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Prevalence and risk factors of stroke in young adults in Quetta Pakistan

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ABSTRACT

Background: Stroke is increasingly affecting young adults in low- and middle-income countries. In Pakistan, data on stroke prevalence and its risk factors in individuals aged 18–45 are scarce, particularly in underserved regions like Quetta.
Objectives: to assess the related modifiable and non-modifiable risk variables and ascertain the prevalence of stroke in Quetta, Pakistan's young adult population.
Methods: At a tertiary care hospital, a six-month cross-sectional study was carried out. Using standardized questionnaires, information was gathered from 80 stroke patients between the ages of 18 and 45. SPSS version 25 was used for descriptive statistics, chi-square tests, and t-tests.
Results: Half of the participants were men, and the other half were women. 33.8% of strokes were ischemic, 27.5% were hemorrhagic, and 38.8% were unknown. Common risk factors included high blood pressure and smoking (56.3%). Medical comorbidities and stroke type were shown to be significantly correlated (p=0.043).
Conclusion: Modifiable risk factors such as smoking and hypertension significantly contribute to stroke in young adults. Immediate public health interventions are needed to address these risks and improve stroke outcomes in this population.
Keywords: Young adults, Stroke, Risk factors, Ischemic stroke, Hemorrhagic stroke

INTRODUCTION

Worldwide, stroke ranks as the third most common cause of disability and the second most common cause of death [1]. A study that was done using Global burden of disease in 2010 affirms that stroke is the most disabling cause of disability adjusted life years as calculated in the study carried out in southeast Asia [2]. Moreover, the prevalence of stroke is higher in people of 15 to 50 years in low-income countries and causes the higher mortality rate compared to high-income countries [3]. Over eight hundred and thousand individuals annually acquire a stroke. The rate of stroke is diminishing in the West even though it is still high in Asia. Nevertheless, the worldwide mortality rate due to stroke is increasing [3].

. In addition, stroke is a huge burden on the economy of the country regarding rehabilitation and long-term care [2]. It is known that there are a lot of risk factors and etiologies related to Ischemic stroke, nevertheless, a high percentage of younger individuals have unidentified causes of stroke. As an example, previous studies conducted in US and Europe have demonstrated that increasing rates of ischemic stroke are occurring among the younger individuals and young acute stroke cases possess most of the conventional stroke risk factors experienced by aged adults, including obesity, hypertension, diabetes mellitus, dyslipidemia, and tobacco use [4].

New evidence shows that the rates of the traditional risk factors are extremely high between the age group of 1555 when compared to the older age bracket [7].

Most of such reports are made by Western European and North American cohorts; no data are yet available on the instance of stroke among young patients in Asia and eastern Europe.

What is more, ischemic stroke occurs more frequently among individuals aged 30-45 (several studies have reported it) [8,9]. Though epidemiological surveys on Pakistanis are not available the factor is known to reduce the life expectancy of the Pakistani. The population is low and limited instances of hospital-based studies have ever been conducted in Pakistan to indicate that young stroke is a common condition.

In a clinical study by Khan JA et al., it was considered that the incidence of stroke is higher among patients of 15 45 years of age (26 percent) [10]. In case series study, Vohra et al. identified 34 percent of their stroke cases to be younger than 50 years [11].

Moreover, the statistics show that over two-thirds of the stroke burden is experienced in emerging countries [12]. Today 10-30 per cent of stroke onset in India happens in youthful individuals, and in Western countries 3-8.5 percent of the stroke disorder happens in young people [1315]. Stroke is also high among the young generation in Pakistan which may mean more financial burden. Moreover, statistics show that the most prevalent risk factor in the young patients was identified as hypertension [16,17]. Moreover, etiological subtypes are also geographically distributed. Thus, to reduce the number of disabilities and disease recurrences young patients might experience, it is highly important to evaluate risk factors and the causes of stroke in younger patients.

Earlier studies have shown how modifiable vascular risk factors have been associated with stroke in the older generation of the population, and the non-modifiable risk factors which include autoimmune and congenital disorders have been implicated in the occurrence of stroke in younger generations. Even though the presence of conventionally amendable vascular risk factors in young adults with an acute ischemic stroke was a controversial topic, the scenario seems to be changing due to the world lifestyle changes towards risk factors of vascular risk in younger individuals. [18]

In the last decade, increased awareness of the importance of modifiable lifestyle-related risk factors to prevent stroke among younger age is possible; most of the research was concentrated over developed countries of the west. Over the past years, the change has been seen in the development of poverty-related illnesses transferred to chronic atherosclerotic diseases due to economic growth in developing countries. [19]

Very little has been documented regarding the impact of these diseases on the higher incidence of stroke in the young population; more especially in Pakistan where there is an entire lack of research studies to explore the incidence rates of various stroke risk factors in the impetus group.

Stroke remains as one of the most prevalent non-communicable disorders in Pakistan, but its prevalence depends on the region as well as the method [20]. They are between 4.8 and 19.1 percent. Even though national data constitutes the main bulk of the country comprises of adults and the elderly, fresh research indicates that young adults in urban and semi-urban circles such as Quetta are not spared by the trend [21]. Sedentarily associated diseases like substance abuse, smoking,

sedentary lifestyles, obesity, dyslipidemia, diabetes mellitus, and hypertension, are the several factors that have caused the increasing stroke incidence in this young age group [22]. Moreover, it is also identified that the genetic predispositions, hyper coagulability and congenital and acquired heart defects are the significant risk factors of stroke in young population [23]. Unlike older adults, young stroke survivors are often faced with long-term physical, psychological and occupational challenges and have the physical, mental and financial strain of this death match measured in loads of personal as well as communal pressure [24].

Stroke epidemiology in young adults such as Quetta remains poorly known, even though it remains an important issue. Low awareness, late presentation to the hospital, absence of preventive measures, and inadequacy of access to specialized treatment help to increase this problem [25]. To enhance clinical outcomes and develop targeted public health interventions, it is important that the prevalence and risks of stroke in this age group should be understood.

To provide future healthcare planning and stroke prevention strategies, this study aims at examining the existence of a stroke and associated risk factors in young adults in Quetta, Pakistan.

LITERATURE REVIEW:

Stroke is a recent problem that has presented itself as a special clinically and public health burden in adults of the young age group. Higher figures that report a perceptible surge in the amount of stroke cases in human beings between the ages of 15 and 45 across the world, have challenged the conventional knowledge that stroke is a geriatric disease. This is of concern in low- and middle-income countries where health systems are often unequipped to manage the population burden of long-term functional impairment in economically productive age groups [26].

It has been established that between 10 and 15 percent of all the strokes experienced globally occur among individuals below 50 years and the figure could be more in certain regions of Asia and sub-Saharan Africa [27]. Katan and Luft provide a systematic review of stroke occurrence in young adults, which indicates the occurrence of 5-15 stroke per 100,000 person-years. The increases tend to affect the developing countries due to the increasing prevalence of modifiable vascular risk factors such as smoking, obesity and hypertension [28]. The rate of age-specific stroke events of individuals younger than 45 was reported to be

growing faster among the younger population compared to those who are older, which is similar to the rates recorded elsewhere in Asia and Middle East [29]. According to the research studies in South Asia, such as Pakistan and India, standard and non-traditional risk factors are usually associated with young stroke patients. As an example, Kamal et al. found that among the young stroke patients in Pakistan, smoking and hypertension are the risk factors which were most common followed by diabetes and then dyslipidemia [30]. It was found that almost one third of stroke patients under the age of 45 in India did not have any identifiable conventional risk factor, so it is possible that a genetic and environmental factor is at work here in this population as well [31].

Most importantly, recent studies have indicated that there is a shift in the etiology of stroke among younger patients. Cases of arterial dissections, vasculitis, hypercoagulable states, and cardioembolic origin of congenital heart disease or patent foramen oval (PFO) are more prone to strokes in young adults, but in old populations, atherosclerotic and cardioembolic strokes are more likely to occur [32]. A report in Iran published an investigation of uncommon causes of ischemic stroke in the younger population including cerebral venous thrombosis and antiphospholipid antibody syndrome that were attributed to ischemic stroke in around 18 percent of the cases [33].

In Karachi and Lahore, a multicentric study showed that the causes of about 20-30 per cent of young stroke patients remained unexplained after careful analysis [34], which indicates the necessity to implement better diagnostic methods and local epidemiological reports that would help to explain the actual risk profile of the young adults in underestimated features. Also, the long time of arrival to the hospital and the underuse of acute stroke medicine such as thrombolysis have been the other significant obstacles to effective stroke treatment in such areas [35]. The existing literature in Pakistan is already scarce especially in regions such as Quetta. Recent data has also given the importance of socioeconomic factors, such as educational level, employment status and health sector access, in having an impact on stroke occurrence and result, in the youth population. In research carried out in Bangladesh the low socioeconomic status and occurrence of stroke among individuals younger than 50 years was considered correlated significantly in a cross-sectional evaluation [36]. This enhances the belief that pathogenesis as well as treatment of stroke on young adults across South Asia to a greater extent depends on the social economic background.

In any case, the growing prevalence of stroke among the youth is a factor that will

require urgent regional-based study to establish prevalence and identify high-risk individuals. There is a need to create awareness, strengthen health systems as well as implement specific primary prevention measures which focus on risk factors among the younger groups which are not only those which can be modified but also those which cannot. The aim of the current Quetta study is to contribute to this small, but currently growing literature.

RESEARCH OBJECTIVE

The key objective of this study is to determine the prevalence rate of stroke and its risk factors that are associated with it among youths between ages 18-45 years in Quetta, Pakistan. The aim of the study is to achieve the capacity to calculate the prevalence of modifiable and non-modifiable risk factors that predispose stroke among this age category by reviewing both clinical and demographic information. There is also a search in the trends in socioeconomic status, medical history and lifestyle that would influence the stroke incidence in the study. The findings will be very useful in developing targeted public health campaigns and early interventions, which can reduce the stroke cases among young individuals.

MATERIALS AND METHODS:

The study is a six-month quantitative cross-sectional study done in a tertiary care hospital in Quetta, Pakistan. The expectation was to establish the prevalence of stroke and associated risk factors in the young population who are between 18 and 45 years. A non-probability consecutive sampling was used to obtain 80 clinical or radiologically verified ischemic or hemorrhagic stroke victims. The five sections of a structured questionnaire were demographic data (age, gender, marital status, education); medical history (hypertension, diabetes, hyperlipidemia, heart disease, prior stroke or TIA, prolonged use of medications), lifestyle data (smoking, drug use, exercise, diet); data on stroke (type, duration of onset, thrombolytic therapy); and clinical data (blood pressure at the time of admission and blood sugar level) with additional data provided by the Hospital records.

The analysis of the data was done using SPSS version 25.0. Means, standard deviations, frequencies, and percentages were calculated as a descriptive statistic of relevant variables. The relationships between categorical variables (i.e. comorbidities and type of stroke) were tested using the Chi-square test. The independent samples t-tests compared the means of continuous variables (blood pressure) of stroke types. Any P-values lower than 0.05 were considered as significant.

RESULTS

Table 1: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	40	50.0	50.0	50.0
	Female	40	50.0	50.0	100.0
	Total	80	100.0	100.0	

Table 2: Education level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Illeterate	22	27.5	27.5	27.5
	primary	21	26.3	26.3	53.8
	Secondary	24	30.0	30.0	83.8
	higher	13	16.3	16.3	100.0
	Total	80	100.0	100.0	

Table 3: Smoke Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	45	56.3	56.3	56.3
	No	35	43.8	43.8	100.0
	Total	80	100.0	100.0	

Table 4: Martial status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	single	16	20.0	20.0	20.0
	married	25	31.3	31.3	51.3
	divorced	24	30.0	30.0	81.3
	widowed	15	18.8	18.8	100.0
	Total	80	100.0	100.0	

Table 5: Long_term_medication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	38	47.5	47.5	47.5
	No	42	52.5	52.5	100.0
	Total	80	100.0	100.0	

Table 6: Stroke type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ischemic	27	33.8	33.8	33.8
	Hemorrhagic	22	27.5	27.5	61.3
	Unknown	31	38.8	38.8	100.0
	Total	80	100.0	100.0	

Table 7: Stroke onset duration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<24 hours	23	28.8	28.8	28.8
	1–3 days	24	30.0	30.0	58.8
	>3 days	33	41.3	41.3	100.0

	Total	80	100.0	100.0

Table 8: Mean & Standard deviation

	N	Mean	Std. Deviation
Age	80	32.5375	8.23537
Blood-pressure_at_admission	80	132.2750	27.00350
Blood_sugar_level	80	89.1375	18.69999
Valid N (listwise)	80		

Table 9: Chi-Square Test

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.012[a]	6	.043
Likelihood Ratio	13.219	6	.040
Linear-by-Linear Association	3.287	1	.070
N of Valid Cases	80		

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 4.68.

Since the p-value is less than 0.05, the result is statistically significant. This means there is a significant association between Stroke Type and Diagnosed Conditions (Hypertension, Diabetes, Hyperlipidemia, Heart Disease).

Table 10 : Independent sample test

Group Statistics

	Stroke_type	N	Mean	Std. Deviation	Std. Error Mean

Blood-pressure_at_admission	Ischemic	27	134.7778	26.76297	5.15054
	Hemorrhagic	22	134.6364	25.74887	5.48968

The mean blood pressure is very similar between both groups:

- Ischemic: 134.78 mmHg
- Hemorrhagic: 134.64 mmHg

Table 10 : Independent sample test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Blood-pressure_at_admission	Equal variances assumed	.102	.750	.019	47	.985	.14141	7.55793	-15.06319	15.34602
	Equal variances not assumed			.019	45.664	.985	.14141	7.52759	-15.01384	15.29667

Levene's Test p-value (0.750) is > 0.05, so equal variances are assumed. This tells SPSS to use the first row of the t-test output.
The p-value (0.985) is much greater than 0.05, meaning there is no significant difference in blood pressure at admission between patients with Ischemic and Hemorrhagic strokes.

DISCUSSION:

The research will focus the incidence of stroke and the issues behind this risk in the context of the urban population in Quetta, Pakistan of the valid age group of 18-45 years. The findings present a significant addition to new knowledge with regard to understanding clinical criteria, lifestyle choices, medical backgrounds, and demographic features influencing stroke in the young population.

It can be concluded that a neutral gender balance in the occurrence of strokes at this age group is addressed in the study population in relation to the equal proportion of males and females (50% each). Table 1 supports this fact by indicating that both the genders are equally susceptible to stroke and this counteracts previous assumptions that males were more susceptible. The

differences in educational attainment were apparent with the results showing that most had either primary (26.3%) or secondary (30%) of education as noticed in Table 2. More importantly, only 1 in 6 have received higher education, which could indicate a possible connection between a lower level of education and higher chances of getting a stroke, possibly due to the inability to access prevention and health literacy.

Lifestyles also followed as significant parameters. Results indicated that Table 3 demonstrated that 56.3 percent of participants were smokers, which is a high percentage and a key indicator in the body of evidence thoughts that smoking is one of the vascular risk factors which can be altered and contributes to onset of stroke early in life. About marital status (Table 4), the sample consisted of a very heterogeneous group: 18.8 percent widowed, 20 percent single, 30 percent divorced, and 31.3 percent married. Since a large proportion of them are bereaved or divorced, the existence of psychosocial stress could be a possible reason that would predispose them to a stroke.

27.5 percent of the respondents also responded that they are using medications over a long period of time (Table 5) which possibly could be due to past medical morbidities like diabetes or high blood pressure. Table 6 represents the distribution of stroke types: 33.8% percent of strokes were defined by ischemic type, 27.5 percent stroke was hemorrhagic and the remaining rate was 38.8 percent of the overall which can either be due to inadequate clinical description of the condition or due to discrepancy in the diagnosis process. These findings point to the necessity of better diagnostic power, especially in low resource settings such as Quetta.

The stroke onset period varied with those of the participants (Table 7). The tendency to experience delayed hospital entrance was indicated by most participants (41.3%) stating that they experienced more than three days of stroke symptoms before going to visit the hospital. Only 28.8 percent of individuals used medical assistance in a day. All these delays significantly affect the outcome of the treatment and indicate the importance of the system of early intervention and community education programs regarding stroke alarm signs.

The focus on young adults is validated by Table 8, which nevertheless demonstrates the average age of 32.5 years old. The admissions presented a mean blood sugar of 89.1 mg/dl, and mean blood pressures of 132.3 mmHg. General blood pressure readings were near the borderline levels of hypertension and at some point, they record high pressures. This implies that slightly higher blood pressure can be a risk factor of stroke amongst younger individuals.

Based on the chi-square test (Table 9), the chi-square statistic and p-value showed a statistically significant relationship ($p = 0.043$) between the type of stroke and other concomitant conditions (e.g., hypertension, diabetes, hyperlipidemia and heart disease). It means that there exists a relationship between the type of stroke and pre-existing medical conditions, which demonstrates the role of the modifiable risk factors in the pathophysiology of stroke among young individuals. And of great importance, following the findings of international studies, ischemia stroke was most greatly associated with hyperlipidemia and hemorrhagic stroke most greatly with hypertension.

The independent samples t-test was used to compare the level of blood pressure in the group of people who experienced an ischemic and hemorrhagic stroke on admission (Table 10). The mean systolic pressures of the two groups were almost similar (134.78 mmHg for ischemia and 134.64 mmHg for hemorrhagic) and the result did not show any significant difference ($p = 0.985$). The research suggests that even though blood pressure is an important clinical indicator, other factors like the kind of stroke, the timing and medical conditions underlying the condition may bring in more complexities into the outcome.

In totality, the research paper brings into the spotlight the prevalence of risk factors that could be changed such as cigarettes, hypertension, and delayed treatment among the young patients of stroke. To curb the elevated cases of stroke among young adults in Pakistan, the findings recommend the use of immediate, region-specific public health measures, which focus on early screening, lifestyle and educational interventions in the context of health.

CONCLUSION

In Quetta, Pakistan, stroke risk is placed under a spotlight in young adults and with

ages between 18 and 45 as the young adults are predisposed towards the risk more than any other age. Since genders are evenly distributed, the low level of education, and prevalence of comorbidity conditions, such as diabetes and hyperlipidemia are high, it can be assumed that lifestyle and sociodemographic variables are highly influential in stroke among the considered age group. Although the ischemic stroke was more common, it was not detected in a considerable number of descriptions due to the weaknesses of the diagnosis. The early diagnosis and treatment of vascular risk factors can be described as necessary because there is a close association between the kind of stroke and preexisting medical conditions.

With the purpose of reducing the stroke rate and improving the outcomes of the younger population, our results suggest public health interventions that should be applied, including behavioral interventions and early screening and education. The amplification of healthcare access, and stroke awareness is the key to minimizing the stipulated socioeconomic outcomes in disadvantaged parts of the world such as Quetta.

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QUESTIONNAIRE

Section A: Demographic Information

1. Age: _____
2. Gender: ☐ Male ☐ Female
3. Marital Status: ☐ Single ☐ Married ☐ Divorced ☐ Widowed
4. Educational Level: ☐ Illiterate ☐ Primary ☐ Secondary ☐ Higher

Section B: Medical History

5. Have you ever been diagnosed with the following? (Check all that apply)

☐ Hypertension ☐ Diabetes Mellitus ☐ Hyperlipidemia ☐ Heart Disease

☐ Previous Stroke/TIA

6. Are you currently on any long-term medication? ☐ Yes ☐ No

Section C: Lifestyle Factors

7. Do you smoke?

☐ Yes ☐ No

8. Do you use any substances (e.g., drugs/alcohol)?

☐ Yes ☐ No

9. Physical activity level:

☐ Sedentary (no exercise) ☐ Moderate (1–2 times/week) ☐ Active (3+ times/week)

10. Diet habits:

☐ High-fat diet ☐ Balanced diet ☐ Vegetarian

Section D: Stroke-Specific Information

11. Type of stroke:

☐ Ischemic ☐ Hemorrhagic ☐ Unknown

12. Duration since stroke onset:

☐ <24 hours ☐ 1–3 days ☐ >3 days

13. Was thrombolytic therapy given?

☐ Yes ☐ No

Section E: Investigations and Risk Factors (for Hospital Records Use)

14. Blood Pressure at admission: / ----------mmHg

15. Blood Sugar Level (RBS/FBS): _____ mg/dL