



HYPERAMYLASEMIA IN CHRONIC RENAL FAILURE-A COMPARATIVE STUDY

DR. CH.KALAVATHI AND DR.A.BHAGYALAKSHMI

Asst.Professor of Biochemistry, Gandhi Medical College, Secunderabad.

ABSTRACT

Chronic renal failure results from progressive, irreversible destruction of nephrons. Gradual decline in Glomerular filtration rate(GFR), occurring over a period of years. Amylase concentration in serum is frequently found elevated in chronic renal insufficiency without associated pancreatic disease. The present study aims at measuring the Amylase levels in Chronic renal failure patients & to note the effect of dialysis in S.Amylase levels. **Materials & Methods:** 50 patients admitted to the nephrology department with chronic renal failure constituted the study group. 30 patients were on chronic maintenance haemodialysis. 25 subjects without any evidence of renal pathology were taken as controls. S.Amylase, S.Creatinine, B.Urea was measured in controls & study group. **Results:** Amylase levels were studied & compared before and after dialysis. Mean values of all the parameters are raised in the study group compared to controls. **Conclusion:** Our study concludes that acute Pancreatitis can't be diagnosed solely depending on the S.Amylase levels, because it is elevated in chronic renal failure also which may lead to false positive results.

KEY WORDS: CRF, GFR, Amylase, Haemodialysis.



DR. CH.KALAVATHI

Asst.Professor of Biochemistry, Gandhi Medical College, Secunderabad.

*Corresponding author

INTRODUCTION

Chronic renal failure results from progressive and irreversible destruction of nephrons, regardless of the cause¹. This diagnosis implies that the glomerular filtration rate (GFR) is known to have been reduced for at least 3-6 months. Often a gradual decline in GFR occurring over a period of years. Diabetes and hypertension are the two common causes, ²which account for approximately 2/3rds of the cases of CRF & End-stage renal disease(ESRD). Many disease processes can lead to progressive, irreversible impairment of renal function. Effectively all lead to a decrease in the number of functioning nephrons. Biochemical markers have long been the cornerstone of diagnosis and continue to play an important role. Amylase concentration in serum is frequently found elevated in chronic renal insufficiency without the associated pancreatic disease. End stage renal disease patients exhibit a marked elevation of serum Amylase and lipase levels in the absence of clinical pancreatitis.³ Moreover, moderate decrease of alpha amylase clearance was observed in the patients with acute and chronic glomerulonephritis. Serum Amylase levels are higher in CRF than in normal subjects. Amylase is an enzyme belonging to the class of hydrolases. It catalyzes the breakdown of starch and glycogen. Starch consists of both Amylose and Amylopectin. The diagnostic significance of serum and urine amylase measurements is in the diagnosis of acute pancreatitis. Disorders of tissues other than the pancreas can also produce elevations in amylase levels. Other disorders causing an elevated

serum amylase levels⁴ include salivary gland lesions such as mumps and parotitis and other intraabdominal lesions like perforated peptic ulcer, intestinal obstruction, cholecystitis, ruptured ectopic pregnancy mesenteric infarction & acute appendicitis. In addition, elevations have been found in renal insufficiency and diabetic ketoacidosis. An apparently asymptomatic condition of hyperamylasemia ⁴ has been found in approximately 1-2% of the population. This condition, called macroamylasemia results when amylase molecule combines with immunoglobulins to form a complex that is too large to be filtered across the glomerulus. Serum amylase levels increase because of the reduction in normal renal clearance of the enzyme and consequently the urinary excretion of amylase is abnormally low. The diagnostic significance of macroamylasemia lies in the need to differentiate it from other causes of hyperamylasemia.

5 times of Upper limit of normal range of Amylase levels

1. Salivary gland disorders ex. calculi and mumps.
2. Chronic renal failure.
3. Macroamylasemia.
4. Morphine administration (spasm of sphincter of oddi).

Hence Aim of our study is to measure the Amylase levels in Chronic Renal failure patients & to note the effect of dialysis in S.Amylase levels.

MATERIALS AND METHODS

The present study was conducted on 50 patients with chronic renal failure .The patients were admitted into the

nephrology department of Gandhi hospital/Gandhi Medical College, Hyderabad. Their ages ranged from 20-70 years. No specific reference of patients was made with reference to sex. The study group includes 50 patients with CRF. The study group is divided into group I & group II. Group I contains 30 patients who were on chronic haemodialysis 3 times a week and group II includes 20 patients who were not on dialysis. From Group I 15 patients with ESRD were selected for estimation of S.Amylase before & after haemodialysis. Samples of 25 healthy age and sex matched individuals served

as controls. They do not have any evidence of renal disease. A random blood samples were collected in both the study & control groups after taking consent, into 2 bottles, one without anticoagulant & the other with anticoagulant. Serum was separated taking precautions to avoid haemolysis. Serum Amylase, Serum Creatinine, Blood urea were estimated in all the control & study group samples. S.Amylase was estimated by CNP G3 method⁵, S.Creatinine was estimated by Jaffe's⁶ Alkaline picrate method, B.Urea was estimated by Diacetyl monoxime (DAM)⁶ method.

RESULTS

TABLE 1
STUDY OF TEST & CONTROL GROUP

VARIABLES	Control group(n=25)	Test group(n=50)	P VALUE
S.Amylase	72.9±7.6	301.9±38.2	<0.0001 significant
Blood urea	32±4.8	86±36.6	<0.0001 significant
S.Creatinine	0.8±0.18	6.53±2.02	<0.0001 significant

The mean S.D, and S.E.M of Amylase, Blood urea, S.creatinine, of the control & study groups were represented in the above table (table 1). The values obtained in the control group are within the established normal values.

Statistical analysis

Serum Amylase levels is higher in patients with chronic renal failure than in those obtained in healthy individuals (Amylase 301.9 ± 38.2 versus 72.9 ± 7.667 [$p < 0.0001$]). It is significantly elevated. Blood urea, Serum creatinine were significantly elevated which are of diagnostic of CRF (Blood urea, 86.1 ± 36.6 versus 32.2 ± 4.88 [$p < 0.0001$]) and (S.creatinine, 6.538 ± 2.02 versus 0.88 ± 0.189 [$p < 0.0001$]).

TABLE 2
MEAN, S.D, AND P VALUES OF AMYLASE IN PATIENTS
ON DIALYSIS AND NOT ON DIALYSIS

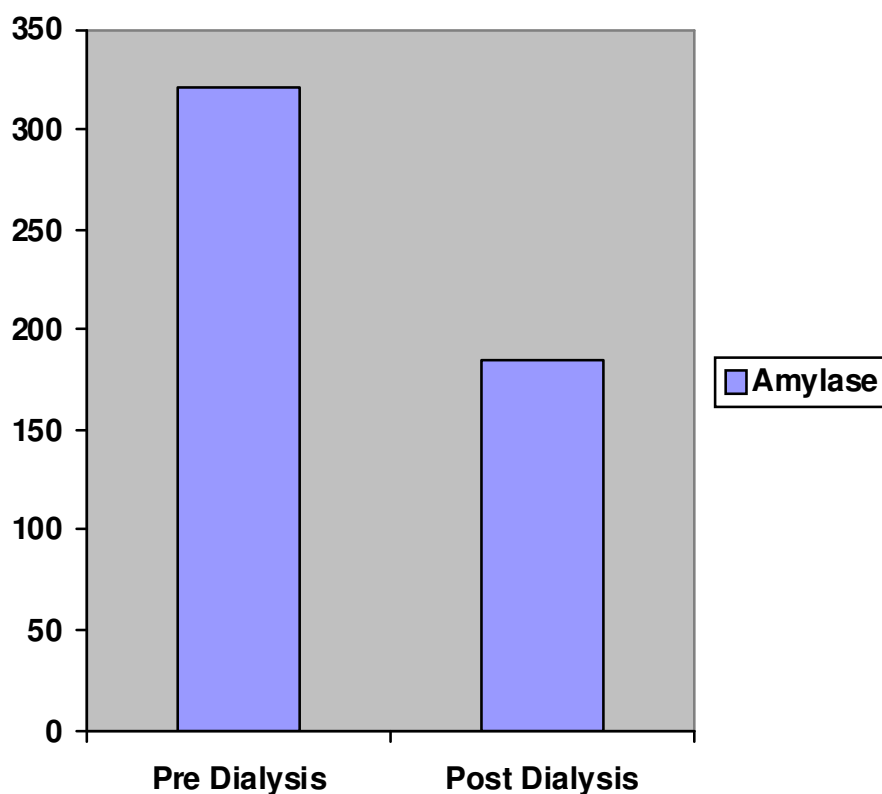
VARIABLES	Pre-dialysis (n=15)	Post-dialysis (n=15)	Pts not on dialysis (n=20) group II
AMYLASE			
Mean±SD	321±42.7	185±25.52	289.7±19.7
P value	P<0.0001	P<0.0001	P<0.0001

COMPARISON OF PREDIALYSIS AND POSTDIALYSIS SAMPLES

Statistical Analysis

Table-2 shows the mean, S.D, and p value of Amylase in pre dialysis and post dialysis samples obtained in patients on dialysis. Amylase levels are reduced after dialysis (post dialysis) as compared to the levels before dialysis (pre dialysis) 185 ± 25.52 versus 321±42.7[p<0.0001].It is statistically significant.

Means of Amylase in Pre dialysis and Post dialysis



DISCUSSION

The present study included 50 cases of chronic renal failure (CRF), out of which 30 cases were of patients on dialysis and 20 were of patients not on dialysis. 25 healthy individuals served as controls. As per the results obtained it is found that patients with CRF frequently have elevated⁷ levels of Amylase compared to healthy controls. The Amylase levels decrease in the dialysis patients when compared to the patients not on dialysis and statistically significant. The comparison between pre dialysis and post dialysis samples for Amylase in the dialysis group showed a statistical difference. The results obtained in the present study can be discussed in the following categories

1. Amylase levels in CRF.
2. Amylase levels in dialysis patients.
3. Amylase levels in pre dialysis and post dialysis samples.

1. AMYLASE LEVELS IN CHRONIC RENAL FAILURE PATIENTS

Total Amylase levels were significantly elevated in chronic renal failure patients in⁸ comparisons to healthy controls

Comparative Study

The rise in Amylase levels in the present study is consistent with the data of manes G,⁹ Ricci E et al, Bardella MT¹⁰, Bianchi MC et al, which has a p value of <0.001. The possible mechanism of elevation of Amylase levels in patients with chronic renal failure could be

1. Amylase molecule combines⁴ with immunoglobulins to form a complex that

is too large to be filtered across the glomerulus.

2. Serum Amylase levels increase because of the reduction in the normal renal clearance of the enzyme and consequently the urinary excretion of Amylase is abnormally low.¹¹

2. AMYLASE LEVELS IN DIALYSIS PATIENTS

Amylase levels were decreased in dialysis patients as compared to patients not on dialysis. An amylase level in dialysis patients in comparison to patients not on dialysis has not been addressed to date. Amylase levels are decreased in dialysis patients.

3. AMYLASE LEVELS IN PREDIALYSIS & POST DIALYSIS

Post dialysis Amylase levels are decreased in comparison to pre dialysis levels¹², which is statistically significant. Amylase pre and post dialysis comparison after the dialysis enzyme activity was decreased despite the lack of extraction by the artificial kidney. The comparison of the pre-dialysis and post-dialysis patients is consistent with the study of Thierry Fx and Dueymes JM et al, in which Total Amylase levels were decreased.¹³

The study is consistent with the Bindu C.M, Vidyashankar et al¹⁴.

CONCLUSION

The serum Amylase levels were significantly elevated in patients with

CRF as compared to healthy individuals. The serum Amylase levels were significantly elevated in patients not on dialysis as compared to patients on dialysis. Serum Amylase levels were significantly lower in post-dialysis as compared to predialysis. Our study

concludes that acute Pancreatitis can't be diagnosed solely depending on the S.Amylase levels, because it is elevated in chronic renal failure also which may lead to false positive results.

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