THE EPIDEMIOLOGICAL PATTERN OF FACTORS ASSOCIATED WITH ISCHEMIC STROKE IN PATIENTS UNDER 50 YEARS OF AGE: A CROSS-SECTIONAL STUDY

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ABSTRACT — OBJECTIVE: The aim of the present study was to investigate the epidemiological pattern of factors associated with ischemic stroke among patients under 50 years old. METHODS: The present cross-sectional study was performed on 197 Stroke patients. Individuals with confirmed ischemic stroke based on of CT scan were included in the study. Demographic information included age, sex, history of smoking, place of residence, season of disease incidence, history of contraceptive use in women, history of hypertension, having high blood pressure at the onset of diabetes, hyperlipidemia, heart disease and patient weight. Finally, the collected data was analyzed using SPSS ver. 22. RESULTS: The mean age of participants was 40.18 years. The mean weight, height, body mass index (BMI) were 79.83, 168.63, and 28.12, respectively. A total of 60.4% of the participants were male and 39.6% were female. Moreover, 66.9% were urban residents, 38.6% had complications in winter, 67% were smokers, and 50% used contraceptives. The history of hypertension, diabetes, hyperlipidemia, and heart disease was seen in 69%, 49.7, 66%, and 73.6% of cases, respectively. Also, 53.8% of patients had high blood pressure upon admission. CONCLUSION: The present study showed that a history of heart disease and a history of hypertension in the past and nicotine use are very common in people with stroke. Considering the above mentioned epidemiological factors, it is recommended to prioritize the mentioned factors when identifying new cases.

KEYWORDS — Ischemic stroke; Risk factors; Epidemiology.

INTRODUCTION

Today, stroke is one of the most important diseases in the world. According to the GBD study, stroke accounts for more than 5.5 million deaths and is regarded as the second leading cause of death in the world in 2019. Strokes affected more than 13 million people worldwide in 2019 [1]. World health organization (WHO) defines stroke as rapidly developed clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 h or leading to death, with no apparent cause other than of vascular origin [2].

Although stroke mortality rates have declined worldwide over the past two decades, the absolute number of people suffers from stroke each year, live with its consequences, or even die. Its prevalence increases due to increasing aging and population growth [3]. It is estimated that 15 million people suffer from stroke each year. Of these, about six million die and another five million become suffer from permanent disability [4]. Life years due to illness, disability or premature death (DALYs) due to stroke are estimated at 44 years per year and are expected to increase to 61 million by 2020 [4]. The global prevalence of stroke is also expected to increase due to an increase in the number of people over 60 years of age of and older. This prevalence is expected to more than double by 2050 and more than triple by 2100, reaching from 901 million in 2015 to 2.1 billion in 2050 and 3.2 billion in 2100 [5].

In low-and middle-income countries (LMICs), the incidence of stroke is rising, and research shows that stroke-related mortality tripled between 2002 and 2020 in Latin America, the Middle East, and sub-Saharan Africa [6, 7]. While the same mortality is increasing in low-income countries compared to high-income countries, and there is a much greater reduction in stroke mortality in high-income countries as compared to low-income countries [8].

Strokes are classified into ischemic and hemorrhagic types based on the underlying pathology [8]. To ensure accurate classification, computed tomography (CT) or magnetic resonance imaging (MRI) as brain imaging techniques are required. Hemorrhagic stroke occurs due to a disorder of the cerebral artery wall and causes intracranial hemorrhage. Hemorrhagic stroke can be classified as intracerebral hemorrhage or subarachnoid hemorrhage based on the site of the hemorrhage. With regard to ischemic stroke, a blood

vessel is blocked, leading to sudden loss of blood flow, local cerebral ischemia, and cell death [9, 10]. The global prevalence of ischemic stroke is twice as high as that of stroke [11]; however, ischemic stroke accounts for about 85% of all strokes in high-income countries [12].

There are several known risk factors for stroke. Age is an important and unchangeable factor. According to a systematic review and meta-analysis, cardiac embolism, atherosclerosis of large arteries (such as carotid artery stenosis), obstruction of small arteries, unknown causes, unusual causes (dissection or vasculitis) account for 22%, 23%, 22%, 26%, and 3% of ischemic strokes, respectively [13].

Various studies show that hypertension, smoking, obesity, poor diet, physical inactivity, diabetes, alcohol consumption, psychological stress and depression, hyperlipidemia cardiac causes (e.g. atrial fibrillation) increase the risk of stroke [13].

Despite many previous individual studies in different regions so far, there have been few studies in this region of Iran. On the other hand, knowing the more accurate course of this disease can help us determine the importance of these factors. The aim of the present study was to determine the epidemiological pattern of risk factors for ischemic stroke among patients under 50 years of age in southeastern Iran.

METHODS

This descriptive study was performed on 197 patients with ischemic stroke referred to an educational center (Imam Ali Hospital) affiliated to Zahedan University of Medical Sciences in southeastern Iran from March 20, 2020 to December 10, 2020. Inclusion criteria included patients aged 12 and 60 years, and having consent to participate in the study. In order to determine the sample size, all patients with confirmed stroke approved by a neurologist were included in the present study.

INSTRUMENT

Data collection was carried out using a researcher-made tool including questions on age, sex, place of residence, season of disease incidence, weight, height, BMI, history of smoking and contraceptive use in women, hypertension, diabetes, hyperlipidemia and history of heart disease.

DATA COLLECTION

Data collection was carried out after obtaining permissions from the Ethics Committee. To this end, the researcher referred to the neurology department for one year and all patients with confirmed ischemic stroke based on CT results admitted to Ali

Ibn Abitaleb Hospital of Zahedan were enrolled in the study. Stroke diagnosis and differentiation was carried out by a neurologist based on CT and MRI. Blood pressure higher> 140.90 mm Hg upon admission was considered as hypertension. Diabetes in patients was defined as random blood sugar> 200 mg/dL or FBS> 126 mg/dL or receiving common diabetes medications. Hyperlipidemia was defined as total cholesterol ≥ 221 mg/dL. Patients were given 15 minutes to complete the questionnaires. The questionnaires were collected by interview in the case of illiterate patients.

ETHICAL CONSIDERATIONS

The present study has been approved by the Ethics Committee of Zahedan University of Medical Sciences under the Ethic Code. Written and oral consent was received from all participants. They are assured that their information will remain confidential. The STROBE checklist was used to report the study [14].

DATA ANALYSIS

Data analysis was conducted using SPSS Ver.22. Descriptive statistical tests (mean, standard deviation, frequency and percentage) were used for quantitative variables. Analytical tests (χ^2) were used to describe the demographic characteristics of the participants. Kolmogrove-Smirnov test was also used to evaluate the data distribution. P-value<0.05 was considered statistically significant.

RESULTS

A total of 197 patients entered the final phase. The mean ± SD of subjects' age was 40.18 ± 5.67 years. Mean weight, height, BMI values were 79.83, 168.63, and 28.12, respectively. Most participants were male (60.4%), urban residents (66.9%), had a history of nicotine use (67%), took contraceptive pills (50%), and had a history of hypertension (69%), diabetes (49.7%), hyperlipidemia (66%), and heart disease (73.6%), and were infected in winter (38.1%) (Table 1).

DISCUSSION

In the present study, risk factors such as male sex, nicotine use, history of hypertension, hyperlipidemia, hypertension upon admission, high BMI were all epidemiological factors with a relatively high prevalence in people with stroke. In the study of risk factors for stroke among people aged 15-45 years admitted to Ayatollah Rouhani Hospital in Babol during 2009-2011, Ahmadi et al. reported that mean± SD of patients' age was 38.09 ± 6.11 years, of which 34 (52.3%) were male and the rest were female. The most common stroke was ischemic stroke (n=61 cases, 93.8%), most of which were embolic (n=38 cases, 58.5%) and

Table 1. Demographic characteristics of the participants

Variable	Mean ±standard deviation	Number	Percentage
Age	40.18± 5.67	-	-
Weight	79.83 ± 10.87	-	-
Height	168.63 ± 7.88	-	-
BMI	28.12 ± 4.82	-	-
Sex(Male)	-	119	60.4
Sex(Female)	-	78	39.6
Place of residence (city)	-	112	56.9
Place of residence(village)	-	85	43.1
Season (Winter)	-	76	38.6
Season (Autumn)	-	72	36.5
Season (Spring)	-	28	14.2
Season (Summer)	-	21	10.7
Nicotine use (yes)	-	132	67
Nicotine use (no)	-	65	33
Contraceptive use (yes)	-	39	50
Contraceptive use (no)	-	39	50
Previous hypertension (yes)	-	136	69
Previous hypertension (no)	-	61	31
Hypertension upon admission (yes)	-	106	53.8
Hypertension upon admission (no)	-	91	46.2
Diabetes (has)	-	98	49.7
Diabetes (no)	-	99	50.3
Hyperlipidemia (yes)	-	130	66
Hyperlipidemia (no)	-	67	34
History of heart disease (yes)	-	145	73.6
History of heart disease (no)	-	52	26.4

hemorrhagic strokes (6.2%) and transient ischemic attack (TIA) (10.8%). The risk factors included hypertension (n=23 cases, 35.4%), heart diseases (n=20 cases, 30.8%), including ischemic heart disease (n=7 patients,10.8%) and patent foramen ovale (n=6 cases) and mitral valve stenosis (n=6 cases). and the rest included other cardiac causes. The prevalence of substance and alcohol abuse, hyperlipidemia, diabetes, blood disorders, increased coagulation was 18 cases (28.1%), 15 cases (23.1%), 13 cases (20%), 12 cases (18.5%), with 6 cases (9.2%), respectively. Other causes were seen in 13.8% of cases and there was no specific risk factor in 7.7% of cases [15].

According to the results of the present study, ischemic stroke is the most common type of stroke and hypertension, heart disorders, substance abuse, hyperlipidemia and diabetes are the most risk factors for stroke. O'Donnell et al. (2016) found that these ten potentially modifiable risk factors accounted for about 90% of all strokes. Hypertension is more associated with intracerebral hemorrhage than ischemic stroke, while smoking, diabetes, and apolipoprotein-related causes, and cardiac causes are more commonly associated with ischemic stroke. However, hypertension is the most important modifiable risk factor for both hemorrhagic and ischemic strokes [16]. In a study of the risk factor and etiology of ischemic stroke among young adults, Renna et al. (2014) reported that the mean ± SD of patients' age was 41± 8 years [17]. The most common risk factors included dyslipidemia (52.7%), smoking (47.3%), hypertension (39.3%) and patent foramen ovale (PFO) (32.8%), large artery atherosclerosis leading to stroke (n=17 patients, 11.3%). Cardioembolism occurred in 36 patients (24%), most of whom showed PFO on transesophageal echocardiography (TEE). Small vessel occlusion was diagnosed in 12 patients (8%) and all of them had hypertension and most of other risk factors. A total of 41 patients (27.3%) showed a stroke of other known causes and 44 patients (29.3%) showed a stroke of unknown causes. The three-year survival rate was 96.8% and recurrent stroke occurred in only three cases [17] The present study is consistent with these studies. Considering that studies have shown that hypertension is an important risk factor for patients due to the subsequent pressure on the heart and other blood vessels [18,19]. Nicotine consumption is also another risk factor for hypertension due to the creating inflammatory conditions and increasing inflammatory cytokines in the body. There have been many studies on nicotine consumption and results showed a evident relationship between it and the risk of stroke [20]. Diabetes mellitus is one of the most important conditions leading to stroke with regard to its involvement in the development of microvascular and macrovascular disorders. It should be considered that the disease duration and the degree of control over the disease are important factors [2]. The present study also showed that people with a history of stroke had BMI values higher than normal range. As studies have shown, the presence of BMI is a risk factor for vascular disease, which is even directly related to the prognosis of recovery. Considering that BMI itself is an index to show the fat distribution and also indirectly the amount of activity in each individual [21]. The present study showed that a high percentage of hypertensive people upon admission, which causes a reversal cycle to overcome the crisis due to the vascular obstruction and the body's resistance to compensate for this obstruction. The most important limitations of the present study

included low sample size, the short follow-up duration, and the absence of a control group. Therefore, it is recommended to carry out further relevant studies with a larger sample size over a longer period of time.

CONCLUSION

The present study showed that factors such as history of heart disease, history of hypertension, nicotine use, known hyperlipidemia, male sex and urbanization were important risk factors leading to a high prevalence stroke. Therefore, we better recognize the increasing epidemiological significance of these factors.

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