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Subsets of symptomatic hand osteoarthritis in community-dwelling older adults in the United Kingdom: prevalence, inter-relationships, risk factor profiles and clinical characteristics at baseline and 3-years

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SUMMARY

Objective: To compare the population prevalence, inter-relationships, risk factor profiles and clinical characteristics of subsets of symptomatic hand osteoarthritis (OA) with a view to understanding their relative frequency and distinctiveness.

Method: 1076 community-dwelling adults with hand symptoms (60% women, mean age 64.7 years) were recruited and classified into pre-defined subsets using physical examination and standardised hand radiographs, scored with the Kellgren & Lawrence (K&L) and Verbruggen–Veys grading systems. Detailed information on selected risk factors was obtained from direct measurement (Body Mass Index (BMI)), self-complete questionnaires (excessive use of hands, previous hand injury) and medical record review (hypertension, dyslipidaemia, type 2 diabetes). Hand pain and disability were self-reported at baseline and 3-year follow-up using Australian/Canadian Osteoarthritis Hand Index (AUSCAN).

Results: Crude population prevalence estimates for symptomatic hand OA subsets in the adult population aged 50 years and over were: thumb base OA (22.4%), nodal interphalangeal joint (IPJ) OA (15.5%), generalised hand OA (10.4%), non-nodal IPJ OA (4.9%), erosive OA (1.0%). Apart from thumb base OA, there was considerable overlap between the subsets. Erosive OA appeared the most distinctive with the highest female: male ratio, and the most disability at baseline and 3-years. A higher frequency of obesity, hypertension, dyslipidaemia, and metabolic syndrome was observed in this subset.

Conclusion: Overlap in the occurrence of hand OA subsets poses conceptual and practical challenges to the pursuit of distinct phenotypes. Erosive OA may nevertheless provide particular insight into the role of metabolic and cardiovascular risk factors in the pathogenesis of OA.

Introduction

Symptomatic hand osteoarthritis (OA) occurs in 13–26% of older adults[1]. Far from being 'just a part of growing old', individuals often perceive it as a serious condition, affecting their everyday lives, capable of causing persistent pain, interference with activities, and considerable frustration[2].

Hand OA may not be a single disease but a number of subsets that include erosive OA, thumb base OA, interphalangeal joint (IPJ) OA (with or without nodes) and a widespread form involving all joint groups in the hands (generalised hand OA)[3,4]. A EULAR Task Force called for further research to determine whether such possible subsets of hand OA are separate phenotypes with different risk factors and clinical outcomes[3]. Such evidence of discrete phenotypes could help advance our understanding of causal mechanisms, of the heterogeneous prognosis of hand OA[5,6], and of differential treatment response with a view to developing targeted interventions. Epidemiological studies can contribute evidence on the distinctiveness of hand OA subsets in the form of the relative frequencies, patterns of co-occurrence, risk factor profiles and clinical outcomes of posited subsets. Such evidence has already started to emerge.

Several studies sampling different populations have provided detailed prevalence estimates stratified by age and gender for erosive OA and thumb base OA[7–13]. Comprehensive comparisons of the relative frequencies of all hand OA subsets, including nodal and non-nodal IPJ OA, in a single population are rarer, with the recent

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publication of a range of prevalence estimates from the Framingham cohorts being exceptional[7].

A number of studies have examined patterning of hand OA[11,14–18] showing patterns of co-occurrence to be polyarticular with clustering by row and symmetry[14,16]. The co-occurrence of nodes in erosive OA has also been previously reported[19,20]. A comprehensive examination of the inter-relationships across all the hand OA subsets would be beneficial to explore further the overlap between subsets.

Risk factors that have conclusively been associated with hand OA include older age, female gender and inheritance through a genetic component[3]. There is also mixed evidence for a number of possible exposures that include obesity, biomechanical forces through occupational and sporting activities and muscle strength as well ethnic background[3] (though this may be related to different cultural practices that may be mechanical such as chopstick use[21]). There have been recent reports of an association between metabolic risk factors and OA[22,23] but the association with hand OA is not clear[24–26]. Conflicting evidence on risk factors for hand OA may partly reflect the use of case definitions for hand OA that combine different subsets with different risk factor profiles. To date, some risk factors are known to be associated with specific hand OA subsets: hypermobility and previous hysterectomy with thumb base OA vs IPJ OA[27,28]; specific genetic factors with erosive OA vs non-erosive OA[20,29].

The clinical burden of erosive OA has been shown to be greater than non-erosive OA in a number of studies[8,19,30–32] but the composition of the comparison non-erosive OA groups has been mixed. Additionally, the clinical burden of combined thumb base and IPJ OA has been found to be greater than thumb base or IPJ OA alone[33]. Thus far, no comprehensive comparison of clinical outcomes at baseline or over time has been made across all the possible hand OA subsets proposed by EULAR.

The present work sought to contribute to the aforementioned epidemiological studies on the distinctiveness of proposed EULAR hand OA subsets by estimating the prevalence, co-occurrence, risk factor profiles on selected mechanical and metabolic risk factors, clinical characteristics at baseline and 3-years for five symptomatic hand OA subsets (erosive OA, generalised hand OA, thumb base OA, nodal and non-nodal IPJ OA) in two samples of community-dwelling older adults drawn from comparable sampling frames in a single geographical region.

Methods

Study population

Participants were recruited from a prospective observational cohort study undertaken in North Staffordshire, UK between February 2004 and April 2005: the Clinical Assessment Study of the Hand (CASHA). All adults aged ≥50 years registered with two general practices were invited to participate at baseline in a two-stage self-report questionnaire survey[34]. In the UK over 95% of people are registered with general practices; thus providing convenient general population sampling frames[35]. Participants were not required to have consulted about their hand pain or hand problem. Those with hand pain or hand problems (e.g., stiffness or knobbly swellings) in the last 12 months were invited to research clinics that included an interview, physical examination and radiographs.

Participants reported the frequency of hand pain, aching or stiffness in the last month (no days, few days, some days, most days or all days). Those who reported symptoms on a few days or more were deemed symptomatic and eligible for inclusion in the analyses. Participants were excluded if General Practitioners or local Rheumatology hospital medical records or a musculoskeletal radiologist identified them as having inflammatory arthritis (rheumatoid arthritis, psoriatic arthritis). Those with no hand radiographs or missing radiographic scoring data were also excluded.

While population prevalence estimates of hand OA subsets were determined from the above CASHA participants this sample alone was not expected to provide sufficient numbers in some of the subsets to examine the inter-relationships, risk factor profiles and clinical characteristics. Therefore, the sample was enriched, a priori, from an identically performed survey in a similar population.

In the Clinical Assessment Study of the Knee (CASK) all adults aged ≥50 years registered with three general practices in North Staffordshire were invited to participate at baseline in the same two-stage self-report questionnaire survey[36] between July 2002 and October 2003. All persons reporting knee pain were invited to attend research clinics however they all underwent an identical hand assessment and hand radiographs to those in the CASHA study. All individuals included in the analysis had hand pain on few days or more in the previous month. UK Local Research Ethics Committees approved these studies (LREC Project Nos: 1430, 05/Q2604/72, 06/Q2801/90). All participants provided written informed consent.

Data collection

Radiographic assessment and scoring

Posterior–anterior (PA) radiographs of the hands were taken with separate exposures for each hand according to a standardised protocol[34,36]. The Kellgren & Lawrence (K&L) grading system[37] was used by two trained readers (MM, JH) to grade OA in the IPJs and first carpometacarpal joints (CMCJ) in each hand. Intra-rater reliability for the presence of OA (K&L ≥ 2) in an individual joint was excellent (unweighted mean kappa = 0.92 & 0.85, mean percentage agreement = 98% & 98% for reader 1 & 2 respectively) and inter-rater reliability was moderate (unweighted mean kappa = 0.5, mean percentage agreement = 90%). The presence of erosive OA in the IPJ was determined using the Verbruggen–Veys Anatomical Phase Progression Score[38] by an additional reader (WYK), intra-rater reliability was excellent (unweighted mean kappa 0.94, mean percentage agreement 98%).

Descriptive data

Demographic and socioeconomic data (age, gender, occupation, education) were collected in the baseline survey. At the research clinics the second and third distal and proximal IPJs were observed and palpated for the presence of nodes. Height and weight, from which Body Mass Index (BMI) was calculated, were also measured. In both studies knee radiographs (PA semi-flexed metatarsophalangeal, lateral and skyline views) were taken and scored for the presence of OA (K&L ≥ 2 on the PA and/or skyline views and/or definite osteophytes (Burnett grade ≥ 1) on the lateral view)[34,36].

Risk factor profiles

Participants reported previous hand injuries and excessive use of hands in employment or pastimes in the baseline survey[34]. A review of general practice consultations was undertaken for a 2-year period prior to clinic attendance for participants who gave permission (n = 1007, 94%). Participants with diagnoses or consultations for hypertension, type 2 diabetes or Impaired Fasting Glucose (IFG) and dyslipidaemia (raised cholesterol or triglycerides) or prescription of a lipid-regulating drug were identified. Metabolic syndrome was defined as the presence of three or more of the following: BMI >30 kg/m^2, hypertension, dyslipidaemia and type 2 diabetes or IFG.