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A Cross-Sectional Observational Study On The Echocardiographic Characteristics Of Mitral Stenosis In A Tertiary Care Hospital

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I. Introduction

Mitral stenosis is a common disease that causes substantial morbidity worldwide. The disease is most prevalent in developing countries like India, but is increasingly being identified in an atypical form in developed countries**.(1)** Mitral valve is affected by various pathologies with Rheumatic Heart Disease (RHD) being quite common in developing countries.

Echocardiography has evolved as the most predominant diagnostic imaging technique in Cardiology. Over the last 5 decades the diagnostic capability of echocardiography has increased dramatically from M-mode to two-dimensional imaging**(2).** Restricted leaflet motion,chordal fusion, leaflet thickening, calcification, and commissural fusion, are few of the morphological features of RHD of the MV leaflet.

Restricted motion of the posterior MV leaflet is a hallmark of RHD and, when severe, gives rise to the classic immobile appearance(3). Valvular thickening,which is present in 56–100% of patients with rheumatic carditis, can also be associated with nodularity (or beading).This is often most pronounced during an episode of acute rheumatic fever and can later regress.**(4)** Chordal thickening, another feature of RHD, can be identified in 100% of those with severe mitral stenosis requiring balloon valvotomy**,(5)** It must be subjectively assessed without utilizing harmonic imaging and at optimal gain settings **(6,7).** Echocardiography is used to diagnose and judge stage of disease, assess mitral regurgitation, exclude that mimic mitral stenosis, and provide information about suitability for percutaneous balloon valvuloplasty (PBV). Both valve area and gradient can be accurately measured, but several measurements with more than one method are often needed to accurately estimate haemodynamics of the mitral valve. The most reliable method to calculate valve area is planimetry with 2D echocardiography cross-section images **(8,9).**

II. Materials and methods:

This is a hospital based cross-sectional observational study conducted in the department of General Medicine and Department of Cardiology, Medical college & Hospital, Kolkata.It deals with the clinical and pathological characteristics of mitral stenosis in which patients will be selected according to inclusion and exclusion criteria and echocardiographic scorings will be observed in selected patients.The study population includes patients with isolated Mitral valve stenotic lesion or combined with other surrogate lesion(s) attending Acute and Chronic wards and OPD of Department Of General Medicine and Cardiology indoor wards and OPD of Medical College and Hospital, Kolkata**.**

Data was redacted and anonymised data was stored in a password protected computer.

All patients were studied on the basis of following variables-

1. Demographic variable
2. Clinical variable
3. Laboratory investigations
4. 2D Echocardiographic variables for Mitral valve lesions:

- Mitral Valve Area (MVA).
- Mean Pressure Gradient (MG).
- Pulmonary Artery Systolic Pressure (PASP).
- Left Ventricular Ejection Fraction (LVEF).
- Wilkins score.

Patients with more than grade one mitral regurgitation, patients having history of surgical/ Trans catheter intervention of mitral stenosis, patients unwilling to give consent and those with poor Echo-window were excluded from the study. After permission of departmental ethical committee and taking informed consent, the patients were evaluated on the basis of history,clinical examination,blood examination, ECG, chest X-ray PA view, 2 D echocardiography. Observation correlation between clinical disease severity of mitral stenosis (including cardiovascular complications) and Echocardiographic score were studied.

Statistical analysis:

Descriptive statistical analysis was carried out with SAS version 9.2 for Windows, SAS Institute Inc. Cary, NC, USA and Statistical Package for Social Sciences(SPSS Complex Samples) Version 21.0 for Windows, SPSS, Inc., with Microsoft Word and Excel being used to generate graphs and tables.

III. Results :

In our total study population of 74,mean age of the patients was 39 years with standard deviation 13.39.

Distribution of study population according to Age (n=74): Table No.1.

Age (in years)	Frequency	Percentage %
<40 Years	42	56.8
40-60 Years	26	35.1
>60 Years	6	8.1

Out of 74 Cases, 42 cases are below 40 years which comprises 56.8 % of study population , 26 cases in the age group 40-60 years comprises 35.1 % of study population and 6 cases are more than 60 years comprises 8.1 % of study population .

Distribution of study population according to Sex(n=74): Table No.2.

Sex	Frequency	Percentage%
Female	39	52.7
Male	35	47.3

52.7% of the study population was Female and rest 47.3% of study population was male.

Distribution of study population according to Religion (n=74): Table No.3.

Religion	Frequency	Percentage %
Hindu	45	60.8
Muslim	29	39.2

60.8 % of the study population is Hindu, rest is Muslin, and there are no other religions.

Distribution of study population according to Locality (n=74):
Table No.4.

Locality	Frequency	Percentage %
Rural	35	47.3
Urban	39	52.7

52.7% of the study population reside in urban area, rest of the population 47.3% in rural area.

Distribution of study population according to Smoking habit (n=74):
Table No.5a.

Smoking	Frequency	Percentage %
NO	50	67.6
YES	24	32.4

32.4 % of total population and 68.5%(n=35) of the male population are smoker.

Distribution of study population according to Alcohol consumption (n=74):
Table No.5b.

Alcohol	Frequency	Percentage %
NO	66	89.2
YES	8	10.8

10.8% of the total population and 22.8%(n=35) of male population are alcoholic.

Distribution of study population according to History of having Penicillin injection presently /in past :
Table No.6.(n=74)

History of Penicillin injection	Frequency	Percent
No	63	85.1
Yes	11	14.9

14.9%(11) of total population was having Injection Penicillin prophylaxis presently/ in past.

Distribution of study population according to History of Ischemic Stroke in past (n=74):
Table No.7.

History of Ischemic Stroke	Frequency	Percentage %
NO	68	91.86
YES	6	8.1

Only 8.1% (6) person gave history of ischemic stroke in past.

Distribution of study population according to History of Rheumatic Fever:
Table No. 8. (n=74)

History of Rheumatic Fever	Frequency	Percent
No	55	74.33
Yes	19	25.67

25.67% (19) of total population gave history of Rheumatic Fever in past.

Distribution of study population according to Previous Medical Management: Table No.9. (n=74)

Previous medical management	Frequency	Percent
No	46	62.2
Yes	28	37.8

62.2% (46) of total population was not medically managed previously.

Distribution of study population according to presence of pedal Edema: Table No.10. (n=74)

Edema	Frequency	Percent
No	56	75.7
Yes	18	24.3

24.3% (18) of total population was having edema during examination.

Distribution of study population according to Pallor: Table No.11. (n=74)

Pallor	Frequency	Percent
No	32	43.2
Yes	42	56.8

56.8% (42) of the total population was having pallor during examination.

20.3% (15) of the total population was having raised JVP during examination.

Distribution of study population according to presence of Basal Crepitations: Table No.12. (n=74)

Basal Crepitations	Frequency	Percent
No	45	60.8
Yes	29	39.2

39.2% (29) of the total population was having basal crepitations during auscultation of chest.

Distribution of study population according to presence of Palpable First Heart Sound(S1): Table No. 13. (n=74)

Palpable S1	Frequency	Percent
No	54	73.0
Yes	20	27.0

20 study individuals were having palpable S1 during examination.

Distribution of study population according to Blood Pressure: Table No.14. (n=74)

Blood Pressure	Frequency	Percent
Low	34	45.9
Normal	40	54.1

45.9% of total population was having low BP(<100/60mmHg), 54% having normal BP(up to 140/90mmHg).

(43)57.6% of total population was having diastolic palpable thrill during palpation.

Distribution of study population according to Presence of Opening Snap during auscultation:
Table No.15. (n=74)

Opening Snap	Frequency	Percent
No	50	67.6
Yes	24	32.4

Distribution of study population according to duration of Second Heart sound and Opening Snap Gap:
Table No.16. (n=74)

S2- Os Gap	Frequency	Percent
Medium	6	8.1
Short	14	18.9
Wide	4	5.4

Among those 24 people who were having opening snap on auscultation, 14had short, 6 had medium & 4 had wide S2-Os gap.

Distribution of study population according to Left Ventricular Ejection Fraction:
Table 17 : Distribution of LVEF in study population (N=74):

Mean	54.5
Median	56.0
Standard Deviation	8.33
Range	31
Min.	37.0
Max.	68.0
Standard Error	0.97

Distribution of Left Atrial diameter in study population:
Table 18 : Distribution of LA diameter in study population (N=74):

Mean	53.36
Median	51
Standard Deviation	8.33
Range	77
Min.	33
Max.	110
Standard Error	1.66

Distribution of Wilkin's Score in study population
Table 19 : Distribution of LVEF in study population (N=74):

Mean	9.96
Median	10
Standard Deviation	3.12
Range	11
Min.	4
Max. Standard Error	15 0.36

Distribution of Mitral Valve Area in study population

Table 20 : Distribution of MVA in study population (N=74):

Mean	0.92
Median	0.90
Standard Deviation	0.11
Range	1.6
Min.	0.7
Max. Standard Error	2.3 0.56

Distribution of New York Heart Association Classification grading in study population
Table No.21 (N=74):

NYHA	FREQUENCY	PERCENTAGE
1	8	10.8
2	28	37,8
3	23	31.1
4	15	20.3

11% (8) of total study population was having SOB of NYHA Grade 1 ,(28)38% having NYHA Grade 2,(23)31% having NYHA Grade 3,(15) 20% having NYHA Grade 4.

Frequency Distribution of Wilkins Score in study population
Table No.22.

WILKIN'S SCORE	Frequency	Percentage
≤ 8	13	37.1 %
> 8	22	62.9 %

Distribution of Wilkins Score in study population according to sex:
Table No.23 (n=74)

Wilkins's Score	**Female**	**Male**
≤ 8	9	13
> 8	30	22

Distribution of four components of Wilkin's Score :
Component 1.
Distribution of study population according to Mitral Valve Thickening Grading:
Table No. 24 (n=74)

Valve thickening Grading	**Frequency**	**Percentage**
1	7	9.5
2	18	24.3
3	33	44.6
4	16	21.6

9.5% (7) of total population was having grade 1 Mitral Valve Thickening, (18)24.3% of total population was having grade 2 Mitral Valve Thickening,(33)44.6 %of total population was having grade 3 Mitral Valve Thickening,21.6%(16)of total population was having grade 4 Mitral Valve Thickening

Component 2.
Distribution of study population according to Mitral Valve Calcification Grading: Table No. 25 (n=74)

Valve Calcification Grades	Frequency	Percentage
1	24	32.4
2	32	43.3
3	16	21.6
4	2	2.7

32.4% (24) of total population was having grade 1 Calcification, (32)43.3% of total population was having grade 2 calcification,(16)21.6 %of total population was having grade 3 calcification,2.7%(2)of total population was having grade 4 calcification.

Component 3.

Distribution of study population according to Mitral leaflet motility Grading: Table No.26 (n=74)

Leaflet motility	Frequency	Percentage
1	9	12.2
2	17	23.0
3	37	50.0
4	11	14.8

12.2% (9) of total population was having grade 1 Leaflet motility, (17)23% of total population was having grade 2 Leaflet motility,(37)50 %of total population was having grade 3 Leaflet motility,14.8%(11)of total population was having grade 4 Leaflet motility.

Component 4.

Distribution of study population according to Subvalvular thickening Grading: Table No.27 (n=74)

Subvalvular thickening	Frequency	Percentage
1	15	20.2
2	19	25.7
3	24	32.4
4	16	21.7

20.2% (15) of total population was having grade 1 Sub valvular Thickening, (19)25.7% of total population was having grade 2 Sub valvular Thickening,(24)32.4 %of total population was having grade 3 Sub valvular Thickening ,21.7%(16)of total population was having grade4 Sub valvular Thickening.

Table No.28, Test No.1: (n=74)
Correlation between NYHA Grading and Mean Gradient in Echocardiography:

	Mean Gradient (mm of Hg)			
NYHA	<5	5-10	>10	Total
1	5	3	0	8
2	9	15	4	28
3	4	15	4	23
4	1	8	6	15
Total	19	41	14	74

Symmetric Measures				
Measure of Agreement	Value	Asymptotic Standardized Error[a]	Approximate T[b] value	**P-VALUE**
Kappa	0.040	0.069	0.627	0.531

Non parametric tests based on attributes (NYHA & MG)- statistically not significant, as P value is >0.05.

Table No.29, Test No.2: (n=74)
Correlation between NYHA Grading and Mean Valve Area (cm^2)in Echocardiography:

NYHA	Mean Valve Area (cm^2)			Total
	>1.5	1.5-1	<1	
1	5	3	0	8
2	6	17	5	28
3	5	6	12	23
4	0	6	9	15
Total	16	32	26	74

Symmetric Measures

Measure of Agreement	Value	Asymptotic Standardized Error[a]	Approximate $T_{b\ value}$	**P-VALUE**
Kappa	0.232	0.074	3.392	**0.001**

Non parametric tests based on attributes (NYHA & MVA)- statistically significant, as P value is <0.05.

Table No.30, Test No.3: (n=74)
Correlation between NYHA Grading and Pulmonary Arterial SystolicPressure in Echocardiography:

NYHA	PASP (mm of Hg)			Total
	<30	30-50	>50	
1	7	1	0	8
2	16	8	4	28
3	10	11	2	23
4	2	9	4	15
Total	35	29	10	74

Symmetric Measures

Measure of Agreement	Value	Asymptotic Standardized Error[a]	Approximate $T_{b\ value}$	**P-Value**
Kappa	-0.015	0.055	-0.2	0.786

Non parametric tests based on attributes (NYHA & PASP)- statistically not significant, as P value is >0.05.

Table No.31, Test No.4: (n=74)
Correlation between NYHA Grading and Wilkin's Score in Echocardiography:

NYHA Grade	Wilkin's score		Total
	≤ 8	> 8	
1	4	4	8
2	10	18	28
3	7	16	23
4	1	14	15

Symmetric Measures

Measure of Agreement	Value	Asymptotic Standardized Error[a]	Approximate T[b]	**P-VALUE**
Kappa	-0.001	0.053	-0.021	0.983

Non parametric tests based on attributes (NYHA &Wilkin's Score)- statistically not significant, as P value is >0.05.

Chi-Square Tests:

Table No.32, Test No.5: (n=74)
Correlation between Wilkin's Score and PASP in Echocardiography:

Wilkin's Score	PASP			Total
	<30	30-50	>50	
≤ 8	19	2	1	22
>8	16	27	9	52
Total	35	29	10	74

Chi-Square Tests

Pearson	Value	Degree of freedom	Asymptotic Significance (2-sided)**P-Value**
Chi-Square	19.203[a]	2	0.0001

Table No.33, Test No.6: (n=74)
Correlation between Wilkin's Score and MG in Echocardiography:

Wilkin's score	MG(mmHg)			Total
	<5	5-10	>10	
≤ 8	16	6	0	22
>8	3	35	14	52
Total	19	41	14	74

Chi-Square Tests

Pearson	Value	Degree of freedom	**p-value**
Chi-Square	37.390[a]	2	0.00001

Table No.34, Test No.7: (n=74)
Correlation between MVA and MG in Echocardiography:

MVA (cm2)	MG (mmH g)			Total
	<5	5-10	>10	

>1.5	13	3	0	16
1.5-1	6	25	1	32
<1	0	13	13	26
Total	19	41	14	74

Chi-Square Tests

Pearson	Value	Degree of freedom	**p-value**
Chi-Square	54.041[a]	4	0.0000

Table No.35, Test No.8: (n=74)
Correlation between (S2) A2-OS Gap and Wilkin's Score in Echocardiography:

S2 Os gap	Wilkin's Score		Total	CHI SQUARE	Degree of Freedom	P-VALUE
	≤ 8	> 8				
medium	0	6	6	14.022	3	0.003*
wide	3	1	4			
small	0	14	14			
N.A.	19	31	50			
Total	22	52	74			

Non parametric tests based on attributes (S2 OS Gap and Wilkin's score) - statistically significant, as P value is <0.05

Table No.36, Test No.9.(n=74) Correlation between MS Diastolic Murmur Duration and Wilkin's Score in Echocardiography:

murmur duration	Wilkin's Score		Total	CHI SQUARE	DF	P-VALUE
	≤ 8	> 8				
Long	0	13	13	14.902	3	0.002*
medium	16	19	35			
short	5	6	11			
N.A.	1	14	15			
Total	22	52	74			

Non parametric tests based on attributes (MS Diastolic Murmur Durationand Wilkin's score) - statistically significant, as P value is <0.05.

Correlation between MS Diastolic Thrill and Wilkin's Score in Echocardiography: Table No.37, Test No.10.

diastolic thrill	WILKIN's SCORE		Total	CHI SQUARE	DF	P-VALUE
	≤ 8	> 8				

No	19	12	31	25.44	1	P<0.001*
yes	3	40	43			
Total	22	52	74			

Non parametric tests based on attributes (MS Diastolic Thrill and Wilkin's score) - statistically significant, as P value is <0.05**.**

Regression Analysis:

Table No.38, Test No.11: (n=74)Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t value	P-VALUE.	95.0% Confidence Interval for B	
		Beta	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	0.057	0.069		0.819	0.415	-0.081	0.195
2	valve thickening	0.971	0.038	0.279	25.666	0.000	0.895	1.046
3	Calcification	1.011	0.030	0.262	34.056	0.000	0.952	1.070
4	leaflet motility	0.968	0.039	0.272	24.958	0.000	0.891	1.045
5	Subvalvular thickening	1.035	0.032	0.348	31.978	0.000	0.970	1.099
a. Dependent Variable: Wilkins score								

Coefficient Correlations						
Model			Subvalvular thickening	Valve calcification	valve thickening	Valve leaflet motility
1	Correlations	subvalvular thickening	1.000	-0.175	-0.376	-0.412
		calcification	-0.175	1.000	-0.107	
		valve thickening	-0.163		1.000	-
		leaflet motility	-0.412	-0.107	-0.415	1.000
a. Dependent Variable: Wilkins score						

From the above table it is revealed that there is statistically significant relation between
Wilkin's Score with its 4 components –Subvalvular thickening, Calcification, Valve thickening, Leaflet Motility as the P value <0.001(At 1% level of significance)

Distribution of mean values of 4 components of wilkin's score according to NYHA Grading:
Table No.38, (n=74)

Components of Wilkin's Score	NYHA Grade			
	1	2	3	4
Valve Thickening(mean)	2.13	2.61	2.83	3.40
Calcification(mean)	1.38	1.64	2.09	2.60
Leaflet Motility(mean)	2.25	2.50	2.70	3.20

Subvalvular Thickening(mean)	1.75	2.46	2.48	3.27

IV. Discussion:

Rheumatic heart disease is the most frequent cause of abnormal valvular function. Acquired mitral stenosis (MS) is virtually synonymous with rheumatic heart disease A steady decline has been observed in the incidence of rheumatic fever and, thus, in acquired MS.[10]

Following development of rheumatic heart disease, evidence of MS may develop as early as the teenage years, presumably because of a more aggressive initial attack and/or recurrent bouts of rheumatic fever (consequences of suboptimal or absent antibiotic prophylaxis). In some developing countries, the prevalence of rheumatic heart disease in children is 5–15 (<5 in India) cases per 1,000 people.[11]

The symptoms of mitral stenosis in elderly patients may be masked or exacerbated by coexistent coronary artery disease, pulmonary disease, hypertension, and other systemic disorders that commonly occur in older adults[12].

Our study was a hospital based study and we took 74 new/ previously diagnosed patients with Rheumatic Mitral Stenotic valve lesions. Out of 74 Cases- 42 cases were below 40 years which comprises 56.8 % of study population, 26 cases were in the age group 40-60 years comprises 35.1 % of study population and 6 cases were more than 60 years comprises 8.1 % of study population. Minimum age of the respondents was 20 years and maximum age was 74years. Mean age of the patients was 39 years with standard deviation was 13.39. Out of all the patients in this study we have found out that 52.7% of the patients were females and 47.3% were males which is also consistent with the demography of rheumatic mitral stenosis as rheumatic origin Mitral stenosis is more common in females.

60.8 % of the study population was hindu, rest was muslim, and there are no other religions.52.7% of the study population was resident of urban area, rest of the population

47.3% was resident of rural area.32.4 % of total population and 68.5% of the male population was smoker where as 10.8% of the total population and 22.8%of male population was alcoholic.

Distribution of New York Heart Association Classification (NYHA) grading for shortness of breath (which is taken as most important parameter for determination of clinical severity) in study population revealed 8 numbers of study population had NYHA Grade 1 ,28numbers had NYHA Grade 2,23numbers had NYHA Grade 3,15numbers had NYHA Grade 4;which comprises 10.8%, 37.8%, 31.1%, 20.3% respectively.We had tried to find out if there is any association exist between NYHA grading and Wilkin's score, but kappa analysis shows p value of 0.983 which is statistically not significant is the p value is >0.05.

We found that 13.5 % (10) of total population was having controlled rate atrial fibrillation and 86.5% (64) of the total population was in sinus rhythm. The patients who were hemodynamically unstable were excluded as per exclusion criteria. It was revealed that 28(37.8%) patients were under some treatment and 62.2% (46) of total population was not managed medically previously.

On general examination we found that 56.8% (42) of the total population was having pallor and 24.3% (18) was having edema. 20.3% (15) of the total population was having raised Jugular Venous Pressure and 39.2% (29) of the total population was having basal crepitations during auscultation of chest. We also found that 8% of total study population was having bradycardia,66% was having normal Heart rate and 26% was having tachycardia.

It was also found that 45.9% of total population was having low Blood Pressure (<100/60mmHg), 54% having normal BP(up to 140/90mmHg).

On examining cardiovascular system we came to know that 43 (57.6%) persons were having diastolic palpable thrill during palpation and 20 (27%) persons were having Palpable First Heart Sound during palpation.

(22) 29.7% of the total population was also having associated mild mitral regurgitation alongwith MS. The Cases with Moderate to Severe MR were rejected as per exclusion criteria.Among those 24 people who were having opening snap on auscultation, 14 had short, 6 had medium & 4 had wide A2-Os gap.

Electrocardiographic changes suggestive of LA enlargement or RV hypertrophy or AF, were present in 61 (82.4 %) study population and 17.6% (13) of the total population was not having any ECG changes.

On echocardiographic evaluation it was observed that mean value of left ventricular ejection fraction of study group was 54.5 %with median value 56%, standard deviation of 8.33. The mean value of left atrial diameter was 53.36mm with median value 51mm, standard deviation of 8 and of mitral valve area was 0.92cm2 with median value 0.9, standard deviation of 3.12.

Ramakrishna C in his study had found that elderly patients had left atrial size of 4.9 cm while it was 4.7 cm in the younger group[13]**.** In our study, we identified that 71% (30out of

42) of younger population (≤ 40 years) having LA diameter of <55mm and 56%(18 out of 32) of elderly study population (>40 years) having LA diameter of <55mm, where as 29% younger population (≤ 40 years) having LA diameter of >55mm and 44% of elderly study population (>40 years) having LA diameter of

>55mm. The correlation age and LA diameter did not become statistically significant as p value is 0.113 (>0.05).

The mean & median values of Wilkin's score were 9.96 &10, with minimum & maximum values 4 and 15 respectively. 37.1% (13) of study population had Wilkin's of score ≤

8where as 62.9% (22) had Wilkin's score >8. Sex distribution of Wilkin's score revealed that 77% (30) of Females had Wilkin's score >8(77%) where as 59% (13) male had Wilkin's score more than 8**.**The correlation between age and Wilkin's score was statistically significant as chi-square test showed p value was 0.003(<0.05).

Regression Analysis was done to find out the dependability of the 4 components of Wilkin's score which revealed that there is statistically significant relation exist between Wilkin's Score with its 4 components –Subvalvular thickening, Calcification, Valve thickening, Leaflet Motility as the P value <0.001(At 1% level of significance). We also found that there is statistically significant correlation exist between Wilkin's score & diastolic thrill and Wilkin's score & A2-Os gap as both case the p value is <0.05.

Non parametric tests based on attributes NYHA & Mean gradient, was found to be statistically not significant, as P value(0.531) is >0.05.Kappa analysis also revealed that correlation between the attributes NYHA & PASP, was found to be statistically not significant, as P value(0.786) is >0.05.

Mitral valve gradient and pulmonary artery pressure was higher in patients having severe MS. This observation was reported by **Lue H et al** in a study to assess the Long term outcome of patients with rheumatic fever[14].In our study we also found similar result , that there is a statistically significant correlation exists between Wilkin's score & Mean valve gradient and also between Wilkin's score & pulmonary arterial pressure as chi-square tests in both cases p value are <0.05.

Study result showed distribution of different components of Wilkin's score as follows- The mitral valve thickening component revealed 9.5% (7) of total population was having grade 1 Mitral Valve Thickening, (18)24.3% was having grade 2,(33)44.6 % was having grade 3,21.6%(16) was having grade 4 Mitral Valve Thickening. The Leaflet motility component distributed as 12.2% (9) of total population was having grade 1 Leaflet motility, (17)23% of was having grade 2,(37)50 % was having grade 3,14.8%(11) was having grade 4 Leaflet motility. Results also reflected that 20.2% (15) of total population was having grade 1 Sub valvular Thickening, (19)25.7% was having grade 2,(24)32.4 %of was having grade 3 ,21.7%(16)of total population was having grade4 Sub valvular Thickening. The mitral valve calcification component reflected as, 32.4% (24) of total population was having grade 1 Calcification, (32)43.3% was having grade 2 calcification,(16)21.6 % having grade 3 calcification,2.7%(2)of total population was having grade 4 calcification.

An attempt to find out the correlation between Mitral Valve Area and Mean valve Gradient by applying Pearson chi-square test it revealed highly statistically significant value (54.04) with p value 0.00001.and **Ramakrishna C** in his study had found mean MVA 0.86cm2 but in our study we got mean MVA value 0.92cm2, with standard deviation of 0.11**.(22)**The correlation between age and MVA found to be not statistically significant as Pearson Chi Square p value was 0.269 (>0.05)

Fawzy et al. in his study had shown that lower in mitral echo score, mitral valve area and higher Doppler mitral valve gradient were observed in younger[15]**.**In our study we found that

45.23% (19out of 42) of study population ≤40 years age was having wilkin's of score

≤ 8 and 9.37 % (3 out of 32) of study population >40 years was having wilkin's of score≤8 . Again 54.76% (23out of 42) of study population ≤40 years age was having wilkin's of score > 8 and 90.63 % (29 out of 32) of study population >40 years was having wilkin's of score >8. It means we got the similar result as we also found higher wilkins's score in elder age group(>40years).The correlation between age and wilkin's score statistically tested by pearson chi- square gave a value of 11.49, with degree of freedom 2 and p value of 0.003, which is statistically significant.

V. Conclusion:

Present study is mainly descriptive as well as correlative and provides unique contemporary data on characteristics of patients with rheumatic mitral stenosis. Majority of patients had Wilkin's score of more than 8 and were unsuitable for percutaneous commissurotomy due to degenerative changes in mitral valve structure. While most(90.63%) of elderly patients(>40 years) had wilkin's score more than 8 but younger patients (≤40 years) had nearly equal distribution of Wilkin's score .So, we recommend that echocardiographic evaluation and scoring by Wilkin's score should be done in all mitral stenosis patients for confirmation of diagnosis, base line valve morphological data & scoring and also for decision making for percutaneous commissurotomy. Follow up echocardiography should be done for evaluation of progression of disease and further management planning.

VI. Limitations of the study:

As it is a cross-sectional study, it does not accurately represent course of the disease. Response to therapy could not be evaluated and the results of this study may not be generalised. There may be observer variation in performing echocardiography. This study was carried out in tertiary care centre where the patients were mostly referred from lower lever hospitals. Less severe cases may be managed at lower level. As more severe cases of Mitral Stenosis patients are attending tertiary level, they might have more complications as compared to the disease in the community. Furthermore, accurate measurement of Pulmonary arterial systolic pressure was not assessed as we could not perform Right heart

catheterisation. There were few limitations of Wilkin's Score like the assessment of commissural involvement were not included, there was underestimation of subvalvular abnormality and inability to differentiate nodular fibrosis from calcification.

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