MATERIAL AND METHODS
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The present study was conducted on a total of 50 patients, suffering from chronic renal failure, irrespective of its etiological diagnosis attending Medical, Surgical and Paediatrics Out Patients Departments and/or admitted in their respective wards of M.L.B. Medical College, Hospital, Jhansi during the period from Feb., 1991 to April, 1992. In all cases, chronic renal failure was diagnosed on the basis of detailed clinical history and physical examination, supplemented with hematological and biochemical investigations. The final criteria of chronic renal failure were small sized kidneys on ultrasound examination (except diabetes, amyloidosis and polycystic kidney) in association of increased values of blood urea and serum creatinine.

A detailed clinical history of each patient with special reference to breathlessness, palpitation, chest pain, swelling over body, anorexia, nausea, vomiting, and hiccups was recorded on predesigned working proforma. A detailed history for any evidence of hypertension, diabetes, chronic recurrent U.T.I. and swelling over body in the past and detailed history of nephrotoxic drugs like aminoglycosides and analgesic was also recorded.

A detailed clinical examination of each patient with special reference to cardiovascular status with other
systemic examination was performed and a note was taken, if any evidence of hypertension, irregular pulse, raised JVP, pallor, oedema, cyanosis, friction rub, cardiomegaly, hepatomegaly, any murmur and basal/generalised crepitations. In each case physical examination was assisted with electrocardiographic, radiological and echocardiographic examinations. Complete biochemical profile including hemogram, renal function tests (complete urine examination, blood urea, serum creatinine, and urinary creatinine clearance test), blood sugar, (Fasting and postprandial) serum cholesterol and electrolyte estimation particularly serum sodium, potassium and calcium were performed.

After complete clinical and echocardiographic evaluation, all patients were put on maintenance haemodialysis programme. In each patient 4 hourly hemodialysis with holo-fibre dialyzer was done three times in a week for a total duration of 4 weeks (about 15-16 dialysis in each case). In most of these patients hemodialysis was done with arterio-venous shunt, but in few with arterio-venous fistula. In those patients who could not have arteriovenous shunt or fistula few dialysis were carried out with temporary cannulation. The femoral vein was cannulated by means of a modified Seldinger Technique for the arterial line. The venous line was connected to a peripheral vein often in antecubital vein.

After 4 weeks of hemodialytic therapy all patients were evaluated again for complete clinical, biochemical,
electrocardiographic, and echocardiographic examination to find any alteration in cardiovascular status.

On radiological examination cardiomegaly was considered if cardiothoracic (C.T.) ratio was more than 50%. In every case the X-ray chest PA view was thoroughly read to see any evidence of perihilar pulmonary congestion. It was ensured that X-ray film is taken at 6 feet distance and in deep inspiration.

On electrocardiographic examination left ventricular hypertrophy was diagnosed on the basis of the Romhilt and Estes point score system. The left atrial enlargement was diagnosed on the basis of wide and notched p wave in lead II or in lead I. The duration of p wave was taken abnormal if it was more than 0.11 sec. P-terminal force more than 0.03 mm sec was also taken as a criteria for left atrial enlargement. Depressed ST segment and symmetrical, pointed and inverted T waves were considered as a criteria for coronary artery disease. Slightly taller, peaked and symmetrical T wave and elevated concave upward ST segment with or without association of diminished QRS complexes were taken as criteria for pericarditis. For pericardial effusion, small inverted T wave, low voltage complexes with or without electrical alternance were the criteria.

ECHOCARDIOGRAPHIC EXAMINATION

All patients were subjected to real time M mode and 2-D echocardiographic examination and were examined
in supine position as well as in lying partially on left side at an angle of 30 to 45 degrees. The left ventricle was scanned at all levels from base to apex.

The left ventricular internal diameter was measured at the peak of systole and diastole. 2-D echocardiography was recorded in the parasternal long axis, parasternal short axis, and apical 4 chamber and subcostal 4 chamber views.

The left ventricular diastolic posterior wall (LVDPW) thickness more than 11 mm and left ventricular systolic posterior wall (LVSPW) thickness more than 15 mm were considered abnormal. Interventricular septal thickness (IVST) was considered abnormal if it exceeded 10 mm and IVS motion was considered abnormal if it was less than 3 mm. The left ventricular enddiastolic diameter (LVEDDd) more than 47 mm and left ventricular end systolic diameter (LVESDd) more than 30 mm were considered abnormal. Left atrial diameter more than 35 mm and aortic root diameter more than 28 mm were taken as abnormal.

Left ventricular functions were assessed by fractional shortening (FS) and ejection fraction (EF). Fractional shortening less than 28% and ejection fraction less than 62% were considered abnormal. The fractional shortening was calculated as:
\[ F.S. = \frac{E.D.d - E.S.d}{E.D.d} \times 100\% \]

E. Dd : End diastole dimension
E. Sd : End systole dimension.

The ejection fractions (E.F.) was calculated as:

\[ E.F. = \frac{E.D.V. - E.S.V.}{E.D.V.} \times 100\% \]

E.D.V. = End diastolic volume.
E.S.V. = End systolic volume.

Approximate quantification of pericardial effusion was made on the basis of method of Horowitch et al. The diminished interventricular septal motion (≤3 mm) and left ventricular posterior wall motions were considered as a criteria for myocardial ischemia. The values were put to statistical analysis by using paired student 't' test.