DISTRIBUTION OF VASCULAR RISK FACTORS IN BRAŞOV STROKE REGISTRY

M. MOARCĂŞ[1]   M. BUSTAN[1]   R. MIRCEA[1]
M. TECĂU[1]   O. FALUP-PECURARIU[2]
R. CHIPERI[1]   V. MONESCU[2]
C. FALUP-PECURARIU[1,2]

Abstract: *As stroke remains one of the main causes of mortality worldwide, knowing the risk factors for stroke facilitates the implementation of prevention programs. We studied the distribution of risk factors for stroke in the population included in Brasov Stroke Registry. We included 119 cases in the present study. The most prevalent risk factor was arterial hypertension, followed by diabetes mellitus, atrial fibrillation, and coronary heart disease. Cardiovascular, but also metabolically risk factors were frequent in the population we studied.*

Key words: *stroke, risk factors, arterial hypertension, atrial fibrillation.*

1. Introduction

From epidemiologically point of view it is important to know stroke risk factors and various possibilities to influence them through prevention programmes. Risk factors for the first stroke can be divided into three categories: unmodifiable, well documented modifiable and potentially modifiable risk factors [1], [3, 4], [8], [10], [12], [20], [23], [27].

2. Purpose

The aim of this paper is to present distribution of risk factors for stroke that were identified in Brasov Stroke Registry.

3. Material and methods

We used a part the data from Brasov Stroke Registry, which is conducted in Clinical Neurology Department from Emergency University County Hospital Braşov in order to collect data systematically. We included 119 cases with stroke in the present study.

4. Results

About a quarter of the patients we studied had atrial fibrillation, which is an important risk factor for ischemic stroke (Fig. 1). All the patients with atrial fibrillation suffered ischemic stroke. About a fifth of the female cases with atrial

[1] Emergency University County Hospital Braşov, România.
[2] *Transilvania* University of Braşov, România.

fibrillation and a sixth of the male cases with atrial fibrillation had the arrhythmia diagnosed during the hospital admission for stroke.
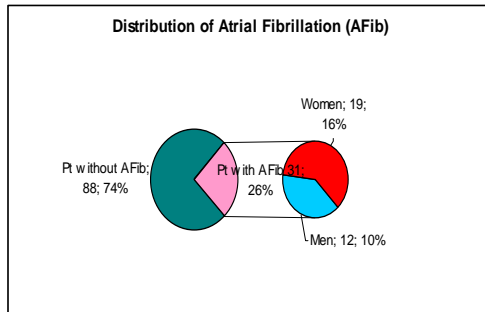

Fig. 1. *Distribution of atrial fibrillation*

The incidence of atrial fibrillation increases with age, both in males and females.

Of the total number of the cases, 78 (65, 5%) patients suffered of chronic arterial hypertension, equally distributed by gender (Fig. 2).
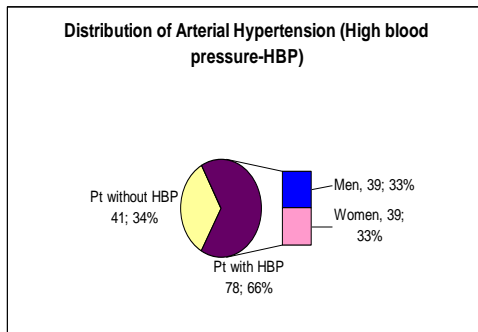

Fig. 2 .*Distribution of arterial hypertension*

Atrial fibrillation, arterial hypertension and also the presence of both risk factors are equally distributed by gender (Fig. 3).
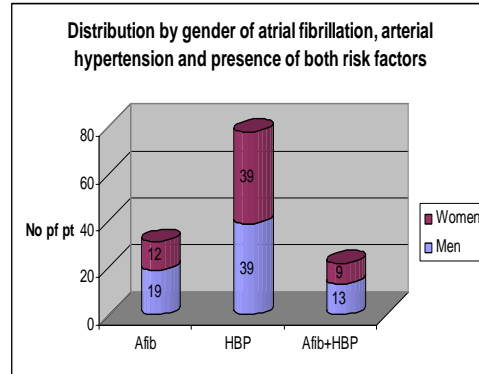

Fig. 3. *Distribution by gender of atrial fibrillation, arterial hypertension and presence of both risk factors*

A number of 74 (62%) patients from Brasov Stroke registry had coronary heart disease, which is an important risk factor for acute cardiovascular events (Fig. 4).
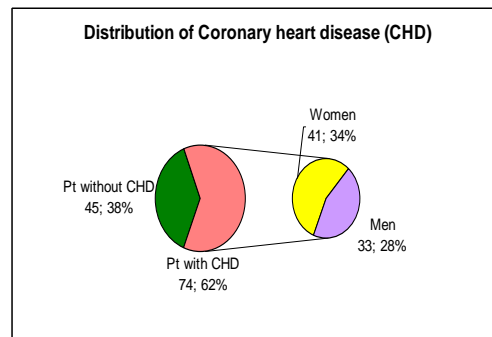

Fig. 4. *Distribution of coronary heart disease*

Approximately a tenth of the total number of cases in the registry had acute coronary events, peripheral vascular disease or heart surgery (Fig. 5).
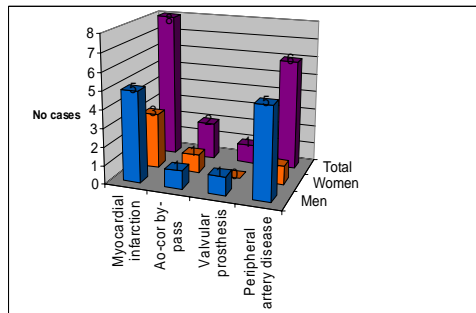
Fig. 5. *Distribution of myocardial infarction, peripheral vascular disease and heart surgery*

The incidence of valvulopathy was low, of 6% among the patients in our registry.

A number of 23 (19%) of the total number of patients suffered of diabetes mellitus. The gender distribution is nearly equal (Fig. 6).
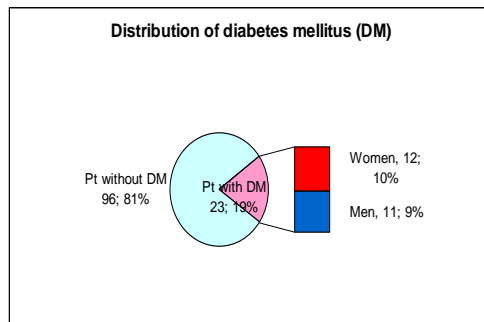

Fig. 6. *Distribution of diabetes mellitus*

Patients with diabetes mellitus were treated with diet as sole therapy, oral antidiabetic agents or insulin, the three therapies being equally distributed among the studied patients and by gender (Fig. 7).
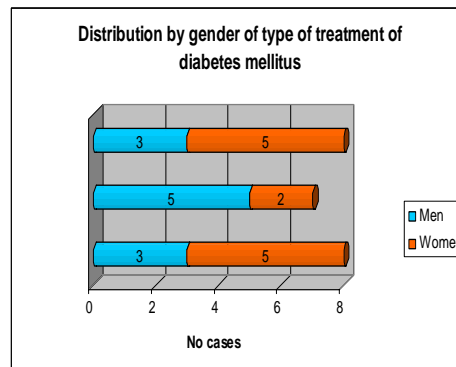

Fig. 7. *Distribution by gender of type of treatment of diabetes mellitus*

The majority of patients presenting dyslipidemia had high total cholesterol levels (about a third of the total number of patients). There was no gender difference in the distribution of cases (Fig. 8).

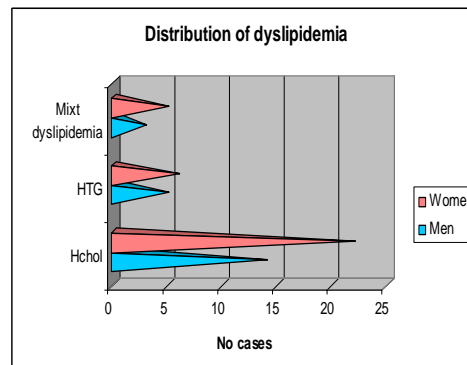Fig. 8. *Distribution of dyslipidemia*

The treatment of hypercholesterolemia was represented by diet alone or statins. Of the total number of patients with high cholesterol levels, 19 (16%) were only on diet and 17 (14, 2%) were treated with statins.

Approximately a quarter of the patients included in the study had heart failure. The gender distribution was not statistically different (Fig. 9).
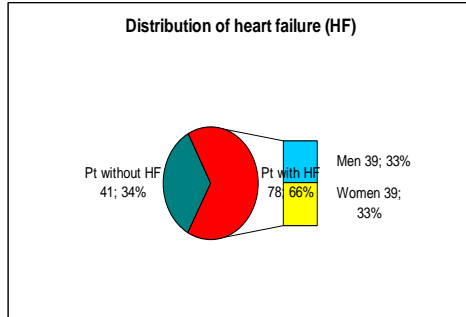
Fig. 9. *Distribution of heart failure*

The incidence of infections in the last 2 weeks prior to stroke was low. The most frequent were urinary tract infections more common in women and respiratory infections more common in men (Fig. 10).
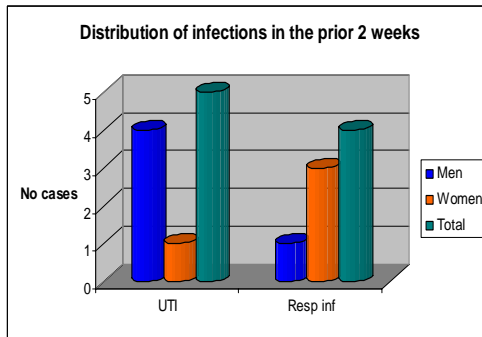

Fig. 10. *Distribution of infections in the prior 2 weeks*

Of the total number of cases, 5 (4, 2%) patients had been diagnosed with dementia prior to stroke.

Due to the additive effect of presence of cardiovascular risk factors, we summed the number of comorbidities with vascular impact present in the same patient - atrial fibrillation, arterial hypertension, diabetes mellitus, coronary heart disease, myocardial infarction, dyslipidemia. The majority of the patients had 1, 2 or 3 associated comorbidities, with no gender difference.

5. Discussions

The most important risk factors in Brasov Stroke Registry are arterial hypertension, diabetes mellitus, atrial fibrillation, dyslipidemia and smoking.

Arterial hypertension was identified as the most important risk factor for stroke in a Caucasian population in Italy, in a 5 year study, on 2365 patients [20]. Similar data was obtained in Spain in a study regarding ischemic stroke that also showed the association between arterial hypertension and small vessels occlusion [5]. In studies on young population from Finland, arterial hypertension was the third most important risk factor [19]. On the other side, Bejot et al. [9] showed in a 22 years study of stroke in elderly that the prevalence of arterial hypertension as risk factor increases after 80 years. Anderssen et al. [1] identified in their studies from Denmark on 40102 patients with ischemic stroke the decrease of prevalence of arterial hypertension between 70 and 80 years.

Arterial hypertension was reported to be more prevalent in women in Caucasian populations in studies from Denmark [1], Hungary [10] and United States of America [21].

Arterial hypertension has been identified as the most important risk factor for stroke also in other population from: Japan [23, 24], in which it was also noticed the increase in risk for cerebral hemorrhage following increase in blood pressure values; Turkey [27], where 10 years studies showed the higher prevalence of arterial hypertension in women; Iran [11].

Regarding the time dinamics of prevalence of arterial hypertension as risk factor for stroke, Arboix et al. [6] found a decrease of it in populations from Spain in 19 years studies, but also an increase of arterial hypertension prevalence in ischemic stroke [4].

Diabetes mellitus is a risk factor predominantly for ischemic stroke, patients with diabetes mellitus both from Caucasian and Asiatic populations have 1,5-3 times the risk for developing stroke [8, 2, 12]. In a multicentric study from China [25], it was found the decrease in incidence of hemorrhagic stroke in centres with high prevalence of diabetes mellitus.

In a study on 6690 patients with stroke performed in USA, it was proven the higher prevalence of diabetes mellitus as risk factor for stroke in men [21].

Dyslipidemia was identified as the most important risk factor for stroke in patients aged 15-49 [7] and the second most important risk factor for stroke in the 15-45 years group [22]. According to studies conducted by Bejot et al, the prevalence of hypercholesterolemia decreases after 80 years [9].

Atrial fibrillation is a risk factor mainly for ischemic stroke [2], with higher incidence in women – both Caucasian and Asiatic [15]. Its prevalence increases over 80 years [9].

In a study from Greece on a stroke population aged 15-45 years, smoking appeared to be the most important risk factor [22]. Studies from Finland regarding the same age range identified smoking the second most important risk factor [19].

A previous stroke has been proven to be an important risk factor for a new stroke, along with the factors previously discussed, coronary heart disease and small vessels disease in a multicentric study [17].

All patients in our registry with a previous stroke suffered an ischemic stroke at the current admission. 37,5% of these patients associate also atrial fibrillation, important risk factor for cardioembolic strokes.

Analyzing the data in our registry, we did not identify a statistically significant correlation between arterial hypertension the pathogenic type of stroke.

We calculated CHADS2 score in patients with atrial fibrillation (heart failure, arterial hypertension, age above 75 years, diabetes mellitus -1 point; previous stroke, TIA or thromboembolism – 2 points). This score predicts the risk of developing stroke in a patient with nonrheumatic atrial fibrillation and helps determine the type of treatment – antiplatelets or anticoagulants based on the risk [18]. We did not identify statistically significant correlation between CHADS2 score and the therapy – antiplatelets (p=0,09) or anticoagulants (p=0,9).

In a study conducted at the San Francisco University, there was emphasized the correlation between CHADS2 scores higher than 5 in patients with coronary heart disease without atrial fibrillation after age- and presence of other risk factors adjustment, showing the possibility top revent stroke by identifying silent atrial fibrillation in these patients [26].

Diabetes mellitus increases twice the risk for stroke independently from other risk factors: moreover, high blood sugar levels in early phases of stroke increase reperfusion lesions and affect recanalization, aggravating the stroke [13]. Diabetes mellitus was proven to be statistically significant associated with lacunary infarctions [3]. In our study, we have not identified correlations between stroke severity, type of stroke, patients' evolution and diabetes mellitus.

Lately, apart from traditional risk factors, there were identified other risk factors like chronic kidney disease, infections, depression, chronic inflammation [14].

Chronic kidney failure is a factor that accelerates or aggravates atherosclerosis and represents a cerebrovascular and cardiovascular diseases risk factor [16]. In our patients, it was not a frequent disease that could have had implications on stroke independently from other factors.

In spite of the possibility of increasing the cardiovascular risk through the presence of multiple risk factors, we did not identify in the studied group statistically significant correlations between the number of risk factors (atrial fibrillation, arterial hypertension, diabetes mellitus, coronary heart disease, myocardial infarction, dyslipidemia) and the gravity or evolution of stroke.

6. Conclusions

1. Cardiovascular risk factors are present in a high percentage of the cases included in Brasov Stroke Registry.
2. Arterial hypertension is the most prevalent risk factor.
3. Atrial fibrillation is an important risk factor for ischemic stroke.
4. The data we obtained from Braşov Stroke Registry could be used for secondary prevention.
5. Primary and secondary prevention measures can lead to a decrease in the incidence of stroke.

References

1. Andersen, K.K., Andersen, Z.J., Olsen, T.S.: *Age- and gender-specific prevalence of cardiovascular risk factors in 40,102 patients with first-ever ischemic stroke: a Nationwide Danish Study*: In: Stroke **41** (2010), No. 12, p. 2768-2774.
2. Andersen, K.K., Olsen, T.S., Dehlendorff, C., Kammersgaard, L.P.: *Hemorrhagic and Ischemic Strokes Compared Stroke Severity, Mortality, and Risk Factors*: In: Stroke **40 (**2009), p. 2068-2072.
3. Araki, Y., Kumakura, H., Kanai, H., Kasama, S., Sumino, H., Ichikawa, A., Ito, T., Iwasaki, T., Takayama, Y., Ichikawa, S., Fujita, K., Nakashima, K., Minami, K., Kurabayashi, M.: *Prevalence and risk factors for cerebral infarction and carotid artery stenosis in peripheral arterial disease:* In: Atherosclerosis **223** (2012), p. 473-477.
4. Arboix, A., Cendros, V., Besa, M., Garcia-Eroles, L., Oliveres, M., Targa, C., Balcells, M., Comes, E., Massons, J.: *Trends in Risk Factors, Stroke Subtypes and Outcome Nineteen-Year Data from the Sagrat Cor Hospital of Barcelona Stroke Registry*: In:Cerebrovasc Dis **26** (2008), p. 509-516.
5. Arboix, A., García-Trallero, O., García-Eroles, L., Massons, J., Comes, E., Targa, C.: *Stroke-related headache: a clinical study in lacunar infarction*: In: Headache. **45** (2005), no. 10, p. 1345-1352.
6. Arboix, A., Massons, J., García-Eroles, L., Targa, C., Comes, E., Parra, O., Oliveres, M.: *Nineteen-year trends in risk factors, clinical characteristics and prognosis in lacunar infarcts:* In: Neuroepidemiology **35** (2010), no. 3, p. 231-236.
7. Bejot, Y., Caillier, M., Ben Salem, D., Couvreur, G., Rouaud, O., Osseby, G.V., Durier, J., Marie, C., Moreau, T., Giroud, M.: *Ischaemic stroke subtypes and associated risk factors: a French population based study:* In: J Neurol Neurosurg Psychiatry **79** (2008), no. 12, p. 1344-1348.
8. Bejot, Y., Giroud, M.: *Stroke in diabetic patients*: In: Diabetes Metab. **36** (2010), supplement 3, p. S84-S87.
9. Béjot, Y., Rouaud, O., Jacquin, A., Osseby, G.V., Durie, J., Manckoundia, P., Pfitzenmeyer, P., Moreau, T., Giroud, M.: *Stroke in the very old: incidence, risk factors, clinical features, outcomes and access to resources--a 22-year population-based study*: In: Cerebrovasc Dis. **29** (2010), no. 2, p. 111-121.
10. Berecski, D., Mihalka, L., Fekete, I., Valikovics, A:, Csepany, T., Fulesdi,

B., Bajko, Z., Sezkeres, C., Fekete, K., Csiba, L.: *The Debrecen Stroke Database: demographic charac-teristics, risk factors, stroke severity and outcome in 8088 consecutive hospitalised patients with acute cerebrovascular disease*: Int J of Stroke **4** (2009), no. 5, p. 335-339.

11. Delbari, A., Salman, Roghani R., Tabatabaei, S.S., Lökk, J.: *A stroke study of an urban area of Iran: risk factors, length of stay, case fatality, and discharge destination*: In: J Stroke Cerebrovasc Dis. **19** (2010), no. 2, p. 104-109.

12. Deleu, D., Inshasi, J., Akhtar, N., Ali, J., Vurgese, T., Ali, S., Rajan, M., AlMutairy, M., Zayed, A., Paulose, G., Nouri, K., Thussu, A., Miyares, F.R., Abdeen, T., AlHail, H., Alshubaili, A., Mahmoud, H.: *Risk factors, management and outcome of subtypes of ischemic stroke: a stroke registry from the Arabian Gulf*: In: J Neurol Sci. **300** (2011), no. 1-2, p. 142-147.

13. Díaz Guzmán, J.: *Cardioembolic stroke: epidemiology*: In: Neurologia. **Supplement 1** (2012), p. 4-9.

14. Elkind, M.S.: *Epidemiology and risk factors*: In: Continuum (Minneapolis Minn) **17** (2011),p. 1213-1232.

15. Horner, S., Niederkorn, K., Schnabl, S., Fazekas, F.: *Gender aspects of Ischemic stroke. An analysis of the Austrian Stroke-Unit Registry*: In: Wien Med Wochenschr. **158** (2008), no. 15-16, p. 446-452.

16. Kalantari, K., Seliger, S.: *Stroke symptoms signal worse outcomes in patients with end-stage renal disease*: In: Neurology. **78** 2012, p. 16-17.

17. Mostaza, J.M., Martín-Jadraque, R., Vicente, I., San Martin, M.A., Lahoz, C.: *Patients at high risk of cerebrovascular disease: the REACH study*: In: Cerebrovasc Dis. **27** (2009), supplement 1, p. 77-81.

18. Palm, F., Kleemann, T., Dos Santos, M., Urbanek, C., Buggle, F., Safer, A., Hennerici, M.G., Becher, H., Zahn, R., Grau, A.J.: *Stroke due to atrial fibrillation in a population-based stroke registry (Ludwigshafen Stroke Study) CHADS(2) , CHA(2) DS(2) - VASc score, underuse of oral anticoagulation, and implications for preventive measures*: In: Eur J Neurol, (2013), **20**, 1, p.117-123.

19. Putaala, J., Metso, A., Metso, T., Kkonkola, N., Kraemer, Y., Haapaniemi, E., Kaste, M., Tatlisumak, T.: *Analysis of 1008 Consecutive Patients Aged 15 to 49 With First-Ever Ischemic Stroke The Helsinki Young Stroke Registry*: In: Stroke. **40** (2009), p. 1195-1203.

20. Silvestrelli, G., Paciaroni, M., Caso, V., Milia, P., Palmerini, F., Venti, M., Parnetti, L.: *Risk factors and stroke subtypes: results of five consecutive years of the Perugia Stroke Registry*: L Clin Exp Hypertens. **28 (**2006), no. 3-4, p. 279-286.

21. Smith, D., Murphy, P., Santos, P., Phillips, M., Wilde, M.: *Gender Differences in the Colorado Stroke Registry*: In: Stroke. **40** (2009), p. 1078-1081.

22. Spengos, K., Vemmos, K.: *Risk factors, etiology, and outcome of first-ever ischemic stroke in young adults aged 15 to 45 - the Athens young stroke registry*: In: Eur J Neurol. **17** (2010), no. 11, p. 1358-1364.

23. Suzuki, K., Izumi, M., Sakamoto, T., Hayashi, M.: *Blood pressure and total cholesterol level are critical risks especially for hemorrhagic stroke in Akita, Japan:* In: Cerebrovasc Dis. **31** (2011), no. 1, p. 100-106.

24. Uchiyama, S., Shibata, Y., Hirabayashi, T., Mihara, B., Hamashige, N., Kitagawa, K., Goto, S., Origasa, H., Shimada, K., Kobayashi, H., Isozaki,

M., Ikeda, Y.: *Risk factor profiles of stroke, myocardial infarction, and atrial fibrillation: a Japanese Multicenter Cooperative Registry*: In: J Stroke Cerebrovasc Dis. **19** (2010), no. 3, p. 190-197.

25. Wei, J.W., Arima, H., Huang, Y., Wang, J.G., Yang, Q., Liu, Z., Liu, M., Lu, C., Heeley, E.L., Anderson, C.S.: *Variation in the frequency of intracerebral haemorrhage and ischaemic stroke in China: a national, multicentre, hospital register study*: In: Cerebrovasc Dis. **29** (2010), no. 4, p. 321-327.

26. Welles, C.C., Whooley, M.A., Na, B., Ganz, P., Schiller, N.B., Turakhia, M.P.: *The CHADS2 score predicts ischemic stroke in the absence of atrial fibrillation among subjects with coronary heart disease: data from the Heart and Soul Study*: In: Am Heart J. **162** (2011), p. 555-561.

27. Yesilot, N., Koyuncu, B., Coban, O., Tuncay, R., Bahar, S. Z.: *Gender differences in acute stroke: Istanbul medical school stroke registry*: In: Neurol India **59** (2011), p. 174-179.