ABSTRACT

OBJECTIVE: Stroke is one of the most critical diseases causing severe disability and death. The incidence of ischemic stroke increases with advancing age. This study aims to identify the etiologic, epidemiological, demographic and clinical features of acute ischemic stroke patients and to contribute to acute stroke data in our country. MATERIALS AND METHODS: This is a retrospective descriptive study. We reviewed the hospital records of 200 patients who were admitted with acute ischemic stroke between January 2016 and December 2016. RESULTS: Of the patients, 52% were female (n: 104) and mean age of the study group was 68.36 ±16.2 (23-97). Only 53 patients (26.5%) had applied to the emergency department after four and a half hours after the onset of the symptoms. In medical history of the patients, 62.5% (n:125) had hypertension, 27% (n: 54) had diabetes mellitus, 14.5% (n: 29) had coronary artery disease, and 11% (n: 22) had atrial fibrillation. The mortality rate was found to be 10.5% in patients who were followed up in the neurology clinic. CONCLUSION: Hypertension and diabetes are the most critical risk factors. Patients mostly apply to the emergency departments lately. Although the results of the present study have parallels with those of previous studies, the most crucial problem is the low rate of patients who apply to the emergency department within the first 4.5 hours which is called golden window period. KEYWORDS: ischemic stroke, risk factors, arrival time to the emergency department
MATERIALS AND METHODS

This retrospective study included 200 adult patients who were diagnosed with acute stroke and followed up in Kahramanmaraş Sutcu Imam University Medical Faculty Hospital Neurology Clinic between 01.01.2016 and 31.12.2016. In the clinical history of the patients, the presence of diseases such as hypertension, heart disease, diabetes mellitus, hyperlipidemia, and epilepsy, and chronic drug use and smoking were investigated. The patients were classified as the total internal carotid artery, middle cerebral artery, anterior cerebral artery, posterior cerebral artery, and lacunar infarct according to the anamnesis, neurological examination, and neuroimaging (brain tomography or magnetic resonance imaging) results. The mortality rates and the number of patients applied to our hospital in the first 4.5 hours were investigated over a one-year period. The Mean, Standard Deviation and Frequency tables were used. The continuous variables were expressed as mean±standard deviation, and the categorical data were expressed as median and percent. For further analysis, the test of significance of the difference between the ratios (chi-square) was used. p <0.05 was considered significant.

RESULTS

A total of 200 patients were included in the study. Of the patients, 52% (n=104) were female, and the mean age was 68.36±16.2 (23-97). The clinical characteristics of the patients are shown in Table 1. It was seen that 12.5% (n=25) of patients were younger than 45 years (younger stroke) and 31% (n=62) were older than 80 years. Of patients under 45 years of age, 56% (14 patients) were female. Of the patients 80-year-old and older, 59.7% (37 patients) were female too, but there was no statistically significant difference between the sexes in all age groups (p>0.05). The rate of smoking habit was 18% (n=36). Hypertension (HT) was the most common disease with a rate of 62.5% (n=125) in all stroke groups compared to the diagnosis of diabetes mellitus (DM) in 27% (n=54) and coronary artery disease, atrial fibrillation (AF) in 11% (n=22), and hyperlipidemia (HL) in 2% (n=4). In patients under 45 years of age, 12% (n=3) had HT, 12% (n=3) had DM, and 4% (n=1) had HL. The head CT and MRI results revealed that 1.5% (n=3) of patients had anterior cerebral artery infarction, 50% (n=100) had middle cerebral artery infarction, 26.5% (n=53) had posterior cerebral artery infarction, 13.5% (n=27) had internal carotid artery infarction, and 2.5% (n=5) had lacunar infarction. The mean duration of application to the emergency department was 16.32±18.3 (1-96) hours, and 26.5% (n=53) of the patients had applied in the first 4.5 hours. The mean ages of the applicants in and after the first 4.5 hours were determined to be 66.3±17.3 and 69.1±15.8, respectively. There was no statistically significant difference between the two groups. Of the patients, 10.5% died during the follow-up period.

DISCUSSION

Stroke patients constitute half of the cases that are hospitalised due to neurological diseases. It is estimated that the prevalence of the patients having a stroke is more than 60 million. In other words, approximately 15 million people suffer from stroke every year in the world. Age is the most important risk factor for stroke that cannot be changed. Approximately 70% of stroke patients have been reported to be over 65 years of age. The mean age of ischemic stroke patients is 60±12. Yoneda et al. found this mean age to be 70±1, and Reganonet al. as 65.3±8.2 [6,7,8]. In the present study, in harmony with the literature, the mean age was found to be 68.36±16.2. Strokes before 45 years of age constitute only 3-5% of all strokes. In other studies carried out, the ischemic stroke incidence at younger ages was reported to be between 3.4-12/100.000 [9]. In the present study, the incidence of ischemic stroke at the age of 45 and below was 12.5%. Stroke has been gaining more importance due to the increasing life expectancy in our country and other countries of the world and the related increase in the elderly population. In this study, 31% of patients with ischemic stroke were over 80 years of age. Many studies in our country have found the acute stroke more common in men in all age groups [10,11]. However, in the studies by Kumral et al. and Bogousslavsky et al., it was reported that stroke cases under the age of 40 and over the age of 75 were more common in women [12,13]. The excess of stroke rates in women attracts attention in the study performed by Demir et al. on stroke cases at younger ages [14]. In the present study, although ischemic stroke was more frequent in women in all age groups, this difference was not statistically significant. In all ischemic stroke cases, the posterior circulation infarctions are seen approximately at the

| Table 1 Clinical characteristics of the patients diagnosed with ischemic stroke. |
|-----------------------------|-----------------|
| The average age             | 68,36 ± 16,2    |
| Female / male ratio (n)      | 1,08(104/96)    |
| Average application time (hours) | 16,32 ± 18,3 |
| Risk factors * n (%)         |                 |
| Hypertension                | 125,(62,5)      |
| Diabetes                    | 54(27)          |
| Hyperlipidemia              | 4(2)            |
| Coronary artery disease     | 29(14,5)        |
| Atrial fibrillation         | 22(11)          |
| Cigarette                   | 36(18)          |
| Application in the first     |                 |
| 4,5 hours n (%)             | 53 (26,5)       |
| Mortality , n (%)           | 21 (10,5)       |

| Table 2 OCSP(Oxfordshire Community Stroke Project) classification, n (%). |
|-----------------------------|-----------------|
| Lacunar infarct             | 5 (2,5)         |
| Anterior cerebral artery infarction | 3 (1,5) |
| Middle cerebral artery infarction | 100 (50) |
| Posterior cerebral artery infarction | 53 (26,5) |
| Internal carotid artery infarction | 27 (13,5) |
rate of 16.5% to 39.8%, lacunar infarcts at the rate of 25%, and anterior circulation infarctions at the rate of 51% [15,16,17]. In this study, 1.5% of the patients had the anterior cerebral infarction, 50% had the middle cerebral artery, 26.5% had the posterior cerebral artery infarction, 13.5% had the internal carotid artery infarction, and 2.5% had the lacunar infarction. HT, alone, is a significant modifiable risk factor for the ischemic stroke. The fact that it is a disease that can be controlled by treatment also increases its importance. Studies have shown that patients with hypertension (KB ≥ 140/90 mmHg) had a 3 to 4 times higher ischemic stroke risk compared to those without hypertension, and the risk of ischemic stroke increased 1.5 times in patients with borderline hypertension (≥ 130-139/85-89 mmHg) [18].

In the present study, hypertension has been determined to be the most common risk factor for patients with stroke (62.5%). HT was determined to be at the rate of 12%, as the most common risk factor in the young stroke group. DM is a major risk factor for death and disability in the world, as well as a strong risk factor for stroke. DM increases the risk of stroke in all age groups. In a case-control study, DM increased the risk of ischemic stroke by 1.8-6 fold [19,20]. In this study, DM was determined to be at the rate of 27% in stroke patients. It is known that the prevalence of CAD is high in ischemic stroke. The symptomatic and asymptomatic cardiac diseases were found to be strongly associated with cerebrovascular diseases [20]. In this study, the CAD was found to be 29%. In patients with AF only, the risk of stroke increases 3-4 times after other risk factors have been corrected. Ischemic stroke occurs at the rate of 2% to 4% per year in patients with no previous transient ischemic attack or stroke history. When 79 years of age and the associated vascular diseases are considered together, the risk of stroke increases 20-fold in AF patients [21]. In the present study, the rate of AF was found to be 11% in stroke patients. Smoking is considered to be a risk factor primarily for CAD but also many diseases and ischemic stroke in women and men. The risk of ischemic stroke was found to be two times higher in smokers than in lifelong non-smokers [22,23]. In the present study, it was determined that 18% of the patient group had the smoking habit.

The thrombolytic therapy with intravenous tissue plasminogen activator (rtPA) (0.9 mg/kg body weight, maximum dose 90 mg) significantly improves the clinical outcomes in acute ischemic stroke patients when administered within the first 4.5 hours after the stroke onset. Intravenous (IV) thrombolytic therapy is one of the most important reperfusion strategies. The recombinant tissue plasminogen activator (rt-PA) is used in treatment. The drug converts inactive plasminogen into active plasmin and plasmin provides recanalisation by disintegrating the fibrin plug [24]. The results of the NINDS randomised controlled study published in 1995 and the results of large databases such as SIST-MOST published later clearly and inarguably demonstrated the beneficial effect and reliability of the IV rt-PA application in ischemic stroke within the first three hours [25,26,27]. The ECASS III study published in 2008 revealed that the IV rt-PA treatment applied between 3 and 4.5 hours were found to be effective, safe, and beneficial, albeit at a reduced rate [28]. According to all rtPA studies including 2.889 patients in total, there was a significant decrease in the number of addiction and death cases [29]. These findings indicate the importance of emergency care within the first 4.5 hours after the onset of the symptoms of the patients. These findings indicate the importance of emergency care within the first 4.5 hours after the onset of the symptoms of the patients. Unfortunately, however, many patients cannot apply to emergency department during this time. When the literature is reviewed regarding the time between stroke and admission to the hospital, it is seen that 32% of 553 stroke patients applied to the emergency department in the first 1.5 hours, and 48% in the first 3 hours in the study by Lacy et al., and 21% (n=216) of the patients applied to the emergency department in the first 1 hour, and 52% in the first 4 hours in the study by Jorgensen et al. performed on 1008 patients in Australia [30,31]. In a study conducted in our country, the rate of those who applied to the emergency department in the first 3 hours after the onset of symptoms in acute stroke cases was given as 49% [32]. In the present study, the time of emergency service admission was 16.32 ± 18.3 hours. It was determined that 26.5% of the patients applied to the emergency department in the first 4.5 hours. The delay in the onset of acute stroke treatment occurs at various stages, but the longest period of time is lost outside the hospital.

The significant factors in the delay of medical help claim are the ignorance about the stroke symptoms, the lack of awareness of its severity, as well as the neglect of the illness and the expectation that the symptoms will heal spontaneously. In addition, living alone, having a stroke at home, having a stroke at night and application to family physicians and health centers instead of applying directly to the emergency departments of reference hospitals has been shown as the most important reasons for late admission [33]. The place and size of ischemia, age, and coexisting diseases are much more important in determining the risk in patients with ischemic stroke. Following the first stroke, the 30-day mortality rates are estimated to be between 10 to 17% and the 5-year survival rate is around 40% [34]. The coexisting diseases such as diabetes mellitus, hypertension, atrial fibrillation, and coronary artery disease, as well as the hemodynamic values of patients at the time of admission are important parameters in determining the mortality rate of patients. In this study, 10.5% of the patient group died and this rate was similar to that in the literature. Although the results of the present study have parallels with those of previous studies, there are some differences. It is clear that more prospective controlled trials are needed to investigate the epidemiology of acute ischemic stroke in our country. But the most crucial problem is the low rate of patients who apply to the emergency department within the first 4.5 hours which is a necessary period of the treatment. Thus, we hope that this and other similar studies will help us in achieving these goals. Also, the awareness about and the determination of the factors that can improve the prognosis of patients may provide an idea about the long-term course of the disease and ensure early treatment of the patients at risk, as well as reduce the rates of complication and mortality in the clinical follow-up period.

CONCLUSION

Thus, we hope that this and other similar studies will help us in achieving these goals. Also, the awareness about and the determination of the factors that can improve the prognosis of patients may provide an idea about the long-term course of the disease and ensure early treatment of the patients at risk, as well as reduce the rates of complication and mortality in the clinical follow-up period.

Authors’ Statements

Competing Interests

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.
There were no financial support or relationships between the authors and any organization or professional bodies that could pose any conflict of interests.

REFERENCES

1. Nentwich, L. M. Diagnosis of Acute Ischemic Stroke. Emergency medicine clinics of North America, 2016; 34(4), 837-859.

2. Bevers MB, Kimberly WT. Critical Care Management of Acute Ischemic Stroke. Curr Treat Options Cardiovasc Med. 2017; Jun,19(6):41.

3. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ: Global and regional burden of disease and risk factors: systematic analysis of population health data. Lancet 2006;367:1747-1757.

4. Onat A, Keleș İ, Çetinkaya A, ve ark. Prevalence of Coronary Mortality and Morbidity in the Turkish Adult Risk Factor Study: 10-year Follow-up Suggests Coronary ‘Epidemic’. Turkey Cardiology Arş 2001; 29:8-19.

5. Maida C, Tuttolomondo A, Raimondo D. Management of blood pressure and heart rate in patients with acute stroke. Current pharmaceutical design.2017; Jul 14.

6. Mukherjee D, Patil CG. Epidemiology and the global burden of stroke. World Neurosurg 2011;76:85-90.

7. Yoneda Y, Okuda S, Hamada R, Toyota A, Gotoh J, Watanabe M, et al. Hospital cost of ischemic stroke and intracerebral hemorrhage in stroke centers. Health Policy 2005;73:202-11.

8. Reganone E, Vila V, Martínez-Sales V, Vaya A, Lago A, Alonso P, et al. Association between inflammation and hemostatic markers in atherothrombotic stroke. Thromb Res 2003;112:217-21.

9. Groppo E, De Gennaro R, Granieri G, Fazio P, Cesnik E, Granieri E, Casseta I. Incidence and prognosis of stroke in young adults: a population-based study in Ferrara, Italy. Neurol Sci 2012;33:53-58.

10. Characteristics of patients who present to the emergency department with stroke and the impact of delayed presentation on therapeutic management strategies.Turk J Emerg Med 2006;6(7):132-138.

11. Keskin Ö, Kalemşoğu M, Deniz T. Investigation of Factors Affecting Emergency Intervention in Acute Stroke. Turk J Emerg Med 2004; 4(4):160-64.

12. Kumral E, Ozkaya B, Sagduyu A, Sirin H, Vardarli E, Pehliv an M. The Ege Stroke Registry: A Hospital Based Study in The Aegean Region, Izmir, Turkey. Cerebrovasc Dis 1998;8:278-88.

13. Bogousslavsky J, Van Melle G, Regli F, fort he Lausanne Stroke Registry: Analysis of 1000 Consecutive Patients With First Stroke. Stroke 1988;19: 1083-92.

14. Demir CF, Berilgen MS, Bulut S, Aydin Ülger M, Özel S. Yukarı Fırat Bölümünde Genç İskemik Inme Olguları. Türkiye Klinikleri J Med Sci 2007; 27:791-796.

15. De Reuck JL, Van Maele G. Seizures and epilepsy in patients with a posterior circulation infarct. J Stroke Cerebrovasc Dis 2012; 21: 1-4.

16. Wiseman, S., Marlborough, F., Douhal, F., Webb, D. J., & Wardlaw, J. Blood markers of coagulation, fibrinolysis, endothelial dysfunction and inflammation in lacunar stroke versus non-lacunar stroke and non-stroke: systematic review and meta-analysis. Cerebrovascular diseases, 2014; 37(1), 64-75.

17. Bamford, J., Sandercock, P., Dennis, M., Warlow, C., & Burn, J. Classification and natural history of clinically identifiable subtypes of cerebral infarction. The Lancet, 1991;337(8756), 1521-1526.

18. Balkan S, Topcuoğlu MA. Stroke and hypertension. Turkish Clinics. J Neu 2004;2(1):41-7.

19. Peters SA, Huxley RR, Woodward M. Diabetes as a risk factor for stroke in women compared with men: a systematic review and meta-analysis of 64 cohorts, including 775,385 individuals and 12,539 strokes. Lancet 2014;383(9933):1973-80.

20. Goldstein LB, Bushnell CD, Adams RJ, Appel LJ, Braun LT, Chaturvedi S, et al. Guidelines for the primary prevention of stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke 2011;42(2):517-84.

21. Hart RG, Halperin JL, Pearce LA, et al. Stroke Prevention in Atrial Fibrillation Investigators. Lessons from the Stroke Prevention in Atrial Fibrillation trials. Ann Intern Med. 2003; 138: 831–838.

22. Peters SA, Huxley RR, Woodward M. Smoking as a risk factor for stroke in women compared with men: a systematic review and meta-analysis of 81 cohorts, including 3,980,359 individuals and 42,401 strokes. Stroke 2013;44(10):2821-8.

23. Sorganvi V, Kulkarni M, Udgiri, R, Kadeli D, Atharga S. Risk factors for ischemic stroke-a case control study. JJABR, 2014, 4(1), 9-12.

24. Kutluk K. Intravenous Thrombolytic Therapy in Acute Ischemic Stroke. Turkiye Klinikleri J Neurol-Special Topics 2012; 5(2):42-4.

25. Tissue plasminogen activator for acute ischemic stroke. The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group. N Engl J Med 1995;333(24):1581-7.

26. Topcuoğlu MA, Arsava EM, Sarıbaş O. Acute ischemic stroke treatment. In: Balkan S ed. Cerebrovascular Diseases. 3. Printing, Ankara: Güneş Medical Bookstores, 2009; 225-230.

27. Advani R, Naess H, Kurz M. W. The golden hour of acute ischemic stroke. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine. 2017; 25(1), 54.

28. Hacke W, Kaste M, Bluhmki E, et al. ECASS Investigators. Thrombolysis with alteplase 3 to 4.5 hours after acute ischemic stroke. N Engl J Med. 2008; 359:1317–1329.

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29. Wardlaw JM, Zoppo G, Yamaguchi T, Berge E: Thrombolysis for acute ischaemic stroke. Cochrane Database Syst Rev 2003;3:CD000213.

30. Lacy CR, Suh DC, Bueno M, Kostis JB. Delay in presentation and evaluation for acute stroke: Stroke Time Registry for Outcomes Knowledge and Epidemiology (S.T.R.O.K.E.). Stroke 2001;32:63-9.

31. Jørgensen HS, Nakayama H, Reith J, Raaschou HO, Olsen TS. Factors delaying hospital admission in acute stroke: the Copenhagen Stroke Study. Neurology 1996;47:383-7.

32. Keskin Ö, Kalemoğlu M, Ulusoy E, Uzun H, Yıldırım I a clinical investigation on the causes of the prehospital delay in acute stroke care. Nobel Med. 2005;1, 14-17.

33. Wester P, Radberg J, Lundgren B, Peltonen M. Factors associated with delayed admission to hospital and inhospital delays in acute stroke and TIA: a prospective, multicenter study: Seek-Medical-Attention-in-Time Study Group. Stroke 1999;30:40–8.

34. Hankey GJ, Jamrozik K, Broadhurst RJ, Forbes S, Burvill PW, Anderson CS, et al. Five-year survival after first-ever stroke and related prognostic factors in the Perth Community Stroke Study. Stroke; a journal of cerebral circulation 2000;31:2080-6.