Diagnostic Importance of Creatine Kinase MB - Isoenzyme in Chronic Hemodialysis Patients.

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Abstract:

Chronic renal failure (CRF) results from advanced and irrevocable destruction of nephrons, despite of the cause. Chronic renal failure patients are having higher risk of cardiac problems. The present study was considered to evaluate use of serum cardiac marker in chronic renal failure. Total 89 patients were studied in between age group 40 to 70 years. After applying the inclusion and exclusion criteria, a total of 60 chronic renal failure patients were eligible for the study. The data was collected and compared with 60 age and sex matched healthy controls from the same age group. The statistical analysis was done using SPSS 16.0 software. All the patients were assessedwith creatinine kinase MB (CK-MB) and baseline parameters such as RBS (random blood sugar), blood urea, creatinine and total cholesterol.

The concentrations of CK-MB, RBS, blood urea, creatinine, and total cholesterol were significantly elevated (P<0.001) when compared with control group. Patients maintained on chronic dialysis without evidence of acute myocardial injury often have chronically increased CK-MB concentration.

Key Words- Chronic renal failure (CRF), Creatinine kinase MB (CK-MB), Cardiac Biomarkers.

Introduction : Chronic renal failure (CRF) results from highly progressive and unalterable damage of nephrons, in spite of the cause. Patients with CRF are a major cardiac population. 1the diagnosisimplies that the glomerular filtration rate (GFR) is known to have reduced atleast for 3 to 6 months. Often there is a gradual decline in GFR occurs over a period of years[1,2]. In the united state there is a rising incidence and prevalence of kidney failure, with poor outcome and high cost. The number of individuals with kidney failure treated by dialysis and transplantation exceeds of 6,50,000 by 20122,[3]. CKD is frequently associated with cardiovascular diseases (CVD). The individual with chronic kidney diseases are more likely to die of CVD than due to kidney failure [4]. Patients with chronic renal failure are major cardiac risk population; coronary artery disease is more prevalent in these patients. This is the major reason for morbidity and mortality in India. Such patients have highly prevalent in abnormal baseline electrocardiograms, echocardiogram, atypical cardiac symptoms, silent myocardial ischemia [4,5].

CVD is the most common cause of death among the individual with chronic renal diseases. Around 50% deaths account due to CVD[6]. Biochemical markers have long been the cornerstone in the diagnosis of CKD.

The various biochemical markers of cardiac injury are falsely elevated in patients with end stage renal diseases (ESRD). Keeping this view in mind the purpose of the present study was to evaluate the CK-MB enzyme to assess the cardiac function in chronic renal failure patients.

Material And Methods : The present work was carried out in the Department of Biochemistry, Govt. Medical College and Hospital Vijayawada in collaboration with Arun Kidney Center (Corporate Hospital Vijayawada). Prior to start the study, local institutional ethical clearance was obtained and utmost care was taken during experimental procedure according to the Declaration of Helsinki 1964.

Total 89 patients were studied in between age group 40 to 70 years. After applying the inclusion

and exclusion criteria, a total of 60 chronic renal failure patients were eligible for the study. Out of this 40 patients were on dialysis 20 patients were not yet on regular dialysis. The data was collected and compared with 60 age and sex matched healthy controls from the same age group.

Study Type: Hospital Based Case – Control Study.

Inclusion Criteria:

1. Patients with chronic renal failure.
2. Patients with end stage renal diseases

Exclusion Criteria:

1. Previous ischemic heart diseases.
2. Patients undergoing percutaneous coronary intervention.
3. Patients with trauma.
4. Patients with hyperthyroidism.
5. Patients with recent convulsions.
6. Patients with recent cerebrovascular diseases.
7. Patients with liver diseases.

After obtaining a written consent form from all the subjects who were included in the study and by giving detail information of study, blood samples were collected from controls as well as CKD patients.Random blood samples were collected into two clean bottles, one without anticoagulant and other with coagulant (sodium fluoride and potassium oxalate). Serum was separated taking precautions to avoid hemolysis from the first bottle and the following tests were done.

1. Serum creatinine kinase MBIsoenzyme (Immuno inhibition method1982)[7].
2. Blood glucose (GOD – POD method)[8].
3. Blood urea (Urease method)[9].
4. Serum creatinine (Alkaline picrate method)[10].
5. Serum total cholesterol (CHOD – POD) [11].

CK-MBwas done on semi automatic analyzer by kinetic method & blood urea, serum creatinine, total cholesterol & blood glucose by colorimetric method.

The statistical analysis was carried out by using the SPSS (Statistical Package for Social Sciences) statistical software, version 16.0 for Windows. The Student's 't' test were applied for the significance and the results were expressed in mean ± SD. p values (p <0.001) were considered as highly significant.

Results :

Table No. -1. Shows the mean ±SD values of CK-MB and baseline biochemical parameters of controls and CKD patients.

Sr. No.	Biochemical parameters	Control (n=60) mean ±SD	CKD(n=60) mean ±SD	P value <
1	Serum RBS(mg/dl)	145±42.2	164.4±75.79*	0.001
2	Serum Urea (mg/dl)	33.2±5.87	88.89±37.78*	0.001
3	Serum Creatinine (mg/dl)	0.87±0.20	7.12±3.70*	0.001
4	Serum Cholesterol (mg/dl)	176.4±25.45	186.54±54.98*	0.001
5	Serum CK-MB (IU/L)	10.43±6.78	25.56±11.34*	0.001

Values were expressed in mean± SD.
****indicates statistically significant (p<0.001)***
n=number of patients.

Discussion : The CKD patients are more prone to die due to CVD than due to develop kidney failure. The alarming elevation in CVD appears not because of intrinsic renal diseases but it is due to dramatic increases in other systemic diseases that causes damage to kidneys. Diabetes and atherosclerosis are mainly responsible for that[12].

CK-MB is the traditional marker for myocardial infarction. In chronic renal failure patients, nonspecific unassuming elevation of CK-MB can causes false positive results at the 20% to 30% in the nonappearance of myocardial injury [13,14].

Injured skeletal muscle, undergoing regeneration may produces CK-MB to reach the proportion found in myocardium. Due to this reason CK-MB level is increased in renal diseases. CK-MB level is significantly elevated in patients with chronic renal failure when compared with healthy controls. Our study was strongly supported by BogarapuKiranmayi et al CK-MB levels are significantly elevated in CRF patients compared to

healthy controls 1. Our finding are also supported by Mary D. McLaurin et al that false elevation of CK-MB is due to chronic dialysis that results in disturbance in total protein metabolism. This leads to abnormal muscle wasting[15].

Conclusion : There is a high prevalence of CVD in subject with CKD. The presence of CKD, whether it is obvious by proteinuria or depleted GFR, appears to be an independent risk factor for CVD. In CKD false elevation of CK-MB and other biochemical markers takes place. Hence such serum biochemical markers of myocardial damage in CKD patients should be interpreted with caution.

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