

Demographic information and risk factors of stroke patients younger than 65 years old

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Abstract: **Objective:** The main objective of this study is to evaluate the prevalence of risk factors for and demographics of patients younger than 65 years old with stroke.

Methods: This retrospective cross-sectional study took into consideration all patients younger than 65 years old who were admitted to the emergency department from 2016 to 2018. Some significant criteria such as age, sex, type of stroke, stroke risk factors, and modified Ranking Scale (mRS) were extracted from patients' medical records. Based on their age, these patients were divided into three groups: younger than 35 years old (Group A), between 35-50 years old (Group B), and older than 50 years old (Group C). Data analysis was carried out using IBM® SPSS® Statistics 20.0 software.

Results: A total of 392 patients with stroke were included in this study. Groups A, B, and C included 31, 124, and 237 patients, respectively. Among them, 313 patients (79.84%) were admitted to the hospital in cold seasons, while 73 patients (18.6%) had no symptoms related to stroke at the time of admission. The most common adjustable risk factor among the patients was hypertension (HTN) with a frequency of 230 (58.7%). Of note, the frequency of HTN, diabetes, atrial fibrillation (AF), oral contraceptive pill (OCP) consumption, and coronary artery disease (CAD) in patients was significantly different among these three groups.

Conclusion: According to the findings of the present study, the prevalence rate of stroke probably varies for male and female (gender) in the studied groups, which is significantly correlated with age. Among the adjustable risk factors for stroke, HTN, diabetes, AF, OCP consumption, and CAD are significantly correlated with the age.

Keywords: Adult; Demography; Risk Factors; Stroke

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1. Introduction

Annually, 750000 new cases of stroke occur in the united states, 150000 of which lead to death (1). In 2015, the number of Iranians with stroke was estimated at approximately 32000, more than half of whom had ischemic stroke (2, 3). Among the most significant risk factors that can cause stroke are hypertension (HTN), dysrhythmia including atrial fibrillation (AF), hypercholesterolemia, and smoking. However, according to recent studies, migraines and oral contraceptive pill (OCP) consumption are among other risk factors in stroke that are more frequently observed among women (4-6). It is well-known that the chance of stroke increases with age, and about two-thirds of all strokes occur in people over 65 years old (7, 8). However, stroke is also seen in adult and young adult patients too. Given that some of the stroke risk factors are controllable, the present study aimed to survey the demographic information and prevalence of the risk factors of stroke patients younger than 65 years old.

2. Methods

2.1. Study setting and population

In this retrospective cross-sectional study, all the patients under 65 years old who were admitted to the emergency department of Imam Reza Hospital of Tabriz, the referral hospital (7/24 stroke center) from 2016 to 2018 were included. Patients with no final diagnosis of stroke, incomplete medical records, and connective tissue diseases or brain congenital malformations were excluded from the study. This study was approved by a regional ethic committee of research under the code IR.TBZMED.REC.1398.842.

2.2. Data gathering

Some significant criteria such as age, sex, type of stroke, stroke risk factors, modified Ranking Scale (mRS), and National Institutes of Health Stroke Scale (NIHSS) were extracted from the patients' medical records in stroke registry of Neuroscience Research Center of Tabriz University of Medical Sciences. Based on their age, patients were divided into

three groups: under 35 years old (Group A), 35-50 years old (Group B), and 50-65 years old (Group C).

2.3. Statistical analysis

Data analysis was carried out using the IBM® SPSS® Statistics 20.0 software. Since the age distribution of the population under study was not normal, the median and interquartile range (IQR) of the population were used for a better understanding. The quantitative variables were determined using the mode and median since the population distribution was not normal. P-values lower than 0.05 were considered significant. To compare the data of the three groups with the qualitative data, chi-squared exam was run. In addition, Fisher's exact test was employed as an alternative to perform the analysis of contingency tables.

3. Results

A total of 392 stroke patients were included in this study, among whom 113 patients (28.8%) were expired. Groups A (under 35 years old), B (between 35-50 years old), and C (older than 50 years old) included 31, 124, and 237 patients, respectively. The median and mode of the patients' age were 54 and 64 years old, respectively. The minimum and maximum ages of patients were 15 and 64 years old, respectively. Among them, 245 (62.5%) and 147 (37.5%) patients were male and female, respectively. Moreover, 300 patients (76.5%) were from urban areas and 92 (23.5%) from rural areas.

The median and IQR of the interval between the onset of symptoms and arrival to the hospital were 6 and 3-21.50 hours respectively. The minimum and maximum intervals between the onset of symptoms and arrival to the hospital were 1 and 1440 hours, respectively. Most patients were admitted to the hospital with a chief complaint of hemiparesis and hemiplegia with a frequency of 161 (41.1%), and 119 patients (30.4%) had a chief complaint of decreased consciousness. The most common adjustable risk factor among the patients was HTN with a frequency of 230 (58.7%), followed by diabetes (19.3%) and smoking (18.6%).

The median (average) duration of hospitalization and IQR was 7 and 4-12 days. The minimum hospitalization duration was one day and the maximum was 68 days. Although most patients were admitted to the hospital as ischemic stroke cases (40.5%), the rate of hemorrhagic stroke was considerable (34.9%).

Furthermore, the median and IQR scores of NIHSS for the population under study were 10 and 2-28.25, respectively. Most of the patients were admitted to the hospital with a diagnosis of moderate or severe strokes based on their NIHSS score. Among them, those 73 patients (18.6%) without symptoms of stroke were referred to as patients with an NIHSS score of 0 at the time of admission. The frequency of different stroke severities in patients based on their NIHSS score is summarized in table 1.

Subarachnoid hemorrhage (SAH) was less frequent in group A (2.2 %) than in groups B (33 %) and C (20.2 %); however,

the distribution of stroke types among these groups was not statistically significant ($p=0.101$). On the contrary, mRS regarding the discharge, drug history, and chief complaint varied significantly among these three groups. In this study, most patients in the age groups A, B, and C had the mRSs of 0 (28.8%), 6 (27.4%), and 6 (31.2%), respectively ($p=0.032$). Among the chief complaints, headache was more common in group B than in the other two groups (31.4 vs 25.5 and 18.1%, $p=0.032$). Patients' gender, residence, type of stroke, chief complaints, drug history, and discharge mRS scores are summarized in table 2.

There was a significant difference among the age groups in terms of patients' drug history. To be specific, 80.6% of group A, 63.7% of group B, and 31.2% of group C had no history of any medication.

The frequency of AF, OCP consumption, HTN, and coronary artery diseases and diabetes in patients were significantly different among these groups. The frequency of AF was higher in group C (7.1%) than that in groups A (0%) and B (0.8%), ($p=0.010$). The frequency of OCP consumption was 6.4% in group A, 3.2% in group B, and 0% in group C ($p=0.004$). The frequency of hypertension was the highest in group C (74.2%), followed by group B (40.3%) and group A (12.9%) ($p<0.001$). The frequency of coronary artery disease was 16.8% in group C, which was significantly higher than that in group B (3.2%). The frequency of coronary artery disease in group A was 0% ($p<0.001$). The frequency of diabetes was significantly higher in group C (24%) than that in groups B (14.5%) and A (3.2%), respectively ($p=0.005$). Variation of the distribution of other risk factors among the studied groups was not statistically significant (Table 3).

Figure 1 shows a comparison concerning patients' date of admission to the hospital based on the hospitalization months in different groups, indicating no significant difference statistically ($p=0.706$). According to this figure, 35 patients (8.92%) were admitted to the hospital in spring, 44 patients (11.22%) in summer, 122 patients (31.12%) in fall, and 191 patients (48.72%) in winter. In other words, 313 patients (79.84%) were admitted to the hospital in cold seasons.

4. Discussion

As mentioned earlier, the present study analyzed the data from 392 stroke patients under 65 years old who were admitted to the emergency department of a referral stroke center

Table 1 The frequency of different stroke severities in patients based on their NIHSS score

Score	Stroke severity	Frequency (%)
0	No stroke symptoms	73 (18.6)
1-4	Mild stroke	54 (13.7)
5-15	Moderate stroke	105 (26.7)
16-20	Moderate to severe stroke	34 (8.6)
21-42	Severe stroke	126 (32.1)

Table 2 Patients' gender, residence, type of stroke, chief complaint, drug history, and mRS on discharge

Variable	Total (%)	Group A (%)	Group B (%)	Group C (%)	P-value
Gender					
Male	245 (62.5)	17 (54.8)	88 (70.9)	140 (59.0)	0.056
Female	147 (37.5)	14 (45.1)	36 (29.0)	97 (40.9)	
Residence					
Urban	300 (76.5)	22 (70.9)	97 (78.2)	181 (76.3)	0.649
Rural	92 (23.4)	9 (29.0)	27 (21.7)	56 (23.6)	
Type of stroke					
Hemorrhagic	137 (34.9)	11 (35.4)	39 (31.4)	87 (36.7)	0.101
Ischemic	159 (40.5)	13 (41.9)	44 (35.4)	102 (43.0)	
SAH	96 (24.4)	7 (2.2)	41 (33.0)	48 (20.2)	
mRS on discharge					
0	61 (15.5)	8 (25.8)	29 (23.4)	24 (10.1)	0.032
1	70 (17.8)	5 (16.1)	23 (18.5)	42 (17.7)	
2	64 (16.3)	5 (16.1)	17 (13.7)	42 (17.7)	
3	42 (10.7)	1 (3.2)	13 (10.5)	28 (11.8)	
4	28 (7.1)	6 (19.4)	5 (4.0)	17 (7.2)	
5	14 (3.5)	1 (3.2)	3 (2.4)	10 (4.2)	
6	113 (28.8)	5 (16.1)	34 (27.4)	74 (31.2)	
Chief complaint					
Hemiparesis & hemiplegia	161 (41.0)	11 (35.4)	40 (32.2)	110 (47.4)	0.005
Disequilibrium	7 (1.7)	1 (3.2)	1 (0.8)	5 (2.1)	
Aphasia	15 (3.8)	0 (0)	4 (3.2)	11 (4.6)	
Loss of consciousness	119 (30.3)	11 (35.4)	40 (32.2)	68 (28.6)	
Headache	90 (22.9)	8 (25.8)	39 (31.4)	43 (18.1)	
Drug history					
ASA	19 (4.8)	1 (3.2)	4 (3.2)	14 (5.9)	<0.001
Anti-HTN	160 (40.8)	4 (12.9)	33 (26.6)	123 (51.8)	
Plavix	2 (0.5)	0 (0)	1 (0.8)	1 (4.2)	
Anti-HLP	13 (3.3)	1 (3.2)	3 (2.4)	9 (3.7)	
ASA & Plavix	20 (5.1)	0 (0)	4 (3.2)	16 (6.7)	
No drug use	178 (45.4)	25 (80.6)	79 (63.7)	74 (31.2)	
Total	392 (100)	31 (100)	124 (100)	237 (100)	

Group A: Under 35 years old; Group B: Between 35- 50 years old; Group C: Older than 50 years old
SAH: Subarachnoid hemorrhage; Anti-HTN: Anti-hypertension; Anti-HLP: Anti-hyperlipidemia;
ASA: Acetylsalicylic acid (aspirin)

Table 3 The comparison of risk factors for stroke in different age groups

Risk Factors	Total	Group A N (%)	Group B	Group C	P-value
Family history risk for stroke	9 (2.2)	1 (3.2)	3 (3.4)	5 (2.1)	0.922
Smoking	73 (18.6)	7 (22.5)	24 (19.3)	42 (17.7)	0.784
Peripheral vascular disease	2 (0.5)	1 (3.2)	0 (0)	1 (0.4)	0.075
Asymptomatic carotid obstruction <60%	5 (1.2)	0 (0)	1 (0.8)	4 (1.6)	0.628
AF	18 (4.5)	0 (0)	1 (0.8)	17 (7.1)	0.010
CHF	8 (2.0)	0 (0)	2 (1.6)	6 (2.5)	0.595
OCP	6 (1.5)	2 (6.4)	4 (3.2)	0 (0)	0.004
Obesity	30 (7.6)	0 (0)	11 (8.8)	19 (8.0)	0.231
Bedridden	1 (0.2)	0 (0)	0 (0)	1 (0.4)	0.722
Malnutrition	3 (0.7)	0 (0)	1 (0.8)	2 (0.8)	0.878
Hypertension	230 (68.6)	4 (12.9)	50 (40.3)	176 (74.2)	<0.001
Coronary artery disease	44 (11.2)	0 (0)	4 (3.2)	40 (16.8)	<0.001
Diabetes	76 (19.3)	1 (3.2)	18 (14.5)	57 (24.0)	0.005
Dyslipidemia	30 (7.6)	0 (0)	8 (6.4)	22 (9.2)	0.157
Total	392 (100)	31 (100)	124 (100)	237 (100)	

Group A: Under 35 years old; Group B: Between 35-50 years old; Group C: Older than 50 years old
AF: Atrial fibrillation; CHF: Congestive heart failure; OCP: Oral contraceptive pill

from 2016 to 2018 based on their demographic information, type of stroke, and stroke risk factors.

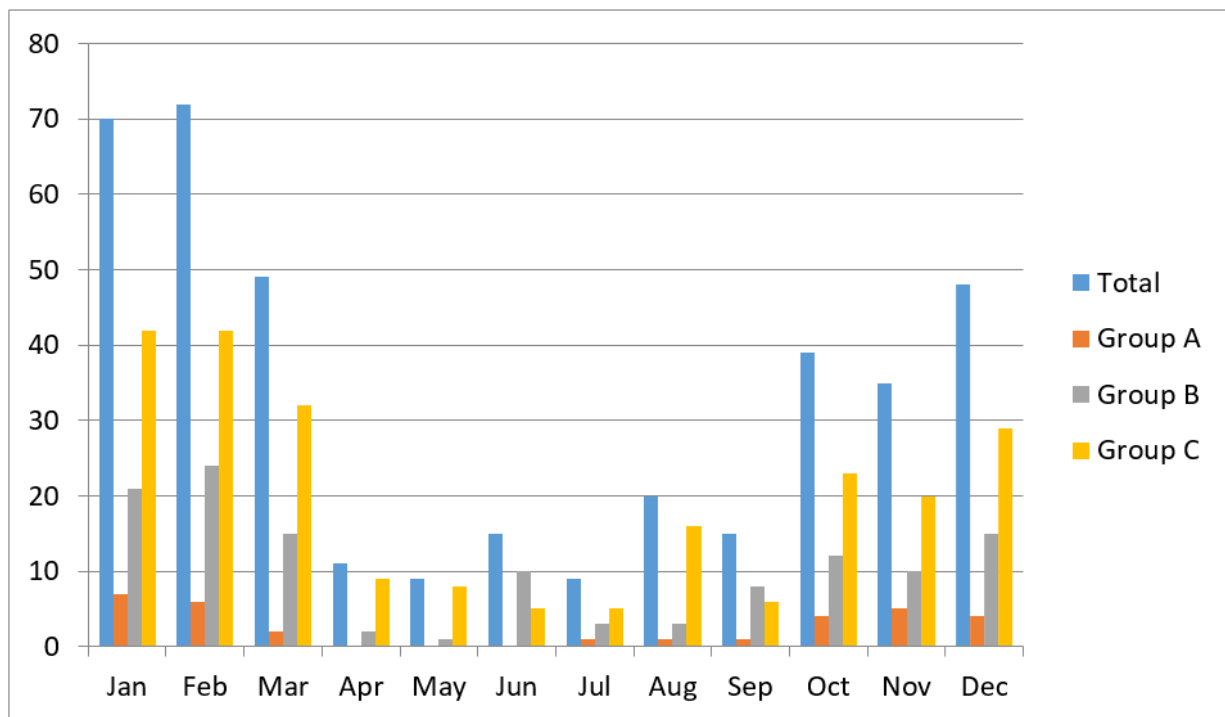


Figure 1 Patients' date of admission to the hospital based on the months in the studied age group (Group A: Under 35 years old, Group B: Between 35- 50 years old, Group C: Older than 50 years old)

Previous studies on the stroke have demonstrated that the chance of stroke would increase with age. Although most stroke cases occur in patients older than 65 years old, one-third of strokes happen for patients younger than 65 years old (7). Given that people in this age group are considered potential workforce for society, the mortality rate is a great burden on both their family and the country. To the best of the author's knowledge, no other previous studies in this age group have been individually conducted. In this regard, the population under study in the present research comprised mostly the patients between 35 and 65 years old. Since similar results were obtained in terms of the relationships among age, gender, and stroke, it could be concluded that the prevalence of stroke among the elderly was higher than that in younger people.

The results obtained from a prospective cohort of blacks study demonstrated that the history of smoking was associated with higher risk of stroke (9). According to the findings of this study, about one-fifth of patients had a positive history of smoking; however, there was no difference between incidences of stroke in different age groups in terms of smoking.

According to the conducted studies, age and sex have a significant effect on the stroke risk and sex differences in stroke epidemiology depend on aging patient. Therefore, in children and early adulthood, the incidence of stroke in men is higher than that in women.

However, with the increasing age and the onset of menopause in women, the number of stroke begins to

increase in women (7). In a study, Schneider S et al. demonstrated that hypertension, hypercholesterolemia, and smoking were the most common risk factors in stroke (10). Among the nonadjustable risk factors in this study, male gender was considered the most susceptible and the most common risk factor, especially in patients older than 35 years old. The prevalence of stroke in patients under 35 was almost similar among males and females. However, the male/female ratio after the age of 35 was 2:1. Among the adjustable risk factors for stroke, HTN, diabetes, AF, OCP consumption, coronary artery diseases, and diabetes significantly correlated with age. These risk factors are of particular importance in helping to reduce the incidence and prevalence of stroke, since they are controllable.

In the present study, about 28.8% of patients who referred to the emergency department with a diagnosis of stroke died and it was significantly correlated with age, pointing to the heavy burden of this disease in our country.

More than three-quarters of the studied patients lived in urban areas the majority of whom were admitted in the cold months of the year, especially the last months of autumn and early months of winter. Considering that the median interval between onset of symptoms and arrival to the hospital was 6 hours, it could be suggested that there was a direct relationship between cold weather and the prevalence of strokes in all 3 age groups and there was no difference in the date of referral to the hospital, taking patients' age into consideration.

The main complaint for a majority of the patients referring to

the emergency department was hemiparesis or hemiplegia which had a higher rate of prevalence in patients above 50 years old. Also, the prevalence of disequilibrium and aphasia was higher in patients above 50 years old and 35 years old, respectively.

The medication history except for Plavix and a negative history of medication had a significant positive correlation with age. Also, the prevalence of ischemic stroke in patients above 50 years old was higher than in younger patients. However, in younger patients, the prevalence rates of hemorrhagic, ischemic, and SAH-related strokes are almost similar, being consistent with the pathophysiology of stroke and the higher rate of vessel occlusion in the elderly.

5. Limitations

Since the present study is not a case-control one, the effect of risk factors on the chance of suffering stroke was not taken into account and only the prevalence of risk factors was discussed. It is recommended that studies in different areas with different climates evaluate the effect of environmental conditions on stroke. Although age significantly affects the stroke risk, the findings in this study point to this conclusion that the rate of strokes at younger ages is not low, perhaps indicating the effect of lifestyle on the chance of experiencing a stroke.

6. Conclusion

This study found that the prevalence of suffering a stroke with emphasis on gender varied in the studied age groups and it was significantly correlated with age. Among the adjustable risk factors for stroke, hypertension, diabetes, AF, OCP consumption, coronary artery diseases, and diabetes were significantly correlated with age. While the nonadjustable risk factors among young adults may cause a stroke, the adjustable risk factors are conducive to the stroke process; therefore, a greater control and management of these factors is of paramount significance in reducing the risk of a suffering stroke.

7. Declarations

7.1. Acknowledgment

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7.2. Authors' contribution

All the authors met the standards of authorship based on the recommendations of the International Committee of Medical Journal Editors.

7.3. Conflict of interest

The authors declare that there is no conflict of interest.

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