

CARDIAC DISORDERS IN PATIENTS WITH ISCHEMIC STROKE

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ABSTRACT

INTRODUCTION

Worldwide cardioembolic strokes account for one third of non-lacunar strokes and almost half of all risk factors of ischemic stroke in Nepal. This study was done to describe the types of cardiac disorders and their associations with younger and older patients with ischemic stroke.

MATERIAL AND METHODS

In this prospective observational study, data were collected by convenience sampling and analyzed by the Statistical Package for the Social Sciences version 26. Cardiac disorders were divided into rhythm disturbances and structural disorders. Patients were divided into younger (≤ 50 years) and older (> 50 years) patients based on standard definition. The associations were analyzed by using Chi-square test. Other data were expressed as frequencies and percentages.

RESULTS

Of 145 patients were included, cardiac disorders were present in 88.3%. Cardiac structural disorders were present in 86.2% out of which the commonest were left ventricular hypertrophy (26.2%), left ventricular diastolic dysfunction (23.4%) and mitral stenosis (13.8%). Cardiac rhythm abnormalities were present in 42.1% and atrial fibrillation (17.2%), atrial ectopics (14.5%) and ventricular ectopics (4.8%) were the commonest. When considered in total, there was no statistically significant differences in the distribution of these disorders between young and old patients. However, mitral stenosis was strongly associated with young patients ($p=0.001$). Atrial fibrillation and older patients were also significantly associated ($p=0.04$).

CONCLUSION

Though common, cardiac disorders in total were not significantly associated with young and older patients with ischemic stroke; however, mitral stenosis was significantly associated with young patients and atrial fibrillation with older patients.

KEYWORDS

Heart diseases, Ischemic stroke, Nepal

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INTRODUCTION

Stroke is a focal neurological deficit of sudden onset either due to occlusion of blood supply (ischemic) or rupture of blood vessel into the brain parenchyma (hemorrhagic). There are over 12.2 million new strokes each year with one in four people over age 25 having a stroke in their lifetime.¹ Globally, over 62% of all incident strokes are ischemic strokes.¹

The data on exact incidence and prevalence of stroke in Nepal are not available. The estimated incidence of acute stroke according to one publication is around 50,000 per year.² In one study conducted by the author, 49.5% of admissions to the medical wards of a university hospital were related to stroke (of which 73.8% were ischemic and 26.2% were hemorrhagic).³ Worldwide cardioembolic strokes account for 35% of the non-lacunar strokes.⁴

Cardiac causes of stroke accounted for 45% of all risk factors in one of the studies published from a tertiary care hospital in Nepal.⁵ This study was carried out to describe the types of cardiac disorders present in patients with ischemic stroke in a tertiary care hospital in Nepal. It also describes the association of the cardiac disorders among with young and older patients with ischemic stroke.

MATERIAL AND METHODS

This was a prospective observational study carried out in patients who were at least 15 years of age and were either admitted with or visited the outpatient department of Tribhuvan University Teaching Hospital with the diagnosis of ischemic stroke. The diagnosis of ischemic stroke was made clinically and was supported with radiological studies that included the computed tomography or the magnetic resonance imaging of the head. Data collection was done only after the patients, or their caregivers provided the informed consent and took place from December 2020 to November 2021. The sample size was calculated as 145 based on the population prevalence of 30% among neurological admissions in hospital setting at 5% margin of error and subsequently corrected for a finite population size of a single center.³ Convenience sampling was used to select the patients. The collected data were entered into and analyzed by using the Statistical Package for the Social Sciences (SPSS) version 26. Cardiac disorders were divided into rhythm disturbances and structural disorders. The association between cardiac disorders and age of the patients were also studied. Patients were divided into younger (≤ 50 years) and older (> 50 years) patients based on standard definition.⁶ To study the association, atrial fibrillations and atrial flutters were grouped as embologenic rhythms. The structural disorders rheumatic heart diseases, non-rheumatic valvular heart diseases, patent foramen ovale, dilated left atrium and global hypokinesia were grouped as embologenic structural disorders. All patients with acute ischemic stroke undergo routine bedside electrocardiogram (ECG) and transthoracic echocardiogram. Rhythm disturbances were diagnosed either with ECG or a 24-hour Holter monitoring (in all patients who did not have atrial fibrillation in their bedside ECG). Structural lesions were diagnosed with the help of transthoracic echocardiogram, bubble contrast echocardiogram (done in

all younger patients with ischemic stroke in the center if the transthoracic echocardiogram is normal) and transesophageal echocardiogram in selected cases. The associations were analyzed by using Chi-square test. Other data were expressed as frequencies and percentages. The data analyzed for this study were extracted from the database which was obtained as a part of the thesis of a co-author of this study. The proposal to carry out the thesis and to study the variables were approved by the Institutional Review Committee of the Institute of Medicine, Tribhuvan University [IRC number: 185(6-11) E2;077/078].

RESULTS

Among 145 patients included in our study, 77 (53.1%) were male. The mean age of the patients was 60 years (range 19-92 years, standard deviation 16.5 years). The proportion of young and older patients was as shown in Figure 1.

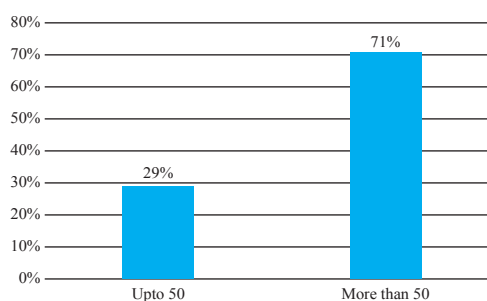


Figure 1. Distribution of young (≤ 50 years) and old (> 50 years) patients

Cardiac disorders were present in 128 (88.3%) of the patients. Embologenic cardiac disorders, however, were present only in 54 (37.2%) of the patients. The distribution of different types of structural cardiac disorders was as provided in Table 1. The distribution of various types of rhythm disturbances was as shown in Figure 2. The association between embologenic cardiac disorders and young and old patients was as shown in Table 2.

Table 1. Distribution of structural cardiac disorders

Types	Frequency	Percentage
Concentric Left Ventricular Hypertrophy	38	26.2
Isolated Left Ventricular Diastolic Dysfunction	34	23.4
Mitral Stenosis	20	13.8
Normal	20	13.8
Non-rheumatic valvular diseases	16	11.0
Global Hypokinesia	6	4.1
Dilated Left Atrium	6	4.1
Patent Foramen Ovale	3	2.1
Regional Hypokinesia	2	1.4
Total	145	100.0

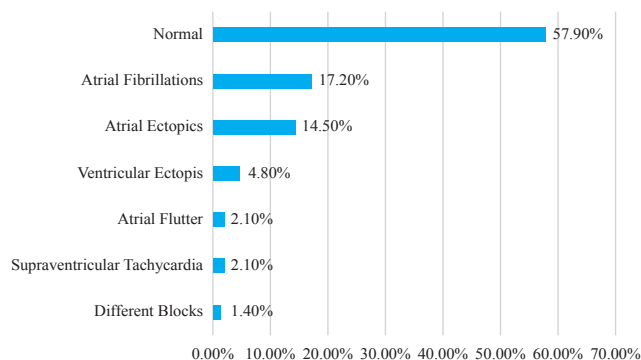


Figure 2. Distribution of different cardiac rhythms observed

Table 2. Association of different embologenic disorders with young and old patients

Cardiac Disorders		Age ≤ 50 Years	Age > 50 Years	P-Value (Chi-Square Test)
Embologenic Rhythm	Yes	8 (19%)	20 (19.4%)	0.96
	No	34 (81%)	83 (80.6%)	
Embologenic Structural	Yes	17 (40%)	29 (28.2%)	0.15
	No	25 (60%)	74 (71.8%)	
Mitral Stenosis	Yes	12 (28.6%)	8 (7.8%)	0.001
	No	30 (71.4%)	95 (92.2%)	
Atrial Fibrillation	Yes	7 (6.7%)	34 (33%)	0.04
	No	35 (83.3%)	68 (67%)	
Total		42 (100%)	103 (100%)	

DISCUSSION

In our study, cardiac disorders were present in 88.3% of the patients. In international studies, ischemic strokes due to cardioembolic phenomena occur in 35% of the non-lacunar strokes.⁴ The prevalence in our study is higher than those taken for worldwide. Cardiac disorders are the topmost cause of death and disability in Nepal.⁷ Rheumatic heart disease, of which mitral stenosis is the most common, is a very important preventable cause of cardiovascular disability and mortality in Nepal.⁸ The most common cardiac structural disorder is not mitral stenosis in our study. Left ventricular hypertrophy and left ventricular diastolic dysfunctions are the most common disorders most likely because of hypertension which is the most common risk factor for ischemic stroke, both worldwide and in Nepal.^{5,9}

Atrial fibrillation is the most common cause of cardioembolic stroke, occurring in almost half of cases of cardioembolic stroke.¹⁰ In our study, atrial fibrillation was found in 17.2% (n=25) of all patients with ischemic stroke and 41% of all patients with detectable cardiac rhythm disturbances (Figure 2). Previous studies have shown that atrial fibrillation was present in 12.5% of all patients with ischemic stroke and in 48% of all cases of possible cardiac causes of stroke.⁵

Our study shows that there is no statistically significant association between rhythms that could potentially cause cardioembolic stroke, designated embologenic rhythms, and younger and older patient groups (Table 2). Similarly, statistically significant association was also not observed between

the two age groups and embologenic structural heart diseases (Table 2). However, when we take into consideration only atrial fibrillation in the embologenic rhythm and mitral stenosis in the structural disorders, there was a strong association between mitral stenosis and young patients and significant association between atrial fibrillation and older patients (Table 2). Rheumatic heart disease is the most common cause of mitral stenosis and is a major cause of significant cardiac morbidity in resource limited settings.^{11,12} Rheumatic mitral stenosis evolves very rapidly in resources limited settings where the prevalence of acute rheumatic fever is very high, there is higher chance of using ineffective antibiotics and where virulent organisms are the causative agents.¹³ Majority of patients who develop rheumatic fever in childhood therefore develop mitral stenosis before they reach 20 years of age.^{12,13} Almost 40% of systemic thromboembolism in mitral stenosis involves the brain.¹⁴ It is therefore not difficult to understand the association between mitral stenosis and younger patients with ischemic stroke.

Atrial fibrillation is highly prevalent in older population. In one study from developed country, the prevalence of atrial fibrillation was one percent; 70% of these patients were at least 65 years old and 45% were 75 years or older.¹⁵ In a publication from a tertiary care center from Nepal, 42.8% of the patients with atrial fibrillation were 75 years old or older and 30.5% were associated with hypertension.¹⁶ It is thus very easy to understand why atrial fibrillation was associated with older patients with ischemic stroke in this study.

We had few important limitations. This is a small study based on a single center. This does not apply to all Nepali population in general. Apart from cardiac conditions, we did not study other risk factors of ischemic stroke as there are already many studies addressing those. In addition, presence of these cardiac conditions does not mean that they are casual as we have not correlated these investigational findings with the imaging and clinical findings; so, our results might just be coincidental. Large scale nation-wide studies addressing all these issues should be carried out so that the results can be generalized, and these limitations could be answered.

CONCLUSION

Cardiac disorders are common in patients presenting with ischemic stroke in our center. Left ventricular hypertrophy is the most common cardiac structural disorder while atrial fibrillation is the most common rhythm disturbance. There is no statistically significant difference in the distribution of cardiac structural disorders combined and the rhythm disturbances combined when compared between young and old patients with ischemic stroke. However, mitral stenosis when studied in isolation is strongly associated with young patients ($p=0.001$). Similarly, the association between atrial fibrillation and older patients is statistically significant ($p=0.04$).

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None

CONFLICT OF INTEREST

None

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