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Risk Factors of Transient Ischemic Attack in Young Adults in Pakistan

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ABSTRACT

Transient ischemic attacks precede about 20%-25% of ischemic stroke. These symptoms normally range from a few seconds to several minutes, with a typical duration of less than one hour. **Objective:** To assess the risk factors of transient ischemic attack in young adults. **Methods:** This prospective study was conducted at the People's University of Medical and Health Sciences Hospital, Nawabshah. Patients with stroke admitted to Medical Units I, II, and III from November 2021 to June 2023 were eligible for inclusion. This study eliminated those who were under the age of 18, those who had experienced brain injury, and those who were above the age of 45. The current study included 209 patients, including both male and female participants aged between 18 and 45 years, who exhibited various forms of stroke. For this study, only 14 (6.7%) patients with transient ischemic attack (TIA) were selected. Data on diagnostic tests, medical records, laboratory investigations, and radiological images were obtained for data collection. **Results:** The most prevalent risk factor was diabetes mellitus in nine (64.3%) patients. Seven (50.0%) patients had hypertension. Cardiac disease was seen in six (42.9%) of patients. Smoking and previous stroke history were observed in one (7.1%) patient each. **Conclusions:** The results of this research suggested that diabetes mellitus, hypertension, and heart problems are the predominant risk factors associated with transient ischemic stroke in young individuals.

INTRODUCTION

Transient ischemic attacks precede about 20%-25% of ischemic strokes [1]. These symptoms normally range from a few seconds to several minutes, with a typical duration of less than one hour [2]. The definition of transient ischemic attack (TIA) has undergone revision due to the discovery of brain infarcts on imaging in patients experiencing symptoms lasting longer than 10 minutes. Additionally, the consideration of urgent revascularization is given to patients who present at the hospital within 6 hours of symptom onset. This update challenges the previous time-based definition of TIA, which categorized it based on symptoms lasting less than 24 hours. The current term for TIA has been revised to "tissue-based" in the latest definition. In the context of a transient ischemic attack (TIA), it is important to note that ischemic lesions may not be discernible on brain imaging. Conversely, if a patient exhibits transitory symptoms and presents with even a minute ischemic brain lesion on imaging, medical professionals classify the event as a small ischemic stroke [3-5]. TIA and small ischemic stroke are usually treated the same way, even though scan results can be different. This is why they are considered together in clinical practice [4-6]. Although a number of risk factors and reasons have been identified, most ischemic strokes in younger age groups still do not have known causes. Atherosclerosis, diabetes, high blood pressure, cholesterol, and smoking are known to increase the risk of stroke in older people. Nevertheless, recent research conducted in the United States and Europe has shown a higher prevalence of ischemic stroke in younger individuals [7-10]. Recent

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statistical data indicates that the incidence of traditional risk factors is much higher among individuals aged 15-55 compared to older age cohorts [9]. However, there is a lack of available data about the frequency of stroke in young populations originating from Eastern Europe and Asia. Most of the existing literature on this topic originates from cohorts in North America and Western Europe. Numerous studies have shown a higher prevalence of ischemic stroke among individuals aged 30 to 45 years [11, 12]. A few hospital-based studies have shown that young Pakistanis are more likely to have a stroke, but there is little statistical research on this group. Syed et al., found that people aged between 35 and 45 years were more likely to have a stroke (26%)[13]. Another study examined a case series and found that thirty-four percent of patients with stroke they studied were younger than 50 years of age [14]. Empirical evidence also shows that more than two-thirds of strokes occur in developing countries. Current estimates place the percentage of stroke cases attributable to young people between 10% and 30% in India but only between 3% and 8.5% in Western countries [15-17]. Young people are more likely to have strokes than older people, which is similar to Pakistan and could have a big effect on the economy. Additionally, it has been established that hypertension is the most prevalent risk factor that young people encounter [18-19]. Furthermore, there are geographical differences in etiological subtyping. To avoid stroke-related impairment and recurrence in younger populations, the evaluation of the factors and origins of stroke in individuals of a younger age group is of utmost importance [18-19].

This study aimed to assess the transient ischemic attack (TIA) risk factors in Pakistan's young population, a demographic that has not been extensively examined in the past.

METHODS

This prospective study was conducted at the People University of Medical and Health Sciences Hospital, Nawabshah. Patients with stroke admitted to Medical Units I, II, and III from November 2021 to June 2023 were eligible for inclusion. This study eliminated those who were under the age of 18, those who had experienced brain injury, and those who were above the age of 45. The current study included 209 patients, including both male and female participants aged between 18 and 45 years, who exhibited various forms of stroke. Only 14 patients (6.7%) with TIA patients were selected for this study. The patients underwent an initial examination conducted by an emergency physician, followed by a subsequent evaluation performed by a neurologist. Data on diagnostic tests, medical records, laboratory investigations, and radiological images were obtained for data collection. After getting ethics approval and permission from the patients or their parents or guardians, detailed demographic information such as age, socioeconomic status, gender, and place of residence was documented on the data collection form. "Complete blood count test" (CBC), "erythrocyte sedimentation rate"(ESR), lipid profile, Hb A1C, "liver function test," and "renal functional tests" were performed initially on all patients. Carotid Doppler, 24-hour ECG recording, and echocardiography were also performed. Upon admission, a computed tomography (CT) scan of the brain was performed for all patients. In instances where it was deemed necessary, a brain MRI with a stroke procedure was also conducted. Operating definitions of hypertension were: An individual is considered to have hypertension if their systolic blood pressure exceeds 140 mmHg, their diastolic blood pressure surpasses 90 mmHg based on two separate measurements prior to the occurrence of a stroke, or if they are already on antihypertensive medication. In addition to the current usage of hypoglycemic drugs, a fasting glucose level of 126 mg/dL or above was diagnostic for diabetes mellitus. Cardiac disease is characterized by a medical history that includes conditions such as valvular heart disease, arrhythmia, and coronary artery disease, among others. The medical records also documented the patient's history of prior transient ischemic attack (TIA), characterized by temporary neurological impairments lasting less than 24 hours, as well as stroke and peripheral angiopathy illness. Cigarette smoking was operationally defined as the act of consuming cigarettes throughout the previous five-year period. The calculation of body mass index (BMI) included dividing weight (in kilograms) by the square of height (in meters). Plasma levels of low-density lipoprotein cholesterol (LDL-c), high-density lipoprotein cholesterol (HDL-c), total cholesterol (TC), apolipoprotein A (ApoA), apolipoprotein B (ApoB) and triglycerides (TG), levels (TG) were evaluated on a subsequent day after admission to the hospital. The tests were done in the morning after not eating or drinking anything all night. They used a Hitachi 7600 automatic analyzer made in Japan by Hitachi Instruments Corporation. All statistical data were analyzed using Excel-365 and SPSS version 26.0. The Chi-square goodness-of-fit test was used to examine the differences across binary categorical variables. To determine if there was a link between the categorical variables, Fisher's exact test was also used. Statistical calculations were performed to determine the variables' percentages, means, and standard deviations. A statistically significant p-value of less than 0.05 was deemed acceptable. The research ensured that all participants, as well as their parents/guardians or legally authorized representatives, provided written informed consent prior to their

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participation. Ethical approval was obtained from the Advanced Studies and Research Board (ASRB) (No. DRGS/2421, Dated: 2-11-2021) at the University of Sindh, Jamshoro. Code numbers were used in lieu of patients' names to protect confidentiality.

RESULTS

Total transient ischemic attack (TIA) patients were 14 (6.7%) out of 209. Six (42.9%) patients were men and eight (57.1%) were women. Mostly 10 (71.4%) patients were in the age group of 31 – 45 years. The mean ± SD GCS score of TIA patients was 13.4 ± 2.2, which indicates a mild TIA, while the mean ± SD age was 36.1 ± 9.3 years. Seven (50.0%) patients were from middle-class families, and the other seven (50.0%) were from low-income families (Table 1).

Table 1: Baseline characteristic of TIA in young adults

Characteristics	Frequency n (%)
Age (Mean ± SD)	36.1 ± 9.3
GCS score (Mean ± SD)	13.4 ± 2.2
Gender	
Male	6 (42.9%)
Female	8 (57.1%)
Age groups (years)	
18 – 30 years	4 (28.6%)
31 – 45 years	10 (71.4%)
Socio-Eco status	
Middle class	7 (50.0%)
Lower class	7 (50.0%)

The most prevalent risk factor was diabetes mellitus in nine (64.3%) patients. Seven (50%) patients had hypertension. Cardiac disease was seen in six (42.9%) of patients. Smoking and previous stroke history were present in one (7.1%) and one (7.1%) patient each. The patient had no family history of any of the risk factors for TIA (Table 2).

Table 2: Risk factors of transient ischemic attack in young adults

Characteristics	Yes	No	p-value
Diabetes Mellitus	9 (64.3%)	5 (35.7%)	0.285
Hypertension	7 (50.0%)	7 (50.0%)	1.000
Cardiac disease	6 (42.9%)	8 (57.1%)	0.593
Smoking	1 (7.1%)	13 (92.9%)	0.001
Previous Stroke	1 (7.1%)	13 (92.9%)	0.001

Diabetes mellitus was observed in three (50.0%) male and six (75.0%) female patients, with no gender differences. Although hypertension is more observed in five (62.5%) female patients than in two (33.3%) male patients. Cardiac disease in 3 (50.0%) males was slightly higher than in females 3 (37.5%). One (16.7%) patient had a smoking history, and one (12.5%) female patient had a previous stroke history. No significant gender differences were observed between male and female patients' risk factors. Ten (71.4%) patients were aged 31 – 45 years and four (28.6%) were aged 18 – 30. Diabetes mellitus was found in eight (80.0%) patients in the age group 31 – 45 years than in one (25%) of patients age group 18 – 30 years. Hypertension was in three (75.0%) patients aged 18 – 30 compared to 4 (40%) patients aged 31 – 45. All six (60.0%) patients with cardiac disease were 31 – 45 years old. Smoking and a previous stroke history were only found in the age group of 31 – 45 years. No significant differences were observed between age groups (Table 3).

Table 3: Risk factors of TIA in young adults according to gender and age

Risk Factors	Total n = 14 n (%)	Male n = 6		Female n = 8		p-value*	Age 18 – 30 n = 4		Age 31 – 45 n = 10		p-value*
		Yes n (%)	No n (%)	Yes n (%)	No n (%)		Yes n (%)	No n (%)	Yes n (%)	No n (%)	
Diabetes Mellitus	9 (64.3)	3 (50.0)	3 (50.0)	6 (75.0)	2 (25.0)	1.000	1 (25.0)	3 (75.0)	8 (80.0)	2 (20.0)	0.582
Hyper-tension	7 (50.0)	2 (33.3)	4 (66.7)	5 (62.5)	3 (37.5)	0.592	3 (75.0)	1 (25.0)	4 (40)	6 (60.0)	0.559
Cardiac disease	6 (43.9)	3 (50.0)	3 (50.0)	3 (37.5)	5 (62.5)	1.000	0	4 (100)	6 (60.0)	4 (40.0)	0.085
Smoking	1(7.1)	1(16.7)	5 (83.3)	0	8 (100)	0.428	0	4 (100)	1 (10.0)	9 (90.0)	1.000
Previous Stroke	1(7.1)	0	6 (100)	1(12.5)	7 (87.5)	1.000	0	4 (100)	1 (10.0)	9 (90.0)	1.000

*Significant p-value <0.05

All 14 patients survived, with no mortality observed in TIA. Of these, 6 (100%) were male and 8 (100%) were female.

DISCUSSION

In our study, the most prevalent risk factor was diabetes mellitus in nine (64.3%) TIA patients. Previous literature reported lower diabetes mellitus in (11%) of young TIA patients [12]. Another study has documented a lower rate of diabetes mellitus in 7 (9.0%) patients [20]. Seven (50%) had hypertension in our study. These numbers were analogous to the results of Janssen et al. They found a slightly higher rate of hypertension in 56.4% of their population, which was younger (<50 years) [21]. Ji et al., observed a lower frequency of hypertension in (20%) of stroke/TIA patients [12]. Six (42.9%) patients had cardiac disease in the current study. Janssen et al., found a slightly higher incidence of cardiac disease in (47.9%) [21]. A prospective study conducted on the Chinese population observed a lower incidence of cardiac disease in 109 (20.6%) stroke/TIA patients [22]. Our study discovered a smoking history in 1 (7.1%) patient. Giovannoni and Fritz reported a higher smoking history in 37 (49%) patients [20]. Another study reported a higher rate of smoking in 40% of stroke/TIA patients [21]. In our study, eight (57.1%) female patients had transient ischemic attacks. These results were agreed with a survey that found 58.8% of female

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patients in a previous study [23]. Pregnancy, migraine, and oral contraceptive use all increase the likelihood of having a stroke or TIA at a younger age, which may explain why women make up a disproportionately high percentage of those affected. Women seem to be more vulnerable to these dangers [21]. All patients survived, and no deaths were reported in the current study. Of the 14 patients, six (100%) were male and eight (100%) were women. The acute fatality and recurrence rates of ischemic stroke in young individuals are quite low, particularly in cases where the underlying etiology remains unidentified. The vast majority of people return to work full-time. The intensity of the first stroke is a good indicator of a person's independence [24].

CONCLUSIONS

The study's conclusions showed that diabetes mellitus was the most common risk factor for TIA, followed by heart disease and hypertension, and that female patients between the ages of 18 and 45 had a higher chance of having the condition. Our study's findings highlight the need to manage common risk factors and do a thorough patient work-up to ascertain the cause of strokes among Pakistan's youth. Larger-scale, continuing research is still required to identify the potential causes of strokes in young individuals as well as the risk factors that may apply to them.

Authors Contribution

Conceptualization: YAJ
Methodology: JW
Formal analysis: YAJ
Writing-review and editing: JW, ZAL
All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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