Available online at www.sciencedirect.com
ScienceDirect
journal homepage: http://www.elsevier.com/locate/pjnns

Original research article

Characteristics of hospitalizations due to acute stroke in the Silesian Province, Poland, between 2009 and 2015

Anna Starostka-Tatar [a], *Beata Łabuz-Roszak* [b,*], *Michał Skrzypek* [c], *Anetta Lasek-Bal* [d], *Mariusz Gąsior* [e], *Marek Gierlotka* [e]

[a] *Department of Neurology, Independent Public Clinical Hospital No. 1 in Zabrze, Medical University of Silesia, Katowice, Poland*
[b] *Department of Basic Medical Sciences, Faculty of Public Health, Medical University of Silesia, Katowice, Poland*
[c] *Department of Biostatistics, Faculty of Public Health, Medical University of Silesia, Katowice, Poland*
[d] *Department of Neurology, School of Health Sciences, Medical University of Silesia, Medical Centre of Upper Silesia, Katowice, Poland*
[e] *3rd Department of Cardiology, School of Medicine with the Division of Dentistry in Zabrze, Medical University of Silesia, Katowice, Silesian Center for Heart Diseases in Zabrze, Poland*

ARTICLE INFO

Article history:
Received 18 June 2017
Accepted 21 November 2017
Available online xxx

Keywords:
Stroke
Epidemiology
Incidence
In-hospital mortality

ABSTRACT

Introduction: The available data on acute stroke (AS) in Poland come mainly from non-representative cohorts or are outdated. Therefore, the current study was done to access the most recent data on AS in the industrial region that covers 12% (4.6 mln) of the country's population.

Objective: To evaluate the epidemiological data of AS in the Silesian Province, Poland.

Patients and methods: Analysis of the data from stroke questionnaires, obligatory for all patients hospitalized due to AS and administered by the only public health insurer in Poland (the National Health Fund) between 2009 and 2015 ($n = 81{,}193$).

Results: The annual number of hospitalizations due to AS in the analyzed period was between 239 and 259 per 100,000 inhabitants of the Silesian Province. Haemorrhagic stroke constituted 13.3%, ischaemic stroke – 85.5%, and unspecified stroke – 1.2%. The average age of patients was 71.6 ± 12.2 years (M 68.2 ± 11.9, F 74.8 ± 11.9, $P < 0.05$). The mean duration of hospitalization was 17 ± 16 days for haemorrhagic stroke, and 14 ± 11 days for ischaemic stroke. Large-artery atherosclerosis (36.1%) and cardioembolism (18.7%) constituted the main causes of ischaemic stroke. Overall hospital mortality for AS was 18% (haemorrhagic – 40.8%, ischaemic – 14.9%). A decreasing trend in mortality was observed in ischaemic but not in haemorrhagic stroke. In-hospital mortality was significantly higher in women than in men ($P < 0.05$).

* *Corresponding author at*: Katedra i Zakład Podstawowych Nauk Medycznych, Wydział Zdrowia Publicznego Śląskiego Uniwersytetu Medycznego, Ul. Piekarska 18, 41-902 Bytom, Poland.
E-mail addresses: annastarostka@wp.pl (A. Starostka-Tatar), broszak@sum.edu.pl (B. Łabuz-Roszak), mskrzypek@sum.edu.pl (M. Skrzypek), alasek@gcm.pl (A. Lasek-Bal), m.gasior@op.pl (M. Gąsior), m.gierlotka@sccs.pl (M. Gierlotka).
https://doi.org/10.1016/j.pjnns.2017.11.010

Please cite this article in press as: Starostka-Tatar A, et al. Characteristics of hospitalizations due to acute stroke in the Silesian Province, Poland, between 2009 and 2015. Neurol Neurochir Pol (2017), https://doi.org/10.1016/j.pjnns.2017.11.010

Conclusions: This comprehensive long-term analysis of the epidemiological situation related to AS in the industrial region of Poland should encourage further development of educational and treatment programmes for improvement in the health status of the population.

1. Introduction

Long-term epidemiological observations made in the US since the beginning of the 20th century have shown a gradual decrease in stroke incidence, initially in women and later in men, showing another increase in the 1980s (from 115 incidents/100,000 to 135 incidents/100,000). It was believed that the increase was due to the increasingly ageing population (new incidents in older age groups), civilization progress and wider availability of neuroimaging which led to higher detectability of minor strokes with a benign clinical course [1]. Similar research done in Europe also showed an increase in incidents of stroke in the elderly people [2,3].

In Poland, the first epidemiological research on stroke was conducted in the 1980s under the auspices of WHO MONICA [4] and 2.9 million individuals aged 34–64 were evaluated. The calculated indicators were negative for Poland and countries of the Eastern Europe. Another research, the Warsaw Stroke Registry, was done in Poland between 1991 and 1992 and it included 182,285 individuals (the standardized incidence rate for stroke was 149/100,000; including 177/100,000 for men and 126/100,000 for women) [5,6]. The subsequent epidemiological research (the Cracow Stroke Registry) was conducted by researchers from Cracow between 1999 and 2000, and stroke incidence rate was 218/100,000 in men and 152/100,000 in women [7].

Another research on stroke done as part of the Polish National Stroke Prevention and Treatment Registry between 2001 and 2002 was one of the biggest epidemiological research in Poland and involved 222 neurological units representing the majority of regions of the country. During the final analyses 8736 ischaemic stroke patients treated in 26 stroke units were evaluated [8]. The subsequent similar research, part of the National Programme for Prevention and Treatment of Cardiovascular Diseases POLKARD, was conducted up to 2009 [9].

Some of the reports concern the epidemiological situation related to stroke in certain cities, districts and provinces [10–16] (Table 1). However, no epidemiological research on stroke has been conducted for the Silesian Province, industrial region, which is the second largest province in Poland with 4,593,358 citizens i.e. nearly 12% of Poland's population.

The aim of this paper was to evaluate the epidemiological situation related to acute stroke (AS) – the incidence of hospitalized stroke, aetiology and in-hospital clinical course of stroke in the Silesian Province between 2009 and 2015.

2. Material and methods

The study was based on the data obtained from stroke questionnaires ($n = 88{,}425$) which were mandatorily reported to the National Health Fund (NHF; the only public health insurer in Poland) by all Silesian hospital departments where patients with AS were treated (homogeneous patient group – JGP – A48-A51), so data concerning stroke were based on hospital registry. The analyzed period was between 2009 and 2015. The research was done with the approval of the Silesian division of the NHF and the Consultant in Neurology for the Silesian Province.

The questionnaire data underwent analysis; incomplete or recurring data (e.g. recurring records of the same hospitalization) were not considered. Finally, 81,193 stroke questionnaires were enrolled for the analysis. Diagnosis of stroke was made according to the International Classification of Diseases version 10 (ICD-10): I60 – subarachnoid haemorrhage (SAH), I61 – intracerebral haemorrhage, I62 – other non-traumatic intracranial haemorrhage, I63 – ischaemic stroke, I64 – unspecified stroke.

The following data from the stroke questionnaires were used in the present study: age, sex, admission date, date of the first occurrence of stroke symptoms, date of death or discharge, number of hospitalization days, aetiology of ischaemic stroke (according to the Trial Org 10,172 in Acute Stroke Treatment – TOAST), clinical symptoms (i.e. consciousness disorders, hemiparesis/hemiplegia, speech disorders, sensory disorders, posterior circle syndrome). The questionnaires also included the information whether stroke was classified as first-ever-stroke. As a result, we were able to calculate the incidence of hospitalized stroke in the Silesian Province between 2009 and 2015.

According to the Bioethics Committee of the Medical University of Silesia, the study was not a medical experiment. Therefore, no approval of the Committee was required.

The statistical analysis was done using the statistical package SAS version 9.4 (SAS Institute Inc., Cary, NC). The level of statistical significance was set at $P < 0.05$.

The quantitative data were characterized using the mean (''X''), the standard deviation (SD), the median and the interquartile range ''R''. For nominal data the percentage values were used. To evaluate the difference between fractions, the significance test of difference was used. The correlation between the nominal variables was verified using the χ^2 test. The verification of the distribution of the variables and the agreement with the normal distribution were made using the Shapiro–Wilk test. The mean difference significance was verified using the Student's *t*-test for two groups and the ANOVA test for three or more groups. The consistency of the distribution was verified using the Mann–Whitney *U* test for groups and the Kruskal–Wallis test for skewed distributions. Multiple comparisons were made based on post hoc test results for variance analysis (ANOVA) and Kruskal–Wallis test with the Bonferroni correction to assess significance of the percentage difference in the case of two or more groups. The

Please cite this article in press as: Starostka-Tatar A, et al. Characteristics of hospitalizations due to acute stroke in the Silesian Province, Poland, between 2009 and 2015. Neurol Neurochir Pol (2017), https://doi.org/10.1016/j.pjnns.2017.11.010