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Ischemic stroke in general practice – risk factors, prognosis – prospective single center study

ANDRZEJ MOLISZ[1, B–F], PIOTR GUTKNECHT[1, B, D, E], BARTOSZ GABRIEL TRZECIAK[1, F], TOMASZ WINIARSKI[1, B], WALENTY NYKA[2, B, D], TOMASZ DZIUBICH[3, A, G], JANUSZ SIEBERT[1, A, C–G]

[1] Department of Family Medicine, Interuniversity Center for Cardiology, Medical University of Gdansk
[2] Department and Clinic of Neurology, Medical University of Gdansk
[3] Faculty of Electronics, Telecommunications and Informatics, Technology University of Gdansk

A – Study Design, **B** – Data Collection, **C** – Statistical Analysis, **D** – Data Interpretation, **E** – Manuscript Preparation, **F** – Literature Search, **G** – Funds Collection

Summary **Background.** Ischemic stroke is one of the leading causes of death and disability in Poland, in the European Union and in the United States. Awareness related to the risk factors, particularly the modifiable ones, is of crucial importance in general practice and may improve early and long-term prognoses.
Objectives. The aim of this study was to assess the risk factors and half-year survival rate in patients with ischemic stroke in the period 2011–2015.
Material and methods. The study involved 70 patients (30 women and 40 men) with ischemic stroke. The mean age of the patients was 71.4 ± 9.6 years (71.7 ± 10.8 years in women and 71.2 ± 8.6 in men). On the basis of an interview, physical examination and additional tests the risk factors of cardiovascular diseases were determined. Half-year survival data were obtained based on telephone surveys and the records of the Office of the Registrar of Vital Statistics.
Results. It was found that the most common risk factors were arterial hypertension, overweight states and obesity, dyslipidemia, coronary artery disease, atrial fibrillation and smoking (67.1%; 65.7%; 38.6%; 38.6%; 28.6%; 24.3%, respectively). 39 out of 47 patients with arterial hypertension (83.0%) took hypotensives, and out of 20 patients with atrial fibrillation only 9 patients (45%) took anticoagulants. The half-year survival rate was 84.3% (59 survivors). 3 patients died in hospital (in the first week after stroke) and 8 patients died following hospital discharge, during ambulatory treatment.
Conclusions. The risk of death is highest during the first 3 months after an ischemic stroke episode. The general practitioner plays a central role in the prevention of ischemic stroke.
Key words: risk factors, prognosis, stroke, family physician.

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Background

Ischemic stroke is one of the most common causes of death and disability in Poland, in the European Union and the United States [1, 2]. The non-modifiable risk factors in include: age (over 55 years), male gender, black race and genetic factors [3–5]. On the basis of INTERSTROKE, a multicenter study, the 5 most significant modifiable risk factors were established: arterial hypertension, smoking, obesity, inappropriate diet, and lack of physical activity, and 5 less significant factors: diabetes, alcohol abuse, stress and depression, cardiac diseases and dyslipidemia [6, 7]. Other authors consider carotid artery stenosis of more than 60% and atrial fibrillation as modifiable risk factors, and at the same time they treat obesity, low physical activity and alcohol abuse as only probable risk factors [5]. Among the other probable risk factors there are also the following: ischemic heart disease, heart defects, myocardial infarction, history of stroke, migraine and positive family history [3–5].

Despite the observed decrease in mortality related to ischemic stroke, it still remains a significant cause of death. Research has shown that a decrease in mortality is of an actual nature and it is not related to mortality increase due to other diseases. In the past years stroke-related mortality fell in the US from the third leading cause of death to the fourth, and chronic lower respiratory diseases changed from the 4th to the 3rd [8]. This is mainly associated with the fact that modern therapy for stroke patients is combined with more successful disease prevention. In the light of the available research a detailed analysis and monitoring of stroke-related risk factors of primary medical care patients appears to be of particular significance.

Objectives

The aim of the study was to evaluate the risk factors and 6-month survival of patients with ischemic stroke in the period 2011–2015. Due to the varied incidence of risk factors the analysis was performed independently for men and women.

Material and methods

The study involved 70 patients (30 women and 40 men) with diagnosed ischemic stroke, treated at the neurological department with tertiary referral. In all patients the diagnosis was confirmed by a neurologist in a computerized tomography scan of the head on the first day after the stroke. The exclusion criterion was an uncertain diagnosis (e.g.

no confirmation in a neuroimaging scan). The mean age of the patients was 71.4 ± 9.6 years, 71.7 ± 10.8 years for women and 71.2 ± 8.6 for men (in the Shapiro–Wilk test there was no basis to refute the hypothesis of a similarity between *age* variable and normal distribution in the study group and in the groups of women and men). The location in the left or right hemispheres was dominant (37 and 30 patients respectively), in 2 patients the stroke affected the solid posterior structures of the skull, and in 1 person the location was bilateral. Thrombolytic therapy was applied in 3 patients (alteplase). Based on medical history, physical examination and additional tests, the risk factors of cardiovascular diseases were determined. Half-year survival data were obtained based on telephone surveys and the records of the Office of the Registrar of Vital Statistics. The study was approved by the Independent Bioethical Committee for Scientific Research at the Medical University of Gdańsk, no. NKBBN/51/2010 of 30th March 2010.

Results

The results are presented in Table 1. The *p* coefficient shows a comparison of the frequency of risk factors depending on gender using the χ^2 Pearson test. The half-year survival curve is shown in Figure 1.

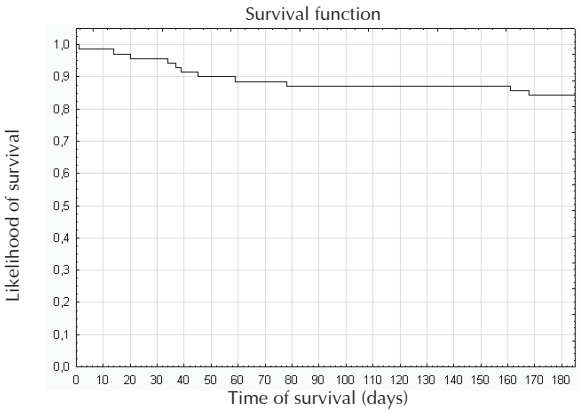

Figure 1. The half-year survival curve (180 days) of 70 ischemic stroke patients. The abscissa axis represents the number of days after stroke.

Discussion

Epidemiology and prognosis regarding ischemic stroke patients were subjected to the multicenter INTERSTROKE study, as well as many other minor analyses [3–7]. In our study material the most frequent risk factor of ischemic stroke is hypertension (67.1%). Its frequency in the presented population is significantly higher than in the general population, which may be associated with the patients' advanced age [9–11]. It is also a very similar value to the one presented in the INTERSTROKE study (66%), in which hypertension is identified as one of the five most important modifiable risk factors [6, 7]. Of particular interest is the fact that 8 out of 47 patients with hypertension (17%) were not pharmacologically treated. Thus, the role of the GP concerning regular monitoring of blood pressure, particularly in patients with other risk factors, appears to be of particular importance.

In our study material overweight states and obesity were found in 65.7% of the patients. This number is higher than in the general population of Poland [11, 12]. A similar result was obtained by Babicz-Zielońska et al. in a group of primary medical care patients [13]. In the INTERSTROKE study overweight states and obesity were found in 43% of the patients. This may result from the other adopted diagnostic criteria: *Waist-Hip Ratio* (WHR; waist circumference in relation to hip circumference) in the INTERSTROKE study, *Body Mass Index* (BMI) in our study.

It is noteworthy that frequency of dyslipidemia is rather low (38.6%) [14]. In the INTERSTROKE study lipid metabolism disorders were monitored using the apoB/apoA1 ratio, confirming the disorder in 49% of the patients. In the presented analysis we considered both the frequency of hypercholesterolemia and hypertriglyceridemia, as well as mixed hyperlipidemia and a low HDL concentration.

Cardiovascular diseases, including coronary disease, atrial fibrillation, cardiac failure and diseases of carotid arteries are present in our analysis more frequently than in the general population [9, 11]. Of particular importance is well-documented importance is, which increases the risk of stroke five-fold [15]. It is noteworthy that in the study group almost half of the patients with atrial fibrillation did not take anticoagulant treatment before the stroke. Zehnder et al. indicated the commonness of the issue of antithrombotic

Table 1. Ischemic stroke risk factors stratified by gender

Risk factors	Occurrence in % (figure in brackets indicates the number of patients)			Coefficient *p* (*a* = 0.05)
	Total (*n* = 70)	Women (*n* = 30)	Men (*n* = 40)	
Hypertension; including treatment with hypotensive drugs	67.1 (47) 55.7 (39)	80.0 (24) 66.7 (20)	57.5 (23) 47.5 (19)	0.100 0.100
Overweight states and obesity (BMI ≥ 25.0)	65.7 (46)	66.7 (20)	65.0 (26)	0.884
Lipid metabolism disorders (diagnosed in accordance with ESC guidelines)	38.6 (27)	46.7 (14)	32.5 (13)	0.221
Coronary disease	38.6 (27)	40.0 (12)	37.5 (15)	0.656
Atrial fibrillation including anticoagulation therapy	28.6 (20) 12.9 (9)	36.7 (11) 16.7 (5)	22.5 (9) 10.0 (4)	0.068 0.964
Nicotinism History of smoking (more than 2 years)	24.3 (17) 12.9 (9)	13.3 (4) 6.7 (2)	32.5 (13) 17.5 (7)	0.083 0.083
Diabetes	21.4 (15)	20.0 (6)	22.5 (9)	0.491
Cardiac failure	18.6 (13)	16.7 (5)	20.0 (8)	0.697
Renal diseases (chronic kidney disease, renal artery stenosis)	10.0 (7)	6.7 (2)	12.5 (5)	0.721
Carotid artery stenosis (based on the Doppler US)	10.0 (7)	10.0 (3)	10.0 (4)	0.691
Deep vein thrombosis and pulmonary embolism	2.9 (2)	3.3 (1)	2.5 (1)	0.806

therapy negligence, and estimated a decline in stroke numbers by 7.4% per year, provided that this treatment was conducted in accordance with the guidelines [16]. In the case of patients with atrial fibrillation it is advocated to employ the CHA2DS2-VASc scale [17]. The role of the GP should involve regular monitoring of the coagulation system and heart rhythm, taking into account ECG records and Holter ECG. No statistical differences were found regarding the frequency of the risk factors related to gender.

Siebert et al., in a study published in 2012, proved the significance of hemodynamic changes in the long-term prognosis in a group of 45 ischemic stroke patients [18]. In our group of 70 patients half-year mortality was 15.7%. The majority of deaths (8 of 11, 72.7%) occurred in the period of ambulatory care, after hospital discharge. The survival curve indicates that the first 3 months are the period of the greatest risk of death. A similar observation was described by Syta-Krzyżanowska et al. in 2013 [19]. The authors stressed that there is a risk of another cerebral ischemic event in the whole post-stroke period [20]. The rules of ischemic stroke prevention are presented in the detailed guidelines of AHA/ASA [21].

Study limitation

The low number of patients may impede the generalization of conclusions. Moreover, the fact that the patients are from the same center negatively affects the epidemiological value of the study. The possible differences in relation to other studies and centers are discussed above. Another limitation of the study is the lack of information related to the cause of deaths after stroke. We have presented the trend of mortality in the first 6 months after stroke, but the lacking data impedes the proper interpretation of the results. This paper may be treated as a general presentation of the commonness of ischemic stroke risk factors and the GP's potential role in their control, and not as a broad epidemiological analysis.

Conclusions

The conducted study indicates that the first 3 months after discharge from the stroke ward is the period of the highest mortality. Close cooperation between the GP, neurologist and cardiologist appears to be of crucial importance, particularly in this period.

The confirmed high frequency of certain risk factors in stroke patients stresses the significance of primary and secondary prevention. Our study indicates that a significant percentage of patients do not follow medical recommendations, such as hypotensive and anticoagulant drugs. Therefore, the GP should also perform an educational role. Particular care needs to be taken with regard to the observation of medical recommendations, including the usage of prescribed medications.

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Address for correspondence:
Andrzej Molisz, MD
Katedra Medycyny Rodzinnej GUM
ul. Dębinki 2
80-211 Gdańsk
Polska
Tel.: +48 58 349-15-75
E-mail: amol@gumed.edu.pl

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