



POTENTIAL RISK FACTORS OF STROKE: A COMMUNITY-BASED, CROSS-SECTIONAL STUDY FROM SINDH PROVINCE OF PAKISTAN

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ABSTRACT

OBJECTIVE: To determine the frequency of potential risk factors of stroke among people attending the stroke (Fali) screening camps in Sindh province of Pakistan.

METHODS: This descriptive cross-sectional study was conducted in the 12 rural and urban areas of Sindh through stroke screening camps, during the period of six months in 2018. A total of 1,480 consecutive persons 18 years or above who had no prior stroke were enrolled. The questionnaire comprised of demographic information, stroke related risk factors, personal history, family history of stroke and investigations did during the camp. Stroke-related risk was categorized as low-risk (1-2 risk factors), moderate-risk (3 risk factors) and high-risk (≥ 4 risk factors). Out of 1,480 persons screened, twenty-eight persons were excluded due to missing information and final sample size was 1,452. Statistical analysis was performed on SPSS version-21.

RESULTS: Out of 1,452 subjects, 802 (55.2%) were males and 650 (44.8%) were females. Mean age was 46.7 ± 13.8 years and majority ($n=1026$; 70.6%) were aging >40 years. Mean BMI was 29.2 ± 14.4 . Low-, moderate- and high-risk groups included 691 (47.6%), 614 (42.3%) & 147 (10.1%) cases respectively. Common potential risk factors of stroke were hypertension ($n=722$; 49.8%), diabetes mellitus ($n=518$; 35.7%), dyslipidemia ($n=290$; 19.97%) and smoking ($n=288$; 19.8%).

CONCLUSION: Common potential risk factors of stroke in our study are hypertension, diabetes, dyslipidemia and smoking. More than half of the participants have potentially moderate- and high-risk of stroke. Robust population-based studies are needed to study the epidemiology of stroke and its risk factors in Pakistan.

KEY WORDS: Epidemiology (MeSH); Stroke (MeSH); Cerebrovascular Disorders (MeSH); Epidemiologic Factors (MeSH); Risk Factors (MeSH); Pakistan (MeSH); Dyslipidemias (MeSH); Smoking (MeSH); Hypertension (MeSH); Diabetes Mellitus (MeSH).

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INTRODUCTION

Non-communicable diseases (NCDs) are a major global health problem, with 63% of deaths due to NCDs and an expected increase of 15% between 2010 and 2020.^{1,2} The main NCDs reported are cardiovascular disease, diabetes and chronic respiratory diseases.² The latest data

from the Global Burden of Disease (GBD) Study 2013 lists cerebrovascular disease as the second leading cause of death and disability-adjusted life years after ischemic heart disease.^{3,4} According to GBD's 2010 study, there were approximately 5.3 million cases of hemorrhagic stroke, of which about 80% occurred in low- and middle-income countries. Hemorrhagic stroke

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causes more than 3 million deaths.⁵

Strokes have different risk factors and can be divided into risk factors that can be modified and not modified. The main risk factors for stroke include age, history of cerebrovascular events, smoking, drinking, lack of exercise, high blood pressure, dyslipidemia, diabetes, cardiovascular disease, obesity, metabolic syndrome, diet, nutrition and genetic risk factors.⁶⁻⁸ A study showed that 90.5% of the global stroke burden can be attributed to variable risk factors, of which 74.2% are related to lifestyle (i.e. smoking, poor diet and less physical exercise).⁹ Ishaq, et al. found that pregnancy/long-term use of contraceptives was the most important risk factor in the Pakistani sample.¹⁰

Stroke and transient ischemic attack (TIA) are very common in Pakistan. A recent community-based study shows that the prevalence of stroke and/or TIA in the urban slums of Karachi is about 21.8%.^{11,12} Ischemic stroke was found in 105 (70%) patients, and hemorrhagic stroke accounted for 45 (30%). The common risk factors were hypertension 127 (84.7%), diabetes 31 (20.7%), coronary heart disease 31 (20.7%), previous TIA / stroke 42 (28%), smoking 28 (16.7%) and obesity 16 (10.7%).¹¹ Lahano, et al. reported that patients with ischemic stroke were most likely to have diabetes, hypertension, hypercholesterolemia, smoking and obesity than those with hemorrhagic stroke.¹³

In the past few decades, the lifestyle of Pakistanis has undergone tremendous changes. The aging of the population has

TABLE I: CLINICAL CHARACTERISTICS & LABORATORY FINDINGS OF THE PARTICIPANTS

Parameters	Mean	SD
Age (years)	46.7	13.8
Fasting Blood Sugar (mg/dl)	143	69.7
Random Blood Sugar (mg/dl)	163.4	78.7
Height (cms)	159.9	15
Weight (kg)	70.3	14.9
Body Mass Index (kg/m ²)	29.2	14.4
Systolic Blood Pressure (mm/Hg)	133.6	24.6
Diastolic Blood Pressure (mm/Hg)	85.6	14.5

TABLE II: SEVERITY OF STROKE RISK IN DIFFERENT RISK FACTORS OF STROKE

Severity of Stroke*					
Risk Factor		Low-risk (n=691)	Moderate-risk (n=614)	High-risk (n=147)	P-value
Gender	Female (n=650)	183 (28.1%)	337 (51.9%)	130 (20.0%)	<0.001
	Male (n=802)	508 (63.3%)	277 (34.5%)	17 (2.2%)	
Dyslipidemia (n=290)		53 (18.3%)	143 (49.3%)	94 (32.4%)	<0.001
Smoking (n=288)		58 (20.1%)	148 (51.4%)	82 (28.5%)	<0.001
Diabetes (n=508)		69 (13.6%)	344 (67.7%)	95 (18.7%)	<0.001
Hypertension (n=722)		191 (26.6%)	438 (60.7%)	93 (12.9%)	<0.001

*Low (1-2 risk factors), moderate (3 risk factors) and High (≥4 risk factors)

increased leading to changes in the prevalence of stroke and its associated risk factors. However, in Pakistan, there is still a lack of research specifically addressing the prevalence of stroke and its associated risk factors in normal population. The current incidence and prevalence of stroke in Pakistan is unclear. Regarding Pakistan, the current published literature is insufficient, and there are not many original research articles. The incidence of stroke per capita in Pakistan is the highest in the world, so collecting and interpreting local epidemiological data would be very beneficial. The objective of this study was to study the frequency of potential risk factors of stroke among people attending the stroke (Falij) screening camps in Sindh province of Pakistan.

METHODS

This descriptive cross sectional study was conducted through the Stroke (Falij) Screening Camps in 12 rural and urban areas of Sindh from July 2018 to December 2018 after the approval from the Institutional Review Board, Liaquat College of Medicine & Dentistry/ Darul

Sehat Hospital, Karachi and written informed consent from all participants. All propagation ways & means were adopted to disseminate the information about these camps, date, venue & brief details about the inclusion criteria. A total of 1,480 consecutive persons 18 years or above who had no prior stroke attended the stroke screening camps with or without common risk factors for stroke in Pakistan including age, gender, diabetes, hypertension, smoking and dyslipidemia were screened. Demographic characteristics, personal and family medical history about stroke risk were determined from the participants. The severity of stroke risk was determined by the team of experts of neurology after consultation. Stroke risk was categorized as low (1-2 risk factors), moderate (3 risk factors) and high (≥4 risk factors).

Out of 1,480 persons screened, twenty-eight persons were excluded due to missing information and final sample size was 1,452. Statistical analysis was performed on SPSS version 21. Categorical variables are presented as frequency while numerical variables as mean±SD.

RESULTS

Out of 1,452 participants 802 (55.2%) were males and 650 (44.8%) were females. Mean age was 49.1 ± 10.8 years (Table I). Around two-third (n=1026; 70.6%) were more than 40 years old and one third (n=426; 29.4%) were ≤40 years of age.

Majority of participants (n=716; 49.3%) were Urdu speaking followed by Sindhi (n=290; 20%), Saraiki (n=283; 19.5 %) and others ethnic background (n=163; 11.2%). Around one-fourth (26.3%) of the participants had matric level education, 21.3% graduate, 16.2 % intermediate, 6.4% masters and 13.1% were illiterate.

Common potential risk factors of stroke were hypertension (n=722; 49.8%), diabetes mellitus (n=518; 35.7%), dyslipidemia (n=290; 19.97%) and smoking (n=288; 19.8%). Low, moderate and high-risk group included 691 (47.6%), 614 (42.3%) & 147 (10.1%) cases respectively (Table II).

DISCUSSION

Our study revealed that more than half of the participants are potentially at moderate- and high-risk of stroke. Common potential risk factors of stroke in our study are hypertension, diabetes, dyslipidemia and smoking.

The majority participants of our study were male which are in accordance with the previous studies conducted nationally and regionally thus making gender,^{12,14} an important predisposing factor. Though keeping in view our societal trend, women are less likely to show up at such screening camps, this may be argued that more men get through the screening owing to the very reason that men are more likely to develop cardiovascular conditions.¹⁵ According to the study results mean age of the participants was 49 years which is lesser than to a study conducted in Abbotabad.¹² This may be due to genetic factors; because across the country lack of awareness regarding riskfactors and compromised health facilities in that under developed area resulting in an early initiation of the disease. However, the reason for the majority of the

subjects belonging to the Urdu speaking origin is that a larger numbers of camps were conducted in the urban areas of the Sindh province where they lived more compared to other ethnic groups. When the educational feature compiled, it is observed that only 13% were illiterate whereas majority of the participants were literate i.e. at least obtained primary schooling. As these stroke screenings camps were organized in the welfare healthcare set ups, which are providing cost effective medical services to the financial middle class segment of the society. This emphasizes the fact that the population that must be sensitized in the efforts to minimize the frequency of strokes risk factors is the less privileged class of the population.

Based on the subjective stroke risk factor tool for the community we had found that around half of our study participants have moderate to high risk of stroke. In our study, the common potential risk factors of stroke were hypertension (49.8%), diabetes mellitus (35.7%), dyslipidemia (19.97%) and smoking (19.8%). While a population base study in China it was found that prevalence rates of dyslipidemia, smoking and hypertension were ranked as the top three cerebrovascular risk factors and were 62.1%, 61.8% and 57.3%, respectively.¹⁶ In Indonesia, a community-based survey showed a high prevalence of stroke which was associated with increasing age, hypertension and diabetes mellitus respectively.¹⁷ A local Pakistan's based study revealed that risk factors appearing in between 30% and 50% of the sample included overweight associated with diabetes mellitus and hypertension (49.00%), smoking (41.7%) and ischemic heart disease (34.5%).¹⁰ This also validate the interpretation of the previous studies conducted in different regions of the world which have also pointed out these four co-morbidities as the main risk factors.¹⁸ These risk factors are preventable and modifiable through community awareness as well changes in the life style. In order to reduce the burden of stroke, prevention remains the best therapeutic at the global level.

Although a mixed sample of different ethnic groups but we cannot generalized this from the entire country.

Though this study provides a unique insight into the community awareness about the risk factors of strokes but it represents only a small percentage of the population. Data was collected from 12 rural and urban areas of Sindh; the 2nd highest Human Development Index out of all of Pakistan's provinces.¹⁹ The sample population was asked a series of questions through the questionnaire used in the study which helped the authors to sensitize an understanding of the awareness among the general population about risk factors for stroke. This is an essential step in recognizing the frequency of stroke risk factors in the Pakistani community. Awareness of the underlying causes and the risks associated with certain lifestyle characteristics is crucial to the treatment strategy of such diseases.

CONCLUSION

Common potential risk factors of stroke in our study are hypertension, diabetes, dyslipidemia and smoking. More than half of our study participants are potentially at moderate- and high-risk of stroke. This highlights the importance of population-based stroke prevention programs in our urban and rural areas. However, more robust, well-designed, population-based studies are highly needed to study the epidemiology of stroke and its risk factors in Pakistan.

LIMITATIONS

Although this study included urban and rural population of Sindh Province, however the sample selected for the study may not be true representative of the target population due to sampling method used in this study.

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AUTHORS' CONTRIBUTIONS

Following authors have made substantial contributions to the manuscript as under:

AM: Conception and study design, drafting the manuscript, critical review, final approval of the version to be published

MAK: Analysis and interpretation of data, drafting the manuscript, final approval of the version to be published

FZ & RNK: Acquisition of data, drafting the manuscript, critical review, final approval of the version to be published

MW: Conception and study design, critical review, final approval of the version to be published

Ai: Acquisition of data, drafting the manuscript, final approval of the version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest

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NIL



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