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Trends in the Burden of Osteoarthritis in China Compared with G20 Countries, 1990–2023: An Analysis of the Global Burden of Disease Study

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Abstract: *Background:* Osteoarthritis (OA) is a leading cause of disability worldwide. China is undergoing rapid population ageing, yet how its OA burden compares with that of other G20 countries over time has not been fully quantified. *Methods:* Using data from the Global Burden of Disease 1990–2023 study, we described OA incidence, prevalence, and disability-adjusted life years (DALYs) for China and the aggregated G20. We analyzed age-standardized rates (ASRs) and absolute numbers for adults ≥ 30 years by year, age group, and anatomical site (knee, hip, hand, other). Temporal trends were summarized by estimated annual percentage change. We visualized overall time trends in incidence, age-specific rates, and case numbers in 2023, and the distribution of OA subtypes in China versus the G20. *Results:* From 1990 to 2023, China's age-standardized incidence rate (ASIR) increased from 487.1 to 550.2 per 100,000, while annual incident cases rose from 4.68 to 11.90 million. Age-standardized prevalence and DALY rates also rose modestly, but absolute numbers of prevalent cases and DALYs more than doubled. Compared with the G20 aggregate, China showed steeper increases in both incidence and case numbers. In 2023, incidence, prevalence, and DALY rates climbed steadily with age in both China and the G20, with incidence peaking at 55–64 years, prevalence at 85–94 years, and DALY rates at 70–79 years; the bulk of cases occurred between 50 and 74 years. Across anatomical sites, knee OA contributed the largest share of burden, followed by hand, other sites, and hip OA, with a broadly similar ranking in China and the G20. *Conclusion:* From 1990 to 2023, China experienced a marked rise in OA burden, driven mainly by population growth and ageing. Older adults, especially those with knee and hand OA, carry the greatest share of the disease. Healthcare planning should prioritize age-friendly prevention, early diagnosis, and long-term rehabilitation.

Keywords: Osteoarthritis; Global Burden of Disease; G20 countries; Incidence and prevalence

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1. Introduction

Osteoarthritis (OA) is the most common joint disease and a major cause of pain, functional limitation, and

reduced quality of life among older adults. Clinically, OA is characterized by progressive cartilage degeneration, subchondral bone remodeling, and synovial inflammation, leading to chronic pain, stiffness, and disability. With no curative pharmacological treatment available, management focuses on symptom control, maintenance of function, and, in advanced cases, joint replacement surgery. As life expectancy increases and lifestyles become more sedentary, OA is emerging as one of the dominant chronic conditions in ageing societies.

China, with the largest population in the world, is undergoing a rapid demographic transition with a growing proportion of older adults. This change is expected to substantially increase the number of people living with OA and to place heavy demand on orthopedic, rehabilitation, and long-term care services [1]. G20 countries share similar challenges but are at different stages of economic development, demographic transition, and health-system capacity. Comparing China with the broader G20 context can therefore provide insights into how population structure and development level shape the OA burden, and where prevention and service planning should be prioritized [2].

The Global Burden of Disease (GBD) study provides a consistent framework for quantifying and comparing the burden of diseases and injuries across countries, time, and demographic groups. Using the most recent GBD 1990–2023 estimates, we aimed to describe long-term trends in OA incidence, prevalence, and disability-adjusted life years (DALYs) in China in comparison with the G20 aggregate. We focused on overall temporal patterns, age-specific profiles, and the contribution of different anatomical sites, illustrated in three key figures.

2. Methods

2.1. Data source and case definition

We used publicly available estimates from the GBD 1990–2023 study. OA was defined according to standard GBD case definitions based on clinical and radiographic criteria and mapped to relevant ICD codes. GBD distinguishes OA of the knee, hip, hand, and other sites; these four subtypes were analyzed separately and combined as total OA.

2.2. Measures

For China and the aggregated G20, we extracted incident cases, prevalent cases, and DALYs for OA among adults aged 30 years and older from 1990 to 2023. Age-standardized incidence, prevalence, and DALY rates per 100,000 population were calculated using the GBD standard population. We further obtained age-specific rates and case numbers for 2023 by 5-year age group, and site-specific ASRs for knee, hip, hand, and other OA.

2.3. Statistical analysis and visualization

Temporal trends in ASRs were summarized using estimated annual percentage change. For descriptive purposes, we highlighted the trajectory of OA incidence from 1990 to 2023 and contrasted China with the G20 aggregate [3]. To explore age patterns, we compared age-specific rates and case numbers of incidence, prevalence, and DALYs in 2023 between China and the G20. Finally, we summarized the relative contribution of knee, hip, hand, and other OA to the total age-standardized burden in 2023. Analyses were descriptive and based on standard GBD summary statistics.

3. Results

3.1. Overall temporal trends

Between 1990 and 2023, China's age-standardized incidence rate (ASIR) of OA increased modestly from 487.1 to 550.2 per 100,000, corresponding to a small but persistent positive annual change. Over the same period, the number of new OA cases more than doubled, rising from about 4.7 million to nearly 12 million per year. Age-standardized prevalence and DALY rates also showed mild upward trends, whereas the absolute numbers of people living with OA and the DALY burden increased sharply, reflecting the combined effects of population growth and ageing. As shown in **Figure 1**, similar qualitative patterns were observed in the G20 aggregate, but the slope of increase in both ASIR and case numbers was generally steeper in China, particularly after the early 2000s.

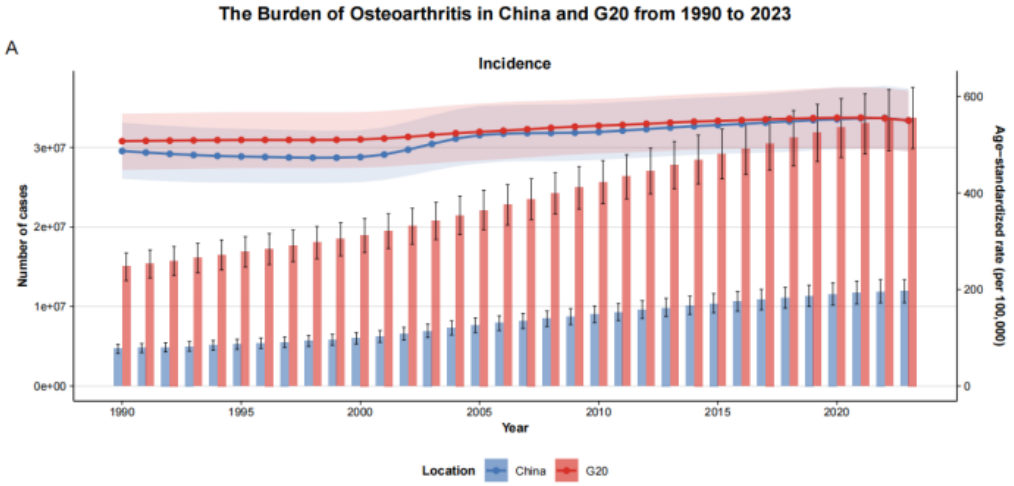

Figure 1. Temporal trends in osteoarthritis incidence in China and the G20, 1990–2023. Bars display the annual number of incident osteoarthritis cases, and overlying lines show the age-standardized incidence rate (per 100,000) for China (blue) and the G20 (red). Shaded bands around the lines indicate 95% uncertainty intervals.

3.2. Age-specific patterns in 2023

Age-specific analyses showed a strong gradient of OA burden with advancing age in both China and the G20 (**Figure 2**). In 2023, incidence rates rose steadily from the 30–34-year group, peaked at 55–64 years, and then declined slightly at the oldest ages. In contrast, prevalence rates increased almost monotonically with age, reaching their maximum in the 85–94-year group, consistent with the chronic and accumulative nature of OA. DALY rates peaked somewhat earlier, around 70–79 years, indicating that functional limitation and health loss are most pronounced in late-elderly adults.

When absolute numbers of cases were considered, the bulk of the burden was concentrated in middle-to-older adults. For both China and the G20, the highest numbers of incidents and prevalent cases, as well as DALYs, occurred between 50 and 74 years. China contributed a substantial share of global cases in these age bands. Although patterns of age-specific rates were broadly similar between China and the G20, age-specific prevalence and DALY rates tended to be slightly higher in the G20 at most ages, whereas China showed particularly rapid growth in case numbers due to its large and ageing population.

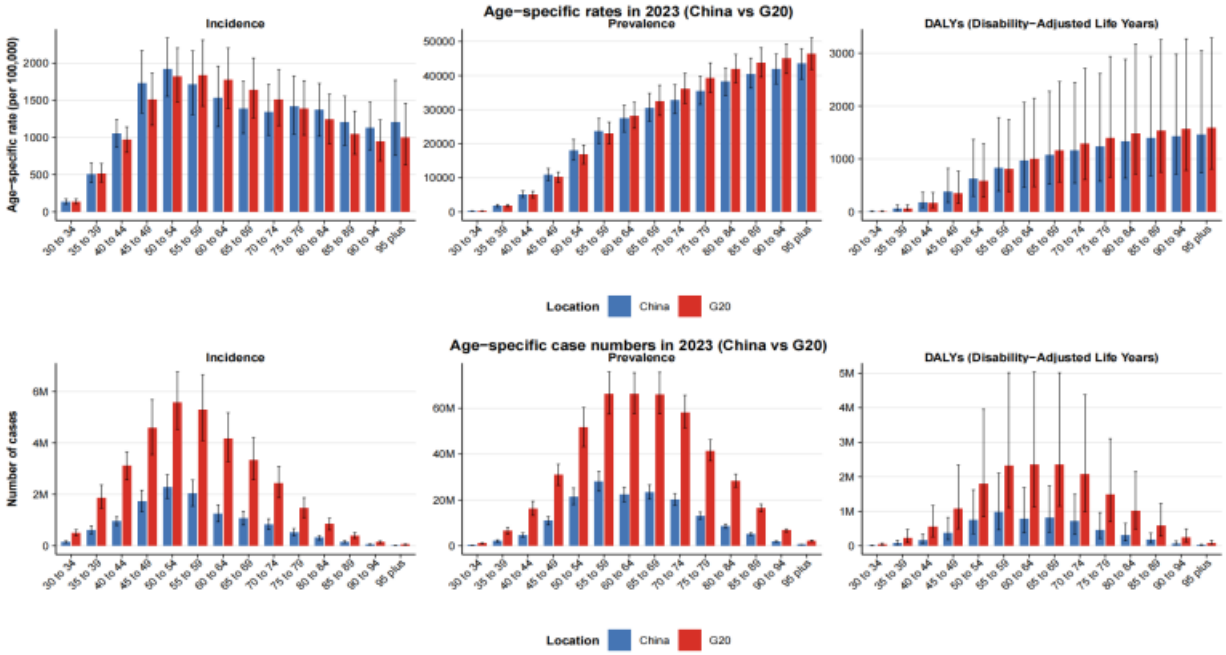

Figure 2. Age-specific burden of osteoarthritis in China and the G20 in 2023.The upper panels present age-specific incidence, prevalence, and DALY rates (per 100,000) for adults aged ≥ 30 years, while the lower panels show the corresponding numbers of incident cases, prevalent cases, and DALYs. Blue bars represent China and red bars the G20 aggregate. Error bars denote 95% uncertainty intervals.

3.3. Distribution by anatomical site

Figure 3 compares the relative ranking of knee, hip, hand, and other OA in China and the G20. In both settings, knee OA accounted for the highest age-standardized rates, followed by hand OA, other sites, and hip OA. This pattern was consistent for incidence, prevalence, and DALYs. The predominance of knee OA highlights its central role in driving the overall OA burden. Hand OA also contributed substantially, especially in China, where its rates have risen in recent years. By contrast, hip and other-site OA remained at comparatively low levels and made a relatively small contribution to the total OA burden.

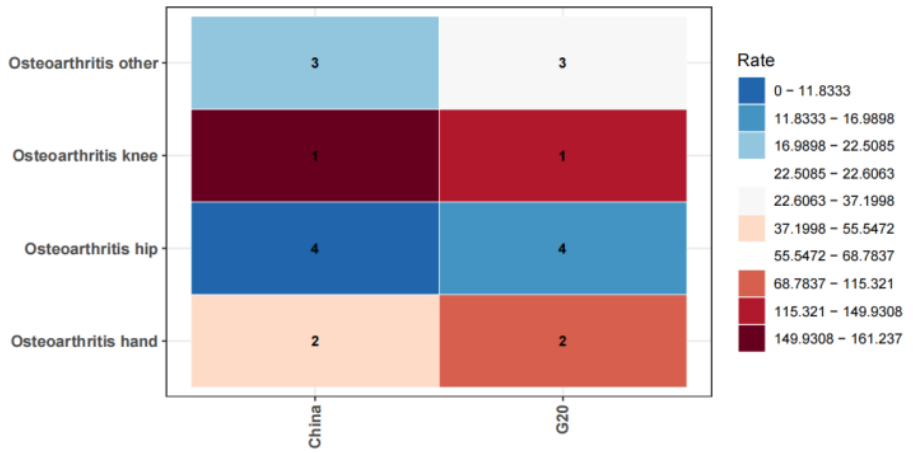

Figure 3. Site-specific burden of osteoarthritis in China and the G20 in 2023. Heat map showing age-standardized rates (per 100,000) of osteoarthritis of the knee, hip, hand, and other sites in China and the G20. Colors indicate the magnitude of the rate according to the legend, and the numbers within each cell represent the within-country rank of each site (1 = highest burden, 4 = lowest burden).

4. Discussion

In this GBD-based analysis, we found that China has experienced a sustained increase in OA burden from 1990 to 2023, with modest rises in age-standardized rates but striking increases in absolute numbers of incident cases, prevalent cases, and DALYs [4]. Compared with the G20 aggregate, China showed steeper growth in incidence and case numbers, reflecting the combination of rapid population ageing and a very large underlying population base [5].

The age-specific patterns we observed are typical of a degenerative joint disease. Incidence rates peaked in late middle age, when cumulative mechanical load and occupational exposures intersect with comorbidities such as obesity [6]. Prevalence and DALY rates remained high into advanced age, underlining that OA is a long-lasting condition that seldom resolves and often leads to progressive functional decline. The concentration of cases and DALYs between 50 and 74 years means that OA disproportionately affects adults in or near retirement age, with implications for labor participation, informal caregiving, and social security systems [7].

Our site-specific analysis underscores the dominant role of knee OA in both China and the G20. The knee joint bears substantial weight and is strongly influenced by body mass index, occupational kneeling or squatting, and previous injury [8]. The high burden of knee OA therefore signals the need to intensify interventions targeting obesity, physical inactivity, and workplace ergonomics. The significant contribution of hand OA, particularly in China, suggests that attention should also be given to manual labor, repetitive hand use, and hormonal or genetic factors that may predispose to small-joint degeneration [9]. Hip and other-site OA currently contribute a smaller share of the burden, but they remain important causes of disability and often require costly surgical treatment [10].

From a policy perspective, our findings highlight several priorities. Because OA burden rises steeply with age, health systems must prepare for greater demand for orthopedic surgery, rehabilitation, and long-term care as the population ages. Prevention strategies should focus on modifiable risk factors, especially high body mass index and insufficient physical activity, which are increasingly prevalent in urbanizing societies. Early diagnosis and timely non-surgical management, including patient education, exercise therapy, weight management, and appropriate pharmacological treatment, are essential to delay progression and reduce the need for joint replacement. China's rapid increase in OA burden suggests that scaling up community-based rehabilitation and integrating OA management into primary care are urgent tasks.

This study has several limitations. GBD estimates are derived from multiple data sources and modelling procedures, and residual uncertainty may persist, particularly in countries or age groups with limited primary data. We could not distinguish radiographic from symptomatic OA or account for disease severity, treatment patterns, or comorbidities. Furthermore, our analyses were descriptive and did not explore causal relationships between risk factors and OA outcomes. Nonetheless, the GBD framework provides the most comprehensive available picture of global and national OA burden, allowing meaningful comparisons between China and the wider G20.

5. Conclusion

Between 1990 and 2023, the burden of OA in China increased substantially, with modest rises in age-standardized rates but large gains in the number of people affected and the associated DALYs. Compared with the G20 aggregate, China shows steeper growth and a particularly heavy burden of knee and hand OA among adults aged 50 years and older. As China and other G20 countries continue to age, coordinated efforts in prevention, early diagnosis, and rehabilitation will be critical to curb the future impact of OA on individuals and healthcare systems.

Disclosure statement

The authors declare no conflict of interest.

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