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Hip Fracture Incidence Over Twenty Years in Poland: The HiPoL Study

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Abstract

Introduction: In the previous report, we noted a significant increase in hip fracture incidence in the local study area. The aim of the study was the continuous observation of hip fracture incidence in the local community over the last 20 years and to estimate their projection for the next 30 years.

Methods: Medical records of the patients aged 50 years and older in the period 2002 – 2021 (local data – area of the district Tarnowskie Góry and the city of Piekary Śląskie) with diagnosis ICD-10: S72.0; S72.1; and S72.2 (only the fragility fractures) were taken into analysis.

Results: 2,723 fragility hip fractures in the local area were registered (72 % in women). The increase in the rate was constantly observed, even during the COVID – 19 pandemic. The incidence rate ratio for the local population increased to 1.41. The incidence rate in 2021 was for the total population 230.2 (men 151.3; women 294.2). For comparison in 2002, it was 129.0 (men 48.8; women 192.4). In 2050 the number of fractures according to our new estimation will increase.

Conclusions: The number of fragility hip fractures in Polish men and women aged over 50 years in the local population increased. The epidemiological situation is still worsening. Therefore, especially due to the reduction of orthopedic beds and the aging population phenomenon the situation will be tragic to our patients.

Keywords: Hip; Fracture; Incidence; Poland.

Introduction

There are some typical locations of low–energy osteoporosis-related fractures. One of the most challenging is a fracture of the hip.[1] This injury is a threat to the life of patients in orthopedic departments because of the high mortality rate.[2] To lower it, patients need to be referred to the hospital immediately and undergo surgery as soon as possible.[3]

Moreover, the stay at the hospital, surgery, and recovery to independence in everyday life is very demanding both for the healthcare system and for the families.[4] The cost of treatment is very high.[5,6] Dealing with patients requires a lot of involvement from family members and neighbors. Very often those injuries cause the transfer of the patients to a nursing home due to a lack of family or

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lack of possibility of taking care of this kind of patient at home.[7] This situation is very frequent in Poland. Moreover, the elderly often do not have family (especially children, grandchildren, etc.) or their descendants work abroad.

All those problems cause the observation of the number of hip fractures is very important to prepare the health and social care system to deal with this challenge.

According to the literature, the incidence of hip fractures in Poland was not very high in the previous decade. In comparison to other countries, according to data published in 2012 by Kanis, Poland was in the group of countries with a moderate risk for hip fracture.[8] However, our latest observation, which showed the situation between 2002 and 2014 raised concerns.[9,10] The number of fractures systematically increased from 78 to 162 cases per year in the study area, both in men and women (3.6- and 1.8-fold, respectively, compared to the year 2002). The IRR (incidence rate ratio) increased to 1.53 (95 % CI 1.1−2.1) in 2014. The increase in the incidence rate of hip fractures was meaningful. In the following years, the situation was a little bit better because of changes in epidemiology related to the COVID -19 pandemic impact.[11,12]

These disturbing data prompted us to continue our previous research. The new project was called HiPol Study (a portmanteau word – that combined hip and Poland). We intend to check if the long-term trend of the number of hip fractures remained constant or if something changed especially in the aspect of the COVID -19 pandemic. Nowadays, we extended the follow-up period to twenty years, because in our country there is no so long study, that shows the trend and changes in the number of hip fractures.

Moreover, in the area of a given voivodeship, we also observed the disturbing trend of reducing the number of „orthopedic" beds – from 1,795 in 2010 (first available data) to 1,298 in 2021 (last available data) despite the aging of the Polish population.[13]

It is very important to observe the occurrence of hip fractures because it helps to take best care of the patients e.g. by providing an adequate number of hospital beds, staff, etc. So the aim of this study was:

- to estimate the incidence and trend of hip fractures in the population of females and males aged 50 or older in the district of Tarnowskie Góry and the city of Piekary Śląskie during the last 20 years, from 2002 to 2021,
- to compare the real data from 2020 and our predictions from the previous article,[10]
- to make the new projection of hip fractures for the local area till the year 2050

(number of fractures and incidence rate with 95 % CI).

Methods

Study population and chosen hospital

The study group consists of people living in the district of Tarnowskie Góry (the city of Tarnowskie Góry and the surrounding rural area) and the city of Piekary Śląskie. Geographically and historically this is a part of the Upper Silesia region (Southern Poland). The total study population and the group aged 50 and older are shown in Fig. 1 (based on data from the Central Statistical Office[13]). These data confirm the aging process in the Polish population (Figs. 1 and 2). The population is 100 % Caucasian.

In the study area, there is only one hospital where all patients with suspected fractures are managed. This is Dr. J. Daab Regional Hospital of Trauma Surgery in Piekary Śląskie.

Data collection

Medical records of the patients aged 50 years and older dated between 1st January 2002 and 31st December 2021 with diagnosis codes of the International Classification of Diseases ICD-10: S72.0; S72.1; and S72.2 (femoral neck, per/inter/sub/trochanteric fracture) were taken into analysis. Furthermore, the circumstances were obtained from the personal interview and described by the ICD-10 codes (V01-Y98) of external causes of morbidity and mortality.[14]

Confirmation of the diagnosis

Every fracture was diagnosed by a radiologist (based on radiographs or computed tomography scans).

Assessments and exclusion criteria

Only fragility fractures (caused by the fall from a standing height or less) of patients living in the observed area were included. Patients living outside of the studied area and those with high energy fractures (e.g. violent trauma, automobile accidents, falls from more than standing height, etc.) and younger than fifty were excluded from the study. Every duplicate record or data in case of readmission was excluded from the final data set.

Statistical analysis

The number of inhabitants of Poland with information about gender, age and place of residence was obtained from the national database available in the Central Statistical Office in Warsaw.[13] For estimating all necessary rates, first, we calculated the crude ones N/100,000 population aged 50 and more of the studied area and then proceeded to calculate the crude specific rates for the male and female population. Then, we used the directly standardized procedure to calculate standardized rates for hip fracture using the Segi "world" population as the standard population.[15] Direct standardization yields a standardized

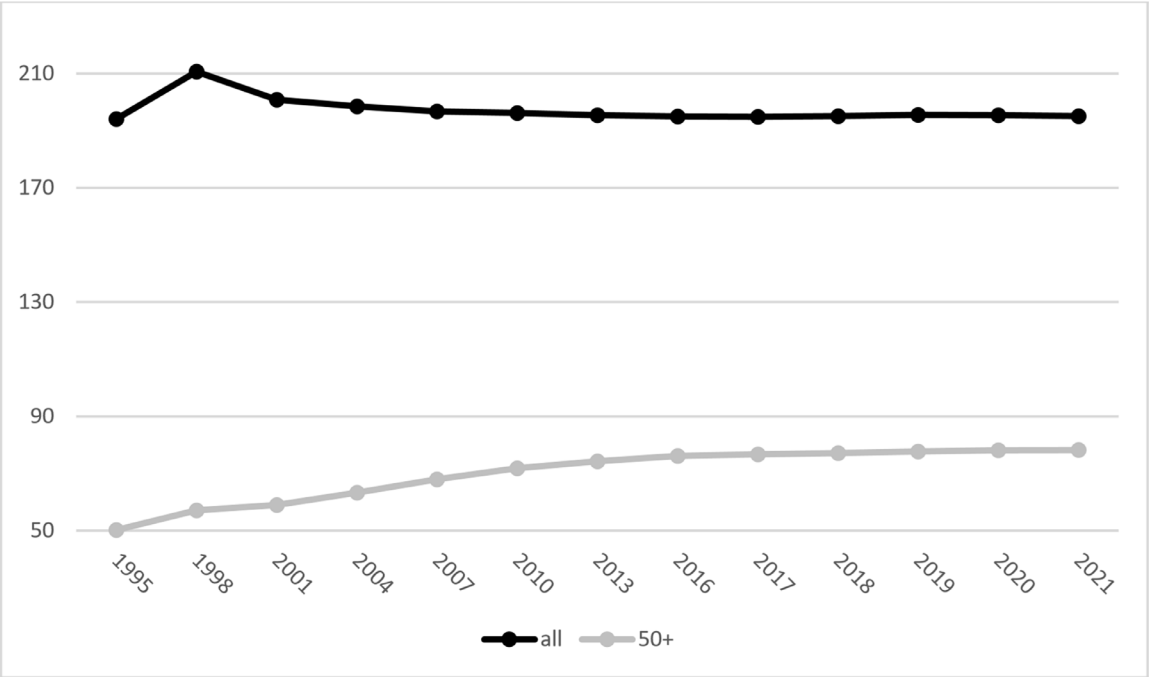

Fig. 1. Number of the citizens in the local study area in thousands (the district of Tarnowskie Góry and the city of Piekary Śląskie). 50+ - subjects aged 50 and more, all – the whole population.

rate, which is a weighted average of the age-specific rates, for each of the populations to be compared. The 95 % confidence intervals (CIs) were calculated assuming Poisson distribution and gamma distribution when the number of incidences was small. The trend for fracture incidences was analyzed by the means of a multiple Poisson regression model incorporating age and gender as confounders. IRR to the first year of registration (2002) was calculated with adjustment for overdispersion (which may occur when observed variance exceeds the variance obtained by the theoretical model). We have also computed 95 % CIs of IRR using the profilelikelihood function. The estimation methods and relevant bibliography have exactly been described in our first publication.[9] We did not change it to be able to compare our new data with previous.

In order to compare the expected crude rates with observed ones we calculated the difference between

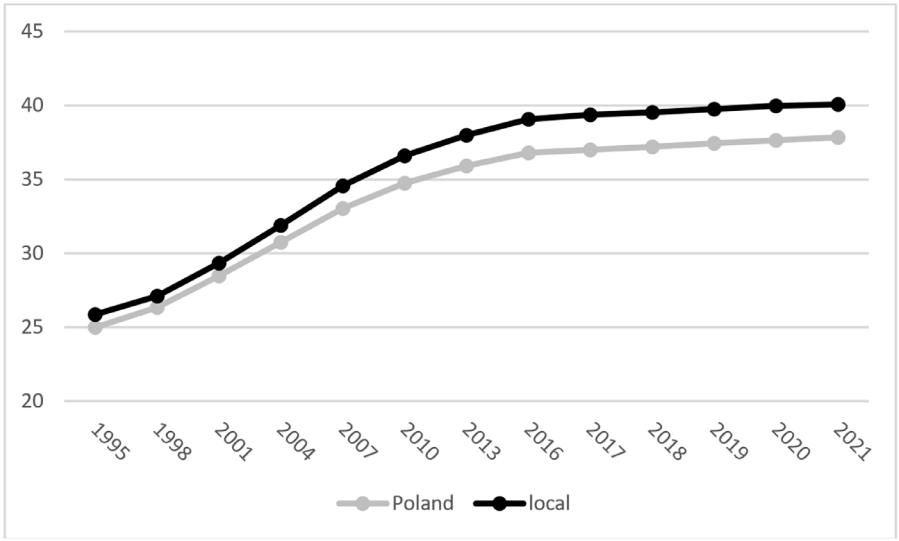

Fig. 2. Ratio of subjects aged 50 and more in the whole country and in local study area (in percentage).

expected and observed crude rates, we also made a simple estimation on the 95 % confidence interval for the difference according to the formula:

$$CI = D \pm \sqrt{CI_{eCR}^2 + CI_{oCR}^2}$$

Where: D = eCR - oCR is the difference between expected and observed crude rates, CIeCR and CIoCR is 95 % confidence interval for the expected and observed crude rates respectively. If the confidence interval for the difference contains 0 we assumed that the difference was not statistically significant.

A p-value less than 0.05 was considered as statistically significant. All analyses were performed using SAS 9.4 (SAS Institute Inc., Gary, NC).

Results

Data from the past

Between 1st January 2002 and 31st December 2021 in the local study area, there were diagnosed 2,723 low−energy hip fractures. Most of the fractures were noted in women (n = 1972, 72.4 % of subjects with fractures).

In Table 1. the number, crude, and directly standardized incidence rates of hip fracture with their 95 % CI in particular years separately for the total, male, and female populations are shown.

In this local population, the number of fractures was systematically increasing from the starting year. However, a significant peak was seen in the year 2016, and then, in the next year, we observed a slight decrease in the number of fractures. Finally, in the two last years, it stayed on the same level similar to 2018. In total, during the entire observation period, the number of hip fractures increased by 130.77 % both in men and women (307.69 % and 95.38 %, respectively, compared to the first year—2002).

The incidence rates in men are always smaller than in women and the calculated standardized coefficients are lower than crude ones.

In Table 2**.** the trend for IRR for local data relative to the year 2002 and its 95 % CI for hip fracture is shown. A systematic increase in IRR compared to the first year of data collection (2002) should be noted. The highest value was obtained in 2016—1.716 (95 % CI (1.255 - 2.38).

In Figs. 3 and 4. the increasing trend both for the incidence rates and the number of fractures are shown.

Comparison of real data of local area from 2020 and projection established in the previous study[10]

In our projected data, from the last article, in the year 2020, as many as 196 fractures should be noted (59 in men, and 137 in women), whereas, in fact, this year there were 181 fractures (51 in men and 130 in women).

The expected crude rates (n/100,000) for the total, male and female population should be 254.9 (220.4–293.2), 172.7 (131.4–222.8), and 320.7 (269.2–379.2), respectively. In fact, the recorded values were similar – 231.7 (199.1 – 268.0), 145.5 (108.3–191.3), and 301.8 (252.1–358.3), respectively – the changes were not significant.

Changes in the number of hip fractures in the future (comparison to the previous projection[10])

According to the collected data, a new projection in the number of fractures and crude rates to the year 2050 was made. The comparisons of previous and new values are shown in Figs. 5 and 6. The number of fractures and the incidence rates will still increase in the next 30 years. The new estimated values are lower than the previous ones, however, the difference is not significant and we expect the number of fractures to double compared to 2020.

Discussion

In the current long-term prospective study, the most important is an estimation of the trend of an observing phenomenon. In our 20 years of observation, we noted the persistent increasing trend of hip fracture incidence. In this period the last two years (2020 – 2021) were marked by the impact of the Covid -19 pandemic. As we see from a wide perspective the pandemic period did not influence significantly on the number of fractures. We could have excepted the decrease in the number of fractures - the possible mechanism of impact of COVID -19 on the hip fracture incidence we described in our previous articles.[11,12] Moreover, we observed higher mortality in the studied group (in 2021 the mortality in group 50+ was higher by 28.9 % than in 2019[13]). However, a lesser incidence of hip fractures we noted in 2017 and 2019 - just before the outbreak of the pandemic. Moreover, according to our new estimation, the new projection for 2050 is similar to the previous one. The resulting changes are not significant. Nowadays, according to Kanis classification in the total and men population, there is a high risk of hip fracture incidence.[8] The main cause of the increase in the number of fractures is the lack of preventive programs both national and local. The knowledge of problems related to osteoporosis is still very low. Nowadays, in the voivodeship where we observe the population, there are only four public outpatient clinics for osteoporosis treatment.[16] Both the public health system and general practitioners avoid treating osteoporosis and related problems. Moreover, as we state above we observe a reducing trend in the availability of beds for treating patients with fragility fractures. The problems of osteoporosis and its associated consequences are not widely discussed in the media or medical courses. However, the development of low bone mass is influenced by many factors, which can be modified by special teams consisting of internists, dietitians, and rehabilitators. Furthermore, the treatment of osteoporosis and its consequences is not only the

Table 1
Number of registered hip fractures, crude, and directly standardized rates - national and local data of population of district of Tarnowskie Góry and the city of Piekary Śląskie (rates n/100,000).

Year		Local DATA		
		Total	Male	Female
2002	Number	78	13	65
	Crude rate	129.0 (102.0–161.0)	48.8 (26.0–83.4)	192.4 (148.5–245.2)
	Standardized rate	114.9 (90.7–143.5)	47.8 (25.4–81.8)	155.2 (119.5–198.1)
2003	Number	82	25	57
	Crude rate	132.4 (105.3–164.4)	91.4 (59.2–135)	164.8 (124.8–213.6)
	Standardized rate	118.1 (93.8–146.7)	90.4 (58.5–133.4)	136.9 (103.4–177.9)
2004	Number	89	25	64
	Crude rate	140.5 (112.8–172.9)	89.3 (57.8–131.9)	181.0 (139.4–231.1)
	Standardized rate	124.5 (99.9–153.4)	88.6 (57.3–130.9)	145.6 (111.9–186.2)
2005	Number	99	20	79
	Crude rate	152.3 (123.8–185.4)	69.3 (42.3–107.1)	218.4 (172.9–272.2)
	Standardized rate	133.8 (108.6–163.2)	67.8 (41.3–104.9)	178.8 (141.1–223.5)
2006	Number	90	20	70
	Crude rate	135.4 (108.9–166.4)	67.8 (41.4–104.8)	189.3 (147.6–239.2)
	Standardized rate	118.4 (94.9–145.8)	66 (40.1–102.4)	152.8 (118.7–193.7)
2007	Number	116	30	86
	Crude rate	170.6 (141.0–204.6)	99.5 (67.1–142.0)	227.3 (181.8–280.7)
	Standardized rate	145.5 (120.1–174.6)	93.3 (62.8–133.4)	179.7 (143.5–222.2)
2008	Number	105	31	74
	Crude rate	151.2 (123.7–183.1)	100.3 (68.2–142.4)	192.0 (150.8–241.1)
	Standardized rate	130.7 (106.6–158.4)	97.3 (65.8–138.6)	151.6 (118.8–190.6)
2009	Number	144	39	105
	Crude rate	203.6 (171.7–239.7)	123.9 (88.1–169.4)	267.5 (218.8–323.9)
	Standardized rate	182.6 (153.6–215.5)	127.3 (90.1–174.8)	214.9 (175.5–260.6)
2010	Number	134	37	97
	Crude rate	186.6 (156.3–221.0)	115.5 (81.3–159.3)	243.8 (197.7–297.4)
	Standardized rate	165.8 (138.8–196.5)	112.3 (79.0–154.8)	201.8 (163.3–246.6)
2011	Number	133	36	97
	Crude rate	182.8 (153.1–216.7)	111.2 (77.9–153.9)	240.3 (194.9–293.2)
	Standardized rate	162.8 (136.3–193.1)	108.4 (75.9–150.1)	195.6 (158.5–238.9)
2012	Number	135	43	92
	Crude rate	183.4 (153.8–217.1)	131.3 (95.0–176.9)	225.2 (181.6–276.2)
	Standardized rate	165.4 (138.5–195.9)	129.5 (93.7–174.5)	188.7 (151.7–232.1)
2013	Number	140	34	106
	Crude rate	188.5 (158.6–222.5)	102.9 (71.3–143.8)	257.1 (210.5–311)
	Standardized rate	163.3 (137.3–192.8)	99.0 (68.5–138.4)	204.2 (167.1–247.1)
2014	Number	162	47	115
	Crude rate	216.2 (184.1–252.1)	140.9 (103.5–187.4)	276.5 (228.3–331.9)
	Standardized rate	183.9 (156.6–214.7)	131.6 (96.7–175.1)	219.4 (180.8–263.9)
2015	Number	155	46	109
	Crude rate	205.1 (174.1–240.1)	136.5 (99.9–182.1)	260.4 (213.8–314.1)
	Standardized rate	173.4 (147.0–203.2)	126.9 (92.8–169.5)	202.4 (165.9–244.7)
2016	Number	191	57	134
	Crude rate	250.7 (216.4–288.9)	167.4 (126.8–216.9)	318.0 (266.4–376.6)
	Standardized rate	204.4 (176.3–235.7)	147.0 (111.3–190.5)	245.7 (205.4–291.6)
2017	Number	154	41	113
	Crude rate	200.7 (170.2–235.0)	119.4 (85.7–162)	266.5 (219.6–320.3)
	Standardized rate	162.4 (137.4–190.6)	108.3 (77.3–147.5)	198.4 (163.1–239.0)

(*continued*)

Table 1 (*Continued*)

Year		Local DATA		
		Total	Male	Female
2018	Number	184	52	132
	Crude rate	238.5 (205.3–275.6)	150.4 (112.3–197.2)	310.0 (259.4–367.6)
	Standardized rate	185.7 (159.5–214.9)	130.6 (97.2–171.7)	221.9 (185.4–263.5)
2019	Number	171	51	120
	Crude rate	220.0 (188.2–255.5)	146.2 (108.9–192.3)	279.9 (232.1–334.7)
	Standardized rate	170.6 (145.5–198.7)	126.0 (93.4–166.2)	199.8 (165–239.8)
2020	Number	181	51	130
	Crude rate	231.7 (199.1–268)	145.5 (108.3–191.3)	301.8 (252.1–358.3)
	Standardized rate	176.8 (151.5–205.1)	128.0 (94.7–169.2)	206.2 (172–245.2)
2021	Number	180	53	127
	Crude rate	230.2 (197.8–266.4)	151.3 (113.3–197.9)	294.2 (245.3–350.1)
	Standardized rate	175.4 (150.1–203.8)	128.0 (95.4–168.3)	207.0 (171.6–247.6)

Data to year 2015 was taken from our previous study.[10]

administration of drugs but above all protection against falls, i.e. preventing sarcopenia[17] (the risk of sarcopenia is greater in a woman). Also, the group of elderly with concomitant diseases has a higher risk of developing sarcopenia, a higher prevalence of sarcopenia risk is in both women and men who had a motor and respiratory system diseases, type 2 diabetes, or neurologic diseases. In addition, women, who had urinary tract disease, allergies, cardiovascular disease, and type 1 diabetes had an increased risk of sarcopenia[18]), treat neurological diseases[19], visual impairment,[20] and making modifications to the apartment of an elderly person, as well.

Even though only the study with a long observation period could help in the management of health care, in the available literature, it is hard to find some with 15 years and longer observation periods of hip fracture

Table 2
The incidence rate ratio relative to year 2002 and its 95 % CI for hip fracture in district of Tarnowskie Góry and the city of Piekary Śląskie in the period 2003–2021. Data to year 2015 was taken from our previous study[10].

Year	Total IRR (95 % CI)	p	Men IRR (95 % CI)	p	Women IRR (95 % CI)	p
2021	1.41 (1.028–1.96)	0.0366	2.43 (1.281–5.063)	0.0105	1.228 (0.963–1.576)	0.1023
2020	1.493 (1.089–2.075)	0.0147	2.361 (1.241–4.931)	0.0136	1.32 (1.036–1.692)	0.0266
2019	1.389 (1.01–1.935)	0.0472	2.411 (1.267–5.034)	0.0115	1.206 (0.943–1.551)	0.1400
2018	1.557 (1.136–2.162)	0.0069	2.51 (1.321–5.235)	0.0081	1.381 (1.085–1.77)	0.0096
2017	1.336 (0.966–1.871)	0.0852	2.03 (1.045–4.295)	0.0472	1.212 (0.945–1.563)	0.1336
2016	1.716 (1.255–2.38)	0.0009	3.061 (1.622–6.36)	0.0012	1.474 (1.159–1.888)	0.0018
2015	1.399 (1.011–1.958)	0.0461	2.406 (1.252–5.054)	0.0126	1.219 (0.949–1.575)	0.1242
2014	1.519 (1.101–2.122)	0.0123	2.702 (1.408–5.672)	0.0047	1.321 (1.031–1.703)	0.0292
2013	1.361 (0.978–1.916)	0.0718	1.881 (0.947–4.033)	0.0840	1.272 (0.988–1.645)	0.0638
2012	1.313 (0.94–1.851)	0.1143	2.434 (1.259–5.134)	0.0122	1.107 (0.854–1.441)	0.4458
2011	1.319 (0.944–1.862)	0.1089	2.076 (1.053–4.434)	0.0440	1.191 (0.921–1.547)	0.1846
2010	1.343 (0.962–1.895)	0.0874	2.152 (1.095–4.586)	0.0339	1.205 (0.932–1.565)	0.1577
2009	1.437 (1.034–2.02)	0.0332	2.264 (1.159–4.808)	0.0228	1.299 (1.009–1.68)	0.0444
2008	1.108 (0.778–1.586)	0.5721	1.988 (0.988–4.299)	0.0639	0.95 (0.722–1.251)	0.7124
2007	1.214 (0.86–1.728)	0.2737	1.97 (0.975–4.272)	0.0688	1.098 (0.843–1.434)	0.4907
2006	0.95 (0.658–1.375)	0.7825	1.237 (0.572–2.794)	0.5940	0.912 (0.691–1.206)	0.5168
2005	1.095 (0.765–1.574)	0.6218	1.395 (0.645–3.153)	0.4044	1.063 (0.812–1.395)	0.6591
2004	1.028 (0.712–1.49)	0.8823	1.66 (0.8–3.657)	0.1861	0.906 (0.681–1.204)	0.4940
2003	0.946 (0.649–1.38)	0.7727	1.719 (0.829–3.788)	0.1572	0.806 (0.6–1.079)	0.1480

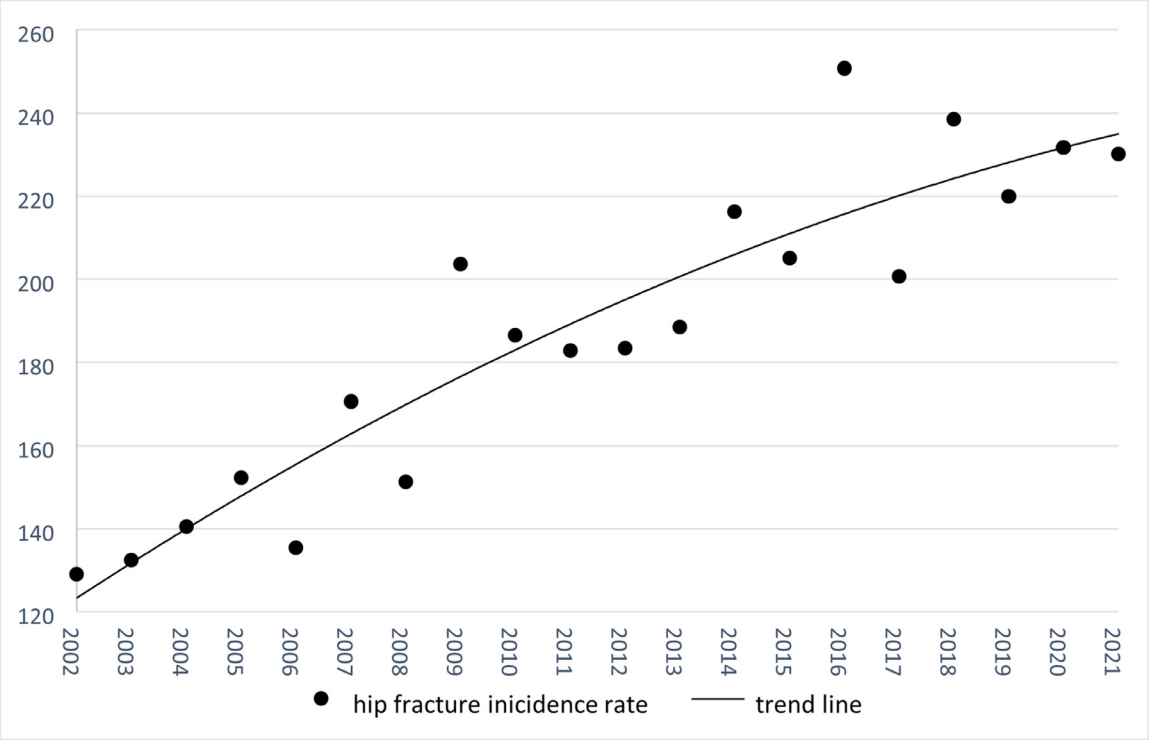

Fig. 3. The line of trend of hip fracture incidence rates for total population.

incidence, especially taking into account also the impact of the COVID -19 pandemic. In Poland, there was not such a long observational study. We could compare our results with several countries in Europe – Austria, Germany, Greece, Finland, Northern Ireland, and Sweden (unfortunately, neither of them contain a pandemic period).[21-26] In the first (Austria) the 30 years analysis was made. The observation period started in 1989 with age-standardized hip fracture incidence on the level 524/100,000 (in total population) and ended in 2018 on the lesser level 517/100,000. During these 30 years, the peak of the rates both for the total, men and women population was in the years 1997 – 2005. However, in fact in the aging population although the incidence rate remains intact the number of annual hospital discharges due to hip fractures in the population ≥ 50 years increased from about 10,000 to 16,000. It is a very strong signal that it cannot reduce the orthopedic beds for patients with fragility fractures, especially with hip fractures. In Germany, the observation was made in the years 1995-2010. During this time the number of hospital discharges for hip fractures increased, from 111,400 to 144,090. However, after correction for double registration and readmissions per year, there were 99,146 and 128,240 patients with at least one hospital admission in 1995 and 2010 respectively. It corresponds to crude incidences of 121.7/100,000 (95 % CI 120.9–122.4) in 1995 and 156.9/100,000 (156.1–157.7) in 2010. In Greece, at the beginning of the study in 1977, the incidence rate was 173.54/100,000 people aged 50 years and above while in 2007 the relevant age-adjusted incidence was 343.96/100,000. In women the increase was 217.26 to 450.65 per 100,000, however, in men was slightly lesser from 122.38 to 221.26 per 100,000) The number of patients with hip fractures had also increased from 5,100 to 14,055. The next observation was made in Finland by Kannus et al. This analysis of the nationwide database in 1970–2016 revealed a high increase in the number of fractures both in men and women (in total population the increase was from 1,857 to 7,122). However, the incidence rate decline has been especially clear in women among whom the age-adjusted incidence was 537.9/100,000 in 1997 and only 344.1 in 2016. In men, the incidence rate was 256.5 in 1997 and 194.7 in 2016. A similar situation was observed in Northern Ireland where also during the observation period (1985 – 2010) the increase of incidence rates in both sexes was noted. However, it should be noted that the incidence has been stable for men from the year 1997 (about 170/100,000), and women from the year 1994 (478/100,000). However, the Swedish observation revealed the reverse situation. In the years 1998 – 2017 (twenty years of observation) in this country Meyer et al. observed a decrease in the incidence rates. In the total population, the age-standardized incidence of first hip fractures declined by approximately 20 % from 5.6 to 4.6 fractures per 1,000 person-years in men and from 8.9 to 6.6 fractures per 1,000 person-years in women. Moreover, in this study, we see also a decrease in the number of patients with hip fractures in the total population. The

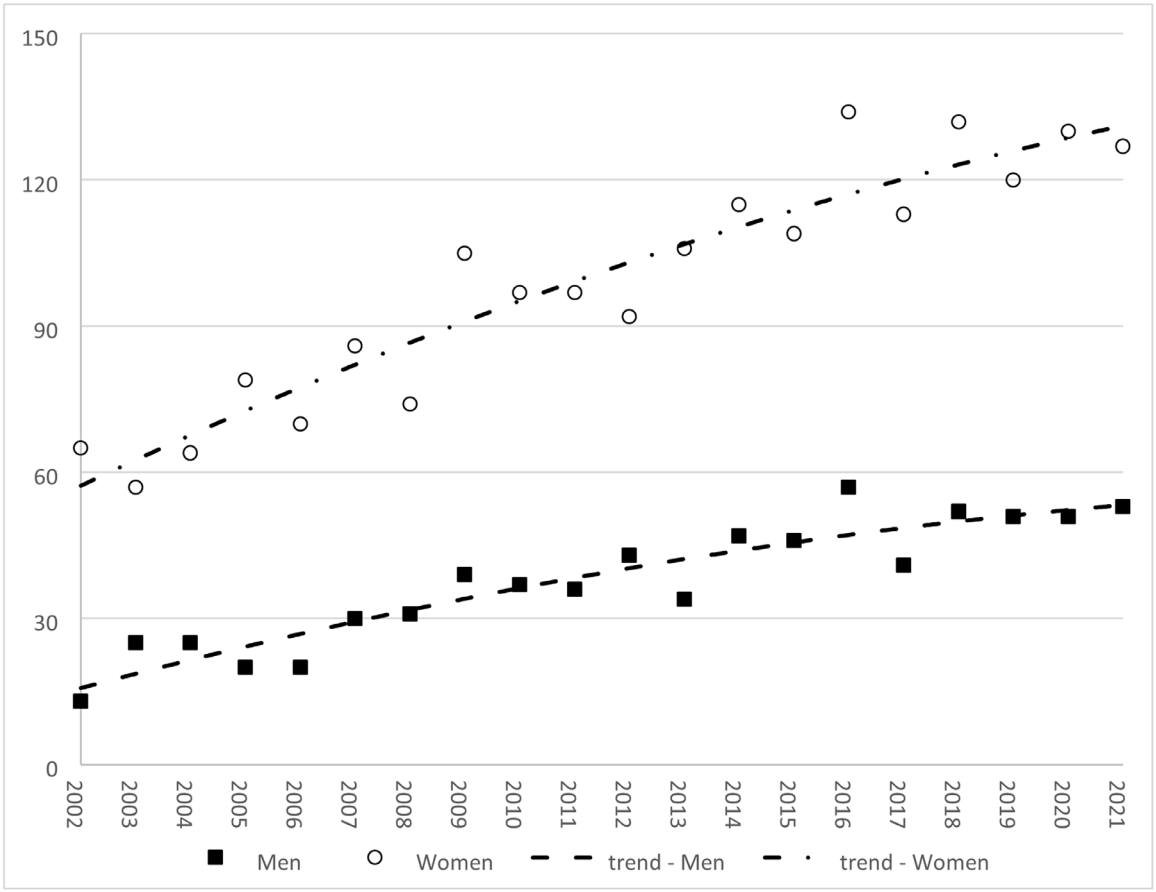

Fig. 4. The line of trend of hip fractures number in men and women.

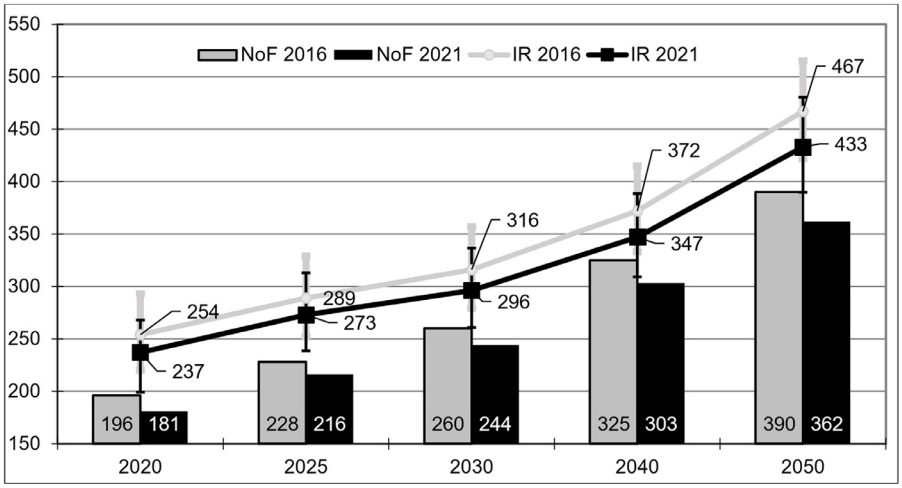

Fig. 5. The hip fracture projection in local study area to year 2050 for total population (number of fracture and incidence rate with 95 % CI). Comparison of previous estimations and the new ones - the value for 2020 in black bar was taken from Table 1. NoF – number of fractures (2016 – projection in 2016, 2021 – projection in 2021), IR – incidence rate (2016 – projection in 2016, 2021 – projection in 2021).

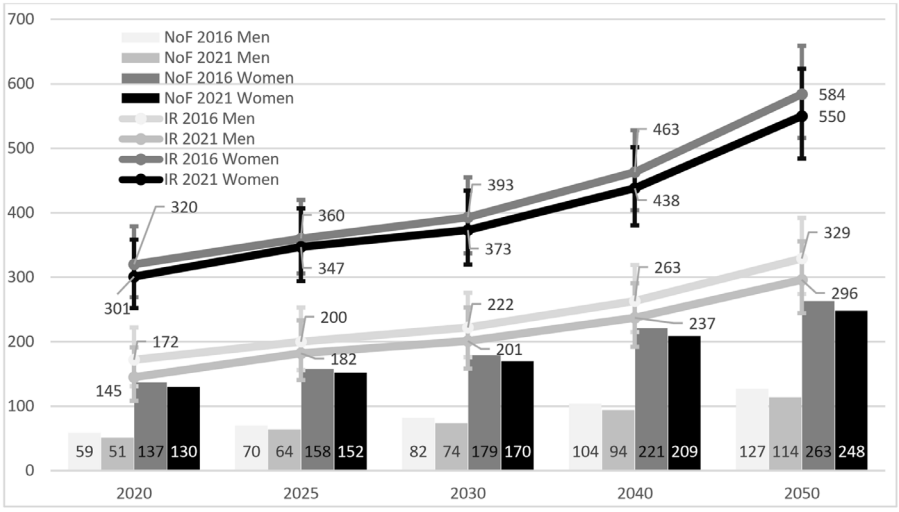

Fig. 6. The hip fracture projection in study area to year 2050 for total population (number of fracture and incidence rate with 95 % CI). Comparison of previous and new estimations for men and women - the value for 2020 in black and dark gray bar were taken from Table 1. NoF – number of fractures (2016 – projection in 2016, 2021 – projection in 2021), IR – incidence rate (2016 – projection in 2016, 2021 – projection in 2021).

total number of annual first hip fractures decreased by 16 % from 15,393 fractures in 1998 to 13,148 fractures in 2017, nevertheless, in the men population, there was a slight increase. Concluding, in those countries, except Sweden, we could observe that in the study period the number of patients with fractures increased significantly, which is normal in aging societies. This information is most important to persons responsible for the functioning of health care to not decrease the "orthopedic" beds. Fortunately, the increasing trend of the number of patients with hip fractures could be stopped as we can see in the example of Sweden.

It is also worth noting that this study has some limitations. Some persons from the studied area could suffer from hip fractures in the other part of the country and then the total number of fractures and the rates could be slightly underestimated. Furthermore, some patients could have not been hospitalized due to various reasons. This article was based only on the data from medical documentation. The information on modifying factors such as diet, physical activity, and fall rate was not available and was not taken into consideration.

Concluding, the number of fragility hip fractures in Polish men and women aged over 50 years in the study area increased. The epidemiological situation is still getting worse. Especially in fact of reduction of orthopedic beds and the aging population phenomenon (In 2010 there were 2,136 persons aged 18 and more for one orthopedic bed, whereas in 2020 the ratio increased to 2,893[13]). In the study area, preventive programs should be introduced as soon as possible to reverse the trend. The data for this study was obtained from a single hospital site, and may not reflect the situation at other hospital sites. This problem will be described in the next article as part of the HiPoL study.

Author contributions

Wilk Robert

1) conceived and designed the study;
2) performed the data collection;
3) analyzed and interpreted the data;
4) contributed reagents, materials, analysis tools or data;
5) wrote the paper

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2) contributed reagents, materials, analysis tools or data;
3) wrote the paper

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1) analyzed and interpreted the data;
2) wrote the paper

Statement of human and animal rights

This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent

For this type of study, formal consent is not required.

Declaration of competing interest

Robert Wilk, Piotr Adamczyk, Michał Skrzypek, Bogdan Koczy, and Wojciech Pluskiewicz declare that they have no conflict of interest. The authors have no relevant financial or non-financial interests to disclose.

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