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General Medicine

A STUDY OF PREVALENCE OF ISCHEMIC HEART DISEASE IN NON-DIABETIC CHRONIC KIDNEY DISEASE PATIENTS IN A TERTIARY HOSPITAL

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KEYWORDS :

BACKGROUND & OBJECTIVES:
This study is undertaken with a view to understanding the prevalence of IHD in non-diabetic CKD population and, analyzing the risk factors that are already described to influence the incidence of IHD in CKD population. Diabetic population has been excluded from the study as Diabetes, alone, irrespective of other risks increases the prevalence of IHD. As recommended by NKF, a timely intervention to reduce Coronary Artery Disease or IHD will surely benefit the patients suffering from CKD.

Objectives of study include:
1. To assess the prevalence of Ischemic heart disease in non-diabetic chronic kidney disease patients.
2. To analyze the risk factors influence the prevalence of IHD in CKD population.

METHODOLOGY:
Patients with CKD [defined as abnormalities of kidney structure or function, present for ≥3months, with implications for health, which presents with a decrease GFR <60ml/min/1.73m², or presence of markers of kidney damage in the form of albuminuria >30mg/day, urinary sediment abnormalities(hematuria, red cell cast etc.), electrolyte and other abnormalities due to tubular disorder, abnormalities detected by histology, structural abnormalities detected by imaging, history of kidney transplantation.] without diabetes mellitus attended to the outdoor and admitted in indoor were included in the study.

The purpose of study explained and informed consent form filled up and duly signed by patients who met the inclusion criteria before enrolling them in the study. Detailed clinical history was taken from the patients and complete clinical examination was done. All patients evaluated for ischemic heart disease by symptom and sign analysis and resting ECG analysis.

Resting ECG criteria for IHD:
1. New or presumable new, transient ST- segment deviation (>0.05mV) or T- wave inversion (>0.2mV).
2. Fixed Q waves, Abnormal ST segments or new T waves.
3. T wave flattening or inversion in leads with dominant R.

All patients also evaluated properly about age, sex, smoking history and presence of hypertension. The following investigations were performed in the cases 1.Serum creatinine 2. Hb% 3. Serum albumin 4. Serum fasting lipid profile 5. Serum C reactive protein 6. Serum phosphate level 7. Serum Ca level 8. Urine for albuminuria and creatinine clearance calculated using MDRD (Modification of Diet in Renal Disease Study) equation.

Equation from the Modification of Diet in Renal Disease Study
Estimated GFR (ml/min per 1.73 m^2) = 186 × $(P_{Cr})^{-1.154}$ × $(age)^{-0.203}$

Multiply by 0.742 for women. Multiply1.21 for African Americans

RESULTS:
In the present clinical study of prevalence of IHD in non-diabetic CKD done on 50 patients, number of males presenting with IHD were more than number of females (62.5%in males Vs 37.5% in females).

In age group above 55 the prevalence of IHD is 62.5% in comparison to 11.1% in age group less than 55 smoking is found to be associated with increased presence of IHD among CKD population (50% IHD in smokers comparison to 25% in non-smokers).

Presence of IHD is more in hypertensives in comparison to non-hypertensives (41.7% in patients having BP>140/90 than 21.4% in patients having <140/90).

IHD is found out in 50% of patient population having dyslipidemia while it is 12.5% in patient population having no dyslipidemia.
Prevalence of IHD is higher in anemic patients in comparison to non-anemic patients (62.5% in anemic patients than 11.5% in non-anemic patients).

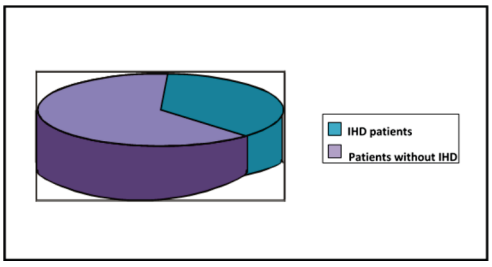
Patients with serum albumin level <3gm/dl had IHD 64% in comparison to 8.7% in patients who are having serum albumin >3gm/dl.

Patients with raised C reactive protein (>5mg/dl) had IHD 66.7% in comparison to 7.7% in patients having lower C reactive protein.

Patients with divalent ion disturbance are showing increased incidence of IHD (63.1%) in comparison to patients who are not having this abnormality (13.1%).

Finally, presence of IHD was found in 18 out of 50 patients having CKD with the proportion being 36%.

Fig. 1. Prevalence of IHD in CKD.



All the patients were discharged with the advice of medical management.

DISCUSSION:
Atheromatous ischemic heart disease
CAD, characterized by critical stenosis of the major coronary arteries, is highly prevalent in the CKD population, because of both the demographic characteristics of the patient population and their underlying disease states (e.g., hypertension, diabetes mellitus). Estimates of prevalence by the time patients reach the need for dialysis vary from 15% to 73%.[1] The wide range in prevalence most likely relates to whether a patient presents symptomatically or the condition is detected on screening, often for transplantation. It is estimated that more than 50% of patients, particularly diabetics, are asymptomatic.[2,3]

Morphology of atheroma in patients with progressive renal disease
Although the distribution of atherosclerotic lesions appears similar to the general population, the morphology in coronary artery disease is

unique[4] with striking medial calcification in addition to intimal hyperplasia. A recent study compared the postmortem morphology of atheromatous lesions in 27 patients with progressive renal disease (average age 69.5 years) and appropriate controls.[5] The major differences in renal patients were that coronary vessels had significantly increased medial thickness with atheroma consisting of calcified plaques in contrast to the fibroatheromatous plaques of control patients.

However, coronary artery calcifications not exclusive to the elderly patients with progressive renal disease, and a recent study of dialysis patients aged 20-30 years had evidence of coronary artery calcification[6] detected by electron beam computed tomography. Coronary calcification was 17.5 times that of the general population and was associated with length of time on dialysis, average serum calcium phosphate product (a determinant of calcium ´ phosphate deposition), and intake of calcium containing phosphate binders.

Moreover, the chemical composition of calcified plaques in dialysis patients is primarily hydroxyl apatite and calcium phosphate, and the calcium ´ phosphate product has previously been identified as an independent predictor of mortality in this population.[7] The morphology of coronary lesions in patients with progressive renal disease (that is, calcified versus fibro atheromatous plaques) is an important factor when considering the likely response to either medical or invasive treatments and the adoption of strategies proven in the general population.

Non-atheromatous ischemic heart disease:

About 25% of dialysis patients with ischemic symptoms do not have critical CAD.[8] A significant percentage of predialysis and transplantation patients are similarly affected. It is likely that these symptoms result from microvascular disease and the underlying cardiomyopathy, in which a reduction in coronary vasodilator reserve and altered myocardial oxygen delivery and consumption predispose to ischemic symptoms.

In dialysis patients, the presence of LV hypertrophy predisposes to non-atherosclerotic ischemic disease, because LV hypertrophy is primarily a response to increased tensile stress requiring an overall increase in myocardial energy, as the demand for oxygen increases, the coronary vasculature dilates above baseline. A further increase in myocardial oxygen requirement may not be met with an adequate increase in coronary flow, especially if there are pathologic changes in the large coronary arteries or in the small coronary vessels. Alterations in subendocardial perfusion are partly related to structural abnormalities of intramyocardial microvasculature and to abnormal structure and function of the aorta and major arteries.

UREMIAAND CARDIOVASCULAR RISK FACTORS:

Although studies are in progress, there is little information currently available on the mortality rate of predialysis patients. However, the predominant burden of ill health in CKD occurs during the period of dialysis. The survival of dialysis patients is worse than that of patients with colon or prostate cancer, resulting predominantly from an excessively high cardiovascular mortality rate.

Traditional Risk Factors include hypertension, dyslipidemia, tobacco use, diabetes. Other risk factors for cardiovascular disease are well defined in the general population; however, they are enlightened more in the presence of CKD. Male sex has been described as an important risk factor in the development of IHD in CKD patients.[9,10] Increasing age has also been considered as an important risk factor in different studies.[11,12]

Uremia Related Risk Factors:

Uremia related risk factors can be classified into hemodynamic and metabolic types, some of which are peculiar to the uremic state and some magnified. Hemodynamic factors include anemia, increased extracellular volume. Metabolic factors include hypoalbuminemia, inflammation, hyperhomocysteinemia, oxidative stress, abnormal divalent ion metabolism (calcium and phosphate), dyslipidemia, thrombogenic factors.

Other potential risk factors:

There is increasing evidence that circulating levels of apoptotic molecules (soluble Fas and soluble Fas ligand) may play an important clinical role in atherogenesis.[13]Epidemiologic studies are now required to define this relationship in better way.Carnitine insufficiency also has been associated with atherogenic risk, although elucidation through appropriate clinical longitudinal studies are currently lacking.

CONCLUSION:

The present study shows that CKD patients, even without diabetes mellitus, have quite high incidence of IHD. This higher incidence may be attributed to the presence of different traditional (increasing age, male sex, smoking, hypertension, dyslipidemia) and non-traditional (raised C-reactive protein, hypoalbuminemia, divalent ion disturbance) risk factors that have shown to significantly influence the outcome of IHD in CKD patients. The study was also shows that CKD itself is a considerable risk in IHD population by analyzing association of CKD related risk factors in IHD. To conclude we can say that early detection of IHD in CKD population can reduce both morbidity and mortality in this group of patients.

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