ORGANIC TRICUSPID VALVE DISEASE IN CHRONIC RHEUMATIC HEART DISEASE: A PROSPECTIVE ECHOCARDIOGRAPHY STUDY
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ABSTRACT

BACKGROUND
Tricuspid valve disease (TV) in chronic rheumatic heart disease is relatively less prevalent, is almost always of rheumatic origin, and generally accompanies mitral valve disease. Majority of studies on prevalence of tricuspid valve involvement are mainly based on tertiary care hospital, pathological or autopsy study and hence may not reflect the true prevalence because of inherent bias of more symptomatic and severe disease. Asymptomatic and less severe form of chronic RHD are not represented. In rheumatic TV involvement, the cusps are thickened, and commissures are fused, there is narrowing of valve area, can be evaluated by Echocardiography even in clinically silent RHD. Echocardiography can result in detection of higher prevalence of disease. We wanted to determine the prevalence of tricuspid valve involvement in patients with chronic RHD by echocardiography study in a tertiary care hospital and peripheral centers to include symptomatic as well as asymptomatic chronic RHD.

METHODS
This long-term prospective study was conducted at VSSIMSAR, Burla and recognized diagnostic centre in nearby district headquarter to include and cover representative population of this part of our country including people coming for different routine cardiac evaluations from October 2016 to November 2018. Around 679 patients in the age group of less than 10 yrs. to more than 70 years were evaluated by echocardiography study.

RESULTS
Out of 679 patients of RHD 458 (67%) were female and 221 (33%) were male. 36 patients (5.1%) had organic TV involvement. Tricuspid valve involvement was always combined with either mitral valve in 2.6% of cases and both mitral and aortic valves in 2.5% of cases in varying combinations. The most common lesion associated with organic TV disease was Severe MS Mild MR Mild AR followed by Severe MS Mild MR, Mild MR Mod AR, Mod MS Severe MR Mild AR and Mild MR. No isolated organic tricuspid valve disease was observed. 24% of cases had evidence of hypertensive TR along with other significant valvular lesions and around 32% had Mild to Moderate functional TR. Associated organic pulmonary valve disease was detected in 0.14% of cases.

CONCLUSIONS
Prevalence of organic tricuspid valve disease in chronic RHD was 5.1% across the whole spectrum of symptomatic and asymptomatic RHD which is lower compared to earlier study and was always involved in combination with other multi-valvular lesions. Isolated rheumatic tricuspid lesion does not occur and most of the patients had combined valvular lesions.


BACKGROUND
Rheumatic heart disease continues to be one of the major causes of cardiovascular morbidity and mortality in this part of our country which is still socially and economically backward. RHD is associated with a significant morbidity and mortality because of involvement of major left sided mitral and aortic valves. Rheumatic valvulitis most commonly affects the mitral valve (70% to 75%) followed by combined mitral and aortic involvement (20% to 25%), with isolated aortic disease being uncommon (5% to 8%).¹ Organic Tricuspid valve involvement in RHD is not uncommon, although less than mitral and aortic valve involvement. It is frequently missed out on routine clinical examination. Isolated rheumatic tricuspid valve disease is uncommon, and this lesion generally accompanies mitral valve disease, which dominates the presentation in many patients with Tricuspid valve disease, the aortic valve is also involved (i. e. Triple
valvular involvement). The tricuspid valve is present in about 15% of patients with rheumatic heart disease in autopsy series. Clinically significant tricuspid disease in association with mitral or aortic valve disease is reported to occur in between 10 to 20% of patients. Recently the tricuspid valve has become focus of interest because accurate recognition proper evaluation and appropriate treatment of tricuspid valvular lesions may improve long term functional outcome in chronic RHD. Rheumatic tricuspid valve disease is often predominantly functional but is occasionally characterized by leaflet involvement with thickened fibrosed and shortened leaflets and commissural fusion. In our country high prevalence (33%) of Organic TV lesion is reported. Majority of data regarding prevalence of are based on either autopsy, postoperative pathological study or from tertiary care hospital with an inherent bias of over representation of more severe and symptomatic disease. Echocardiography has now added new dimension to early and accurate recognition of valvular lesion. Prevalence of valvular lesion was more when echocardiography was added to clinical study. We took the opportunity to do echocardiography in all cases coming for pre-op evaluation, pre-employment check-up, insurance check-up and routine health check-up to evaluate presence of asymptomatic RHD. Our institute VSSIMSAR Burla is a tertiary care hospital but there is no facility for heart surgery, patients are referred here only for primary evaluation as this is the only hospital in this part of country with facility for cardiac care, hence it caters to all groups and less chance for overrepresentation of more symptomatic cases. There is paucity of data regarding tricuspid valvular involvement in asymptomatic cases. Therefore, we undertook this study in our institute in collaboration with recognized diagnostic clinic in nearby district to cater to majority and representative population of this part of our country dominated by socially and economically backward population to find out the prevalence of organic tricuspid valve disease in Chronic Rheumatic heart disease.

MATERIALS AND METHODS
All new patients coming for routine medical check-up and routine cardiologic evaluation for the presence of suspected heart disease, Pre-operative check-up, pre-employment, Pre-insurance and antenatal check-up were included in the present study. Total of 679 patients diagnosed as having RHD by echocardiography of both sexes and all age groups from less than 10 yrs. to more than 70 yrs. were included. Special care was taken to exclude patient with associated Congenital heart disease, Ischaemic Heart disease, Cardiomyopathies, Collagen vascular disease, Myxomatous and old age degenerative disease and other Cardiac disease All patients were subjected for detail transthoracic two-dimensional, colour flow imaging and Doppler echocardiography. Echocardiography was performed in accordance with WHF 2012 criteria for diagnosis of valvular lesions in RHD. The Patterns and severity of each valvular lesion was defined according to AHA/ACC 2006 guidelines. 8

Tricuspid valve involvement as well as other valvular involvement in singly and in varying combinations was thus studied utilizing two-dimensional colour Doppler evaluation. Several views including the parasternal RV inflow view, the parasternal short axis view, the apical four chamber view and subcostal four chamber view. The tricuspid inflow velocity was recorded from either in apical four chamber view or low parasternal right ventricular inflow view. As the tricuspid inflow velocity are accentuated during inspiration all measurement taken was averaged throughout the respiratory cycle.

Tricuspid stenosis was diagnosed with presence of thick valve more than 5 mm with restricted mobility, doming of ant leaflet and Peak velocity >1 m/s with mean gradient between 2 and 10 mmHg. A mean gradient of >5 mmHg and valve area <1 cm² was suggestive of severe TS. Colour flow mapping was performed in at least 2 orthogonal planes. Tricuspid regurgitation was graded as mild if Jet area < 5 cm², Moderate if jet area 5-10 cm² and Severe if jet area >10 cm² and jet area >40% that of Right Atrium and Vena Contract a width >0.7 cm with dense jet and systolic flow reversal in hepatic vein. TR was diagnosed as hypertensive of the Peak velocity exceed >2.8 m/s and functional without any structural abnormality if velocity less than 2.8 m/s specially if gradient <40 mmHg.

RESULTS
The Present study was done at VSSIMSAR Burla, Sambalpur and recognized diagnostic centre in nearby district to include and cover representative population of this part of our country from October 2016 to November 2018. Total no 679 cases of established chronic rheumatic heart disease who fulfilled 2012 WHF criteria for echocardiography diagnosis of RHD were included in the present study. Out of 679 (67.2%) were females and 32.8% were males. Highest prevalence chronic RHD was noted in the age group of 41- 50 year (20.6%) followed by 31-40 yrs. (17.6%) 51-60 yrs. (15%) 21-30 yrs. (16.2%) 61-70 yrs. (11%) >70 yrs. (12%) <10 yrs. (1.6%).

Mitrval valve was involved either in the form of thick valve fulfilling criteria for rheumatic aetiology or with valvular lesion in 96.4%. Aortic valve was involved in 64.7% of cases (isolated 3.6% and combined with mitral in 61.1%) followed by tricuspid valve involvement in 5.1% of cases followed by pulmonary valve involvement in 0.14% of cases in the form of thick valve with non-hypertensive PR. (Graph 1)
Organic Tricuspid valve involvement was found to be always associated with other valves. When involved, it was always associated with Mitral Valvular lesions 2.6%, in varying combinations of mitral stenosis and regurgitation. In 2.5% cases it was associated with both Mitral and Aortic valvular lesions, in varying combinations of stenosis and regurgitation lesions of mitral and aortic valves. (Table 1 and Graph 2).

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Pattern of Valvular Lesion</th>
<th>Total No. of Cases</th>
<th>Associated TV Lesion</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Severe MS Mild MR Mild AR</td>
<td>44</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Severe MS Mild MR</td>
<td>58</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>Mild MR</td>
<td>124</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Mild MR Mod AR</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>5.</td>
<td>Severe MS</td>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>6.</td>
<td>Severe MR Severe MR</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Mild MS Severe MR</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Mod MS Severe MR Mild AR</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>9.</td>
<td>Mod MS Severe MR</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>10.</td>
<td>Mod MR Mod AR Mild AS</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>11.</td>
<td>Mild MS Mild MR Mod AR</td>
<td>22</td>
<td>1</td>
</tr>
<tr>
<td>12.</td>
<td>Mild MS Severe MR Mild AR</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>13.</td>
<td>Severe MS Mod AR Mild AR</td>
<td>13</td>
<td>1</td>
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<tr>
<td>14.</td>
<td>Severe MR</td>
<td>9</td>
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</tr>
<tr>
<td>15.</td>
<td>Mild MS Mod MR</td>
<td>7</td>
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<tr>
<td>16.</td>
<td>Severe MS Mild AR Mild AS</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>17.</td>
<td>Severe MS Mod MR Severe AR</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 1

In the present study, out of 5.1% cases of tricuspid valvular involvement majority of the cases were associated with Severe Mitral stenosis. Tricuspid valvular involvement was also associated with Severe MR and Severe AR in significant number of cases. 11 cases of organic TV lesion were observed even in asymptomatic and mild to moderate valvular lesion particularly mild MR. Involvement of all four valves was seen in 0.14% of cases.

DISCUSSION

Tricuspid valve involvement in patients with RHD warrants interrogation of the tricuspid valve in patients referred to the echocardiography laboratory for the assessment of left-sided rheumatic valve disease because undetected and hence uncorrected tricuspid valve disease may lead to postoperative problems, despite the successful relief of left-sided valve disease, and carries a high mortality and morbidity. There is major difference in prevalence among patients diagnosed non-invasively and at autopsy (7.7% versus 38.5%) Non-invasive study by Goswami et (9%) Manoharan et al (8.6%) and autopsy studies Chopra P et al, Chopra et al. (41.6%) Berry et al (32%) Tandon et al (42%) Kinare et al (34%) probably the patients in autopsy studies died from RHD, and were likely to have the severest form of the disease, with significant involvement of the tricuspid valve. However Right sided valves receive less attention and its presence overlooked during routine echocardiography evaluation. Mitral valve disease was the most frequently associated lesion. Today, echocardiography remains the most commonly used, accurate and non-invasive tool for the diagnosis of tricuspid valve disease. The tricuspid valve should be carefully evaluated, using 2D and Doppler echocardiography, in patients being considered for surgical treatment of rheumatic valve disease, because the results can influence the surgical approach.

Present study is very unique in nature because many cases of asymptomatic and mild rheumatic heart disease which were observed during routine screening for asymptomatic people are included. Whatever data available for review were based on tertiary care hospital post-op or autopsy data with its inherent bias of overrepresentation of more symptomatic and severe diseases.

In the present study, Mitral Valve was involved in 96.4%, Aortic Valve was involved in 64.7% and Tricuspid valve involvement was observed in 5.1% in patients with RHD and out of 5.1% cases of tricuspid valvular involvement all the cases were associated with mitral valve disease and in around 2.5% cases had associated aortic valve disease. The most common lesion associated with organic TV disease was Severe MS Mild MR Mild AR followed by Severe MS Mild MR, Mild MR Mod AR, Mod MS Severe MR Mild AR and Mild...
MR. 16 cases of Tricuspid valve disease was associated with severe mitral stenosis or severe MR. 11 cases of organic TV lesion was observed even in asymptomatic and mild to moderate valvular lesion particularly mild MR. This is a unique observation not reported in any earlier study. Thus, organic TV disease also observed in asymptomatic rheumatic heart disease. Our study observed Mild to Moderate functional TR in 32% of cases Aurakzai et al in their study had reported Tricuspid Regurgitation to be even more frequent than Aortic regurgitation.23 The reason may be association of Functional TR due to other causes and not due to Rheumatic heart involvement of the tricuspid valve. Most common cause of primary TR is RHD but rare & is always associated with Mitral Valve disease and often with Aortic valve abnormalities.24,25 In addition hypertensive TR was observed in 24% of cases. This can well be explained due to coexistent severe mitral valve disease in majority of the cases. Rheumatic disease of the tricuspid valve in the absence of mitral valve involvement do occur but is rare27 and thus warrants detailed & careful assessment of the tricuspid valve in patients referred to the echocardiography laboratory for the assessment of left-sided rheumatic valve disease. Early detection and appropriate treatment of rheumatic Tricuspid Valve Disease may improve the long-term functional outcome. If undetected and hence uncorrected tricuspid valve disease may lead to postoperative problems, despite the successful relief of left-sided valve disease and carries a high mortality and morbidity.

CONCLUSIONS
Across the whole spectrum of symptomatic and asymptomatic chronic rheumatic heart disease, Tricuspid Valve Disease is involved in 5.1% of cases which is lower than reported for Organic TV disease in earlier studies. Even though it is not uncommon among patients with RHD, it receives less attention and may easily be overlooked. Mitral valve disease is the most frequent associated lesion, and echocardiography the most common means of detecting Rheumatic Tricuspid valve disease. An accurate assessment of valve morphology, using 2D echocardiography, and colour doppler is important for detecting organic rheumatic tricuspid valve disease. Three-dimensional echocardiography has an incremental value over 2D in the detection of tricuspid valve disease.

REFERENCES


