Epidemiology and socioeconomic burden of osteoarthritis

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Osteoarthritis (OA) is one of the most common joint disease worldwide. It can lead to joint disability as it is a slowly progressive disease. It is also the most common reason for total knee and hip replacement. The prevalence of OA varies by site, age, sex, and ethnicity. The rapid increase in the prevalence of OA indicates that it will have an increasing effect on public health systems and future healthcare. The prevalence of OA is increasing owing to the growing age of the population all over the world.

Keywords:
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Introduction

Osteoarthritis (OA), also known as osteoarthrosis or degenerative joint disease, is a group of mechanical abnormalities involving degradation of joints, including articular cartilage and subchondral bone [1]. The word osteoarthritis originated from the Greek word Osteo, which means the bone, arthro, which means joint, and itis, which means inflammation [2]. OA is considered a major cause of disability and is one of the most frequent musculoskeletal disorders [3,4]. It leads to persistent disability between fourth and fifth decades of life [5]. OA can occur in any synovial joint but is most common in knee, hip, hand, foot, and spine [6]. Low back pain caused by spine OA is categorized as the single leading cause of disability all over the world [3,4]. The economic problem of spine OA, including healthcare costs and lost work hours, has been evaluated in billions of dollars yearly [7].

The incidence of OA increases with age especially after 60 years and is high in women than in men [8]. Worldwide estimations are that 18 and 9.6% of females and males aged 60 years and older, respectively, have symptomatic OA [9]. These estimations are higher in radiological knee OA (22.8% for females and 14.1% for males) at a younger age (45 years and over). The incidence of OA ascends parallel with the increase of obesity in the population. Obese men have approximately five times the risk of knee OA compared with nonobese men. For obese women, the risk is almost four times greater [10]. Obesity is considered as one of the major risk factors for the progression of OA. Other risk factors include sex, race and ethnicity, heredity, diet, smoking, and injuries or trauma to the joint [11].

OA is of two types: primary OA (idiopathic) and secondary OA. Primary OA has no known cause and is mostly related to aging. It can present as generalized, localized, or erosive OA. Secondary OA is caused by another disease or condition [12]. The distribution of OA in the population and analysis of risk factors for its occurrence and development can be described by epidemiological principles. For the purpose of epidemiological studies, OA can be identified radiographically, clinically, or pathologically [13]. Radiographic OA is mainly assessed by the Kellgren and Lawrence score, which grades the severity of the disease from 0 to 4. These criteria were adopted by the WHO to define radiographic OA in epidemiologic studies [14].

In the past, OA was thought to be a degenerative 'wear and tear' process and consequently misnamed as degenerative joint disease. However, the pathogenesis of OA is much more complex than just wear and tear and the term 'osteoarthritis', where '-itis' is indicative of an inflammatory process, is definitely correct. There are multiple factors that play a significant role in the pathogenesis of OA, including proinflammatory mediators, biomechanical factors, and proteases [15,16].

Estimation of epidemiological studies show that ~43 million patients are affected by OA in the USA alone and ~15% of the world population [17,18]. It can lead to limit of activities and absence from work among working adults and combined with a significant deterioration in function among older persons. OA is also a major economic problem in the USA, as it costs medical care yearly billions of dollars [19].

Socioeconomic burden of osteoarthritis

Arthritis and other rheumatic conditions are becoming a major public health problem and are the foremost cause of disability in the developed countries. For example, in the USA in 2002, nearly 43 million adults had clinical OA [20]. In 1997, direct and indirect expenditures of arthritis and other rheumatic conditions totaled an estimated $86 billion, accounting for nearly 1% of gross national product [21]. Even though OA is one of the most prevalent diseases in aging population, its socioeconomic effect may not have had enough attention. Although being less disabling than rheumatoid arthritis, OA causes a greater socioeconomic effect because of its prevalence, which is estimated to be at least 7–20 times more than rheumatoid arthritis [22]. Approximately 80% of patients with OA have movement limitation. According to National Health and Nutrition Examination Survey III data, 25% of patients cannot do a major part of daily living activities, and ~12% need help with personal care and routine needs. Patients with OA often have multiple comorbidities, and OA can also be confused with other inflammatory diseases, so the actual burden of this disease on society is difficult to be evaluated. So by the year 2030, 25% of adults in the USA will have physician-diagnosed arthritis (predominantly OA), and it is very important to assess its direct and indirect costs [23].

Indirect costs are incurred mostly for time lost from employment and for unpaid informal caregivers, with caregiver time accounting for 40% of indirect costs. The indirect cost of absenteeism was estimated at ~$10.3 billion in the USA [3].

Epidemiology

Even though OA occurs all over the world, the disease varies between populations. Estimation of the worldwide prevalence for symptomatic OA is 9.6 and 18% among men and women, respectively [9]. OA is recorded eighth as a worldwide cause of disability especially among the old women [24].

Approximately 1.9 million people are affected in Australia [25], ~27 million people are affected in the USA [26] and in the Middle East, more than one million people complain of OA in Yemen, Iraq, Syria, and Saudi Arabia [27]. In Egypt, more than five million people have OA [28].

In the next 25 years, regarding the prevalence of OA, the number of arthritic persons and the consequent social effect are expected to increase by 40% [29]. In 2008, the National Arthritis Data Workgroup, addressed this problem and produced the best available report on the prevalence of OA in the USA. It is clear as 46 million American adults had arthritis representing 21% of the population &27 million of them had clinical OA. This estimation was less in 1995 by 30% [18].

Knee osteoarthritis

Worldwide nearly 250 million people have OA of the knee (3.6% of the population) [3]. Approximately 27 million people in the USA have OA, representing 25% of the visits to primary care physicians, and half of all NSAID prescriptions. It is estimated that 80% of the population have radiographic features of OA by the age of 65 years, although only 60% of those will have symptoms [30].

Population studies for prevalence rates for knee OA in the US are comparable to those in Europe. Based on these studies, it is reported that severe radiographic changes affect 1% of people aged 25–34 years, and this figure increases to ~50% in those who are 75 years. In the Framingham study, the prevalence of radiographic knee OA among people aged over 45 years was 19.2% and in those older than 80 years was elevated to 43.7% [31].

In OA epidemiology, there is geographical variation. Studies from China, which used similar methods and definitions to the Framingham Study, report that the prevalence of bilateral knee OA and lateral or medial compartment disease was 2–3 times higher in Chinese cohorts compared with estimation of the Framingham OA Study [32]. In the Community Oriented Program for Control of Rheumatic Disorders studies in Asian region, statistics from clinically diagnosed knee OA proved that prevalence within this area is 1.4 and 19.3% in urban Filipinos and rural communities in Iran, respectively [33]. The reason for this difference partially may be the physical and socioeconomic environment. The differences between urban and rural populations researched in the Community Oriented Program for Control of Rheumatic Disorders studies conducted in India, Bangladesh, and Pakistan showed that in India the prevalence of clinically diagnosed knee OA was less in the rural society (3.3%) than urban areas (5.5%), and the prevalence was higher in rural society after adjusting for age and sex distribution [33]. Moreover, in China, men aged 60 and above from a rural community demonstrated that the prevalence of symptomatic knee OA was higher when compared with their urban counterparts [34].

Hand osteoarthritis

OA of the hand and wrist is a common condition that sooner or later affects nearly everyone. It is painful and results in great weakness of the hands as well as progressive deformity associate with aging. The severity

of hand OA is related to hand dysfunction. Weakness of pinch and grip strength is more profound with more joints involved; pain and tenderness have significant effects on hand function [34].

OA at the distal interphalangeal joints (DIP) is the most common site in the body; in a large cohort, it was found in 70% of 61–63-year olds. This was compared with 23, 10, and 41% at the proximal interphalangeal joints, at the metacarpal phalangeal joints, and at the basal (carpometacarpal) joint of the thumb respectively [35]. The DIP joints and the interphalangeal joint of the thumb are also the most commonly involved when assessed on physical examination. Osteophytes (traditionally called Heberden's nodes in this location), mucus cysts (with nail deformities), and progressive deformity are noted. The joints may become unstable and angulated. Patients complain that their arthritic fingers are unsightly. Painful arthritis in the DIP or proximal interphalangeal joints is associated with bad health status when measured by patient-reported outcome measures [36].

Data from the Framingham cohort showed a prevalence of 13.2 and 26.2% in men and women aged 70 or more years, respectively, with at least symptomatic one hand joint with OA [37]. In spite of the American College of Rheumatology criteria, defined symptomatic hand OA is, however, far less common. Its prevalence was found to be 7% in the Framingham cohort and 8% in the USA National Health and Nutrition Examination Survey. Rates increased among older individuals to 26% for women and 13% for men. The prevalence of hand OA in a study from Teheran demonstrated that in people aged 40–50 years, it was 2.2%, increasing with age to 22.5% in people aged more than 70 years [38].

Hip osteoarthritis

The hip is the second most common large joint to be affected by OA. In western populations older than 35 years, the prevalence of hip OA ranges from 3 to 11%. OA of the hip is a painful and disabling condition. The prevalence and incidence of hip OA are increasing and will continue to increase owing to the current aging of the general population [24,39].

In studies from Europe and North America, the mean prevalence of primary radiographic hip OA was 10.1 and 7.2%, respectively [40]. These levels are much higher than those seen in Africa (2.8%) and Asia (1.4%).

Spine osteoarthritis

Lumbar spondylosis is more prevalent between the middle-aged group and the elderly [41,42]. Lumbar spine degenerative changes are common and increase in rate of occurrence with aging [43]. Degenerative changes in the spine are classically identified as individual radiographic features, such as disc space narrowing (DSN), vertebral osteophytes, and facet joint osteoarthritis (FOA). There are variations in the prevalence of lumbar spine degenerative changes; differences in study sample ages and operational definitions of the severity of the condition are the most possible reasons for these variations [44]. The community-based (mean age 65 years) prevalence of DSN has been estimated to be between 50 and 64%, whereas vertebral osteophytes prevalence estimates are between 75 and 94% [45,46]. FOA is a multifactorial process thought to be an indirect consequence of DSN [44,47]; however, the community-based prevalence of radiographic FOA has not been reported. Community-based studies describing the differences in sex and race within lumbar spine individual radiographic features are limited.

The accurate incidence of spine OA is difficult to be identified owing to the truth that the degenerative process is initiated years before the clinical symptoms and morphologic abnormalities are detected. Furthermore, many patients with mild symptoms or episodic attacks do not look for healthcare.

It must be clear that one has to consider the gross difference between symptomatic prevalence and radiographic prevalence of facet joint OA. For example, a population-based clinical study revealed that the prevalence of symptomatic lumbar facet joint OA was 7.4% [48]. Comparatively, cadaveric studies of the lumbar spine reported that at least 50% of the population demonstrates lumbar facet joint OA [49]. It is well established that the radiographic prevalence of spine OA increases with age similar to other synovial joints [50].

Egyptian physicians described cervical spinal problems in ancient times, more than 5000 years ago [51]. The neck is the most movable part in the whole spine and is only supported by ligaments and neck muscles. Cervical spondylosis may be symptomatic or asymptomatic, and symptoms are usually seen in the form of neck pain, neck stiffness, or even shoulder pain and stiffness. In early cervical spondylosis, neck pain is associated with slight degenerative changes within the intervertebral disc [52].

Neck pain affects ~330 million people globally (4.9% of the population) [3]. It is more common in women than men, representing 5.7 and 3.9%, respectively [53].

Conclusion

OA is the commonest joint disease worldwide and mainly occurs in later life. The burden of OA is physical, psychological, and socioeconomic. It can be associated with significant disability, such as a reduction in mobility and activities of daily living. Despite being less disabling than rheumatoid arthritis, OA poses a greater socioeconomic effect.

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Conflicts of interest

There are no conflicts of interest.

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