

# Prevalence of Rheumatic Valvular Lesion in Dilated Cardiomyopathy: A Study of 1182 Cases of Idiopathic Dilated Cardiomyopathy in a Tertiary Care Hospital.

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## ABSTRACT

**Background:** Congestive heart failure due to underlying primary myocardial disease idiopathic dilated cardiomyopathy is a major cause of heart failure in our country. Mitral regurgitation of varying severity are a common echocardiography features and annular dilation accompanying dilated LV is the presumed mechanism. Aims and Objective: To find the prevalence and pattern of rheumatic valve lesion in patients with Dilated Cardiomyopathy in view of high prevalence of chronic rheumatic heart disease in our country. **Methods:** An Echocardiography study and analysis of 1182 patients diagnosed as dilated cardiomyopathy in the age group of 20 to 90 yrs was conducted to ascertain the prevalence and spectrum of valvular lesion of rheumatic origin if any. **Results:** Total no of 1182 cases of DCM patients were included. Female sex dominated the study group 56 % vs 46 % male patient. Maximum cases were in the age group of 60-70 yrs (56%) followed by 23 % in the age group of 50 to 60 yrs, Around 56 % of Patient diagnosed as DCM had evidence of underlying RHD with Mitral valve thickness with thick subchordal apparatus and/ or aortic valve involvement. Mitral valve involvement was found as high as 79% of cases followed by Aortic valve involvement along with mitral valve involvement (21% cases). **Conclusion:** Prevalence of evidence of chronic rheumatic heart disease in around 56% in dilated cardiomyopathy is surprise finding in the present study and heightened awareness among the treating physicians about the high prevalence of associated rheumatic heart diseases in dilated cardiomyopathy and requires further evaluation to examine if there is causal relationship between the commonly prevalent disease.

**Keywords:** Dilated Cardiomyopathy, Echocardiography, Chronic rheumatic heart disease.

## INTRODUCTION

Cardiomyopathies are diseases of heart muscle that result from myriad insults such as genetic defects, cardiac myocytes injury and infiltration of myocardial tissue Aetiological basis for Idiopathic Dilated Cardiomyopathy include familial and genetic factors inflammatory and infectious factors particularly viral infections Cytotoxicity and cell loss and abnormalities in endogenous repair mechanisms.<sup>[1-4]</sup> DCM represents end phenotype of heart muscle damage induced by different causes and in the end stages most DCM looks phenotypically alike and manifest with presence of LV systolic dysfunction and LV dilatation. Even though the presentation of patient with dilated ventricle and heart failure may be fairly uniform a wide variety of

specific and secondary Cardiomyopathy may cause clinical presentation of a DCM. Hence the first step in the diagnosis of evaluation involves screening test which may help to exclude secondary causes. Valvular Cardiomyopathy is a specific secondary cardiomyopathy which arises as ventricular dysfunction that is out of proportion the abnormal loading conditions by the valvular stenosis and/ or regurgitation.<sup>[5]</sup>

Echocardiography is the corner stone in the evaluation and management of patients with DCM. 2D Echocardiography is a highly useful and readily available techniques to assess ventricular size and performance and exclude associated Valvular or Pericardial abnormalities. In our country Rheumatic heart disease in childhoods is very common which ultimately results in chronic rheumatic heart disease in adults. Many childhood Carditis goes undetected and in adult RHD many Patient do not give history of acute rheumatic fever in childhood. It is possible that many carditis may present later in life with features of failure due to abnormal loading condition eg increased aortic impedance with aging and latent cases may present with failure. During evaluation of

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many cases of dilated cardiomyopathy we get high incidence of MR which is said to be functional due to annular dilatation in dilated cardiomyopathy.<sup>[6]</sup> The valve and sub-valvular apparatus are supposed to be normal. But During evaluation of many such cases of dilated cardiomyopathy we encountered many cases of MR where there was valve thickening as well as the thick sub-valvular apparatus and many cases we got AR as associated lesion and such echocardiography features suggest presence of organic disease of mitral valve apparatus probably associated chronic rheumatic heart disease. But there is scanty data during review and search of journal for existence of underlying structural abnormality and we did not get any documented references.

Therefore we conducted this prospective study at VSSIMSAR Burla the only tertiary care and Medical College Hospital catering to a large economically backward area of our country to evaluate the prevalence of Rheumatic Valvular lesion associated with DCM.

## MATERIALS AND METHODS

All new comers with primary diagnosis of Dilated Cardiomyopathy were included in the study and all subjects were evaluated by Echocardiography and diagnosed using standard echocardiography criteria. DCM was diagnosed with evidence of increased LV dimension (LV end diastolic dimension (LVEDD) higher than 112% of predicted for value corrected for age and body surface area by following formula  $[45.3 \times (\text{body surface area})^{1/3} - (0.03 \times \text{age} - 7.2)] + 12\%$  M with depressed contractile function indices (Ejection Fraction less than 45% and fractional shortening less than 25%). As this was a prevalence study only for evaluation of different pattern of Valvular involvement simple criteria was adopted for evaluation of different valve lesion as described below. Mitral valve apparatus was studied by measuring annular diameter in multiple short axis view. Thick mitral valve was defined as valve thickness more than 5mm thick sub-chordal thickening was measured from parasternal long axis view with chordal length was measured at midsystole from tip of papillary muscle to mitral systolic closure line. Chordae tendinae was defined as thick chordal apparatus and thick papillary muscle. Degree of subvalvular thickening was graded from grade 1 to 4. Severe subvalvular disease was defined by thick chordae with length  $<10$  mm.<sup>[11]</sup> Chordal fusion was graded from 1+ to 4+. (c)MS was defined by presence thick mitral valve  $>3$ mm with doming and calculation of valve area was done with planimetry and or pressure half-time method MS was Mild if Valve Area  $>1.5$  cm<sup>2</sup> and Mean Pressure Gradient  $<5$ mmHg. Moderate if valve area  $<1.5$  cm<sup>2</sup> with Mean Gradient  $<10$  mmHg and Severe if valve area  $<1$ cm<sup>2</sup> and Mean gradient  $>$

10mmHg. MR was evaluated and was identified as central jet or posterior jet MR. Post jet MR was identified as more probably due to Rheumatic and severity was graded as mild if jet area 4 cm<sup>2</sup> moderate if jet area 4-10 cm<sup>2</sup> severe if jet area  $>10$  cm<sup>2</sup>.<sup>[8,9]</sup> Presence of aortic valve involvement was evaluated by presence of thick valve with or without aortic regurgitation with central closure with increased gradient across aortic valve and graded as Mild if gradient  $<25$  mmHg moderate  $>25$  but  $<40$  mmHg severe  $>40$  mmHg or Vel  $<3$ cm/sec  $>3$  but  $<4$  cm/sec  $>4$  cm/sec AR was diagnosed again by presence of thick valve with central jet and was graded as Mild if jet width / LVOT width  $<25\%$  Moderate if  $>25-45\%$  &  $45-65\%$  Severe if  $>65\%$  Organic tricuspid valve disease was defined by the presence of thick and was diagnosed by presence of thick valve with doming. As aim was to find out prevalence of RHD we did not apply rigid criteria for quantification of valvular lesion. From June 2014 to January 2018 total no of 1182 patients with evidence of DCM were included in the study. Age groups from 20 yrs to 90 yrs were included in the study. Same no of patient normal patients undergoing preoperative evaluation were included as control subject to see the change in valve morphology with aging which may adversely effect interpretation. 56 % patients were female and 44 % patients were male. All subject with coexisting risk factors like diabetes hypertension CAD CKD were excluded from the study group.

All subjects were subjected for routine blood test specially ESR, hrCRP to exclude any recent active lesion. Routine investigation like FBS Renal Function ECG Chest X-ray was done for exclusion of specific subset which may influence the result.

## RESULTS

Total no of 1182 cases of DCM patients were included. Female sex dominated the study group 56 % vs 46 % male patient. Maximum cases were in the age group of 60-70 yrs (56%) followed by 23 % in the age group of 50 to 60 yrs, 12% in age group 40 to 50, 8% in age group 30 to 40 and only 2% in age group 20 to 30. Around 56 % of Patient diagnosed as DCM had evidence of underlying RHD with Mitral valve thickness with sub-chordal fusion and/ or Aortic valve involvement. Mitral valve involvement was found as high as 79% of cases followed by Aortic valve involvement along with mitral valve involvement (21% cases). Mitral valve involvement with thick valve and mild mitral regurgitation with posterior jet was the predominant finding 42% followed by Thick mitral valve alone 18%, thick mitral valve with mild MR mild AR 12% thick mitral valve with mild AR 6% thick mitral valve with mod MR 13%. Isolated MS was observed in 1.2% Thick mitral valve mild MS mild MR mild AR 7.8%. Organic TV disease was detected in 6%

along with thick mitral valve and MR. No evidence of Aortic stenosis or pulmonary involvement was observed. Within the mitral valve involvement Thick sub-chordal apparatus was the most predominant finding in this study. No evidence of any healed vegetation or pericardial thickening was observed.

**Table 1: Pattern of Valvular Lesion**

Nature of valve lesion	Total no of cases	Percentage (%)
Thick MV Mild MR	496	42
Thick Mitral valve only	212	18
Thick MV Modertae MR	153	13
Thick MV mild MR mild AR	141	12
Thick MV Mild AR	71	6
Thick MV mild MS mild MR mild AR	92	7.8
Organic TV disease	71	6
IsolatedMS	14	1.2

## DISCUSSION

Left ventricular dilatation complicating cardiomyopathy is a common cause of clinically apparent MR.<sup>[2]</sup> The exact mechanism of such functional MR has evaded cardiologist for generations Ventricular dilation may cause alterations in all six elements of mitral valve complex but the particular anatomic changes responsible for valvular incompetence have not been identified.<sup>[4]</sup> Mitral insufficiency commonly occurs in the presence of left ventricular dilatation without any primary valvular involvement. Such functional mitral regurgitation as attributed to dilatation of mitral annulus and to retraction of the leaflets by chordate and papillary muscle as the left ventricle dilates.<sup>[2]</sup> However functional mitral insufficiency has not been found to be correlate well with mitral annular dilation.<sup>[3-5]</sup> Chester m et al postulated that mitral leaflet tissue can stretch somewhat to accommodate dilation of the mitral complex but less tissue is available for cooptation and valvular seal becomes ineffective Mitral annular dilation is commonly implicated as the genesis of functional mitral incompetence.<sup>[6]</sup> One study observed markedly elevated values in four interrelated parameters leaflet area annulus area the distance from coaptation in the left ventricle to the annular plane and left atrium. Mitral leaflet tissue may stretch to accommodate dilatation in the mitral apparatus and secondary functional regurgitation are common. Cardiac valves are supposed to normal and mitral regurgitation is presumed to be due to annular dilatation.<sup>[7]</sup> Hurst but our study of dilated cardiomyopathy by echocardiography we encountered high prevalence of mitral valve and aortic valve involvement in patients with dilated cardiomyopathy. We are working in this part of our country which is economically backward and still there is high prevalence of chronic rheumatic heart disease. In chronic rheumatic heart disease LV

dysfunction is also not uncommon Valve morphology is supposed to be normal in DCM.<sup>[5]</sup> Literature review on Valve morphology and regurgitation lesion of rheumatic mitral valve and aortic valve involvement we did not get any reference. A survey conducted by the Indian council of medical research (ICMR) involving 133.000 children 6-16 yr showed the incidence to be 5.3/1000 population. Another survey using echocardiography has suggested higher prevalence as high as 20/1000. Echocardiography has improved the recognition of presence of carditis and lead to recognition of subclinical carditis and able to detect higher prevalence of MR which was not possible by auscultation (8ghai) Only 50% of patients with established RHD give a past history of rheumatic fever. This may be attributed to subclinical carditis or the difficulty encountered in diagnosis. 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%).<sup>[12]</sup>

Our present study observed high prevalence of underlying structural disease of mitral and aortic valve in 62% of cases of diagnosed DCM. The involvement of mitral valve in the form of thickening, shortening of mitral valve and sub-chordal apparatus was as high as 54 % of total cases observed. This is not reported an any study on DCM. Presence of mild MS mild Aortic valve disease with AR further favour our observation of presence of underlying Rheumatic valvular involvement. Organic TV disease in the form of thickening valve with organic TR was observed in 5% of cases. This pattern of prevalence of different valvular lesion is almost similar to the pattern of valvular involment reported from our country.<sup>[12]</sup> We didnt get evidence of aortic stenosis as these group were excluded to avoid aortic valve disease with associated LV dysfunction. MR Jet was typical posterior jet typical of chronic rheumatic MR that we observe in Chronic Rheumatic heart disease. Only few cases of central jet was observed this further substantiates our observation regarding presence of underlying rheumatic heart disease which is not yet reportedin literature Is it acocidental finding or effect of childhood carditis which many times are not detected clinically and with aging process with change in after load of LV outflow manifest with LV dysfunction is a subject for future evaluation.

## CONCLUSION

Present study observed high Prevalence of different valvular lesion of probably chronic rheumatic origin in around 62% in patients diagnosed as Dilated Cardiomyopathy. Valve lesion in dilated cardiomyophy is presumed to be functional in

nature due to dilatation of annular diameter but present we got echocardiography evidence of mitral and aortic valve lesion of rheumatic origin and MR is probably of rheumatic origin in our country. Presence of Mitral Stenosis and combined valve lesion further strongly favours the Rheumatic aetiology. Both Primary Myocardial disease of Dilated Cardiomyopathy subset and Chronic Rheumatic Heart Disease are common prevalent lesion and important cause of morbidity and mortality in our country. Further study is required to seriously look into the issue as many cases of so called dilated cardiomyopathy may in fact be cases of Rheumatic Heart Disease which goes undetected and present in later age group as Dilated Cardiomyopathy.

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