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ORIGINAL ARTICLE

SERUM AMYLASE: AN EARLY MARKER OF RENAL DAMAGE IN HYPERTENSION

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ABSTRACT: INTRODUCTION: Hypertension is one of the risk factors for cardiovascular disease and causes progressive damage to kidney in a long term process. Hypertension impairs glomerular function and also leads to subclinical atherogenesis, there is a excretion of low molecular weight compounds like albumin and amylase in urine. This study was conducted to analyze the changes in amylase levels in hypertension. **MATERIAL AND METHODS:** This is a hospital based study. The patients attending the medicine department were selected for the study. 60 subjects were selected based on history and clinical examination consisting of 30 hypertensive patients and 30 normotensive subjects in the age group 35-60 years. Blood samples collected in vacutainers were analyzed in the clinical biochemistry laboratory. Serum samples were analyzed 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 3.71 ± 0.22 g/dl in cases while it was 4.14 ± 0.20 g/dl in controls. The serum amylase levels were 99.79 ±13.63 U/L in cases while it was 137.76 ± 16.86 U/L in the control. The p-value was 0.0001 which was statistically significant. **CONCLUSION:** The initial damage to glomerulus can be detected by the alteration in serum amylase values in hypertension. Thus serum amylase can be considered as an early marker for detecting the renal damage in hypertension.

KEYWORDS: hypertension, glomerulus, albumin.

INTRODUCTION: Hypertension in most of the cases is clinically asymptomatic but it is a risk factor for cardiovascular disease and cause progressive damage to kidney in a long term process. 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] The time when hypertension becomes clinically evident renal dysfunction has already developed.

Hypertension has been shown to accelerate atherogenesis in animals and because of this damaging impact of subclinical atherogenesis, glomeruli becomes dysfunctional and there is a excretion of low molecular weight compounds like albumin in urine.[2,3,4,5] Amylase a low molecular weight substance is also excreted through kidney.[6] Serum albumin levels are altered due to the changes in glomeruli, but it cannot serve as an early marker of hypertension because many other diseases and nutritional status like malnutrition can influence the albumin levels.

There is no change seen in amylase values with respect to nutritional status and in some common diseases. Based on these observations, we studied the levels of serum albumin and amylase in the patients with hypertension.

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MATERIALS AND METHODS: The study included 60 subjects consisting of 30 hypertensive patients and 30 normotensive subjects in the age group 35-60 years. Subjects with hypertension (blood pressure≥ 140/90) for at least one year duration and without any renal disease were included under cases. Renal disease was excluded based on urea and creatinine reports. Age and sex matched normotensive control group with no presenting complaints were considered under control after obtaining ethical clearance. Smokers, alcoholics and those who were on treatment with antihypertensives were excluded. Blood was collected in vacutainer under aseptic precautions and serum was separated for analysis of total protein, albumin and amylase. Total protein was estimated by Biuret method.[7]

Albumin was estimated by Bromocresol green method. [8] Amylase was measured by $CNPG_3$ methodology.[9,10] Serum albumin levels are altered due to the changes in glomeruli, renal and many other diseases and nutritional status like malnutrition, etc., hence we considered another alternative serum parameter like amylase which is not under the influence of these clinical conditions, so we did not consider the urine tests.

STATISTICS: Results were analyzed using students paired t test using SPSS software version 13. The p values < 0.05 with 95% confidence interval was considered significant.

RESULTS: The systolic blood pressure was 144±6mmHg while the diastolic pressure was 97±4 mmHg seen in cases while the control group had systolic blood pressure was 123±5 mm Hg and diastolic pressure was 83±7 mm Hg. Total protein was 6.92±0.17 g/dl in cases while it was 7.24±0.21g/dl though both were in normal range but it was significant statistically.

The level of serum albumin was 3.71±0.22 g/dl in cases while it was 4.14±0.20 g/dl in controls. The serum amylase levels were 99.79±13.63 U/L in cases while it was 137.76±16.86 U/L in the control. The p-value was 0.0001 which was statistically significant. We could not find a significant correlation between the duration of hypertension and the parameters measured in cases.

DISCUSSION: The study showed a statistically significant change in the levels of serum albumin and amylase. The change in amylase was much significant as compared to albumin. Some studies support the fundamental role of the kidneys in the pathogenesis of hypertension. [11] Some authors have proposed that hypertension may increase capillary pressure and acute elevation in systemic perfusion pressure may accelerate hyperfiltration and these events lead to damage to the kidney. [12, 13] The damage to the kidney can be detected by the increased excretion of low molecular weight substances like albumin and amylase.

Amylase has a molecular weight less than that of albumin. The amylase and albumin filtered 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.[14] Thus albumin cannot serve as a reliable marker of glomerular damage.

Changes in amylase levels in serum due to common disorders is less, 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 suggested that increase in single nephron GFR (snGFR), with concomitant increase in proximal tubular flow, can overcome the reabsorptive capacity of the

proximal tubule. Thus the minimal damage to glomerulus will be reflected by the changes in serum amylase levels. [15]

CONCLUSION: The initial damage to glomerulus can be detected by the alteration in serum amylase values in hypertension. Thus we conclude that serum amylase can be considered as an early marker for detecting the renal damage in hypertension. A major limitation of the study is the sample size which is small, further studies with larger groups is required to support and establish amylase as an early marker of renal damage in hypertension.

Parameter	Normal Value	Controls	Cases	*p-value
Total protein (g/dl)	6.2 - 8.0	7.24 ± 0.21	6.92 ± 0.17	0.0001
Albumin (g/dl)	3.5 - 5.5	4.14 ± 0.20	3.71 ± 0.22	0.0001
Amylase (U/L)	25 - 98	137.76 ± 16.87	99.79 ± 13.63	0.0001

Table 1: Levels of serum total protein, albumin, amylase in cases and control

*p-value < 0.05 – Statistically significant

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