

Epidemiology of knee osteoarthritis during the COVID-19 pandemic

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ABSTRACT

Osteoarthritis of the knee, otherwise known as gonarthrosis, accounts for more than 80% of all degenerative joint diseases. Degenerative changes alone affect 80% of the population aged 75 years and older. Currently, 2 public health trends are believed to be the dominant factors in the development of gonarthrosis: increasing body mass index (BMI) and increasing age of the population. Both of these factors are also significant risk factors in the development of life-threatening complications with COVID-19 infection. This retrospective study collected the number of patients admitted to a trauma and orthopedic clinic at one time between 2019–2021 along with isolating the number of patients with a diagnosis of gonarthrosis (M17). In both cases, the results

show a significant decrease in the number of patients admitted in the 2nd quarter (Q2) of 2020 and a decrease in overall patient admissions compared to the COVID-19 outbreak in Poland (31.25% decrease from 2019 to 2020). A significant impact on the decrease in the number of patients in Q2 2020 may have been the closure of the outpatient clinics from March 16, 2020 to August 16, 2020. Other factors influencing the subsequent decrease in patients may have been people's fear of contracting COVID-19, decreased physical activity, worsening dietary habits, and weight gain during the "lockdown". A review of recent studies on this topic may support this hypothesis.

Keywords: osteoarthritis; gonarthrosis; COVID-19 infection.

INTRODUCTION

Osteoarthritis was first described in 1907 by Archibald Garrod. Despite the passage of time, it is still the most common cause of pain, disability, sickness absence and invalidity [1]. Statistics report that over 80% of the population aged 75 and over suffer from degenerative changes [2]. This is a significant problem in the public health sector. In addition, the ageing population and an increase in obesity directly contribute to the increase in the incidence of the disease. The concept of osteoarthritis includes pathological processes of various etiologies, which result in progressive biological and mechanical damage to the cartilage, subchondral layer of the bone and other structures that make up the joint. Processes within the vitreous cartilage lead to its softening, fibrosis, ulceration and the formation of defects. Osteophytes and subchondral cysts develop, while the subchondral layer of bone itself hardens and thickens. Clinical symptoms that patients complain of include: joint pain, pressure soreness, restricted mobility, crackling and sometimes effusions. Inflammatory changes are limited to the joint and are not accompanied by systemic symptoms. Despite the widespread use of the term "osteoarthritis", there is no fully accepted definition of this condition.

One joint stands out from others in its incidence of degenerative changes. Osteoarthritis of the knee otherwise known as gonarthrosis accounts for over 80% of all degenerative joint changes [3].

A large body of evidence suggests that gonarthrosis is caused by the breakdown of joint tissues due to mechanical loading [4] and inflammation [5], but the deeper causes of the high incidence of knee osteoarthritis remain unclear and under-researched,

hindering efforts to prevent and treat the disease. However, 2 recent public health trends are widely believed to be the dominant factors. First, due to the correlation of the prevalence of gonarthrosis with age, it is believed that the increase in life expectancy in Poland since the early 20th century has led to an increase in the prevalence of the disease among the elderly, with the assumption that aging joint tissues undergo greater wear and tear due to stress as we age. Secondly, body mass index (BMI) has increased in Poland in recent years and is a well-known risk factor for knee osteoarthritis. However, there are no studies confirming that the increase in longevity and BMI are responsible for the current prevalence of gonarthrosis.

On November 17, 2019, an outbreak of COVID-19 began in the city of Wuhan, Hubei Province, central China. Approximately 5 months later, on March 11, 2020, the World Health Organization declared it a pandemic. The first case of a patient infected with COVID-19 in Poland was reported on March 4, 2020 in a hospital in Zielona Góra [6, 7]. Due to the threat of the SARS-CoV-2, on March 20, 2020, according to the regulation of the Minister of Health, an epidemic state came in to force in Poland. From March 24 to April 20, 2020, the strictest restrictions on movement were in force. On December 27, 2020, the National Vaccination Program against COVID-19 was launched.

MATERIALS AND METHODS

The data collected has retrospective value and is organised by time period by quarter: Q1 2019 to Q3 2021. The data includes the number of patients first admitted to the trauma and orthopedic

clinic at the St. Barbara Regional Specialized Hospital No. 5 – Trauma Center along with the number of patients coded with the ICD-10 classification code M17 meaning ‘gonarthrosis’ (degenerative joint disease of the knee). Excel and Statistica were used to determine the number of patients and the changing number of patients over time.

RESULTS

The collected data are presented in Tables 1 and 2, and Figures 1, 2, 3.

TABLE 1. First-time trauma and orthopaedic outpatients in 2019–2021 by quarter (Q)

2019				2020				2021			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	ongoing
904	960	1018	1150	935	375	825	637	839	897	710	

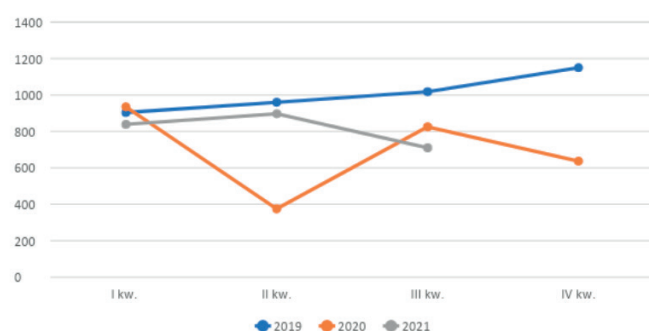


FIGURE 1. First-time trauma and orthopaedic outpatients in 2019–2021 by quarter

Prior to the time of the COVID-19 outbreak in Poland, the number of patients admitted to the dispensary was 4,032 as of 2019. In the year the outbreak started in the country, the number of patients in the dispensary was 2,772. The decrease in the number of patients was 31.25% in 2019–2020. In the current year, 2,446 patients have been admitted to the dispensary up until now.

In 2019, the number of patients diagnosed with osteoarthritis of the knee was 480, while in 2020, the incidence was 34.58% over the previous year i.e., 314 cases were reported. In the current year, 312 patients have been diagnosed with code M17. Due to the still ongoing year and the observed trend, it can be concluded that the number of total patients will definitely exceed the number of last year.

Considering the ongoing Q3 2021, one has to take into account that the continuously growing number of patients admitted to the trauma and orthopaedic clinic, as a result of which the grey curve representing this time period will most likely have higher values after the end of the current year. The number of patients admitted to the outpatient clinic before and after a state of national epidemic was declared, which falls in the 2nd quarter of 2020, is: before the epidemic – 4,967, after the

declaration of the epidemic – 3,908. This is a decrease in the number of first-time patients by 21.32%.

TABLE 2. First-time trauma and orthopaedic outpatients in 2019–2021 by quarter with diagnosis of gonarthrosis (M17)

M17										
2019				2020				2021		
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
116	97	116	151	101	18	97	98	106	114	92

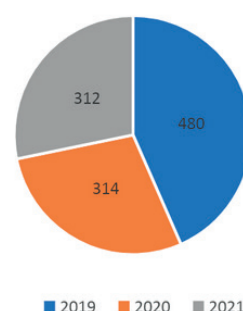


FIGURE 2. Number of patients with diagnosis of gonarthrosis (M17)

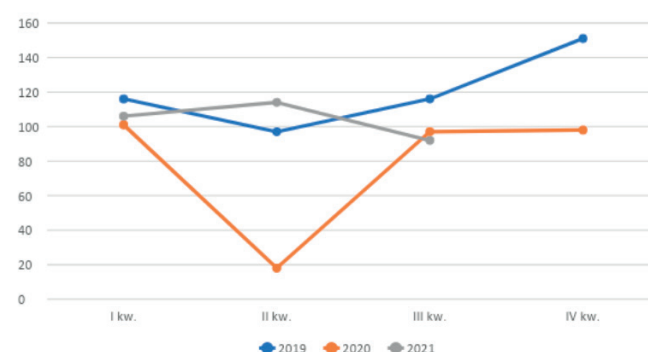


FIGURE 3. First-time trauma and orthopaedic outpatients in 2019–2021 by quarter with diagnosis of gonarthrosis (M17)

On the other hand, the number of patients with an M17 diagnosis before the epidemic was 581, and after the announcement of the epidemic in Poland was 507. The difference was 12.73%. In both cases, the number of patients was summed over a time period of 5 quarters. The 3rd quarter of 2021 is coming to a close and, with the trend in place, is unlikely to equal the pre-epidemic result. Comparing the number of patients with M17 dissolution from Q2 2020 to the lowest number of patients i.e. Q2 2019, Q3 2020 (n = 97), the decrease is as high as 81.44%.

DISCUSSION

Referring to the results obtained, it should be pointed out that in the period of the 2nd quarter of last year, i.e., 2020, a significant decrease in the number of gonarthrosis diagnoses was recorded. Such a drastic result was most probably caused by the

beginning of the COVID-19 epidemic in Poland and the restrictions introduced at that time. The closure of outpatient clinics between 16.03.2020–16.08.2020 played a decisive role (after resumption of outpatient clinics from 17.08.2020, the number of patients in Q3 increased). A factor in the lower number of patients compared to the previous year may be the fear of the elderly contracting coronavirus and life-threatening complications, as older age is one of the risk factors for contracting the disease [8]. This shows how elderly people make up a large proportion of those suffering from osteoarthritis of the knee. The 2nd conclusion comes after observing a trend of increasing numbers of patients diagnosed with knee osteoarthritis. This correlates with the timing of clinics reopening and the relaxation of mobility restrictions. However, as mentioned in the introduction, epidemiological studies have shown that there are both endogenous and exogenous risk factors for osteoarthritis. Only in very few cases can osteoarthritis be attributed to the action of defective genes. Its development and progression are the result of the interaction of multiple genes in combination with other external risk factors.

In an epidemiological study, Grotle et al. found a significant relationship between being overweight (BMI >30) and knee osteoarthritis, but not for hip osteoarthritis [9]. During the pandemic, many sporting activities were cancelled and the diet of many Poles deteriorated. Although the strictest restrictions lasted about 1 month, fitness clubs and other establishments were closed much longer. One research paper compiled data from questionnaires on changes in weight, diet and physical activity in 183 Poles during the 1st lockdown. It indicates that half of the subjects experienced an increase in body weight. It also reports that the observed increase in body weight could be associated with a decrease in physical activity and an increase in the intake of total food and energy-dense products. Foreign studies also indicate a similar trend. Pellegrini et al. observed an increase in body weight during lockdown with a concomitant decrease in physical activity and increased intake of total food [10, 11]. Another Polish study, on a larger number of subjects, also showed a decrease in physical activity, which promotes the incidence of obesity and overweight; especially as the results obtained in this study suggested an increase in food intake in more than 1/3 of the subjects [12]. The above information may lead to the conclusion that the continuous increase since the onset of the epidemic in Poland, i.e., after Q2 2020, may also be due to the deterioration of a “healthy” lifestyle and an increase in risk factors such as overweight, obesity, and physical inactivity in patients diagnosed with knee osteoarthritis. However, more detailed studies involving a group of patients with newly diagnosed gonarthrosis and their lifestyle during the coronavirus outbreak are needed to confirm this conclusion.

Also, it cannot be ignored that after the 1st lockdown period, the number of admitted I-trauma patients to outpatient clinics has decreased by 21.32%. Although the number of patients may increase due to the continuous increase in the number of admissions in Q3 2021, it still points to the conclusion that the decrease may be due to people’s fear of visiting hospitals

during the COVID-19 outbreak period. A study conducted across the United States and Canada using online surveys examined people’s aversion to healthcare professionals during the coronavirus pandemic. The survey included 3,551 non-healthcare professionals. Results indicated that for more than ¼ of those surveyed, health care workers should be isolated, and more than ½ of those surveyed expressed their fear of contact with health care workers [13].

As mentioned in the article, a strong correlation between older age and knee osteoarthritis is noted. Important risk factors for life-threatening COVID-19 complications are old age, cardiovascular disease, diabetes [8], and obesity [14]. Due to the high mortality rate in this age group caused by COVID-19 complications, this may have had an impact on the overall decrease in the number of patients diagnosed with M17 compared to the time before the outbreak began in Poland.

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