

Original article:

**Correlation of cardiovascular involvement with electrocardiogram,
chest x - ray and 2-D Echocardiography with renal involvement in
Indian Population.**

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Abstract:

Introduction: Many patients with CKD die prematurely before or after beginning dialysis. Reasons for these adverse associations are not well understood. Whether CVD events differ in patients with and without CKD is poorly defined. With this view present study work was done to correlate the cardiovascular involvement with electrocardiogram, chest x - ray and 2-D Echocardiography with renal involvement in Indian Population.

Materials and methods: 70 consecutive patients of end stage renal disease of any etiology of chronic kidney disease stage 5 who were admitted in the medical wards and dialysis unit in Dr D.Y. Patil Medical College and Research Centre, Pimpri, Pune.

Results : X-ray finding showed cardiomegaly in 32.9% of ESRD patients and Pulmonary oedema was present in 25.7% patients and Pleural effusion was noted in 17.1 % patient.

Conclusion: There is statistically no significant association between the clinical findings of chest X-ray and the patients who had hypertension, since p value > 0.05. But, in first two findings, the proportion of patients having Cardiomegaly and pulmonary oedema is more in hypertensive patients than Normotensive patients.

Introduction:

Many patients with CKD die prematurely before or after beginning dialysis. Reasons for these adverse associations are not well understood. Whether CVD events differ in patients with and without CKD is poorly defined. The relative importance of nontraditional risk factors for CVD in CKD is not well defined. Similarly, whether differences in CVD in CKD patients suggest preventative or therapeutic strategies unique to Determination of cardiac disease in each patient with renal failure can provide rational strategy for therapy.¹ Extensive research work by innumerable workers has been done in this field already. Efforts to know the underlying pathology of these cardiac problems with a view to help the chronically morbid patient of renal failure have been taken and are still going on.² With this view present study work was done to correlate the cardiovascular involvement with electrocardiogram, chest x - ray and 2-D Echocardiography with renal involvement in Indian Population.

Materials and methods:

70 consecutive patients of end stage renal disease of any etiology of chronic kidney disease stage 5 who were admitted in the medical wards and dialysis unit in Dr D.Y. Patil Medical College and Research Centre, Pimpri, Pune.

Inclusion criteria

1. All of the patients were previously diagnosed as having chronic kidney disease on the basis of ultrasound and decreased creatinine clearance for more than 3 months.
2. Patients in end stage renal disease stage 5 (GFR less than 1 Sml/min per 1.73 m²)
3. Patients on haemodialysis or with renal transplantation.

Exclusion criteria

1. Pre-existing heart disease like rheumatic heart disease, congenital heart disease.
2. Other pre-existing cardiovascular disease like myocarditis due to virus, diphtheria and other infection.
3. Primary heart muscle disease like primary cardiomyopathy.

Chest X-ray: cardiomegaly was defined as cardiothoracic ratio more than 0.5 cm.

Ultrasonography abdomen: bilateral shrunken kidney with loss of cortico-medullary differentiation was taken as indicative of chronic kidney disease.

12 lead ECG: Left ventricular hypertrophy was defined as amplitude of 'S' wave in V₁ plus 'R' wave in V₆ more than 35mm. Left ventricular hypertrophy, ischemic changes, arrhythmias, tall 'T', QT prolongation, low voltage pattern were seen.

2D- Echocardiography: Echocardiography machine GE LOGIQ 400 PRO was used with 3-5 MHz transducer probe. Two dimensional echocardiography and M- mode echocardiography performed. 150

The M. mode recording perpendicular to the long axis of and through the centre of the left ventricle at the papillary muscle level were taken standard measurements of the systolic and diastolic wall thickness and chamber dimensions. The left ventricular ejection fraction (EF) and fractional shortening (FS) were taken as measure of left ventricular systolic function. Diastolic function was determined by measuring E/A ratio by special Doppler inflow velocity. E is peak early diastole velocity and A is peak atrial filling velocity of left ventricle across mitral valve.

B/A ratio less than 0.75 and more than 1.8 considered as diastolic dysfunction.

- Left ventricular hypertrophy was considered when Interventricular septum thickness or left ventricular posterior wall thickness > 12.
- The common cardiac abnormalities in ESRD increase in LV cavity size, thickened LV posterior wall, thickened interventricular septum, regional wall motion abnormality, decrease in LV compliance, pericardial effusion calcific/sclerotic valves were identified.

Observations and results:

Table 1 . Chest X - ray findings in ESRD study cases.

| X-ray chest findings | No. of cases | Percentage |
|----------------------|--------------|------------|
| Cardiomegaly | 23 | 32.9 |
| Pulmonary oedema | 18 | 25.7 |
| Pleural effusion | 12 | 17.1 |

X-ray finding showed cardiomegaly in 32.9% of ESRD patients and Pulmonary oedema was present in 25.7% patients and Pleural effusion was noted in 17.1 % patient.

Table.2 Electrocardiographic (ECG) findings in ESRD study cases.

| Electrocardiographic changes | No. of cases | Percentage |
|------------------------------|--------------|------------|
| Tachycardia | 34 | 48.6 |
| Left ventricular hypertrophy | 32 | 45.7 |
| ST-T changes | 21 | 30.0 |
| Low voltage complex | 4 | 5.7 |
| Tall 'T' wave | 5 | 7.1 |
| QT prolongation | 4 | 5.7 |
| Ventricular ectopics | 5 | 7.1 |
| Ventricular tachycardia | 2 | 2.9 |
| Complete heart block | 1 | 1.4 |

Correlation analysis of clinical findings of cardiac involvement in end stage renal disease with ECG, chest x-ray and 2-D Echo.

Discussion:

There is statistically no significant association between the clinical findings of chest X-ray and the patients who had hypertension, since p value > 0.05 . But, in first two findings, the proportion of patients having Cardiomegaly and pulmonary oedema is more in hypertensive patients than Normotensive patients.

In this study X-ray finding showed cardiomegaly in 32.9% patients; pulmonary oedema was present in 25.7% and pleural effusion was noted in 17.1% patient. Roy et al observed similar results.³ The above findings were consistent with our study.

In this study ECG changes were tachycardia (48.6%), left ventricular hypertrophy (45.7%), ST -T changes (30%), ventricular ectopics (7.1%), complete heart block (1.4%), and low voltage pattern (5.7%) in pericardial effusion, tall 'T' wave (7.1) and ventricular tachycardia (2.9%) in hyperkalemia, QT prolongation (5.7%) in hypocalcaemia observed in ESRD patients.

Shapira OM et al (1992)⁴ found that most frequent changes were a decrease in T wave amplitude and increase in Tmax time (all patients), an increase of QRS amplitude (61 % of patients), shortened or prolonged QTc interval (61%) and ischemic-like ST-T changes (22 % and 39%, respectively). Potentially clinically significant arrhythmias occurred in 12 patients (31 %) of which 8 were supraventricular, 3 were combined ventricular and supraventricular, and 1 was pure ventricular. Vera krane et al (2009)⁵ study observed LVH in 12%; signs of MI were present in 14% ECGs, AV block 1°-111° was documented in 7%patients. Variation in ECG findings may be due to small sample size and advanced presentation of ESRD cases. Variation in hyperkalemia changes in ECG depends on level and duration of serum potassium.

Conclusion:

There is statistically no significant association between the clinical findings of chest X-ray and the patients who had hypertension, since p value > 0.05 . But, in first two findings, the proportion of patients having Cardiomegaly and pulmonary oedema is more in hypertensive patients than Normotensive patients.

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