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In patients with chronic renal failure many cardiovascular pathophysiological adjustments are made by kidneys due to progressive loss of nephrons and decline in renal functions. Despite the significant advances in nephrology, mortality in patients with chronic renal failure is still high. Approximately 50-60% deaths in patients with chronic renal failure are attributed to cardiovascular complications. According to Lazarus et al (1975) cardiovascular complications are the most frequent cause of death in uremic patients, accounting for more than 40% of the total mortality. No cardiovascular complication spares the patients with chronic renal failure. Arterial hypertension, coronary artery disease, primary myocardial disease, pericardial disease, congestive heart failure, cardiac calcification, and cardiac arrhythmias are much more common in patients with chronic renal failure as compared to the general population (Barry and Brenner et al, 1976).

An increasing incidence of cardiovascular lesions in patient of chronic renal failure, is the result of the larger number and older ages of patients in dialysis programmes. The pathophysiologic changes in chronic renal failure patients under going dialysis are complex and varied. The haemodyaemetic alterations caused by hemo-dialysis may produce profound changes in patients with
underlying heart lesions. In addition to high incidence of cardiovascular diseases, many other factors may adversely affect cardiac dynamics and precipitate symptoms in these patients. Thus volume overload, arterial hypertension, anaemia, electrolyte-metabolic abnormalities, hyperadrenergic states, autonomic dysfunction and acute hemodynamic changes, occurring during hemodialysis may worsen the already compromised cardiac function.

![Diagram](image)

Schematic presentation for the pathogenesis of symptoms in patients with chronic renal failure.

In chronic renal failure the heart and circulation are affected by several pathologic mechanisms. Cardiac output is increased because of the increased oxygen demand of the body tissue, due to chronic anemia and chronic volume overload (Schorf et al, 1980). An arteriovenous
fistula for hemodialysis treatment also augments cardiac output, decreasing the peripheral vascular resistance (Riley Jr et al., 1978). Arterial hypertension also causes cardiac changes, which are the most important factors affecting the patients prognosis (Lazarus et al., 1975). It may induce ventricular hypertrophy and lead to accelerated atherosclerosis. Uremic changes in metabolism and electrolyte balance affect the heart leading to uremic pericarditis (Mitchell, 1974), and perhaps to uremic cardiomyopathy (Druke et al., 1977). Hence an entirely normal heart in chronic renal failure is an exception rather than the rule, and the diseased heart is quite easily affected by the hemodynamic alterations caused by hemodialysis. The important cardiovascular effects of uremia which have been reported, are (1) congestive heart failure (2) Arterial hypertension, (3) pericarditis and pericardial effusion, (4) cardiomyopathy (5) Accelerated atherosclerosis leading to ischaemic heart disease (6) Hypotension and arrhythmias. Atherosclerosis, hypotension and arrhythmias usually appear after initiation of dialytic therapy. Most of these cardiovascular manifestations are because of salt and water retention leading to fluid overload, accumulation of metabolic toxins, anemia, electrolyte and metabolic disturbances. As early as 1944, Raab suggested that a specific myocardial toxin may be
present in blood and heart muscles of uremic patients and constitute the primary cause of uremic heart disease.

Most published reports of cardiovascular abnormalities in uremic patients are based on non-invasive techniques such as echocardiography (D Cruze et al., 1979), measurement of systolic time intervals (Bornstein et al., 1975 and cardiac catheterization in few studies (Capetti et al., 1975). Other simpler techniques are electrocardiography, radiological examination and biochemical techniques.

Due to paucity of literature from our country, the present study has been designed to evaluate the cardiovascular manifestations in the patients of chronic renal failure by clinical as well as echocardiographic examination.