MEDICAL SCIENCE MONITOR

PUBLIC HEALTH

e-ISSN 1643-3750
© Med Sci Monit, 2016; 22: 3967-3974
DOI: 10.12659/MSM.900902

Received: 2016.08.03
Accepted: 2016.10.04
Published: 2016.10.25

Incidence of Posttraumatic Shoulder Dislocation in Poland

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ABCDEF 1 Karol J. Szyluk
DF 1 Andrzej Jasiński
F 2 Michał Mielnik
DF 3 Bogdan Koczy

1 Department of Hand Surgery, District Hospital of Orthopedics and Trauma Surgery, Piekary Śląskie, Poland
2 Department of the Knee Surgery, Arthroscopy and Sports Traumatology, District Hospital of Orthopedics and Trauma Surgery, Piekary Śląskie, Poland
3 Department of Trauma and Orthopaedics, District Hospital of Orthopedics and Trauma Surgery, Piekary Śląskie, Poland

Corresponding Author: Karol J. Szyluk, e-mail: kszyluk@o2.pl
Source of support: Departmental sources

Background: The incidence of shoulder joint dislocation has been estimated at 11–26 per 100 000 population per year. In our opinion, basic epidemiological data need to be continually updated in studies of large populations. To study the incidence of posttraumatic dislocation of the shoulder joint in the Polish population.

Material/Methods: We retrospectively investigated the entire Polish population between 1 January 2010 and 1 January 2015. To identify the study group, data collected in the electronic database of the National Health Fund were used. The study group was divided into subgroups to detect possible differences in the incidence of shoulder dislocation with regard to age, sex, and season of the year (month) when the dislocation occurred.

Results: The cumulative size of the study sample was 192.72 million over the 5 years of the study. We identified 51 409 patients with first posttraumatic shoulder dislocation, at a mean age of 50.83 years (SD 21.12), from 0 to 104 years. The incidence of traumatic shoulder dislocations for the entire study group ranged from 24.75/100 000/year (number of posttraumatic shoulder dislocations per 100 000 persons per year) to 29.09/100 000/year, for a mean of 26.69/100 000/year.

Conclusions: In this study, the overall incidence of first-time posttraumatic shoulder dislocations in the Polish general population was 26.69 per 100 000 persons per year. These results are higher than estimates presented by other authors. It is necessary to study, regularly update, and monitor this problem in the general population.

MeSH Keywords: Incidence • Shoulder Dislocation • Shoulder Joint

Full-text PDF: http://www.medscimonit.com/abstract/index/idArt/900902

2439 3 4 16

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

Background

The shoulder joint is the most commonly dislocated joint in the human osteoarticular system [1–3]. This propensity for dislocation is associated with the exceptional structural and biomechanical features of the joint, which enable a wide range of motion and manipulative ability, but at the same make the shoulder joint prone to being dislocated [1,4,5]. The incidence of shoulder dislocations has been estimated at 11.2–26.2 per 100 000 population per year [6,7]. The available data thus reflect a significant discrepancy of such estimates. Still, few studies have been concerned with the incidence of shoulder joint dislocations in large populations. Some papers have targeted homogeneous groups, such as rugby players or military personnel [8–10]. In our opinion, basic epidemiological data need to be continually updated in studies of large populations. We also believe that deriving estimates of incidence from studies of homogeneous groups at high risk for dislocation may not reflect the actual magnitude of the problem. These assumptions prompted us to investigate the incidence of traumatic shoulder dislocation in the entire population of Poland. To our knowledge, no incidence studies of traumatic shoulder dislocation based on data from a group of this size have ever been published. Data from such a large sample may represent a significant contribution to the determination of basic epidemiological parameters concerned with dislocations of the shoulder joint.

Purpose

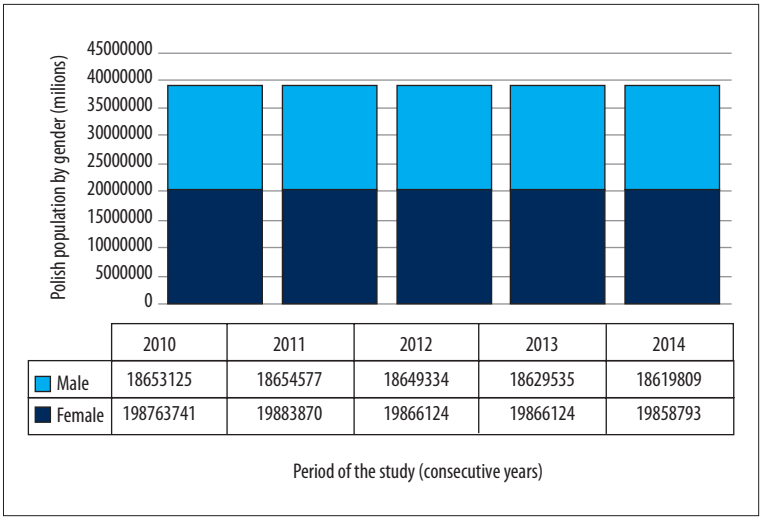
To study the incidence of traumatic dislocation of the shoulder joint in the Polish population.

Material and Methods

This is a retrospective study. The study design and the final report were submitted for review to an ethics committee, which fully acknowledged the compliance of the study with ethical principles and the applicable law. The study involved the entire Polish population between 1 January 2010 and 1 January 2015. The basic demographic indices of the population (overall size and size by age, sex, and age groups) in the study period were obtained from the publicly available database of the Central Statistical Office of Poland (GUS) [11], an official online government portal containing data on the population and distribution by sex and age.

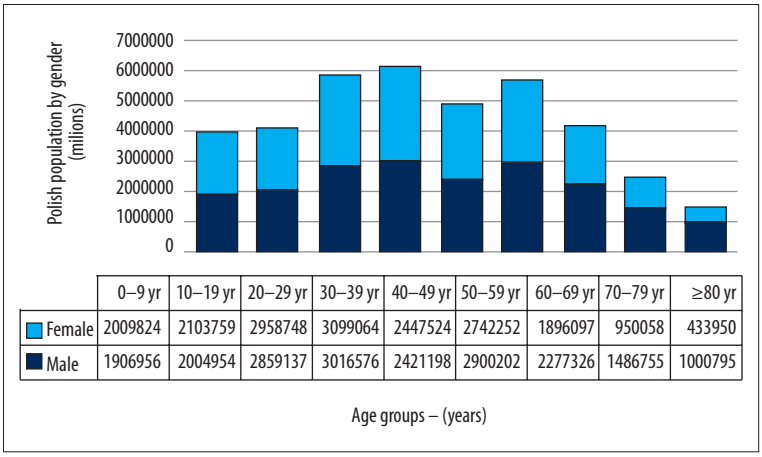
Inclusion criteria: patients with a diagnosis of shoulder dislocation made by a hospital emergency department physician that was coded and recorded in the database of the National Health Fund according to the International Statistical Classification of Diseases and Related Health Problems (ICD 10) – S 43.0 (Version applied in Poland during the study period) [12,13], only 1 dislocation event during the study period was included (any subsequent dislocation events in the same patient were treated as recurrences that might confound the results), patients with diagnosed all concomitant injuries including fractures, only Polish citizens permanently residing in Poland were enrolled. *Exclusion criteria:* no diagnosis or appropriate (ICD10-compliant) coding of shoulder dislocation, all "duplicating" shoulder dislocation events in the same patient were regarded as recurrences, patients who were not residents of Poland were excluded from the study. In order to identify the group of patients with first-time traumatic shoulder joint dislocations suffered in Poland in the individual years of the study period, we used de-individualized data collected in the electronic database of the National Health Fund in keeping with the applicable legal provisions regarding the protection of personal data in Poland. Records were extracted if they contained a diagnosis of shoulder dislocation made at a hospital emergency department and coded in an ICD 10-compliant manner. Each patient was assigned a unique technical identifier representing a combination of digits that precluded any possibility of personal identification of the patient. Each technical identifier could appear only once in the dataset in the study period. All repeat visits to hospital emergency departments with a diagnosis of shoulder dislocations were rejected. The resultant group comprised patients who presented at a hospital emergency department on account of a shoulder dislocation only once over the 4 years of the study. This allowed for excluding multiple-visit patients (i.e., those with recurrent shoulder dislocation). Patients with known shoulder joint instability were also excluded on the basis of an earlier ICD 10 diagnosis. Thus, we ultimately obtained a group of patients diagnosed with their first-ever traumatic shoulder dislocation. The basic demographic parameters were used to present differences in the incidence of shoulder dislocation with regard to age (10-year age spans), sex, and season of the year (month). On the basis of our data, the count and frequency of traumatic shoulder dislocations in the study period were determined for the entire Polish population. Further analyses were conducted using basic demographic indices as described above. Incidence rates (the number of new dislocation events per 100,000 population registered in 1 year) were then calculated for each year of study and a mean value was calculated to obtain incidence figures for the entire period of study. Histograms of patient age at first dislocation showed that, despite the large sample sizes, the distributions were considerably different from the normal distribution. Accordingly, the non-parametric Mann-Whitney U test was used to confirm sex-related differences. For the same reason, medians are provided alongside mean values. The non-parametric Kruskal-Wallis test was used to detect any differences in incidence within the study's time frame. The confidence level was set at $p<0.05$.

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]



	2010	2011	2012	2013	2014
Male	18653125	18654577	18649334	18629535	18619809
Female	198763741	19883870	19866124	19866124	19858793

Figure 1. Polish population by sex in consecutive years of the study.



	0–9 yr	10–19 yr	20–29 yr	30–39 yr	40–49 yr	50–59 yr	60–69 yr	70–79 yr	≥80 yr
Female	2009824	2103759	2958748	3099064	2447524	2742252	1896097	950058	433950
Male	1906956	2004954	2859137	3016576	2421198	2900202	2277326	1486755	1000795

Figure 2. Polish population by age groups.

Results

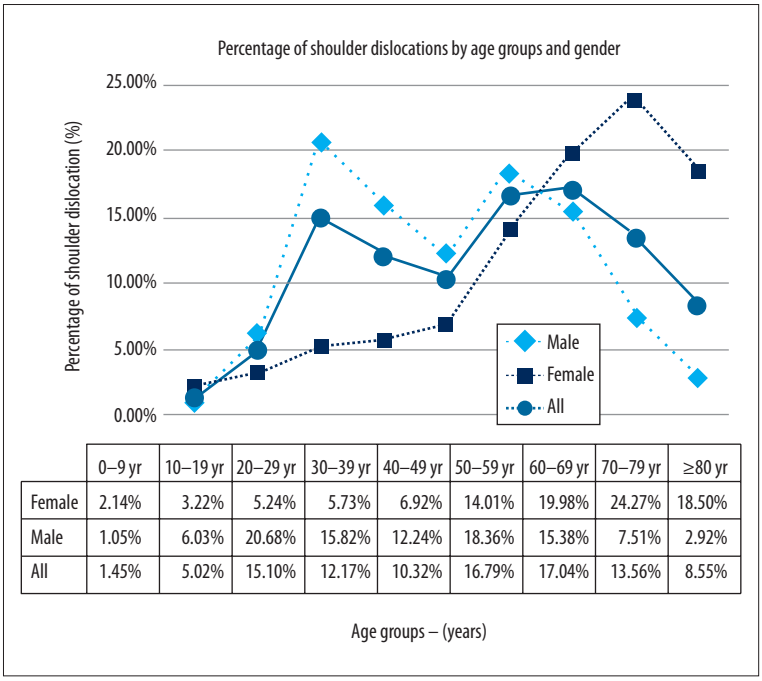
According to Central Statistical Office of Poland data, the Polish population in the study period (December 31, 2009 – January 1, 2015) numbered from 38 478 602 individuals in 2014 to 38 538 447 in 2011, for a mean count of 38 538 447 individuals. The analysis was concerned with basic demographic data (population size and sex- and age-based distribution of the population). No significant differences or trends of change in the size of the Polish population were identified with regard to these parameters for the consecutive years of study. Consequently, our study group was analyzed as a 5-year cumulative sample of 192.72 million individuals. The detailed demographic data for the Polish population, including distribution of the population size according to gender and the designated age spans, are presented in Figures 1 and 2. Analysis of the National Health Fund data identified a group of 51 409 patients meeting the inclusion criteria and not meeting the exclusion criteria, including 32 829 (63.85%) males and 18 580 (36.15%) females. The number of dislocation events in the designated age groups was counted in the male and female subpopulations and the entire population in the consecutive years of study for the designated age groups (Table 1). The age of the patients at their first-time shoulder dislocation ranged from 0 to 104 years in the entire population, for a mean age of 50.83 years (SD 21.12). For females, the age range was 0–104 years (SD 20.75), and for males it was 0–99 years (SD 18.89). The mean age at first traumatic shoulder dislocation in males was significantly lower (p=0.00) than in females. Analysis of dislocation count per gender and age group (Figure 3) showed the highest dislocation counts among 60–69-year-olds in women and among 20–29-year-olds in men. With regard to the entire population, the highest count of first-time traumatic shoulder dislocations was noted in the 60–69 age group (Figure 3). Annual incidence figures for the entire group of 51 509 patients ranged from 24.75/100 000/year to 29.09/100 000/year, for a mean of 26.69/100 000/year (SD 1.66). For women, the annual figures ranged from 17.5/100 000/year to 20.9/100 000/year, for a mean of 18.7/100 000/year (SD 1.33), and for men the range was from 32.5/100 000/year to 37.8/100 000/year, for a mean of 35.2/100 000/year (SD 2.1). Analysis of the incidence of shoulder joint dislocation per gender and age group (Figure 4)

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

Table 1. Breakdown of demographic data of the study group by age group and sex in consecutive years of the study.

Age groups (years)	2010 year			2011 year			2012 year			2013 year			2014 year		
	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total
0–9 yr	81*	74	155	77	69	146	85	69	154	74	68	142	81	65	146
10–19 yr	128	482	610	134	431	565	117	358	475	127	383	510	92	327	419
20–29 yr	229	1450	1679	203	1423	1626	184	1426	1610	194	1202	1396	164	1287	1451
30–39 yr	230	1061	1291	205	1061	1266	233	1043	1276	206	1026	1232	190	1004	1194
40–49 yr	269	889	1158	295	809	1104	238	817	1055	232	733	965	251	771	1022
50–59 yr	640	1385	2025	540	1317	1857	505	1148	1653	484	1072	1556	434	1105	1539
60–69 yr	811	994	1805	728	987	1715	696	1034	1730	728	938	1666	749	1097	1846
70–79 yr	1074	519	1593	908	550	1458	876	450	1326	797	443	1240	854	502	1356
≥80	699	192	891	643	206	849	705	190	895	640	183	823	750	189	939
Total	**4161**	**7046**	**11207**	**3733**	**6853**	**10586**	**3639**	**6535**	**10174**	**3482**	**6048**	**9530**	**3565**	**6347**	**9912**

* Numer of dislocations.



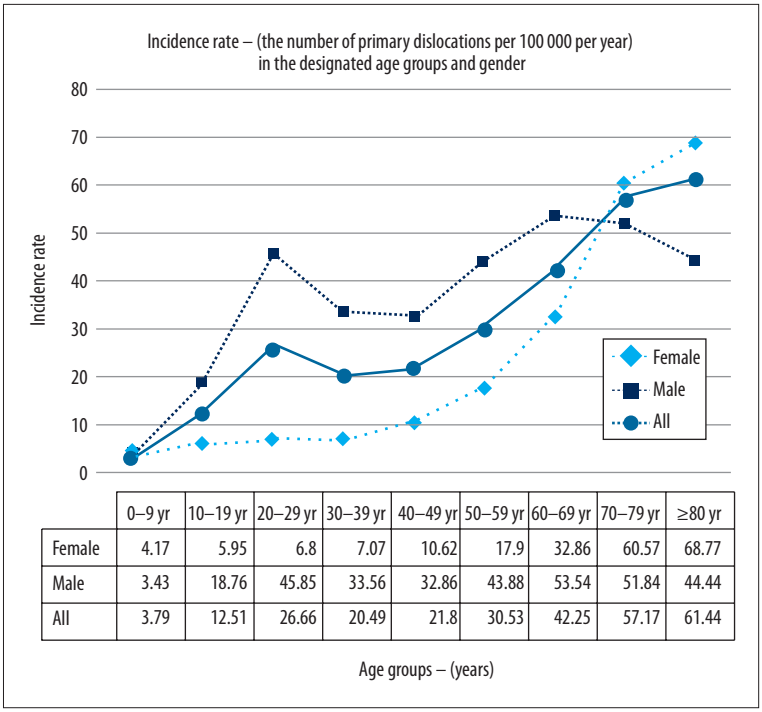
	0–9 yr	10–19 yr	20–29 yr	30–39 yr	40–49 yr	50–59 yr	60–69 yr	70–79 yr	≥80 yr
Female	2.14%	3.22%	5.24%	5.73%	6.92%	14.01%	19.98%	24.27%	18.50%
Male	1.05%	6.03%	20.68%	15.82%	12.24%	18.36%	15.38%	7.51%	2.92%
All	1.45%	5.02%	15.10%	12.17%	10.32%	16.79%	17.04%	13.56%	8.55%

Figure 3. Percentage of shoulder dislocations in the designated age groups and by sex, and in the entire population during the entire study period.

showed the highest incidence rate among women older than 80 years, and among 60–69-year-olds in men. With regard to the entire population, the highest incidence rate of traumatic shoulder dislocations was noted in the 80 years and older age group (Figure 4). The detailed data on incidence for the entire study period can be found in Table 2. There were no significant differences in incidence between individual years of study with regard to the entire group (p=0.91) as well as with regard to the female (p=0.63) and male (p=0.96) subgroups.

Analysis of incidence of traumatic shoulder dislocations per season of the year revealed a statistically significant correlation between month and season of the year and the count of shoulder dislocations (r=0.47, p=0.00005), with dislocations occurring most commonly in winter (13.75%), including a peak in January (5.15%), and least often in autumn (12.41%), with a nadir in November (3.79%).

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]



	0–9 yr	10–19 yr	20–29 yr	30–39 yr	40–49 yr	50–59 yr	60–69 yr	70–79 yr	≥80 yr
Female	4.17	5.95	6.8	7.07	10.62	17.9	32.86	60.57	68.77
Male	3.43	18.76	45.85	33.56	32.86	43.88	53.54	51.84	44.44
All	3.79	12.51	26.66	20.49	21.8	30.53	42.25	57.17	61.44

Figure 4. Incidence in the designated age groups by sex and in the entire study population (mean of annual incidence figures).

Table 2. Incidence in the designated age groups among females, males and the entire population in individual years of study.

Age groups (years)	2010 year			2011 year			2012 year			2013 year			2014 year		
	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total
0–9 yr	4.30*	3.73	4.01	4.06	3.46	3.75	4.45	3.43	3.92	3.86	3.36	3.60	4.21	3.20	3.69
10–19 yr	5.94	21.36	13.83	6.47	19.85	13.32	5.86	17.09	11.61	6.58	18.91	12.89	4.91	16.59	10.90
20–29 yr	7.61	46.66	27.45	6.87	46.53	27.03	6.40	47.90	27.50	6.99	41.79	24.70	6.13	46.39	26.62
30–39 yr	7.91	35.51	21.90	6.92	34.86	21.08	7.71	33.61	20.84	6.69	32.45	19.75	6.10	31.38	18.91
40–49 yr	11.15	36.50	23.89	12.30	33.39	22.89	9.89	33.59	21.80	9.56	29.87	19.78	10.19	30.92	20.62
50–59 yr	21.24	48.87	34.63	18.20	47.06	32.21	17.37	41.76	29.22	17.03	39.79	28.11	15.66	41.93	28.47
60–69 yr	39.90	59.19	48.63	33.88	55.36	43.62	30.58	54.56	41.47	30.29	46.74	37.78	29.65	51.83	39.76
70–79 yr	70.10	53.48	63.65	60.02	57.16	58.91	59.06	47.49	54.55	54.52	47.23	51.67	59.15	53.85	57.07
≥80	75.03	48.44	67.09	66.17	49.22	61.07	70.03	43.52	62.01	62.02	40.56	55.49	70.63	40.46	61.41
Total	**20.93**	**37.77**	**29.09**	**18.77**	**36.74**	**27.47**	**18.30**	**35.04**	**26.40**	**17.53**	**32.46**	**24.76**	**17.95**	**34.09**	**25.76**

* Incidence rate – the number of primary posttraumatic dislocations per 100,000 population per year.

Discussion

This paper is concerned with incidence figures. Incidence is a very important measure of a population's health needs because it allows for monitoring changes in the occurrence of a disease over time in all members of the population, making it possible to plot the changes on a timeline and assess the significance of a given medical condition. Certainly, the value of descriptive and analytical data pertaining to incidence increases as the size of the study population grows. To our knowledge, this is the first study of such a large sample, with a cumulative sample size of 192.72 million over the 5 years of study. Our analysis relies on the acquisition of direct data covering an entire population, which is of immense importance with regard to reliability of the findings, rather than extrapolating data from a random sample to the entire population, which might distort

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

Table 3. Comparison of present study results with available data from literature.

	Simonet et al., 1984	Krøner et al., 1989	Nordqvist and Petersson, 1995	Zacchilli and Owens, 2010	Liavaag et al., 2011	Current study
Population selection	Olmsted MN (rural)	Denmark (urban)	Malmo, Sweden (Urban)	NEISS Sample (United states population)	Norway Oslo (urban)	Poland, Entire population
Group selection	All traumatic dislocations	None	First-time traumatic dislocations	Probability sample (model)	All traumatic dislocation	First-time traumatic dislocations
Population	880,000	1,268,765 (milion)	230,056	1.46 billion (model)	575,475	192.72 (milion)
Study period (years)	1970–1979 10 yr	1980-1984 5 yr	1987 1 yr	2002–2006 5 yr	2009 1 yr	2010–2014 5 yr
Mean age (years)	36.4 yr	51 yr	Male 44 yr Female 63 yr	35.4	Median 34	Male 44.83 Female 61.33
All dislocations (n)	124	216	55	8940 349,486 (model)	324	51,409
Male population (%)	66.7%	53.3%	53%	71.8%	72.4%	63.85%
Female population (%)	33.3%	46.7%	47%	18.2%	27.6%	36.15%
Incidence rate*, all dislocations	11.2	17	----------	23.9	56.3	----------
First-time dislocations	8.2 (all genders)	12.3 (both genders)	23.9	----------	26.2	26.69 (first time)
Male incidence rate	11.2 (all dislocations)	9.1	27	34.9	82.2 (all dislocations) 34.8 (first-time)	35.2
Female incidence rate	5.0 (all dislocations)	8.0	22	13.3	30.9 17.9 (first-time)	18.7 (first time)
Peak of incidence, all group	20–29 (13)	NR	>65	20–29 (47.8)	>80 (first-time) 20–29 (all dislocations)	≥80 yr. (61.41) (first time)
Peak of incidence, males	20–29 (23.4)	21-30	>65 (43)	20–29 (79.2)	>80 (first-time) 20–29 (all dislocations)	60–69 (53.54)
Peak of incidence, females	>60 (15.5)	61-80	>65 (53)	80–89 (38.8)	>80 (first-time) >80 (all dislocations)	>80 (68.77)

* Incidence rate – the number of dislocations per 100 000 person per year.

the results. All study participants lived on the territory of Poland, which is a country situated in a single time zone and a single climate zone (temperate). The duration of the study, which is another criterion required for an analysis of incidence, was 5 years. The analysis addressed 3 basic questions that characterize a population, namely *Who? Where?* and *When?* Our study did not focus on a particular selected group of patients, such as military personnel, as studied by Owens in a study of the population of a military academy showing an incidence rate of 290 dislocations per 100 000 person-years, or collision athletes, studied by Bohu, who reported an incidence of 190/100 000/year [8,9]. We believe that such sample selection cannot

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

be representative for an entire population as soldiers and athletes are groups at higher risk of traumatic dislocations of the shoulder joint, which distorts study results and may not be extrapolated to the entire population. Our study adopted no age limits; only age spans were used to better characterize incidence across the study population. This methodology made it possible to investigate the entire spectrum of the study population. Our results differ substantially from data presented by some other authors (Table 3). The mean incidence of first-time traumatic shoulder dislocations in the Polish population was 26.69/100 000/year (SD 1.66). Simonet reported a rate of 11.2/100 000/year for all dislocations, while Koroner reported a figure of 12.3/100 000/year for first-time traumatic dislocations [6,14]. Both these figures are more than 2-fold lower than ours. The most similar estimates can be found in Liavaag [7]. The differences between our data and the results given by Simonet are, in our opinion, due to lifestyle changes since 1970 and the fact that Simonet's study evaluated only 1 town (Olmsted, Minnesota, USA), making it rather likely that the sample was not representative. Similar factors might explain the differences between our results and Krøner's [6,14]. The convergence of our data and those reported by Liavaag may be due to the characteristics of the study population and the methodology, because Oslo, the capital of Norway, is a big city with its population showing considerable diversification with regard to the level of physical activity and age. Liavaag's study was also a direct investigation that used no extrapolation of results and the data were obtained in 2009, which fits in well with the study period in our investigation. Moreover, the population of Oslo accounts for approximately 10% of the entire population of Norway, which was slightly above 5 million in 2009 [7]. Accordingly, the sample used in the Oslo study appears to be more representative than the data presented by Simonet for the USA, which had a population of over 200 million in the 1970s. These methodological considerations associated with the characteristics of the respective study populations (population size) and representativeness of the sample underlie, we believe, the differences and similarities between the results of those studies and ours [6,7]. In our study, peak incidence was noted between the ages of 60 and 69 years among males and after the age of 80 among females, which was again considerably different from the data reported by Simonet [6], Krøner [14], and Zacchilli [15]. Differences were particularly evident with regard to males, and the other authors reported peak incidence for males in the 3rd decade of life. At the same time, Nordqvist [16] and Liavaag [7] report similar periods for peak incidence of traumatic shoulder dislocation, which is due to the fact that they were concerned with first-ever dislocation events. Analysis of incidence figures in particular months of the year shows a significantly higher incidence in the winter months, with a peak in January, when it is winter in the Northern Hemisphere and the risk of slipping or stumbling over something and falling incidents leading to shoulder injuries, including dislocations, is higher. This is especially true of less physically able individuals possessing poorer co-ordination skills, which, in our opinion, explains these statistically significant differences. The results of our study, and, in particular, the differences between our results and literature data, confirm the importance of continuous investigation of incidence of shoulder dislocations. The discrepancies between our data and literature reports resulted in a discussion. We still see the need to analyze basic indices of population health. At the same time, we see limitations in using such a large sample, and primarily the inability to study in detail a larger set of variables, such as activity level, type of occupation, and type of sport practised. Hence, we see room in subsequent publications for analyzing the causes and describing basic indices of shoulder dislocation recurrences on the basis of direct data, as in this paper, and also by extrapolating detailed data from a representative sample onto an entire population.

Conclusions

In this study the overall incidence of first-time traumatic shoulder dislocations in the Polish general population was 26.69 per 100 000 persons per year. This result indicates a higher incidence rate than the findings of other authors, but our sample was larger than those in other papers and is more representative. It is necessary to study changes in the incidence of shoulder joint dislocation over time with regular updates and to monitor this problem in the general population to make our understanding more accurate.

Conflicts of interest

No conflicts of interest.

References:

1. Doshi D, Firke R: A new patient-controlled technique for shoulder relocation in emergency departments. Am J Case Rep, 2014; 15: 485–87
2. Kazar B, Relovszky E: Prognosis of primary dislocation of the shoulder. Acta Orthop Scand, 1969; 40: 216–24
3. Hovelius L: The natural history of primary anterior dislocation of the shoulder in the young. J Orthop Sci, 1999; 4: 307–17
4. Chant CB, Litchfield R, Griffin S, Thain LM: Humeral head retroversion in competitive baseball players and its relationship to glenohumeral rotation range of motion. J Orthop Sports Phys Ther, 2007; 37(9): 514–20
5. Bergin D: Imaging shoulder instability in the athlete. Magn Reson Imaging Clin N Am, 2009; 17(4): 595–615
6. Simonet WT, Melton LJ 3rd, Cofield RH, Ilstrup DM: Incidence of anterior shoulder dislocation in Olmsted County, Minnesota. Clin Orthop Relat Res, 1984; 186: 186–91
7. Liavaag S, Svenningsen S, Reikerås O et al: The epidemiology of shoulder dislocations in Oslo. Scand J Med Sci Sports, 2011: 21: 334–40

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

8. Bohu Y, Klouche S, Lefevre N et al: The epidemiology of 1345 shoulder dislocations and subluxations in French Rugby Union players: A five-season prospective study from 2008 to 2013. Br J Sports Med 2015;49: 1535–40
9. Owens BD, Duffey ML, Nelson BJ et al: The incidence and characteristics of shoulder instability at the United States Military Academy. Am J Sports Med, 2007; 35: 1168–73
10. Owens BD, Dawson L, Burks R, Cameron KL: Incidence of shoulder dislocation in the United States military: Demographic considerations from a high-risk population. J Bone Joint Surg Am, 2009; 91: 791–96
11. *https://bdl.stat.gov.pl/BDL/start* [in Polish]
12. *http://www.nfz.gov.pl/* [in Polish]
13. *https://www.csioz.gov.pl/interoperacyjnosc/klasyfikacje/* [in Polish]
14. Krøner K, Lind T, Jensen J: The epidemiology of shoulder dislocations. Arch Orthop Trauma Surg, 1989; 108: 288–90
15. Zacchilli MA, Owens BD: Epidemiology of shoulder dislocations presenting to emergency departments in the United States. J Bone Joint Surg Am, 2010; 92(3): 542–49
16. Nordqvist A, Petersson CJ: Incidence and causes of shoulder girdle injuries in an urban population. J Shoulder Elbow Surg, 1995; 4: 107–12

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]