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Exploring the Pattern of Stroke in Young Adults: Clinical Presentations, Risk Factors, and Implications for Early Detection and Management

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ABSTRACT

Background: Stroke in young adults is an increasingly recognized clinical and public health concern. Unlike older populations, young stroke patients often present with diverse risk profiles and atypical symptoms, necessitating a targeted approach to diagnosis and management. **Objective:** To explore the clinical presentations, associated risk factors, and stroke patterns among young adults aged 15 to 49 years, with a focus on implications for early detection and prevention. **Methods:** This descriptive cross-sectional study was conducted at Allied Hospital, Faisalabad, from December 2024 to April 2025. A total of 95 young adults with confirmed stroke were enrolled. Data on demographics, clinical features, stroke subtypes, and risk factors were collected through a structured proforma. **Results:** Of the 95 patients, 63 (66.3%) had ischemic stroke and 32 (33.7%) had hemorrhagic stroke. The mean age was 36.4 ± 8.2 years, and 61.1% were male. Hemiparesis was the most common presentation (72.6%), followed by headache (29.5%) and aphasia (23.2%). Hypertension (56.8%), smoking (45.3%), and dyslipidemia (22.1%) were the most frequent risk factors. Statistically significant associations were observed between stroke type and hypertension ($p = 0.01$), smoking ($p = 0.04$), and dyslipidemia ($p = 0.03$). **Conclusion:** It is concluded that ischemic stroke is more prevalent than hemorrhagic stroke among young adults. Hypertension, smoking, and dyslipidemia are major modifiable risk factors. Early recognition of stroke symptoms and aggressive risk factor control are essential to mitigate the rising burden of stroke in younger populations.

INTRODUCTION

Stroke, a devastating neurological condition often associated with the elderly, has traditionally been perceived as an affliction of the aging population [1]. However, in recent years, a disturbing trend has emerged - the increasing incidence of stroke among young adults. This trend has sent shockwaves through the medical community, raising questions about the clinical presentations, risk factors, and implications for early detection and management of stroke in this previously less-affected demographic [2]. Recent epidemiological trends suggest that young adults now account for approximately 10–15% of all strokes worldwide, a figure that has shown an upward trajectory in both low-income and high-income countries over the past two decades [3]. This is a phenomenon experienced globally, requiring medical professionals to adapt and address the unique challenges presented by younger stroke patients. Our exploration of this pattern commences with the clinical [4].

At first glance, one may assume that the clinical symptoms of stroke in young adults mirror those of their older counterparts. However, our research at BHI Allied Hospital reveals a striking difference. Young adults often present with atypical symptoms, making diagnosis a challenging puzzle [5]. In Patient 95's case, the initial signs were subtle, consisting of unexplained headaches and intermittent dizziness. These nonspecific symptoms led to a delay in diagnosis, as strokes were not immediately suspected. As we investigate further, we aim to unravel the underlying factors contributing to these atypical presentations [6]. Understanding the risk factors associated with young adult strokes is paramount in developing strategies for early detection and management. Risk factors that predominantly affect the elderly, such as hypertension and atherosclerosis, may not be as prevalent in this demographic [7]. However, our research at BHI Allied Hospital has unearthed a new set of risk factors that warrant attention. Lifestyle-related factors, including

smoking, obesity, and substance abuse, have shown a strong correlation with young adult stroke cases [8]. Patient 95, for example, was a smoker, and this habit played a significant role in his stroke at a relatively young age. Moreover, the role of genetics in young adult stroke cases is a subject of ongoing research, and we explore these hereditary aspects as well [9].

The implications for early detection and management of strokes in young adults are multifaceted and crucial. Early detection is hindered by the aforementioned atypical symptoms, emphasizing the need for greater awareness among both healthcare professionals and the general public [10] Educational campaigns and training programs for medical staff are imperative to ensure that stroke is considered as a potential diagnosis in young adults presenting with unusual neurological symptoms [11].

Furthermore, once a diagnosis is made, the management of young adult stroke patients differs from that of older individuals [12]. In Patient 95's case, the rehabilitation process was arduous and required a tailored approach to meet his unique needs. Young adults typically have different life goals and social responsibilities, which must be considered in their recovery plans [13]. Additionally, addressing lifestyle factors and risk reduction strategies is crucial to prevent recurrent strokes, making education and counseling essential components of management [14].

Objective

This study aims to explore the patterns of stroke in young adults by analyzing the clinical features at presentation, identifying associated risk factors, and evaluating the implications for timely diagnosis and optimized management.

METHODOLOGY

This descriptive cross-sectional study was conducted in the Department of Neurology at Allied Hospital, Faisalabad. The study period spanned six months, from December 2024 to April 2025. A total of 95 patients aged between 15 and 49 years, admitted with a confirmed diagnosis of stroke, were included in the study. The diagnosis of stroke was established through clinical examination supported by neuroimaging (computed tomography or magnetic resonance imaging).

Inclusion and Exclusion Criteria

Inclusion criteria comprised all young adult patients within the specified age group who presented with acute ischemic or hemorrhagic stroke during the study period. Patients with transient ischemic attacks, head trauma, brain tumors, or incomplete medical records were excluded to maintain diagnostic clarity and data reliability. A non-probability consecutive sampling technique was used to recruit participants.

Data Collection

Data were collected through a structured proforma designed to capture relevant patient information, including age, gender, clinical presentation, type of stroke, and associated risk factors. Documented risk factors included hypertension, diabetes mellitus, dyslipidemia, smoking, alcohol or substance abuse, previous cardiac conditions, autoimmune disorders, and family history of cerebrovascular disease. Clinical features at the time of admission—such as hemiparesis, aphasia, visual disturbances, seizures, headache, or altered consciousness—were also recorded.

Data Analysis

Statistical analysis was performed using SPSS version 25.0. Continuous variables such as age were presented as mean ± standard deviation, while categorical variables like stroke type and risk factors were expressed as frequencies and percentages. Associations between various risk factors and stroke type were analyzed using the chi-square test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 95 young adult patients aged 15 to 49 years were included in the study. The mean age of participants was 36.4 ± 8.2 years. Among them, 58 (61.1%) were male and 37 (38.9%) were female, resulting in a male-to-female ratio of approximately 1.6:1.

Table 1

Demographic Characteristics of Study Participants

Characteristic	Value	Percentage (%)
Total number of patients	95	-
Mean age (years)	36.4 ± 8.2	-
Male	58	61.1
Female	37	38.9

Out of 95 patients, ischemic stroke was observed in 63 patients (66.3%), while 32 patients (33.7%) had hemorrhagic stroke.

Table 2

Distribution of Stroke Types

Stroke Type	Frequency (n)	Percentage (%)
Ischemic Stroke	63	66.3
Hemorrhagic Stroke	32	33.7

The most common clinical presentation was hemiparesis, observed in 69 patients (72.6%). Other presenting symptoms included:

- Aphasia: 22 patients (23.2%)
- Headache: 28 patients (29.5%)
- Seizures: 15 patients (15.8%)
- Loss of consciousness: 18 patients (18.9%)
- Visual disturbances: 11 patients (11.6%)

Table 3

Clinical Presentations at Admission

Clinical Presentation	Frequency (n)	Percentage (%)
Hemiparesis	69	72.6
Aphasia	22	23.2
Headache	28	29.5
Seizures	15	15.8
Loss of consciousness	18	18.9
Visual disturbances	11	11.6

The frequency of risk factors identified among the study participants is as follows:

- Hypertension: 54 patients (56.8%)
- Smoking: 43 patients (45.3%)
- Diabetes mellitus: 27 patients (28.4%)
- Dyslipidemia: 21 patients (22.1%)

- Substance abuse (including alcohol and illicit drugs): 13 patients (13.7%)
- Cardiac disease (including rheumatic heart disease or arrhythmia): 9 patients (9.5%)
- Family history of stroke: 17 patients (17.9%)
- Autoimmune disorders (e.g., SLE, APS): 4 patients (4.2%)

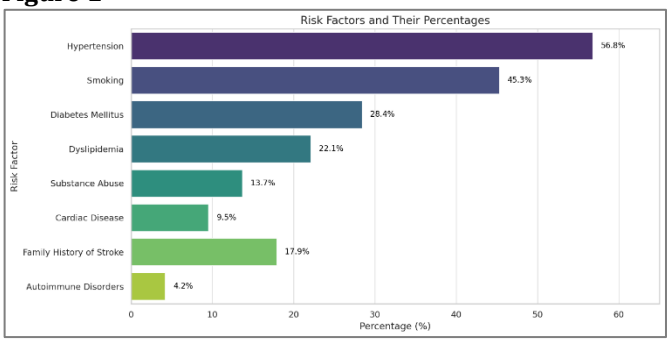
Ischemic stroke was significantly associated with smoking and dyslipidemia ($p<0.05$), while hemorrhagic stroke was more commonly seen in patients with uncontrolled hypertension ($p=0.01$).

Table 4

Frequency of Documented Risk Factors

Risk Factor	Frequency (n)	Percentage (%)
Hypertension	54	56.8
Smoking	43	45.3
Diabetes Mellitus	27	28.4
Dyslipidemia	21	22.1
Substance Abuse	13	13.7
Cardiac Disease	9	9.5
Family History of Stroke	17	17.9
Autoimmune Disorders	4	4.2

Figure 1



Hypertension was the most significant risk factor, observed in 32 ischemic and 22 hemorrhagic stroke patients, with a statistically significant association ($p = 0.01$). Smoking was also significantly associated with ischemic stroke (31 vs. 12 cases; $p = 0.04$). Dyslipidemia showed a higher frequency in ischemic stroke patients (18 vs. 3) and was also statistically significant ($p = 0.03$). Although diabetes mellitus was more prevalent among ischemic cases (19 vs. 8), the association did not reach statistical significance ($p = 0.07$).

Table 5

Association Between Stroke Type and Major Risk Factors

Risk Factor	Ischemic Stroke (n=63)	Hemorrhagic Stroke (n=32)	p-value
Hypertension	32	22	0.01
Smoking	31	12	0.04
Diabetes Mellitus	19	8	0.07
Dyslipidemia	18	3	0.03

DISCUSSION

This study explored the clinical patterns and risk factors associated with stroke in young adults, highlighting a notable predominance of ischemic stroke (66.3%) compared to hemorrhagic stroke (33.7%). The mean age of participants was 36.4 years, with a male predominance (61.1%), consistent with prior research suggesting higher stroke incidence among young males due to modifiable lifestyle factors [13]. Hypertension emerged as the most prevalent and statistically significant risk factor ($p = 0.01$), reinforcing its well-established role in both ischemic and hemorrhagic stroke pathophysiology. This finding is supported by a study conducted by Bejot et al., which also identified hypertension as a dominant factor in young stroke populations [14]. Smoking, reported in 45.3% of patients and significantly associated with ischemic stroke ($p = 0.04$), aligns with previous findings linking tobacco use to endothelial dysfunction and early-onset atherosclerosis [15].

Dyslipidemia was also significantly associated with ischemic stroke ($p = 0.03$), reflecting its contribution to plaque formation and cerebrovascular events in younger individuals. Although diabetes mellitus was more common among ischemic stroke patients, its association was not statistically significant in this cohort ($p = 0.07$). This may reflect variations in glycemic control or sample size limitations, but still suggests an important trend worth investigating further. Clinically, hemiparesis was the most frequent presentation (72.6%), followed by headache and aphasia. These findings are consistent with prior literature indicating that while young adults may sometimes present with atypical features such as seizures or visual symptoms, classic focal deficits remain common [16].

Overall, the study underscores the importance of early screening and aggressive management of modifiable risk factors in young adults. The presence of multiple preventable contributors especially hypertension, smoking, and dyslipidemia suggests that targeted interventions could play a key role in reducing the burden of stroke in this age group. Future longitudinal and multicenter studies with larger samples are warranted to validate these associations and to explore potential genetic and autoimmune contributions to stroke in young populations.

CONCLUSION

It is concluded that stroke in young adults is an emerging clinical challenge, with ischemic stroke being more common than hemorrhagic stroke in this age group. Hypertension, smoking, and dyslipidemia were found to be the most significant and prevalent risk factors, particularly associated with ischemic events. Early recognition of clinical presentations most notably hemiparesis and timely identification of modifiable risk factors are essential for effective prevention and management.

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