Nepal Stroke Association
The Stroke Journal
Volume 1, Issue 1, Page 9-12

ORIGINAL ARTICLE

The Stroke Journal

Pattern of valvular involvement causing atrial fibrillation and stroke in patients with rheumatic heart disease: a hospital based observational study

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ABSTRACT

Background: Rheumatic heart disease (RHD) is common in developing countries like Nepal causing high morbidity and mortality among young population. Complications like atrial fibrillation and ischemic stroke is also highly prevalent. This study is aimed at evaluating the pattern of valve involvement causing atrial fibrillation and stroke in the western part of Nepal.

Materials and methods: A retrospective study was designed. Data of echocardiography reports from January 2015 through December 2017 were collected in a pre-structured proforma and analyzed.

Results: A total of 7248 patients underwent echocardiography during the study period. Among them 294 (4.05%) patients had RHD. Females predominated with male to female ratio of 1:2.3. Most patients, 180 (61%) belonged to age group of 21–40 years. The commonest mixed lesion featuring mitral stenosis (MS) with mitral regurgitation (MR) and aortic regurgitation (AR) was commonly seen in 113(38.4%). The commonest isolated lesion was MR (17%) followed by MS (7%). The frequency of atrial fibrillation (AF) and stroke was 26% and 9.5% respectively in RHD patients. AF and stroke was commonest in patients having mitral valve disease and associated with MS. The prevalence of AF and stroke in MS (either isolated or mixed form) was higher as compared to valvular lesions without MS (26 versus 2), odds ratio being 17.031 and 42.7742 respectively. The mean left atrial size in patients with MS was 5.3+0.7 cm.

Conclusion: The proportion of AF and ischemic stroke in patients with RHD was high in this study. MS either isolated or combined with other valvular lesions is the major culprit. Aim to prevent at community level with screening programs might help reduce the disease burden and sequel.

Keywords: Rheumatic heart disease, mitral stenosis, atrial fibrillation, stroke

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INTRODUCTION

Rheumatic heart disease (RHD) is still prevalent in various parts of the world causing high morbidity and mortality among productive age population.[1] Nepal and few other developing countries are considered as high endemic area for RHD.[2] Silent RHD was five times more prevalent than manifest RHD as shown in a study done in eastern part of Nepal.[3] Worldwide, it is estimated that approximately 15 to 20 million people have RHD and at least 282000 people develop RHD each year.[4]

Complications of RHD include heart failure, infective endocarditis, arrhythmias most commonly atrial fibrillation (AF) and embolic phenomenon usually causing ischemic stroke.[5] RHD is considered as common risk factor for ischemic stroke in developing countries like Nepal. Worldwide estimated about 3 to 7.5% of all strokes are directly attributable to RHD, with 144000 to 360000 strokes and 108000 to 269000 stroke deaths caused by RHD each year.[4]

The prevalence of RHD among adults in developing countries is about 10 times higher than the prevalence in industrialized and developed countries such as Canada (0.22/1000) and Japan (0.14/1000).[3,6] Hence, as burden of RHD is so high in this area, clinical profile of patients with RHD-related stroke should be well understood for better prevention and treatment strategy policy. Unfortunately, detailed information on this issue is scarce in Nepal and this study may trigger stimulus for further large studies.

MATERIALS AND METHODS

It is a retrospective, cross-sectional and descriptive study conducted at Manipal teaching hospital, Pokhara, Nepal. All patients presenting with AF and ischemic stroke underwent 2D trans-thoracic echocardiography and were assessed for evidence of RHD. Echocardiography reports from January 2015 through December 2017 were analyzed. Permission to carry out the research and consent to review records of the patients was taken from institutional review committee. Only the first-time Echo of each patient was included for the study to avoid repetition bias and the case records with incomplete data were excluded. All echocardiograms were performed in accordance with the American College of Cardiology/American Heart Association guidelines using ACCUSON 2000 SIEMENS USG.[7] RHD cases were defined according to the World Heart Federation (WHF) criteria.[8] Data were collected and analyzed using SPSS for windows version 18.0.

RESULTS

Total 7248 patients underwent echocardiography during the study period. Among them, 294 (4.05%) patients aged between 9 and 75 years (mean±SD age=28±5 years) were diagnosed to have RHD. Out of 294 patients, 198 (67.34%) patients were females. 180 (61.2%) patients were in the age group of 21–40 years of age. Seventy eight (26.5%) patients were below 20 years of age (Table 1).

Mixed valve lesion was seen in almost two third of cases with MR, MS and AR being the commonest mixed lesion (38%), followed by MR and AR (23%). Isolated valve lesions were also seen and MR (17%) was the commonest. Isolated/Pure MS was seen in 7% of cases (Table 2).

Table 1: Age distribution of RHD (n=294).

Age	n (%)
<20 years	78 (26.5)
20-40 years	180 (61.2)
40-60 years	32 (10.8)
>60 years	4 (1.3)

Table 2: Valve involvement in RHD (n=294).

Valve involvement	n (%)
MR+MS+AR	113 (38.4)
MR+AR	69 (23.4)
Isolated MR	51 (17.3)
MR+ MS	32 (10.8)
Isolated MS	21 (7.1)
Isolated Aortic valve involvement (AR/AS+AR)	8 (2.7)

Out of 294 patients with RHD, 69 (26.13%) had AF. Sixty four patients with AF had some form of mitral valve disease. Twenty eight patients had suffered ischemic stroke on presentation. The commonest valve lesion involving ischemic stroke with AF was mitral valve (all patients with AF and stroke had some form of mitral valve lesion) (Table 3).

Further analysis showed lesions involving MS (either isolated or mixed form) had higher rates of AF and stroke (26 versus 2), odds ratio being 17.031 and 42.7742 respectively (Table 4 and 5).

Table 3: Pattern of valve involvement in RHD with AF and ischemic stroke.

Valve lesion	AF	Stroke
Isolated or mixed lesions involving Mitral valve	66	28
Aortic valve disease only	3	00

Table 4: Isolated or mixed mitral stenosis (MS) vs other lesions (none MS) in development of AF.

AF	MS		Odds ratio	Risk ratio
	Yes	No		
Yes	58	21	17.03 (9.06-32.01)	6.47 (4.20-9.96)
No	30	185		

Size of left atrium in cases with AF was also analyzed. In patients with Isolated MS and AF, the mean left atrial size was 5.3±0.7 cm while the mean left atrial size in Isolated MR and AF was found to be 5.6±0.6cm. Table 5 shows the detailed assessment of LA size in various lesions with AF and stroke.

Table 5: Isolated or mixed mitral stenosis (MS) vs other lesions (none MS) in development of stroke.

Stroke	MS		Odds ratio	Risk ratio
	Yes	No		
Yes	26	2	42.77 (9.87-185.30)	30.43 (7.38-125.45)
No	62	204		

Table 6: LA size in various RHD lesions with AF and ischemic stroke.

Valve lesion	Mean±SD LA (cm)	Frequency	
		AF	Stroke
MS+MR+AR	5.9±0.9	33	14
Isolated MS	5.3±0.7	16	10
MS+MR	5.8+0.6	09	03
Isolated MR	5.6±0.6	08	01
Aortic valve disease	4.3±0.7	03	00

Table 6 shows that although the mean LA size in MS is less than MR, the incidence of AF and stroke is very high in MS than other valvular lesions.

DISCUSSION

RHD is a major burden of cardiovascular disease in developing countries like Nepal although it is rare in western countries.[1] It is also considered as a major cause of cardiac valvular surgeries in young in the developing countries. Complications of RHD like heart failure, AF and thromboembolic phenomenon are commonly seen.[9]

The prevalence of RHD in our study was 4.05% which represents the population presenting to hospital with symptoms. This data is similar to a study done by Amjad et al (5.5%)[10] and Sharma et al (5%)[11] but was lower to the study done by Shrestha et al (15%)[3] and Mahmoud et al (10%).[12]

In our study mitral valve involvement was the commonest valve involved by RHD followed by aortic valve. The commonest age group being 20–40 years of age. Females were affected more than males (F:M = ›2:1). This result is similar to other studies done world wide.[13-14]

Valvular AF refers to patients with MS or patients with artificial valves. In our study, AF and stroke were commonly seen in patients with mitral valve disease particularly more with MS. The prevalence of AF and stroke in MS (either isolated or mixed form) as compared to valvular lesions without MS had higher rates of AF and stroke (26 versus 2), odds ratio being 17.03 and 42.77 respectively

The frequency of AF and stroke was common in MS even though the mean LA size was less than patients with MR or other valvular lesions in our study. The pathophysiology behind this may be valvular heart diseases, such as MR, aortic stenosis (AS) and aortic insufficiency, do not result in conditions of low flow in the left atrium, and do not apparently increase the risk of thromboembolism brought by AF compared to MS.[16,17] Also the structural alterations (fiber arrangement) in left atrium is different in MS than in MR or any other valvular lesion. This structural alterations and slow flow/ blood stasis is the major cause of AF and thrombus formation followed by embolic events. This explains cause of AF and stroke in patients with MS even the LA size is smaller.[18]

There are few limitations of our study. This is a hospital based study; the results may not be the true representation of community. The actual burden of disease in the community may be "silent RHD" which is more common than manifest disease as shown by Nikesh et al.[3] The analyzed data are retrospective data of selected patients referred for echocardiography.

CONCLUSION

RHD is considered as a common burden causing significant mortality and morbidity in productive age group population of our society. AF and ischemic stroke is common. Preventive strategies like screening programs

especially of school going children at community level for early detection and treatment of RHD can contribute in reduction of disease burden and its squealae.

COMPETING INTERESTS

The authors declare that there are no competing interests regarding the publication of this paper.

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