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A Study on Different Risk Factors and Clinical Manifestation of Cardiovascular Diseases in Chronic Kidney Disease Patients

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Abstract: *Chronic kidney disease (CKD) affects around 10-13% of general population. The risk for cardiovascular disease (CVD) morbidity and mortality remains high in all stages of chronic kidney disease. It is documented that CKD patients have an extremely high risk of developing CVD compared to general population so much so that early stages of CKD patients are more likely to develop CVD than progress to ESRD. Cardiovascular disease often begins before end stage renal disease (ESRD) and patient with reduced kidney functions are more likely to die of cardiovascular disease (CVD) than to develop ESRD. Hypertension, one of the leading cause of renal failure is the major culprit in this process causing left ventricular hypertrophy, cardiac chamber dilation, increased left ventricular wall stress, redistribution of coronary blood flow, reduced coronary artery vasodilator reserve ,pericardial effusion, ischemia, myocardial fibrosis, heart failure and arrhythmia. In addition to impairing the coronary micro circulation, hypertension may contribute to the development of atherosclerotic coronary artery disease particularly in the presence of many lipid abnormalities observed in ESRD. These patients have reduced high density lipoprotein cholesterol and increased plasma triglyceride concentrations and defect in cholesterol transport. Other abnormalities that may contribute to artherosclerotic coronary artery disease in ESRD are reduced high density lipoprotein cholesterol synthesis and reduced activity of the reverse cholesterol pathway. The result of study showed majority of patients were male compromising 66% and female were compromising 34%. males were mostly elderly . Most common symptoms were dyspnea followed by orthopnea, pedal edema, palpitation, chest pain. Echogardiography finding were LVEF<45% with global hypokinesia, left ventricular hypertrophy, LAD, RCA, LCx territory hypokinesia. Risk factor for cardiovascular complication in CKD include hypertension, dyslipidemia, diabetes mellitus, albuminuria, anaemia, metabolic changes.*

Keywords: *chronic kidney disease, their cardiovascular manifestation and risk factors*

I. Introduction

Chronic kidney disease (CKD) comprises either glomerular filtration rate (GFR) <60 ml/min/1.73 m2 for more than three months, or other pathological abnormalities or markers of kidney disease, including abnormalities in blood, urine tests or imaging studies. Detection of pre-renal disease and CKD stage I and II cannot therefore rely on measurement of GFR alone and instead require assessment of persistent proteinuria, microalbuminuria and haematuria, alongside eGFR level derived from serum creatinine. Patients with CKD have a marked increased incidence of cardiovascular disease (CVD) mortality and morbidity compared with age matched counterparts in the general population. Individuals with early CKD were much more likely to die with cardiovascular disease than to develop end stage renal disease (ESRD). Initial evidence indicating a relationship between renal dysfunction and adverse cardiovascular events became apparent in those on dialysis, where the number of CVD deaths was found to be raised. Almost 50% of those suffering from established ESRD are unlikely to survive a CVD event. Compared to the age adjusted CVD mortality in the general population this is approximately 15-30 times higher.

Risk factor for cardiovascular disease in chronic kidney disease:
Traditional risk factor:-
Old age, male sex, hypertension, higher LDL cholesterol, lower HDL cholesterol, diabetes, smoking, physical inactivity, menopause, family history of cardiovascular disease.

Non traditional risk factor:
Albuminuria, homocysteine, lipoprotein (a) and apolipoprotein (a) , anaemia,extracellular volume over load, electrolyte imbalance, oxitative stress, metabolism.
Spectrum of cardiovascular disease in chronic kidney disease

Types of CVD	Pathology	Clinical presentation
Arterial vascular disease	Arteriosclerosis	IHD(myocardial infarction, angina , sudden cardiac death) , heart failure
Cardiomyopathy	Concentric LVH , LV dilation with proportional hypertrophy	Heart failure, hypotention, IHD

Cardiovascular disease is frequently associated with CKD and CKD appear to be risk factor of CVD. The National Kidney Foundation Task Force on Cardiovascular disease in Chronic Kidney Disease issues a report which showed that there was high prevalence of CVD in CKD and that mortality due to CVD was 10 to 30 times higher in CKD patients than in general population.

Locatelli *et al.* (2003) analyzed the prevalence of the major CVD risk factors in CKD patients and their importance as contributors to the excess CVD in their study population. They found out that hypertension plays a major role in determining cardiac damage at all stages of CKD, including the dialytic phase. They also reported that anaemia was a major determinant of the development of LVH and therefore its correction can be expected to improve cardiovascular status and long-term survival, but this needs to be done before changes in cardiac structure become well established. The study also showed that calcium–phosphate disorders were important cardiovascular risk factors in CKD, and that dyslipidemia was particularly frequent in study that comprised 369 individuals with CKD not receiving renal replacement therapy at baseline assessment, the patients were compared with two age- and sex-matched control groups, one comprising 103 patients with angiographically-proven coronary artery disease and the other 103 apparently healthy individuals. Of the patients with kidney disease, 34% had vascular disease and 21% LVH according to electrocardiographic criteria. The study indicated that the traditional risk factors included history of hypertension in 76%, diabetes in 15% and dyslipidemia with reduced LDL cholesterol, elevated triglyceride and decreased HDL cholesterol levels. Other possible risk factors included elevated levels of plasma homocysteine, a low serum albumin, an elevated CRP and a low haematocrit **(Wheeler *et al.*, 2003)**.t in CKD patients.

Zhang *et al.* (2006) in their study on a Chinese population of individuals who were older than 40 years found that, the prevalence of CVD was markedly increased in early stages of CKD. Compared with participants with GFR >90 ml/min per m2, participants in stage 2 and 3 of CKD tended to have more cardiovascular risk factors such as older age, obesity, diabetes, hypertension, hypercholesteremia, and albuminuria.

Essig *et al.* (2007) in their study on 104 patients with early CKD (mean GFR 60±21 ml/min/1.72 m2) aged 18 to 75 years, biochemical analysis and ultrasound studies were conducted for the patients to determine the cardiovascular remodelling and extracellular fluid excess in early stages of CKD. Results showed that 71 patients were males and 33 were females. Eleven patients were stage-1 CKD, 36 stage-2, and 57 stage-3. There was asignificant increase in homocystein, PTH, and SBP across the three CKDstages. The results of ultrasound showed that there was an associationbetween GFR decline and LVH in 58% of stage-1 and 68% of stage-2.Glomerular filtration rate decrease was also associated with common carotidremodeling and increased aorta stiffness

Levin (2008) reported that the increase in CVD burden is present inpatients prior to dialysis, due to both conventional risk factors as well as thosespecific to kidney disease. Of importance is that even in patients with mildkidney disease, the risk of cardiovascular events and death was increasedrelative to patients without evidence of kidney disease. The prevalence of hypertension was high in patients with CKD (87–90%). At least 35% of patientswith CKD had evidence of an ischemic event (myocardial infarction or angina)at the time of presentation to a nephrologist. The prevalence of LVH increasedat each stage of CKD, reaching 75% at the time of dialysis initiation, and themodifiable risk factors for LVH including anemia and SBP were also worsen ateach stage of kidney disease. Even under the care of nephrologists, a changein cardiac status (worsening of heart failure or anginal symptoms) occurred in20% of patients This study is evaluation for risk factors for CVD in CKD patients.

II. Aims And Objectives

To study the risk factors for cardiovascular complication in CKD patients like ischemic heart disease , left ventricular hypertrophy, dilated cardiomyopathy ,pericardial effusion in patient admitted in RIMS, Ranchi

Materials And Methodology:-

This study was done on patients admitted with symptoms and sign of cardiovascular diseases in medical ward of RIMS, Ranchi over a period of one year. This was a cross sectional study and included 30 patient who fulfilled the inclusion criteria of clinical and echocardiographic finding. clinical findings included symptom and sign of cardiovascular diseases while ecgocardiographic finding included left ventricular hypertrophy, pericardial effusion, global hypokinesia and dilation of all chambers of heart, left ventricular ejection fraction <45%, LAD territory hypokinesia, RCA territory hypokinesia, LCx territory hypokinesia. The patients with valvular and congenital heart diseases were excluded from the study. Other investigations done

were chest radiogram, CBC, blood glucose, HbA1C, renal function test, lipid profile, electrolytes, routine examination of urine, Electrogardiography ect.

III. Observations and Results

Distribution of different cardiovascular disease in CKD patients

Cardiovascular complication in CKD patients	Number	Percentage
Left ventricular hypertrophy	8	26.6
Dilated cardiomyopathy	14	46.6
Pericardial effusion	3	10
Ischemic heart disease	4	13.3
Others	1	03.3

The most common type of cardio vascular disease in CKD patients was dilated cardiomyopathy 46.6% followed by left ventricular hypertrophy 26.6% ,ischemic heart disease 13.3% ,pericardial effusion 10%

Symptoms profile in the present study:-
Most common symptoms were dyspnea 66.67% followed by pedal edema 56.6% , orthopnea 43.3%,
Chest pain 23.3% , palpitation 20%

Types of heart failure:-
Most common heart failure were LVF 50% ,followed by RVF 16.6%
Electrocardiographic and Echocardiographic profile

Electrocardiographic profile		Echocardiographic profile	
Sinus tachycardia	43.3%	LVEF<45% , Global hypokinesia	63.3%
Atrial fibrillation	10%	Pericardial effusion	06.6%
Complete heart block	03.3%	LVH	46.6%
Ventricular tachycardia	03.3%	LAD territory hypokinesia	10%
LBBB	46.6%	RCA territory hypokinesia	03.3%
RBBB	10%	LCx territory hypokinesia	00
LVH	53.3%		
RVH	33.3%		
Ischemic changes	10%		

Sex distribution:
In our study male patients were more than female patients. Males were 66% and female were 34%

Age distribution:
In our study most of patients was elderly
Age between 20 to 30 years – 7%, 30 to 40 years -10%, 40-50 years – 13% and 50 to 60 years- 40% and above 60 years were 30 %

Risk factors:-

Hypertension	65%
Anaemia	70%
Dyslipidemia	32%
Diabetes mellitus	11%
Metabolic derangement	13%
Albuminuria	90%

IV. Discussion

The present study aims to evaluate the different cardiovascular manifestation in patient of chronic kidney disease admitted in department of medicine RIMS Ranchi. In our study CVD with CKD were mostly seen in age group 31- 60 years followed by above 60 years then the age group of 20 to 30 years . Males patient were 66% and female patients were 34%. Most patient presented with complain of dyspnea followed by pedal edema, orthopnea, chest pain, palpitation. In clinical examination most patient had bilateral basal crepts, raised JVP, pedal edema and hypertension, In our study most cardiovascular complications were dilated cardiomyopathy followed by left ventricular hypertrophy, ischemic heart disease, pericardial effusion and others . In all patients CBC, renal function test, Na^{+}, K^{+} ,Ca^{++} , lipid profile, routine examination of urine and blood sugar , HbA1c were done. In our study 70% patient had anaemia, all the patient had raised serum creatinine level. In lipid profile there was decreased in HDL and increased in LDL .In routine examination of urine 90%

patient had albuminuria out of which 30 % patient had macroalbuminuria, 5% patient had raised serum potassium level. In 11% patient had raised blood sugar and HbA1c.

According to AMERICAN JOURNAL OF KIDNEY DISEASE risk of cardiovascular disease are anaemia, alteration in metabolism, hyperlipidemia ,hypertension, diabetes mellitus According to **Locatelli *et al.* (2003)** major CVD riskfactors in CKD patients and their importance as contributors to the excess CVD in their study population. They found out that hypertension plays a major role in determining cardiac damage at all stages of CKD, including the dialytic phase .They also reported that anaemia was a major determinant of the development of LVH and therefore its correction can be expected to improve cardiovascular status and long-term survival, but this needs to be done before changes in cardiac structure become well established. The study also showed that calcium–phosphate disorders were important cardiovascular risk factors in CKD, and that dyslipidemia was particularly frequent in study that comprised 369 individuals with CKD not receiving renalreplacement therapy at baseline assessment, the patients were compared with two age- and sex-matched control groups, one comprising 103 patients with angiographically-proven coronary artery disease and the other 103 apparently healthy individuals. Of the patients with kidney disease, 34% had vascular disease and 21% LVH according to electrocardiographic criteria. The study indicated that the traditional risk factors included history of hypertension in 76%, diabetes in 15% and dyslipidemia with reduced LDL cholesterol, elevated triglyceride and decreased HDL cholesterol levels. Other possible risk factors included elevated levels of plasma homocysteine, a low serum albumin, an elevated CRP and a low haematocrit **(Wheeler *et al.*, 2003)**.t in CKD patients In our study major risk factors leading to CVD in CKD includes hypertension , anaemia, dyslipidemia, diabetes mellitus, albuminuria etc.

Prolonged hypertension leads to dilated cardiomyopathy , left ventricular hypertrophy. Anaemia exerts independent effect on CVD in CKD, for every 1gm/dl drop in haemoglobin ,risk of cardiovascular compliation increases by 25% and risk of death by 14% .(Metivier ,2000), dyslipidemia leads to artherosclerotic changes which later leads to cardiovascular complications.

V. Conclusion

Dilated cardiomyopathy is the most common cardiac complication in CKD patients followed by left ventricular hypertrophy, ischemic heart disease, pericardial effusion. Risk factor leading to cardiovascular complication in CKD were hypertension, anaemia, diabetes mellitus, dyslipidemia , metabolic changes. Most patient were males. Most common age group were 50 to 60 years. They presented with symptoms of dyspnea ,orthopnea, pedal edema ,chest pain palpitation. Sign were bilateral basal crepitations , raised JVP , hypertension ,hepatomegaly. echocardiography finding were LVEF <45% global hypokinesia, left ventricular hypertrophy , ischemic heart disease, pericardial effusions.

In our study dilated cardiomyopaty is most common cardiac complication followed by left ventricular hypertrophy because of late presentation and poor control of hypertension and anaemia.

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