

## Mitral and Aortic Valve Calcification in End Stage Renal Disease Patients

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### ABSTRACT

**Background:** Scarce local studies have been conducted to find out burden of mitral valve calcification and aortic valve calcification in patients infected with end stage renal disease in our population.

**Aim:** To evaluate the frequency of mitral valve calcification and aortic valve calcification in ESRD pts.

**Methods:** In a cross-sectional survey conducted at Department of Cardiology, Jinnah Hospital, Lahore. One hundred and forty male and female patients of end stage kidney disease for more than 3 months on maintenance hemodialysis were selected. Demographic profile was recorded including age, gender and duration of ESRD. The presence of mitral or aortic valvular calcification was checked by echocardiography. Data was analyzed using SPSS.

**Results:** One hundred and forty patients with mean age of 39.24±11.310 years were included. 89 patients (63.6%) were male and 51 patients (36.4%) were female. Among 140 patients 43 (30.7%) were having mitral valve calcification while 44 patients (31.4%) had aortic valve calcification. Gender and duration of ESRD was equally distributed across both groups i.e. with and without calcifications. Age was significantly associated with presence of aortic and mitral valve calcification.

**Conclusion:** It is concluded that the frequency of aortic and mitral valve calcification is quite high in end stage renal disease. Preventive measures need to be implemented in already sick population.

**Key words:** End stage renal disease, Aortic valve calcification, Mitral valve calcification, Hemodialysis

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### INTRODUCTION

It is commonly observed that there is presence of mitral and aortic valve calcification in end stage renal disease (ESRD). Calcifications of valves are believed to have association with uremic nephropathy. ESRD may cause derangement in calcium phosphorus and parathyroid hormone metabolism.<sup>1</sup> Longer the duration of end stage renal disease more the risk of calcifications at valves. There is increasing number of patient of ESRD worldwide so the risk of valvular calcification is also increasing.<sup>1,2</sup> In a study by Washiyama et al<sup>2</sup>, mitral and aortic valve calcification are commonly found in end stage renal disease patients with a frequency of four to five time higher than in general population.

In study by Kaplon et al<sup>3</sup>, there are currently more than 200,000 patients with ESRD receiving dialysis in United States. It is reported that by the year 2010 there will be an estimated rise in number of these patients to 350,000. With a frequency of

approximately eight percent per year, the number of ESRD patient requiring valve operation is likely to increase. The calcification of aortic valve or mitral annulus has been considered to be a chronic, non-inflammatory, degenerative process that occurs predominantly among elderly patients. The prevalence of mitral valve calcification is 44.5% and the prevalence of aortic valve calcification is 52% in ESRD patients with p=0.01<sup>4</sup>. 38.2% ESRD patients had mitral valve calcification and 44.4% ESRD patients had aortic valve calcification (p=0.01).<sup>1</sup> A study by Sayarlioglu et al<sup>5</sup> shows that there are 23.3% patients who have aortic valve calcification with p<0.001. A study by Bellsi et al<sup>6</sup> showed that 38% of ESRD patients have mitral valve calcification and 44% of ESRD patients have aortic valve calcification with p<0.001. There is little variation of frequency seen in international data in both valves calcification.<sup>7-9</sup> In an Indian study by Valson et al<sup>10</sup>, mitral valve calcification and aortic valve calcification were present in 61.7%.

The purpose of this study was to find the frequency of mitral and aortic valve calcification in patient of end stage renal disease in our population and to compare the frequency of valvular calcification with the international data to provide the broader spectrum. Limited data is available in our region. Valvular calcifications in ESRD can be easily prevented by good regulation of calcium phosphorus parathyroid hormone metabolism.

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## SUBJECTS AND METHODS

A cross sectional survey was carried out in Department of Cardiology, Jinnah Hospital, Lahore from October 2014 to April 2015. Using non-probability, purposive sampling, 140 patients of end stage renal disease for more than 3 months were selected. ESRD was defined by Glomerular filtration rate less than 20ml/min for more than 3 months using Cockcroft-Gault formula. Aortic valve calcification was considered present in patients when bright echoes of more than 1-mm thickness were seen on 1 or more cusps echocardiography at the time of inclusion. Mitral valve calcification was considered present in patients when bright echoes of more than 1-mm thickness were seen on 1 or more cusps by echocardiography at the time of inclusion. Patients with rheumatic valvular disease, congenital valvular disease (positive ASO titer) and acute renal failure (history of less than 3 months) were excluded. Informed consent was taken from guardian of patients and was explained that the data would be used and published but confidentiality would also be maintained. All data was recorded on structured Performa. The presence of mitral or aortic valvular calcification was checked on echocardiography at the time of inclusion into study according to operational definition. SPSS [statistical software/package for social sciences] version 17.0 was used for data analysis. A p value  $\leq 0.05$  was considered significant.

## RESULTS

140 patients were enrolled with end-stage renal disease (ESRD) in our study sample whose mean age was  $39.24 \pm 11.310$  years ranged from 18 to 50 years. In our sampled population (n=140) 89 patients (63.6%) were male and 51 patients (36.4%) were female. Among 140 patients 4(30.7%) were having mitral valve calcification while rest 97(69.3%) didn't had. 44 pts (31.4%) had aortic valve calcification. Fifty patients (37.1%) had end-stage renal disease duration more than one year. When study group (n=140) was arranged into age groups 52(37.1%) were patients below 40 years of age while rest of 88(62.9%) patients were 40 years and above. To evaluate mitral valve calcification distribution in male and female patients, we cross tabulated it with gender. P value was 0.898 which was non-significant. 16 females (31.4%) out of 51 showed positive results for mitral valve calcification while 27(30.3%) male patients were having mitral valve calcification. To find out the aortic valve calcification (AVC) distribution in male and female patients we cross tabulated gender with AVC and there were non-significant results (p=0.443). 14(27.5%) female patients showed positive

results for aortic valve calcification while 30 males (33.7%) out of 89 male patients had aortic valve calcification. To evaluate mitral valve calcification distribution in those patients who had duration of end-stage renal disease more than one year, we cross tabulated mitral valve calcification with ESRD. Out of 52 patients of ESRD 17 patients (32.7%) were those who showed duration of ESRD more than one year as well as positive results for mitral valve calcification while rest of them did not have. To evaluate aortic valve calcification distribution in those patients who had duration of end-stage renal disease more than one year we cross tabulated AVC with ESRD. Out of 52 patients of ESRD 17 patients (32.7%) were those who showed duration of ESRD more than one year as well as positive results for aortic valve calcification while rest of them did not have. To find out the trend of mitral valve calcification in different age groups we cross tabulated age groups with MVC and p value was less than 0.001 which gave us highly significant difference. Out of 88 patients who were 40 years and above, 41 (46.6%) of them were having mitral valve calcification. And out of 52 patients with age below 40 only 2 patients (3.8%) showed mitral valve calcification. To find out the trend of aortic valve calcification in different age groups we cross tabulated age groups with AVC and p value was less than 0.001 (significant). Out of 88 patients who were 40 years and above 43 patient (48.9%) of them were having aortic valve calcification. And out of 52 patients with age below 40 years only one patient (1.9%) showed aortic valve calcification.

## DISCUSSION

Dialysis patients present a significantly increased total and cardiovascular mortality when compared with the normal population<sup>11</sup>. Valvular abnormalities occur in patients with chronic kidney failure. Dystrophic calcification may cause valvular heart disease in these patients. In some studies, heart valve calcifications (HVCs) were found in about half of hemodialysis patients. Patients with hemodialysis may frequently have comorbid diseases, including heart valve calcification due to systemic atherosclerosis and cardiovascular complication, even in young adults.<sup>12</sup> Previous studies demonstrated the association between age, diabetes mellitus, dialysis duration, higher serum calcium and phosphorus, and HVC in hemodialysis patients.<sup>7-9</sup> In addition to these complications, there are potential risks of valve dysfunction, myocardial ischemia, conduction defects, infective endocarditis, and heart failure in hemodialysis patients. Wang and colleagues<sup>13</sup> demonstrated that cardiac valve calcification is as a strong independent predictor for

all-cause mortality and cardiovascular deaths among the chronic kidney failure patients.

In the present study, among 140 patients, 43 (30.7%) were having mitral valve calcification. This proportion is quite high. It implies that routine echocardiographic screening should be carried out in patients with end stage renal disease for mitral valve calcification. Our results are comparable with previous studies. In a study by Rroji et al<sup>4</sup> reported that mitral valve calcification was found in 44.5% patients on end stage renal disease. Similarly Bellasi et al<sup>6</sup> showed that 38% of end stage renal disease patients had mitral valve calcification. In another study, 38.2% patients with end stage renal disease had mitral valve calcification as reported by Raggi et al.<sup>1</sup> As calcification of aortic valve or mitral annulus has been considered to be a chronic, non-inflammatory, degenerative process that occurs predominantly among elderly patients. The difference may be secondary to difference in population demographics. A younger age group was included in our study population.

In our study, aortic valve calcification was present in 31.4% in our sampled patients with end stage renal disease. Sayarlioglu et al<sup>5</sup> showed that 23.3% patients had aortic valve calcification. A study by Bellasi et al<sup>7</sup> showed that 44% of end stage renal disease patients had aortic valve calcification. highest reported prevalence was published by Rroji et al<sup>4</sup> who has concluded a prevalence of 52%. In an Indian study by Alem et al<sup>8</sup>, mitral valve calcification and aortic valve calcification were present in 61.7%. Our results approve the hypothesis concluded by Washiyama et al.<sup>2</sup> In their study they reported that mitral and aortic valve calcification was hypothesized that to be commonly found in end stage renal disease patients with a frequency of four to five time higher than in general population. Mean age was 39.2±11.3 years showing increased burden of ESRD in young individuals. More stress should be focused on preventable causes of end stage renal disease. Aortic and mitral valve calcification were associated with age only. Aortic and mitral valve calcification distribution was equal among male and female and was found independent of duration of disease.

## CONCLUSION

It is concluded that the frequency of aortic and mitral valve calcification is quite high in end stage renal disease. Among 140 patients, 43 (30.7%) had mitral valve calcification and 44 patients (31.4%) had aortic valve calcification. Preventive measure should be taken to reduce the burden of end stage renal disease in our population.

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