presence of non-cardiovascular comorbidities. Arthritis, age, smoking, activity limitation, and non-cardiovascular comorbidities were analyzed as time-varying covariates. Baseline values of physical activity, BMI, diabetes and hypertension were analyzed as time-invariant covariates as updated values of these variables could theoretically be on the causal pathway between arthritis and the development of heart disease. Crude and multivariable adjusted-effects of arthritis on incident heart disease stratified by gender were estimated using discrete time survival analysis. An interaction term for arthritis by activity limitation was tested as a proxy for arthritis severity.

Results: The analytical cohort included 12,591 age 18 years or older without prevalent, or a past history of heart disease baseline NPHS cycle 1 (1994/5). 1,783 first-ever heart disease events were reported over the course of the follow-up to 2010/11. After adjusting for demographic variables and a number of other common risk factors for heart disease, women with arthritis had a 75% higher risk of incident heart disease in each NPHS cycle (OR: 1.75, 95% CI: 1.39, 2.20). Arthritis was not associated with a significant increased risk for heart disease in men (OR: 0.95, 95% CI: 0.74–1.22). Women with arthritis who reported concurrent activity limitation had over a 2.5 times higher risk for incident heart disease than those without arthritis or activity limitation (OR: 2.55, 95% CI: 1.91, 3.38), adjusted for all covariates. Older age, being a current smoker, baseline diabetes and hypertension, higher BMI and non-cardiovascular comorbidities were also independently associated with incident CHD.

Conclusion: In this large representative Canadian sample, women with arthritis, and those with activity limitation in particular, had a significantly increased risk for developing heart disease. This has important implications for primary prevention strategies for women with arthritis. Moreover, given that OA is overwhelmingly the most prevalent type of arthritis, the present sample of arthritis was likely to reflect mostly cases of OA, highlighting potential novel pathways between OA and heart disease.

359 GAINS ASSOCIATED WITH IMPROVED SES OFFSET BY LOSSES ASSOCIATED WITH INCREASED OBESITY: AGE, PERIOD AND COHORT EFFECTS IN THE PREVALENCE OF ARTHRITIS 1994–2010 – A LONGITUDINAL POPULATION-BASED STUDY

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Purpose: The number of people with osteoarthritis (OA) is projected to increase given the aging of the population, but little attention has been paid to whether there will be differences between birth cohorts. It might be expected that younger cohorts would benefit from improvements in health status such as socioeconomic status (SES) over time. A potential negative effect is the increasing prevalence of obesity. The purpose of this study was to examine birth cohort and period effects (secular changes) in the age-trajectories of reported arthritis from 1994 to 2010 in a representative sample of Canadians; and to determine whether these cohort or period effects in reported arthritis are associated with differences in SES (education and income), smoking, physical activity, or obesity over time.
FINDINGS FROM THE CLINICAL ASSESSMENT STUDY OF THE FOOT PATTERNS OF JOINT INVOLVEMENT IN FOOT OSTEOARTHRITIS: The aetiology of foot osteoarthritis (OA) is poorly understood. Radiographic OA affects multiple joints more than expected by chance within a foot and across both feet. Generalised estimating equations were used to examine pairwise associations between affected joints within a foot and to test for overall symmetry across the feet. Latent class analysis was used to investigate subgroups of radiographic foot OA.

Methods: We analyzed data from the Canadian Longitudinal National Population Health Survey, a nationally representative community sample followed every 2 years for 18 years (1994/95 through 2010/11). Standardized questionnaires were administered at each interview and included information on chronic conditions, socio-demographic variables and lifestyle/health behaviours. We used data for four birth cohorts (n = 8,809 at baseline): World War II generation, born 1935–1944; older baby boomers, born 1945–1954; younger baby boomers, born 1955–64; and generation X, born 1965–74. Data included self-reported arthritis diagnosed by a health professional (likely mainly osteoarthritis (OA)), year of education, household income, smoking, index of physical activity, and height (m) and weight (kg) (used to calculate body mass index (BMI: wt/ht2)). Multilevel growth models were used to estimate the age-trajectory for reported arthritis for each cohort accounting for period. Once the age-trajectory was established, education, household income, smoking, physical activity, and BMI were separately introduced into the models to examine their influence on arthritis. Sensitivity analyses restricted the analysis to respondents reporting OA. However the question about type of arthritis was only asked after 2000.

Results: There was a trajectory of increasing prevalence of arthritis with increasing age in all cohorts, with younger cohorts having successively greater prevalence. After accounting for period effects the cohort effect was no longer apparent. There were marked population-level cohort effects for increasing education, income, physical activity, and BMI and decreasing smoking from the youngest to oldest cohorts, which were much reduced (education, smoking, and physical activity) or removed (income and BMI) once period was taken into account. Including these variables in a multi-level growth model showed the prevalence of arthritis was significantly lower (p<0.01 for the 11 years of school) or higher (OR: 0.60; 95% CI: 0.53–0.68; highest vs lowest quartile) and the prevalence was significantly higher for obese individuals (OR: 2.63; 95% CI: 2.20–3.14: BMI >35 vs normal BMI (18.5–24.9) and current smokers vs non-smokers (OR: 1.63; 95% CI: 1.42–1.88). Physical activity was not significantly associated with arthritis. Further analysis showed that the population-level effects of increasing education and income on reducing the arthritis prevalence were almost counter-balanced by effects of increasing BMI (obesity). Findings from sensitivity analyses restricted to the smaller OA sample were similar.

Conclusions: The findings suggest that the cohort effect of more arthritis in younger cohorts is explained by period effects such as education, income in reducing the prevalence of arthritis have been partially offset by increases in BMI over time. Our understanding of the impact of BMI on arthritis is therefore likely to be an underestimate. The cohort effect of increased arthritis in younger cohorts also suggests that previous population projections may be underestimated.

360 PATTERNS OF JOINT INVOLVEMENT IN FOOT OSTEOARTHRITIS: FINDINGS FROM THE CLINICAL ASSESSMENT STUDY OF THE FOOT

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Purpose: The aetiology of foot osteoarthritis (OA) is poorly understood. OA most commonly affects the 1st metatarsophalangeal joint (MTPJ), followed by joints in the midfoot; the 2nd cuneo-metatarsal joint (CMJ), talo-navicular joint (TNJ) and navicular-first cuneiform (NCJ) joint. Patterning of OA joint involvement has been investigated at other sites, particularly the hands where a strong symmetrical patterning has been noted following by clustering of joint groups. However, little is known about the patterning of OA in the joints of the feet. Examining the clustering and patterning of joint involvement, both within a foot and across feet could help identify distinct phenotype and advance our understanding of the possible causal mechanisms of foot OA.

The aim of this study was to investigate the patterns of radiographic OA in the foot across both feet among a sample of community-dwelling older adults.

Methods: The Clinical Assessment Study of the Foot is a population-based cohort of adults aged ≥50 years who reported foot pain in the last year. Participants attended a research clinic where weight-bearing dorso-plantar and lateral radiographs of each foot were taken. Using a validated atlas, radiographic foot OA was diagnosed according to the American Congress of Radiology (ACR) clinical criteria.

Results: 560 participants attended research clinics and after exclusion for inflammatory arthritis (n = 24) and no radiographs (n = 3), 533 were eligible for the analyses (mean age 64.9 years (SD 8.4), 55.9% female). The 1st MTPJ was most frequently affected (287 feet, 27.2%) followed by the 2nd MTPJ (184, 17.2%), TNJ (138, 14.8%), NCJ (86, 8.1%) and the 1st CMJ (50, 4.7%). Radiographic OA was found to cluster across both feet (p < 0.001) but not within each foot separately. Radiographic OA was also found to be highly symmetrical in the same joint in both feet even after adjustment for age, sex, total number of affected joints and the affected joint [adjusted odds ratio (OR) 2.96, 95% CI: 2.10, 4.18]. Clustering across both feet and symmetrical patterning was stronger in females than males. Within a foot, the strongest pairwise associations were found between the joints of the midfoot: the 2nd CMJ and NCJ [OR 6.12, 95% CI: 3.68, 10.17], the NCJ and TNJ [2.83, 95% CI: 1.68, 4.79] and the 2nd CMJ and TNJ [1.61, 95% CI: 1.05, 2.49]. Latent class analysis identified three distinct classes of foot OA: class 1 (64%) had low probability of OA in all joints; class 2 (21%) had high probability of bilateral 1st MTPJ OA; and class 3 (15%) had high probabilities of involvement across all ten foot joints in both feet. Increasing the number of classes preserved class 1 and class 2 however class 3 disaggregated. The 4 class solution showed class 3 splitting into two similar sized groups with high probabilities of either bilateral 2nd CMJ OA or bilateral TNJ OA. The 5 class solution than grouped a small group with high probability OA in multiple midfoot joints including bilateral 2nd CMJ, NCJ and TNJ.

Conclusions: OA frequently involves multiple joints across both feet, has a strong symmetrical patterning, and subgroups into those with 1st MTPJ OA and those with midfoot OA which may be distinct subtypes of foot OA. These patterns may signify that certain foot joints have a predilection for OA and person-level risk factors. Further work to replicate these findings and to investigate distinctive causal mechanisms is warranted.

361 PREVALENCE AND OVERLAP OF DOCTOR-DIAGNOSED KNEE OA, FREQUENT KNEE PAIN AND RADIOGRAPHIC KNEE OA IN SWEDEN


Purpose: To provide estimates of the overlap between subjects that seek healthcare for knee osteoarthritis (OA) and those with knee pain and/or radiographic knee OA.

Methods: In 2007 a random sample of 10 000 56 to 84 year old Region Skane residents from the Malmö Diet and Cancer Study (Manjer et al 2001) were sent a mailed questionnaire about knee pain in the last 12 months; this being the first part of the Malmö Osteoarthritis Study (MOA). We classified subjects with knee pain with duration of at least 4 weeks as having frequent knee pain. Out of the 7737 questionnaire responders a sample of 1300 subjects with frequent knee pain and a random sample of 650 subjects without were invited for a clinical and radiographic examination including assessment of clinical knee OA according to the American College of Rheumatology (ACR) clinical criteria. Participants underwent radiography of both knees in weight-bearing and semi-flexion. An independent radiologist who was blinded to clinical data assessed all frontal tibiofemoral (TF) and patellofemoral (PF) radiographs. Subjects who fulfilled criteria approximating Kellgren and Lawrence (KL) grade 2 or worse on either the TF or PF joint were considered as having OA. We then matched those having radiographic knee OA and frequent knee pain to have symptomatic knee OA. Using the subject’s personal identification number and individual linkage with the Skåne Health Care Register, covering the entire population in the county, we retrieved information on all doctor visits with a diagnosis of knee OA (ICD-10 code M17) for the years 1998 to 2007. Invitation to OA and period preceding the MOA examination. Subjects who received a diagnosis of knee OA at least once where considered as having doctor diagnosed knee OA. We estimated the proportion of radiographic OA affects multiple joints more than expected by chance within a foot and across both feet. Generalised estimating equations were used to examine pairwise associations between affected joints within a foot and to test for overall symmetry across the feet. Latent class analysis was used to investigate subgroups of radiographic foot OA.