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AMYLASE AS AN EARLY SERUM MARKER FOR KIDNEY DAMAGE IN MILD HYPERTENSION –A PILOT STUDY

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ABSTRACT

Introduction : Mild hypertension is clinically asymptomatic but it is a risk factor for cardiovascular disease and cause progressive damage to kidney in long term. Hypertension has damaging impact of subclinical atherogenesis and glomeruli become dysfunctional and there is excretion of low molecular weight compound like albumin and amylase in urine. So the study was done to see the change in amylase levels in hypertension.

Material and methods: It was a hospital based case control study involving 100 subjects. The patients were enrolled on the basis of history and clinical examination. The study was done in a tertiary care setup. The patients attending the medical opd were enrolled for study and samples were send in the clinical biochemistry lab. The study was conducted in 100 subjects consisting of 48 hypertensive patients and 52 normotensive subjects in age group 35-60 years. Serum samples were analysed for total protein, albumin and amylase Result: The study showed a statistically significant change in the levels of serum albumin and amylase. The level of serum albumin was 4.78± 0.39g/dl in case while it was 4.99± 0.49 g/dl in controls. The P value was 0.026 which was statistically significant. Amylase also showed statistically significant change in the values when controls were compared with cases. The serum levels were 129.60±39.72 mg/dl in control group while it was 112.06±30.70 mg/dl in the cases.

Conclusion : The minimal damage to Glomerulus will be reflected in the change in serum amylase levels.

Key words: glomerulus; asymptomatic; hyperfilteration

INTRODUCTION

Mild hypertension is clinically asymptomatic but it is a risk factor for cardiovascular disease and cause progressive damage to kidney in long term. There are some evidences which indicate that renal function is altered before the development of the disease and some form of renal dysfunction is essential for the development and maintenance of hypertension. [1] So by the time hypertension becomes clinically evident renal dysfunction is already there.

Hypertension has been shown to accelerate atherogenesis in animals, [2,3] and because of this damaging impact of subclinical atherogenesis, [4] glomeruli becomes dysfunctional.[5] and there is excretion of low molecular weight compound like albumin in urine. Amylase another low molecular weight Psubstance is cleared through kidney[6] The serum albumin levels are changed because of this change in glomeruli, but it can not serve as an early marker of hypertension

because many other diseases and nutritional status can lead to low serum albumin .The of low molecular weight compound amylase does not change with nutritional status and common diseases of the person. On the basis of this observation we studied the levels of serum albumin and amylase in the patients of mild hypertension. The serum amylase is easily measured and can be a break through in early diagnosis of the development of the renal disorder because of hypertension.

Material and methods: The study was conducted in 100 subjects consisting of 48 hypertensive patients and 52 normotensive subjects in age group 35-60 years. The subjects with hypertension (blood pressure≥ 140/90) in the age group 35-60 years without any renal disease. Renal disease was excluded on the basis of history, urea and creatinine. Age and sex matched normotensive control group with no presenting complaints were taken. Their blood was collected in serum vacutainers and it was separated for analysis of total protein albumin and amylase in above mentioned analyzer. All tests were done on SYNCHRON CX4 system which is a microprocessor controlled random access chemistry analyzer by Beckman and Coultier.Thesystem is designed to perform end point rate and non linear assays at 37 ˚C. Total protein estimated by Biuret Manual method (Randox method) which is based on the principle "Cupric ions, in an alkaline medium, interact with protein peptide bonds resulting in the formation of a colored complex which is measured at 546 nm."Albumin was estimated by Bromcresolgreen Method (Centronic GmbH method) which is based on the principle "The reaction between albumin in serum and the dye Bromcresolgreen produces change in color that is proportionate to the albumin concentration measured at a wavelength of 578 nm."Amylase was measured by CNPG3 liquid(FAR srl) which is based on the principle "α-amylase hydrolizes 2-chloro-4nitro-phenyl-α-D-maltotrioside (CNPG3) into 2-chloro-4-nitrophenyl-α-Dmaltoside (CNPG2), maltotriose (G3), glucose and 2-chloronitrophenol.The absorbance change in unit time measured at 405 nm is proportional to the enzyme activity in the sample."

Statistics: Results were analyzed using students paired t test using SPSS software version 13. The p values less than o.o5 with 95% confidence interval was considered significant.

RESULTS

The study was conducted in 100 cases and controls. Systolic blood pressure was 146 ± 4 mmHg while the diastolic pressure was 98 ± 6 mmHg seen in cases while the control group had systolic blood pressure was 124 ± 6 mmHg and diastolic pressure was 84 ± 4 mmHg. Total protein was 7.26 ± 0.65 g/dl in cases while it was 6.89 ± 0.78 g/dl though both were in normal range but it was significantly different statistically (Table 1).

The level of serum albumin was 4.78 ± 0.39 g/dl in case while it was 4.99 ± 0.49 g/dl in controls. The P value was 0.026 which was statistically significant. Amylase also showed statistically significant change in the values when controls were compared with cases. The serum levels were 129.60 ± 39.72 mg/dl in control group while it was 112.06 ± 30.70 mg/dl in the cases.

DISCUSSION

Study was conducted to identify whether amylase can be used as an early serum marker of hypertension. The study showed a statistically significant change in the levels of serum albumin and amylase. The change in amylase was much significant (p value 0.017) as compared to albumin (p value 0.026).

There are some studies which support a fundamental role for the kidneys in the pathogenesis of hypertension [7]Some authors have proposed that hypertension may increase capillary pressure, [8]and acute elevation in systemic perfusion pressure may accelerate hyperfiltration, [9] and these events lead to damage to kidney.The damage to the kidney is reflected in the increased excretion of low molecular weight substances like albumin and amylase

Amylase has a molecular weight of 55,000 kdalton which is less than the molecular weight of albumin (74,000 kdalton).Mostly the filtered amylase and albumin are re-absorbed by the tubular cells. In the case of amylase only about 45% of the filtered molecules are reabsorbed, whereas more than 90% of the filtered amount of albumin is reabsorbed by the tubular cells [10]. S, Albumin can therefore not serve as a reliable marker of glomerular damage .On the other hand amylase because of less variability in serum by common disorders plus less efficient reabsorption of filtered amylase by tubules can serve as a better indicator of glomerular damage. A recent study by Lazzara and Deen[11] suggested that increases in single-nephron GFR (snGFR), with concomitant increases in proximal tubular flow, can overwhelm the reabsorptive capacity of the proximal tubule. So whenever there will be minimal damage to Glomerulus it will be reflected in the change in serum amylase levels.

As the sample size of our study is small, further studies are required to establish amylase as earliest marker of renal damage in hypertension.

Conclusion: Serum amylase levels will change in mild hypertension but as the sample size of our study is small, further studies are required to establish amylase as earliest marker of renal damage in hypertension.

Table 1

(Levels of serum total protein, albumin, amylase in cases and control)

N = 100	Normal Value	Cases	Control	p-value
Total protein g/dl	6.4-8.3	6.89±0.78	7.26±0.65	0.045
Albumin g/dl	3.4-4.8	4.78± 0.39	4.99± 0.49	0.026
Amylase mg/dl	25-98	112.06±30.70	129.60±39.72	0.017

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