

## Preplanned Studies

## Epidemiological Characteristics of Osteoarthritis in Yichang City — Hubei Province, China, 2017–2018

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### Summary

#### What is already known about this topic?

OA has been listed as the fastest increasing major public health problem and ranked second as a cause of disability by World Health Organization (WHO). With population aging, osteoarthritis (OA) is causing an increased economic burden for individuals and society and is attracting an increasing amount of scientific attention.

#### What is added by this report?

This research used healthcare data to analyze the epidemiological characteristics of OA in Yichang City, Hubei Province, China. The exact number and distribution of patients were obtained, and a descriptive analysis of OA visits by age, gender, and season was performed. Knee joint disease among women was most common, followed by other joint diseases. Knee osteoarthritis was the most common OA diagnosis between 60 and 69 years of age.

#### What are the implications for public health practice?

In China, the prevalence of OA among middle-age and elderly people was high. With increases in the size of the elderly population, the burden of disease caused by OA may increase. It is necessary to strengthen publicity to improve people's awareness of self-health care of bone and joint. Interventions and preventive strategies targeting high-risk groups are urgently needed in order to improve healthy bones and healthy life quality among middle-age and elderly people.

World Health Organization (WHO) has identified osteoarthritis (OA) as the fastest growing major public health problem and the second leading cause of disability globally. OA is a disease that affects entire joints, leaving no tissues unaffected. The complete pathway that leads to destruction of joints is unknown (1). According to the Department of Bone and Joint Epidemiology of Peking University People's Hospital, the number of disability-adjusted life years lost in China per 100,000 caused by OA increased from 92.5

in 1990 to 98.8 in 2017 (2). The overall prevalence of OA among people over the age of 65 in China was 8.1% (3). OA causes huge economic burdens on patients, families, and society; it most commonly affects the hands, hips, knees, and spine, with knee joint involvement being the most common (4). For many years the seriousness of OA has been emphasized, but there are few large-sample-size epidemiological OA cohorts established in our country, as OA epidemiology is still in its infancy. Despite many investigations and studies having been repeated in a variety of areas, resulting data have not been well recognized internationally due to inconsistencies in testing methods and diagnostic standards (5). This study is based on the Big Data Information Platform of Health in Yichang City, which includes diagnostic and treatment information from OA-related visits by 817,700 permanent residents, over a 6-month period, in 5 administrative regions, 10 tertiary hospitals, and 26 community health service centers. The study could provide a basic description of Yichang's OA situation and help form the basis for public health risk assessments and policymaking.

Yichang Big Data Platform on Health serves 817,700 permanent residents and the outpatient records, inpatient records, prescription drug data, and physical examination records are all included. An one-person-one-card system is used to accurately track urban residents.

The research conducted a retrospective analysis of deidentified healthcare data from the Big Data platform. The study passed ethical review; unique identification codes were recoded. Patients diagnosed with OA who had records in the Big Data platform from January 1, 2017 to December 31, 2018 were selected. Patients with ICD codes M15-M19 who met imaging OA diagnostic criteria were included in the analytic data set. The OA cases in this analysis were redefined as at least one OA out-patient or in-patient visit, and those with multiple visits were classified as one OA patient and the earliest visit time was retained.

SAS software package (version 9.4, 100 SAS Campus Drive Cary, NC 27513, USA) was used for descriptive analyses by age, gender, and joint.

There were 16,745 patients who met inclusion criteria during the study period with a total of 23,460 visits, with an average of 1.40 visits. The mean age and standard deviation were  $58.69 \pm 15.18$  years; there were more females than males (Figure 1). The largest proportions of patients were among 60–69 years old, followed 50–59 years old and 70–79 years old (Figure 2). Outpatient and inpatient treatment rates were highest in the spring (Figure 3).

ICD-10 codes M15–M19 were polyarthropathy (M15), coxarthropathy (M16), knee OA (M17), arthrosis of first carpometacarpal joint (M18), and other joint diseases (M19) (Table 1). Knee OA was the most common diagnosis, with women more affected than men. Among 50–59 years old, M16, M18, and M19 were the most prevalent diagnostic codes. In

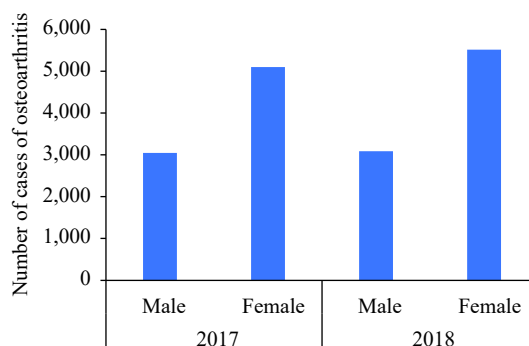


FIGURE 1. Distribution of osteoarthritis (OA) by gender and year from 2017 to 2018, Yichang City, Hubei province, China.

2017, the highest number of M15 OA patients were 50–59 years old; while in 2018, the highest number of M15 OA patients were 60–69 years old. In both 2017 and 2018, M17 OA patients, aged 60 to 69 years, represented the highest number of cases.

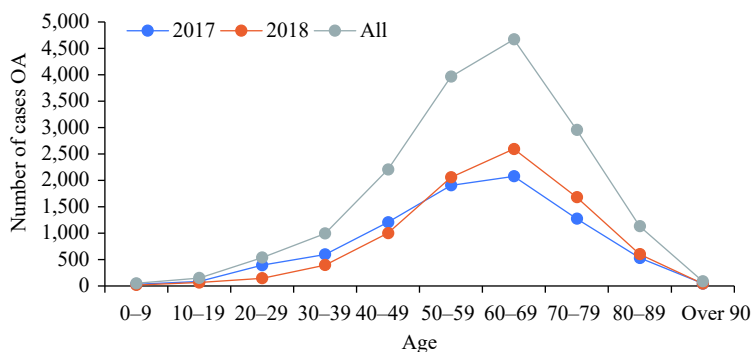


FIGURE 2. Distribution osteoarthritis (OA) in different age groups by study year from 2017 to 2018, Yichang City, Hubei Province, China.

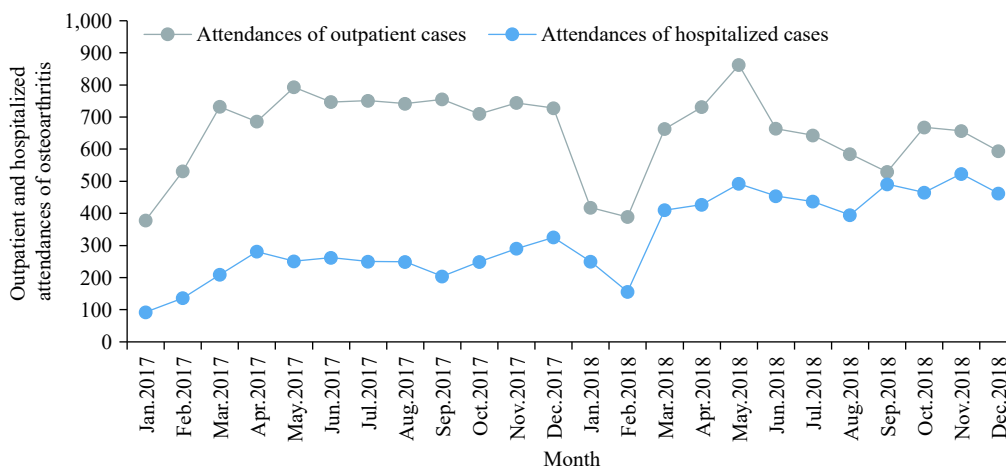


FIGURE 3. Outpatient and hospitalized attendance of osteoarthritis (OA) patients by month from 2017 to 2018, Yichang City, Hubei Province, China.

TABLE 1. Characteristics of different types of osteoarthritis in 2017–2018, Yichang City, Hubei Province, China.

Feature	2017						2018						All
	Male		Female		All		Male		Female		All		N
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	
Polyarthropathy (M15)													
0–29	12	2.38	19	3.76	31	6.14	8	0.89	8	0.89	16	1.78	47
30–39	8	1.58	16	3.17	24	4.75	12	1.33	26	2.89	38	4.22	62
40–49	21	4.16	39	7.72	60	11.88	31	3.44	72	7.99	103	11.43	163
50–59	48	9.50	82	16.24	130	25.74	64	7.10	184	20.42	248	27.52	378
60–69	48	9.50	71	14.06	119	23.56	77	8.55	178	19.76	255	28.30	374
Over 70	52	10.30	89	17.62	141	27.92	115	12.76	126	13.98	241	26.75	382
All	189	37.43	316	62.57	505	100.00	307	34.07	594	65.93	901	100.00	1,406
Coxarthropathy (M16)													
0–29	5	2.23	7	3.13	12	5.36	15	4.59	10	3.06	25	7.65	37
30–39	4	1.79	3	1.34	7	3.13	11	3.36	13	3.98	24	7.34	31
40–49	18	8.04	20	8.93	38	16.96	27	8.26	23	7.03	50	15.29	88
50–59	21	9.38	42	18.75	63	28.13	31	9.48	40	12.23	71	21.71	134
60–69	20	8.93	42	18.75	62	27.68	30	9.17	43	13.15	73	22.32	135
Over 70	19	8.48	23	10.27	42	18.75	32	9.79	52	15.90	84	25.69	126
All	87	38.84	137	61.16	224	100.00	146	44.65	181	55.35	327	100.00	551
Gonarthrosis (M17)													
0–29	72	1.81	81	2.04	153	3.85	66	1.16	63	1.11	129	2.27	282
30–39	88	2.21	109	2.74	197	4.95	111	1.95	115	2.02	226	3.98	423
40–49	204	5.13	284	7.14	488	12.27	238	4.19	376	6.62	614	10.81	1,102
50–59	282	7.09	627	15.77	909	22.86	423	7.45	865	15.23	1,288	22.68	2,197
60–69	363	9.13	869	21.85	1,232	30.98	518	9.12	1,322	23.27	1,840	32.39	3,072
Over 70	335	8.42	663	16.67	998	25.09	535	9.42	1,048	18.45	1,583	27.87	2,581
All	1,344	33.79	2,633	66.21	3,977	100.00	1,891	33.29	3,789	66.71	5,680	100.00	9,657
Arthrosis of first carpometacarpal joint (M18)													
0–29	1	5.56	0	0.00	1	5.56	1	4.00	0	0.00	1	4.00	2
30–39	1	5.56	4	22.22	5	27.78	3	12.00	5	20.00	8	32.00	13
40–49	3	16.67	0	0.00	3	16.67	1	4.00	1	4.00	2	8.00	5
50–59	1	5.56	4	22.22	5	27.78	3	12.00	5	20.00	8	32.00	13
60–69	1	5.56	1	5.56	2	11.11	2	8.00	5	20.00	7	28.00	9
Over 70	2	11.11	0	0.00	2	11.11	3	12.00	3	12.00	6	24.00	8
All	9	50.00	9	50.00	18	100.00	11	44.00	14	56.00	25	100.00	43
Other arthrosis (M19)													
0–29	127	3.71	185	5.41	312	9.12	29	1.74	27	1.62	56	3.36	368
30–39	172	5.03	192	5.61	364	10.64	61	3.66	46	2.76	107	6.42	471
40–49	235	6.87	383	11.19	618	18.06	97	5.82	134	8.04	231	13.87	849
50–59	266	7.77	534	15.60	800	23.38	187	11.22	256	15.37	443	26.59	1,243
60–69	268	7.83	395	11.54	663	19.37	176	10.56	243	14.59	419	25.15	1,082
Over 70	351	10.26	314	9.18	665	19.43	180	10.80	230	13.81	410	24.61	1,075
All	1,419	41.47	2,003	58.53	3,422	100.00	730	43.82	936	56.18	1,666	100.00	5,088

## DISCUSSION

OA is a clinically common chronic degenerative disease and is the leading cause of impaired mobility and dysfunction in middle-aged and elderly people (6). Yichang is located in the southwest of Hubei Province. By 2020, the city had jurisdiction over 5 municipal districts, 3 county-level cities, 3 counties, and 2 autonomous counties, with a total area of 21,000 square kilometers, a permanent population of 4.1 million, and a registered population of 3.9 million. Its Big Data Platform for Health Management covers all 13 counties and urban districts of the city, as well as the 4.1 million permanent residents; it collects more than 1.8 million pieces of data every day, and stores more than 4 billion pieces of data. Interconnection maturity has reached Grade 4 A. Since its inception in 2014, data quality has been confirmed by published studies(7). Using the big data of Yichang, we analyzed the epidemiological characteristics of osteoarthritis by gender, age, and disease type to provide a foundation for overall management and clinical treatment of OA.

In 2017, China had 61.2 million OA patients, with an age-standardized prevalence of 3.1% (2). Based on number of the permanent residents in the Yichang urban area (817,700), we estimate that there are about 25,349 OA patients in the city in 2017. Among OA patients, 32.14% went to see a doctor, which reflects the low rate of doctor visits among patients with OA. This may be due to the fact that many patients are not fully aware of OA and consider it a normal phenomenon of aging and are ignored (8). As the population ages, so will the disease burden of OA. The proportion of OA patients in the study population was the highest between the ages of 60 and 69, with women higher than men, which is consistent with most epidemiological studies. The average age of onset for OA is around 20 years, and the majority of cases are asymptomatic. As people get older, the incidence rises; OA becomes most common after middle age (9), affecting women more than men (10). Although the effect of estrogen on OA has been extensively studied, its mechanism of action remains unknown (11).

The spring season has the highest number of OA hospitalizations. It is not clear if this is due to changing weather. People suffering from OA often believe that changes in the weather exacerbate pain (12). More research is needed to understand the relation between OA and climate change, if any. In our study, the proportion of patients with knee OA aged 60–69 years was higher in women than men from 2017 to 2018,

followed by other joint diseases (M19), polyarthropathy (M15), coxarthropathy (M16), and arthrosis of first carpometacarpal joint (M18). According to Sun X et al., the prevalence of knee OA in middle-aged and elderly people in China was 21.51%; women are more likely to develop knee OA than men (13).

This study was subject to some limitations. First, we only analyzed OA patients who went to outpatient clinics or were hospitalized for diagnosis and treatment. The number of patients with OA was slightly underestimated due to exclusion of patients who did not seek medical attention. Second, because our study only covers the urban population of Yichang City, this exploratory research may have underestimated the number of OA patients. Data on the incidence and prevalence of OA in rural areas were not included. The incidence and prevalence of OA should be able to be analyzed in greater detail as the Big Data on Health Platform matures.

In China, the prevalence of OA among middle-age and elderly people was high. With increases in the size of the elderly population, the burden of disease caused by OA may increase. It is necessary to strengthen publicity to improve people's awareness of self-health care of bone and joint; advocate early detection, early diagnosis, and early treatment; and increase the rate of diagnosis of OA to reduce the burden of disease brought by OA. Interventions and preventive strategies targeting high-risk groups are urgently needed in order to improve healthy bones and healthy life quality among middle-age and elderly people.

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