Population Based OA Research – what has it shown?

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Ageing of the population and increasing obesity contribute to morbidity worldwide. Osteoarthritis (OA) is the most prevalent medically treated arthritic condition worldwide (for example, 3532 per 100 000 people in the United States). Diagnosis of OA is made on the basis of clinical examination or radiography.

Radiography can show osteophytes, bony outgrowths at the joint margin, and narrowing of the joint space, but it cannot visualize soft tissue pathology. In contrast, MRI can visualize various tissues that are clinically relevant and have an important role in regard to structural progression not seen on radiography. MRI can also show incidental findings in otherwise asymptomatic people. In the knee, MRI visualizes most components of the joint, including articular cartilage, menisci, intra-articular ligaments, synovium, bone marrow, subchondral cysts, and other periarticular and intra-articular lesions that are not detectable by radiography.

About half of people with knee pain have no radiographic OA. A major advantage of a population based study is that we can collect data from people with normal knees that are not usually enrolled into clinical studies or undergo further imaging evaluation. Thus, population based studies enable us to examine people with and without OA.

To date, several population-based OA studies have been conducted worldwide. Examples include studies conducted in a community in Framingham, MA, United States [1,2,3,4,5], Rotterdam, Netherlands [6,7], Beijing, China [8,9], Japan [10]. These studies have provided insights into causative factors and disease mechanism of OA, as well as prevalence of OA in different races. Of the aforementioned studies, the Chinese [9] and Japanese studies [10] focused on radiographic OA, while Framingham, Rotterdam and Tasmanian studies collected a wide range of MRI data, using both semiquantitative and quantitative approaches.

Some of the key findings from the the Framingham OA study include, but not limited to: Incidental meniscal findings on MRI of the knee are common in the general population and increase with increasing age [2]; MRI shows lesions in the tibiofemoral joint in most middle aged and elderly people in whom knee radiographs do not show any features of osteoarthritis, regardless of pain [1]; and MRI-detected cartilage damage and osteophytes are highly prevalent in the medial patellofemoral and medial posterior tibiofemoral joints in radiographically normal knees in middle-aged to elderly persons [3]; The majority of knees with severe tibiofemoral cartilage damage exhibited moderate to large osteophytes - the larger the osteophyte, the more likely was the presence of severe cartilage damage [4]; Many knees with mild OA without joint narrowing on radiographs were found to have MRI-detected bone attrition, implying bone attrition might occur in milder OA and at earlier stages of disease than previously thought [5].

Data from the Rotterdam OA study showed MRI-based definition of OA was shown to be more sensitive in detecting knee OA [7]. Moreover, statistically significant associations were demonstrated between crepitus and all patellofemoral joint MRI features of OA, as well as between a history of patellar pain and almost all patellofemoral joint MRI features, thus implying crepitus and history of patellar pain are clinical findings that indicate patellofemoral joint lesions seen on MRI [6];

In addition to above mentioned population based studies, there are large-scale epidemiological observational research studies, such as the Multicenter Osteoarthritis Study (MOST) [11,12] and the Osteoarthritis Initiative (OAI) [13]. These studies offer access to the publicly available data which can be utilized by researchers worldwide. While the focus of my talk is population based studies, I will also briefly describe these observational cohort studies showing important findings related to OA research.

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