AN ANALYSIS OF VALVULAR HEART DISEASE BY ECHOCARDIOGRAPHY- A TERTIARY CARE INSTITUTE STUDY
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ABSTRACT

BACKGROUND
Diseases of heart valves constitute a major cause of cardiovascular morbidity and mortality worldwide. In developing countries, Rheumatic Heart Disease (RHD) continues to be the predominant form of valvular heart disease. The current study was undertaken at a Tertiary Care Institute with an objective of establishing distribution and different patterns of valvular heart diseases by echocardiography.

MATERIALS AND METHODS
17,625 consecutive first time Echocardiograms performed between January 2016 and December 2016 were analysed. Echo was performed by consultant cardiologists using Philips HD11XE and Aloka SSD4000 machine following ASE guidelines. Applying exclusion criteria of trivial and functional regurgitant lesions yielded a total of 632 cases of organic valvular heart diseases.

RESULTS
In our study 632 patients were diagnosed with valvular heart disease, out of which 428 patients (67.7%) were diagnosed with Rheumatic Heart Disease. Mitral valve was the most commonly affected followed by aortic and tricuspid valves. The least commonly affected valve was pulmonary valve. In Rheumatic heart disease, most common isolated lesion reported was MS with MR, most commonly reported in females between 21-40 years' age group.

CONCLUSION
In non-RHD group, mitral valve prolapse (21.3%) was the commonest lesion reported followed by calcific degenerative aortic valve (6.17%) and congenital bicuspid aortic valve (3.4%); 118 patients were reported with multivalvular lesion. MS + MR + AR was the commonest multivalvular lesion found in 65 patients (55.08%).

KEYWORDS
Valvular Heart Disease, Rheumatic Heart Disease, Mitral Regurgitation.

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analysed. Our study period was January 2016 to December 2016. Echocardiography was performed by consultant cardiologist using a two-dimensional colour Doppler and M-mode Philips HD11XE and Aloka SSD4000 ultrasound system. The echocardiography was performed in accordance with American College of Cardiology/American Heart Association Guidelines.

**Inclusion Criteria**
All the lesions classified as isolated lesion and combined valvular lesions were included in our study. Also, all the Rheumatic heart disease diagnosed according to World Heart Federation Echocardiography Criteria were included in our study.

**Exclusion Criteria**
A trivial, functional/unspecified mechanisms of MR, trivial-to-mild AR due to sclerotic valve or unspecified causes and trivial or functional TR were excluded from our study. Complex congenital heart diseases with valvular involvement were also excluded. Congenital lesions, degenerative disease and other acquired causes were the exclusion criteria for Rheumatic heart disease.

**RESULTS**
Out of 17,625 consecutive cases undergoing echocardiography, 632 valvular heart diseases were reported. Rheumatic heart diseases were the predominant type constituting 428 cases (67.7%), while non-rheumatic heart diseases constituted 204 cases (32.2%) (Figure 1).

Table I and II show the distribution of valvular heart disease and multivalvular heart disease respectively.

<table>
<thead>
<tr>
<th>Valvular Heart Disease</th>
<th>Total</th>
<th>Percentage</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated MS</td>
<td>78</td>
<td>12.3%</td>
<td>22 (28.2%)</td>
<td>56 (71.79%)</td>
</tr>
<tr>
<td>Isolated MR</td>
<td>236</td>
<td>37.3%</td>
<td>96 (40.6%)</td>
<td>140 (59.3%)</td>
</tr>
<tr>
<td>Isolated AS</td>
<td>28</td>
<td>4.4%</td>
<td>20 (71.4%)</td>
<td>8 (28.6%)</td>
</tr>
<tr>
<td>Isolated AR</td>
<td>23</td>
<td>3.6%</td>
<td>12 (52.1%)</td>
<td>11 (47.9%)</td>
</tr>
<tr>
<td>BCAV</td>
<td>22</td>
<td>3.4%</td>
<td>18 (81.8%)</td>
<td>4 (18.1%)</td>
</tr>
<tr>
<td>Multivalvular Lesion</td>
<td>264</td>
<td>41.77%</td>
<td>93 (35.22%)</td>
<td>171 (64.7%)</td>
</tr>
</tbody>
</table>

Table 1. Distribution of Valvular Heart Disease in our Study

Most of the valvular lesions were reported in females. More than 2/3rd of cases of Isolated MS (71.7%) and Multivalvular lesion (64.7%) are seen in females, whereas Congenital Bicuspid Aortic Valve disease (81.8%), isolated AS (71.4%) and isolated AR (52.1%) were distributed predominantly in males.

<table>
<thead>
<tr>
<th>Multivalvular Heart Diseases</th>
<th>Total (264)</th>
<th>Percentage</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS + MR</td>
<td>117</td>
<td>44.3%</td>
<td>23 (19.7%)</td>
<td>94 (80.3%)</td>
</tr>
<tr>
<td>MS + AR</td>
<td>9</td>
<td>3.4%</td>
<td>3 (33.3%)</td>
<td>6 (66.6%)</td>
</tr>
<tr>
<td>MS + MR + AR</td>
<td>65</td>
<td>24.62%</td>
<td>18 (27.6%)</td>
<td>47 (72.4%)</td>
</tr>
<tr>
<td>MS + AS</td>
<td>2</td>
<td>0.75%</td>
<td>1 (50%)</td>
<td>1 (50%)</td>
</tr>
<tr>
<td>MR + AR</td>
<td>23</td>
<td>8.71%</td>
<td>8 (34.8%)</td>
<td>15 (65.2%)</td>
</tr>
<tr>
<td>MS + AS + AR</td>
<td>4</td>
<td>1.5%</td>
<td>2 (50%)</td>
<td>2 (50%)</td>
</tr>
<tr>
<td>MR + AS + AR</td>
<td>3</td>
<td>1.1%</td>
<td>2 (66.6%)</td>
<td>1 (33.3%)</td>
</tr>
</tbody>
</table>

Figure 1. Shows Different Aetiology of Valvular Heart Disease in Our Study

Figure 2. Age Wise Distribution of Different Valvular Heart Disease

Among non-rheumatic heart disease, mitral valve prolapse syndrome constitute 135 cases (21.3%) followed by degenerative calcified aortic valve disease 39 cases (6.17%) and bicuspid aortic valve disease 22 cases (3.4%). Only a very few cases of aortic aneurysm with AR, congenital pulmonary valvular stenosis and ischaemic mitral regurgitation were also reported in our study.

The valvular heart disease was most commonly reported in females. The number of female patients were 386 constituting 61.07%, 226 male patients (35.75%) and 20 paediatric cases (3.1%) were registered. Rheumatic heart disease was commonly reported in the age group of 21 - 40 years with female preponderance. Degenerative valvular heart disease was most commonly reported in old age (>60 years) with male preponderance (Figure 2). Most commonly affected age group in Mitral valve prolapse is 20-40 years, whereas congenital bicuspid aortic valve disease were distributed equally in both groups of <20 years and 20 to 40 years.
Table 2. Distribution of Multivalvular Heart Disease in Our Study

<table>
<thead>
<tr>
<th>Combination</th>
<th>Cases</th>
<th>Percentage</th>
<th>(Females)</th>
<th>(Males)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS + MR + AS + AR</td>
<td>9</td>
<td>3.4%</td>
<td>3 (33.3%)</td>
<td>6 (66.6%)</td>
</tr>
<tr>
<td>MS + MR + AS</td>
<td>3</td>
<td>1.1%</td>
<td>1 (33.3%)</td>
<td>2 (66.6%)</td>
</tr>
<tr>
<td>AS + AR</td>
<td>29</td>
<td>10.9%</td>
<td>25 (86.2%)</td>
<td>4 (13.8%)</td>
</tr>
</tbody>
</table>

In general among all multivalvular lesions combinations associated with MS were predominantly seen in females, whereas combination with AS were more common in males.

Mitral Valve
Mitral valve was the most commonly involved valve constituting 87% (550 cases) with predominant Rheumatic aetiology. Isolated mitral valve disease (MS and MS with MR) was reported in 195 cases (30%). Among the patients with isolated mitral valve involvement pure Mitral Regurgitation (MR) was the dominant lesion 236 cases (37.3%). A two-thirds of the above cases diagnosed as isolated MR was seen in females in the age group of 21 - 40 years. MVP (Mitral Valve Prolapse) was the most common aetiology of mitral regurgitation occurring in 131 patients (57.2%).

Pure mitral stenosis constituted 78 cases (12.3%) with female preponderance 56 cases (71.79%) compared to males 28 cases (28.2%); 288 cases (45.5%) of MS (isolated and combined) were reported in our study. Most of them had severe MS (48.2%) with orifice size < 1 cm² followed by moderate MS (32.2%) and mild MS (19.6%). Severe MS was predominantly seen in females in our study. The incidence of pulmonary hypertension in our study was 11.21%. The most common lesion associated with pulmonary hypertension was mitral stenosis (40 cases, 83.33%). Also, there was an increased incidence of pulmonary hypertension with increasing severity of mitral stenosis.

Aortic Valve
227 (35.9%) cases of isolated and combined aortic valve disease were found in our study, out of which 22 cases were associated with bicuspid aortic valve (congenital), 28 cases were associated with isolated AS, (predominantly degenerative) and was most commonly reported in elderly males (> 60 years). Rheumatic heart disease constituted a minority of cases to this stenotic valvular lesion (3 cases) (Figure 3).

Isolated AR was seen in 23 cases (3.6%). Rheumatic Heart Disease was the commonest cause of isolated AR followed by bicuspid aortic valve and aneurysmal dilatation of Aorta.

Tricuspid Valve
Tricuspid stenosis was the least common lesion (1 case among all valvular lesions) and was associated with mitral stenosis; 48 cases of functional tricuspid regurgitation due to pulmonary hypertension were reported in our study. Organic tricuspid regurgitation of rheumatic aetiology was reported in 4 cases (0.63%).

Pulmonary Valve
Pulmonary valve was the least commonly affected valve in our study. Two cases of isolated congenital pulmonary valvular stenosis were reported in our study.

Multivalvular Disease
Multivalvular diseases constituted 41.77% (264 cases) in our study. Table 2 and Figure 4 shows distribution of multivalvular heart disease in our study.

DISCUSSION
Echocardiography is the main tool in diagnosing and the periodic assessment of patients with valvular heart diseases. The superiority of Echo over clinical examination in identifying subclinical Rheumatic heart disease has been conclusively shown in various school surveys across India.9,10 Hence, more number of children will receive secondary prophylaxis for Rheumatic Fever, thus reducing the burden of Rheumatic Heart Disease.

Rheumatic heart disease was the most common heart disease in young adults (20-40 years). In the present study...
Rheumatic Heart Disease constituted 67.79% of total valvular heart disease, which is similar to the study of Manjunathan CN et al (64.3%)¹¹ and Radhakrishnan D (68%).¹²

In the present study, Mitral Stenosis with Mitral Regurgitation (44.32%) were the commonest valvular Heart Disease similar to other studies; 40% by Dare et al¹³ and Waller B et al.¹⁴ In our study, isolated mitral valve in Rheumatic Heart Disease were 68.1% and 35.9% were associated with aortic valve. This was in concordance with Manjunathan CN et al and Radhakrishnan D.¹¹,¹² In our study, 37% of cases were isolated MR reported in young age group (10 - 30 years), of which 42% were of Rheumatic aetiology, predominant (48%) being myxomatous mitral valve prolapse. This is in concordance with studies by Olson¹⁵ and Duren.¹⁶

The peak incidence of Rheumatic MR was two decades earlier than that of mitral stenosis. This is due to the fact that a long latent period following the acute attack of Rheumatic fever generally exists before the stenotic mitral lesion manifests clinically.¹⁷

35.9% aortic valve diseases have been reported in our study. Aortic associated with mitral was around 23% similar to the studies of CN Manjunath¹¹ and Siddharth et al.¹⁸ Rheumatic heart disease was the predominant aetiology for isolated AR, whereas degenerative calcification was the main etiological factor in isolated AS.¹⁹,²⁰,²¹ In our study, among 28 (4.4%) isolated AS cases, 50% (14 cases) were due to degenerative calcification of aortic valve similar to Subramaniyan et al.¹⁹ and Peterson MD et al.²⁰; 12 (53%) out of 23 isolated AR cases were due to Rheumatic heart diseases, which is in concordance with Olson et al.²²

Multivalvular involvement in our study were (264 cases, 41.7%), which is in concordance with Vaishali Bhalani et al²³ and was lower by 18% and 36.8% in other studies by Radhakrishnan D²² and Manjunath et al.¹¹ respectively. In our study, most common combination was MS with MR (44%) and MS with MR with AR (24%) similar to Manjunath et al.¹¹

In our study the least common combination was MS with AS (0.75%, 2 cases), which is not in concordance with other studies. In our study peak age of valvular heart disease were 25 - 40 years (32%), similar to studies by Radhakrishnan D²²; (29.8%) proportionmale over male (35%) was observed. This is in concordance with studies by Radhakrishnan D et al, Bonow et al and Kutumbiah et al.¹²,¹³,¹⁴

Limitations of the Study

1. Our analytical study reflects a single tertiary care institute retrospective observation. Hence, it is not a population-based study. This may result in several biases.
2. This study reflects the prevalence of valvular lesion in selected population. Being a tertiary care centre, more severe lesions are likely to be over-represented.
3. There may be overlapping of lesions, because it is a retrospective study (repeat Echo).
4. Even though Echo remains an important diagnostic tool, it has inherent limitations in comparison to surgical or autopsy-based studies in detecting early morphological lesions, as the lesion takes time to develop to be seen by Echocardiography.

CONCLUSION

Rheumatic heart disease (67.7%) is the most common contributing aetiology to valvular heart diseases. The other important causes being myxomatous mitral valve prolapse, degenerative and bicuspid aortic valve. Multivalvular lesions constitute more than one-third of all the cases. Rheumatic involvement of mitral (87%) followed by aortic (35.9%) was the most common presentation. MS with MR was the commonest lesion affecting females in the age group 21 - 40 years. With the advent of newer techniques and advancement in assessment of anatomical and haemodynamic effects, Echocardiography has now become an important modality in evaluation and management of valvular heart disease patients.

REFERENCES


