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MS. Barech

*Bolan Medial College Hospital*

SM Sadiq

*Bolan Medial College Hospital*

AK Zarkoon

*Bolan Medial College Hospital*

M Gulandam

*Bolan Medial College Hospital*

Kaleem Ullah

*Bolan Medial College Hospital*

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# RISK FACTORS FOR ISCHEMIC STROKE IN PATIENTS ATTENDING A TERTIARY HOSPITAL IN QUETTA

Muhammad Saleem Barech,<sup>1</sup> Syed Mohammad Sadiq,<sup>1</sup> Abdul-Kareem Zarkoon,<sup>2</sup> Gulandam,<sup>3</sup> and Kaleemullah<sup>3</sup>

<sup>1</sup>Department of Neurology, Bolan Medical College Hospital - Sandaman Provincial Hospital, Quetta

<sup>2</sup>Department of Nephrology, Bolan Medical College Hospital - Sandaman Provincial Hospital, Quetta

<sup>3</sup>Department of Medicine, Bolan Medical College Hospital - Sandaman Provincial Hospital, Quetta

Correspondence to: Dr Barech, Department of Neurology, Bolan Medical College Hospital - Sandaman Provincial Hospital, Quetta, Pakistan.  
Email: drsaleem\_barech676@yahoo.com

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## ABSTRACT

**Objectives:** The aim of this study was to see the pattern of risk factors in patient with ischemic stroke. **Methodology:** 156 patients with ischemic stroke were selected from the neuro-medicine OPD of Bolan Medical College Hospital. The basic demographic data (age, gender, family history, smoking history) and blood pressure were recorded of all patients. They were advised to complete the necessary investigation, such as CT-brain (plain or with contrast), MRI-brain if needed, blood sugar, lipid profile, CBC, ECG, Echo, Doppler sonography for carotid artery. **Result:** 94 (60.3%) patients were male and 62 (39.7%) were female. The mean  $\pm$  SD age of the study patient was  $61 \pm 9.7$ . In this study 116 (74.4%) patients had a single risk factor whereas the remaining 36 (23%) patients had at least two risk factors and only 4 (2.6%) patients were classified as unknown etiology. Out of 156 patients 62.9% of study subjects were hypertensive, 26.3% were diabetic, 14.1% had dislipidemia, 12.2% were having IHD, 7.84% subjects had positive family history, 10.4% were active smokers, 2.05% with polycythemia and only 1.21% of study subjects were having carotid stenosis. In this study 29 (18.6%) patients were having aphasia. The mean  $\pm$  SD age of patients with aphasia was  $65 \pm 11$  years and in non-aphasia patients was  $60 \pm 9$  years, the mean difference (5.17 years) between these two groups was statistically significant ( $P=0.009$ ). Also the difference in proportion of normal and aphasic patient among the elderly was statistically significant ( $P=0.01$ ). Furthermore, 24 (82.8%) patients with aphasia were hypertensive and the remaining 5 (17.2%) patients were normotensive. Hypertensive patient had significantly higher risk of aphasia compared to normotensive ( $P=0.03$ ). However no significant difference was found among patients with aphasia related to DM, IHD, Hyperlipidemia and polycythemia. **Conclusion:** Overall 62.9% of study subjects were hypertensive, 26.3% were diabetic, 14.1% had dislipidemia, 12.2% were having IHD, 7.84% subjects had positive family history, 10.4% were active smokers, 2.05% with polycythemia and only 1.21% of study subjects were having carotid stenosis respectively. In this study 29 (18.6%) patients were having aphasia. Advance age and hypertension were significant contributors for aphasia.

## INTRODUCTION

Stroke is defined as sudden lost of blood flow to an area of the brain that leads to functional neurological deficit. Ischemic stroke accounts for up to 85% of all strokes,<sup>23</sup> which is mainly caused by thrombosis or embolism of the brain vessel. Men are at higher risk compared to female and mainly affecting adult age above 45 years. The most important etiologies of ischemic stroke include large-artery atherosclerosis, cardioembolism and cerebral small-vessel disease. Less common causes of stroke are cervical artery

dissection, cerebral vasculitis, coagulopathies, hematologic disorders, and others. A considerable minority of ischemic stroke cases remains etiologically undefined even after complete diagnostic workup. It is presently an important challenge to adapt acute therapy and secondary prevention according to the cause of stroke in individual patients. The pathogenesis, prognosis, and treatment differ among subtypes, evaluating risk factors for individual subtypes may contribute to more effective primary and secondary prevention of ischemic stroke. However, there is still scant information on the role of risk factors and the

clinical course in etiologic stroke subtypes.

Epidemiologic studies of the risk factors for ischemic stroke have been very important for defining several measures to prevent stroke and for increasing the understanding of the origin of stroke in different regions and populations. There are a number of risk factors that increase the chances of having a stroke. Some risk factors cannot be reversed or changed like ethnicity, family history, gender and age. But some risk factors can be removed like smoking and alcohol intake. However most of the risk factors can't be removed, but can be controlled such as hypertension, diabetes, atrial fibrillation, hyperlipidemia, polycythemia and others. Effective risk factors intervention offers a real hope of reducing stroke morbidity and mortality.

No population-based study of the risk factors for stroke in Baluchistan has been reported. This study was designed to evaluate the relative importance of the various risk factors contributing to ischemic stroke in Quetta, Baluchistan using standardize diagnostic method. The present study examines the prediction of ischemic stroke by demographic, psychosocial, behavioral, and conventional cardiovascular risk factors in a cross-sectional study of Bolan Medical College Hospital (BMCH) patient attended in 12 months since January 2008.

## METHODOLOGY

Patients were selected from the neuro-medicine OPD of BMCH, either admitted in the ward or treated on the out patient basis. The basic demographic data (age, gender, family history, smoking history) and blood pressure were recorded of all patients. They were advised to complete the necessary investigation, such as CT-brain (plain or with contrast) MRI-brain if needed, blood sugar, lipid profile, CBC, ECG, Echo, Doppler sonography for carotid artery.

**Inclusion criteria:** Only patients who meet the criteria for ischemic stroke were selected.

**Exclusion criteria:** Patients with haemorrhagic stroke were not included in this study.

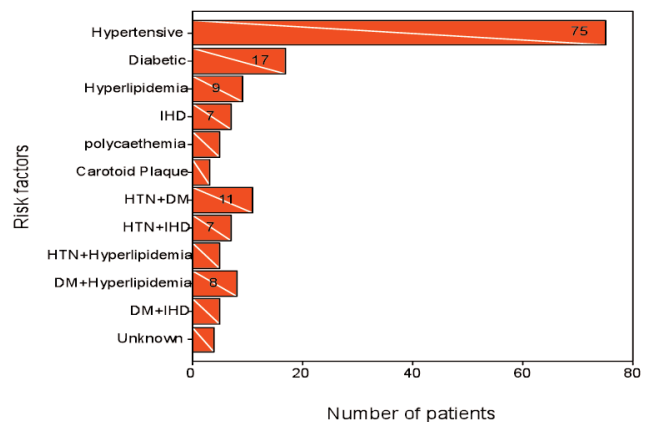
## RESULTS

Out of 156 patients 94 (60.3%) were male and 62 (39.7%) were female. The mean  $\pm$  SD age of the patient was  $61 \pm 9.7$ , ranging from 42 to 84 years. Among these 20 (12.8%) subjects had positive family history and 26 (16.6%) were active smokers. In this study, 116 (74.4%)

patients had a single risk factor whereas the remaining 36 (23%) patients had at least two risk factors and only 4 (2.6%) patients were classified as unknown etiology. Among the single risk factor patients, 75 (48.1%) patients had hypertension, 17 (10.9%) patients were known diabetic, 9 (5.8%) patients were having hyperlipidemia, 7 (4.5%) patients had IHD, 5 (3.2%) patients were having polycythemia and only 3 (1.9%) patients had carotid stenosis.

Moreover among the patients who had combined risk factors, 11 (7.1%) patients had hypertension (HTN) and diabetes mellitus (DM), 7(4.5%) patients had HTN and ischemic heart disease (IHD), 5 (3.2%) patients had HTN and hyperlipidemia, 8 (5.1%) patients had DM and hyperlipidemia and 5 (3.2%) patients were having DM and IHD.

Overall, out of 156 patients 62.9% of study subjects were hypertensive, 26.3% were diabetic, 14.1% had dislipidemia, 12.2% were having IHD, 7.84% subjects had positive family history, 10.4% were active smokers, 2.05% with polycythemia and only 1.21% of study subjects were having carotid stenosis as shown in Figure 1.



**Figure 1.** Prevalence of risk factors in the sample population.

In this study 29 (18.6%) patients were having aphasia while the remaining 127 (81.4%) were non-aphasic. The mean  $\pm$  SD age of patients with aphasia was  $65 \pm 11$  years and in non-aphasia patients was  $60 \pm 9.1$  years, the mean difference (5.17 years) between these two groups was statistically significant ( $P=0.009$ ). Moreover, 21(72.4%) patients of elderly age group ( $>60$ years) were having aphasia while in middle age group ( $<59$ years) only 8 (27.6%) patients had aphasia. The difference in proportion of normal and aphasic patient among the elderly was statistically significant ( $P=0.01$ ).

Furthermore, 24 (82.8%) patients with aphasia were hypertensive and the remaining 5 (17.2%) patients were normotensive. Hypertensive patient had significantly higher risk of aphasia compared to normotensive (P=0.03). However no significant difference was found among patients with aphasia related to DM, IHD, hyperlipidemia and polycythemia as shown in Table 1.

**TABLE 1.** Contributing factors for aphasia among stroke patients

Variables Categories	Aphasic	Non-aphasic	P-value
Age (mean ± SD)	65 ± 11	60 ± 91	0.009
Age (years) >60	21	59	0.01
<59	8	68	
BP (mmHg) >140	24	78	0.03
<139	5	49	

## DISCUSSION

Stroke is an important public health problem and a burden to community and health care providers. It is the third most common cause of death after ischemic heart disease and cancers, not only in developed countries, but worldwide. Stroke occurs predominantly in middle and late years of life. Ischemic strokes mostly occur between the ages of 71 and 80 years.<sup>3</sup> Several line of evidence suggests that hypertension, diabetes mellitus, hyperlipidaemia, ischaemic heart disease, atrial fibrillation, smoking, polycythemia and carotid stenosis are contributing factors for stroke disease. The prevalence of risk factors varies in different communities. Despite numerous prior studies of stroke risk factors much remains unknown and several inconsistencies continue to exist. However the minor differences in the prevalence of stroke risk factors in different communities are probably due to differences in culture, disease patterns, living habits and distribution of various ethnic groups.

In this study the frequency of stroke was higher among men where male: female ratio was 1.5:1. Khan et al noted the male: female ratio 3.5:1. Our finding is in accord to the finding by hamzullah & zarif, and elsewhere.<sup>2,3</sup> The reason is possibly due to differences in the frequency and control of stroke risk factors such as hypertension, ischemic heart disease, peripheral artery disease, and cigarette smoking.<sup>26</sup> Studies have shown that all the above risk factors are more prevalent among male subjects.<sup>3,23,10</sup> Another explanation might be the positive effects of estrogen on the cerebral circulation.<sup>9</sup> A

lifetime exposure to ovarian estrogens may protect against ischemic stroke, at least of the noncardioembolic type, an effect that seems to cease with menopause.<sup>9</sup> The complex interplay between genetics, vascular risk factors and their impact on stroke incidence and mortality may be an explanation for the increased likelihood of stroke prevalence among men.

As mentioned the mean age of patients in our study was 61 years. Older studies in various populations showed that stroke prevalence rise with older age group.<sup>7</sup> Some researchers believe that the risk of stroke doubles for each successive decade after age 55 years (Brown et al 1989, Wolf et al 1992). The peak of age in our study subjects is in accord to the finding from other studies,<sup>22,13,20</sup> which is not unexpected because the strongest risk factor for stroke is age.<sup>22,12</sup> In advance age the effect of increasingly high frequency of contributing factors such as hypertension, diabetes and hyperlipidemia might be a reason for the increased prevalence.<sup>3,18,20,30</sup> Furthermore, greater proportion of aged patients was having aphasia. Earlier studies reported that the frequency of aphasia among stroke patients varied from 21% to 38%.<sup>24</sup> Similarly in this study 29 (17.9%) of 156 had aphasia. Also significant association between advance age and the frequency of aphasia was noted. Stefan et al demonstrated that every seventh of first ischemic stroke patient <65 years of age had aphasia, whereas the proportion nearly tripled for subjects >85 years of age.<sup>1,25</sup>

Hypertension is a leading factor for atherosclerosis, which is more prone to thrombosis and rupture of the vessel. In this study hypertension was present in 62.9% of our cases. This is in accord to the finding reported by Javed et al (62%) and Khan Ni et al (65%), however this figure was quite lower than other studies reported from elsewhere. Valery L et al from Russia found 84.8%, Ong and Raymond from Singapore 71.5%, Leon A.S et al from Australia found 67% with hypertension.

Diabetes was found the second most common risk factor in this study. This is in accord to the finding published in Pakistan and from elsewhere. It was present in 26.3% of cases in present study which is quite lower than other studies in Pakistan. Khan Ni et al found 36% of diabetes with stroke, Hamzullah and Zarif reported 30%. The frequency of diabetes among stroke patients in other industrialized countries varies from 7% to 41%.<sup>31,22,5,2</sup> Gang et al demonstrated that hypertension and diabetes are strong predictors of stroke. In addition, researchers believe that diabetic patients are at an increased risk for hypertension and stroke.<sup>5</sup> However, both hypertension and diabetes can increase the risk of stroke independently

and their combination increases the risk significantly.<sup>11,5</sup> In this study greater proportion of diabetic patients with stroke were also having hypertension. The co-existence of diabetes and hypertension as a risk factor for ischemic stroke was present in 12%. Brett et al demonstrated that diabetic patients with ischemic stroke are younger, more likely to have hypertension and high cholesterol than their non-diabetic counterparts.

Many researchers reported a strong association between stroke with the presence of symptomatic and asymptomatic cardiac disease. For every decrease of 5% in the ejection fraction, an 18% increase in the risk of long-term stroke has been found.<sup>8</sup>

Atrial fibrillation (AF) is an important independent risk factor for stroke and account for up to one fourth of all strokes in elderly patients. AF can result in a possible fivefold increase in ischemic stroke risk. Most ischemic strokes in AF patients are due to cardiogenic embolism of left atrial appendage thrombi. In our study population AF contributed in up to 6% of stroke risk factor. This is in close agreement with the finding of Kamakshi et al who found 6% of stroke patient caused by AF.

Carotid artery stiffness, intima-media thickness, and early plaque formation are potentially useful predictors of the risk of both ischemic stroke and coronary artery disease (CAD).<sup>15</sup> Calcifications of the mitral and aortic valves are also associated with carotid atherosclerosis and may represent widespread systemic atherosclerosis.<sup>16</sup>

Atherosclerosis and thrombosis are important pathological processes underlying both CAD and ischemic stroke. Other important mechanism may be artery-to-artery embolism because of atherosclerosis and unfavorable hemodynamics.<sup>28</sup> Moreover, high fibrinogen level, sympathetic activation and prothrombotic mechanisms following a myocardial infarction may result in extensive thrombus formation.<sup>29</sup>

Many studies reported that low serum cholesterol concentration is associated with an increased risk of hemorrhagic stroke, while high cholesterol level is associated with an increased risk of ischemic stroke. Studies in men subsequently showed increases in ischemic stroke rates at higher levels of total cholesterol, particularly for levels above 240 to 270 mg/dl. The Asia Pacific Cohort Studies Collaboration found a 25% increase in ischemic stroke rates for every 1mmol/L increase in total cholesterol (Zhang et al; 2003). Dyslipidemia was present in 32% of our patients which is higher than 11-23% reported in other studies from Pakistan. Higher prevalence of dyslipidemia in our stroke population could be due to smoking and underlying diabetes.

Cigarette smoking is a potent risk factor for ischemic stroke. The mechanisms by which cigarette smoking is thought to increase the likelihood of ischemic stroke include increased fibrinogen levels, platelet adhesiveness and reduced cerebral blood flow due mainly to atheroma formation associated with smoking and higher blood viscosity in chronic smokers.<sup>27,14</sup> Smoking may furthermore contribute to uncommon etiologies in younger patients.

Present study recorded 32% male patients with smoking which is lower than 53% reported by Basharat et al (2002) but higher than 24% reported elsewhere in Pakistan. The high frequency of smoking in present study could be due to low socioeconomic status of the patients and they are more likely to be smokers as they adopt it as a leisure activity and are less likely to stop because of lack of proper awareness.

In conclusion, our results show ischemic stroke as a poly-etiological disease with profound differences regarding age, sex and risk factors distribution. Most of the major risk factors can be modified but that requires awareness, education, elimination of poverty, use of medication and change in lifestyle. Therefore, future studies on stroke risk factors, etiologies and current treatment strategies are recommended to design a plan for better control and prevention of stroke in this territory.

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