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Original Article

Evaluation of Serum Creatinine in Hypertensive Patient

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Abstract

Background

The study is carried out to evaluate serum creatinine in hypertensive patients in Nobel Medical College Teaching Hospital, Biratnagar, Nepal.

Material and Methods

The study was carried out on total 100 subjects, with

a) Case groups (Hypertensive Subjects), n = 50
b) Control groups (Non-Hypertensive Subjects), n = 50 with no present and past family history of hypertension,

in the Department of Biochemistry, Nobel Medical College Teaching Hospital, Biratnagar, Nepal from 21st March 2013 to 30th july2014, after Institutional Ethical Approval.
venous blood sample was collected and sample was analysed for serum creatinine level by Jaffe's method.

Result

serum creatinine is significantly increased in case group with the Mean of 1.17 ± 0.25 when compared to control group Mean of 1.05 ± 0.14 with $p = 0.002$. Thus, showing a suggestive significant of serum creatinine levels in cases when compared to control group.

Conclusion

The hypertensive patients have significant alteration in serum creatinine level and are likely to developed chronic kidney disease. Thus, it is indicated to have serum creatinine estimation in daily clinical practice.

***Key Words**: creatinine, hypertension, Jaffe 's method*

Introduction

The hypertension was defined according to Fifth report of Joint National Committee for detection, evaluation and treatment of high blood pressure, as systolic blood pressure more than or equal to 140 mm of Hg and diastolic blood pressure more than or equal to 90 mm of Hg or those individuals under antihypertensive treatment [1]. The kidney, a main target of organ damage in hypertension and long-term elevations of blood pressure (BP), even within the normal range can induce early renal damage [2]. Elevated serum creatinine level is an indicator of chronic renal disease, is common and associated with inadequate treatment of high blood pressure [3]. It is seen that serum creatinine value within the reference range is also predictor of cardiovascular morbidity in patients with essential hypertension. Elevated serum creatinine values predict a poor prognosis in a patient with hypertension and mild elevation in serum creatinine level were associated with and increased all cause mortality rate in a population based samples of elderly patients and in a patients with heart failure [4]. The

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relationship between hypertension and serum creatinine level is progressive and gradual without evidence of the threshold and resembles the continuous pattern of risk for stroke and cardiovascular disease [5].

Serum creatinine in the hypertensive

Creatinine (2-amino-1-methyl-5H-imadazol-4-one) is a molecule used as a source of high-energy phosphate that can be utilized by tissues for the production of ATP. Creatine either comes from the diet or synthesized from the amino acids arginine, glycine, and methionine. This is synthesized in the kidneys and liver, although other organ systems may be involved. creatine and p-creatine are converted non-enzymatically to the metabolite creatinine, which diffuses into the blood and is excreted by the kidneys. Creatinine forms spontaneously from p-creatine [6].

Renal dysfunction in the form of raised serum creatinine is often found in hypertension, conclusive evidence that it is actually caused by elevated blood pressure in patients with non-malignant essential hypertension is lacking. However, a substantial body of evidence that renal disease can cause hypertension. Certainly, the number of patients in the large hypertension trials who developed new renal disease during follow-up is very small compared with those developing myocardial infarctions or strokes [7]. The potential benefits of earlier referral to a nephrologist of patients with high serum creatinine include identifying and treating renal failure, slowing the rate of decline associated with progressive renal insufficiency, managing the conditions and facilitating entry into dialysis programs for all patients who might benefit [8]. Elevated serum creatinine has been associated with increased mortality in hypertensive persons, the elderly, and patients of myocardial infarction or stroke where cardiovascular disease is the major cause of death. The relationship between serum creatinine concentration and the heart disease and stroke events lead to cause of mortality in a general population of middle-aged men [9].

Material and Methods

The study was carried out on total 100 subjects, which were divided into two groups-

a) Case groups (Hypertensive Subjects), n = 50
b) Control groups (Non-Hypertensive Subjects), n = 50 with no present and past family history of hypertension,

in the Departement of Biochemistry, Nobel Medical College Teaching Hospital, Biratnagar, Nepal from 21st March 2013 to 30th july2014, after Institutional Ethical Approval.

Subject with Diabetes mellitus, Cardiac patients, Alcoholic patients, Smokes, Renal failure, patient with nephropathy were excluded from the study. venous blood sample was collected and sample was centrifuged for the estimation of serum creatinine level. Sample was analysed by Kinetic test without deproteinization according to Jaffe's method [10].

Results

The present study is case control study where creatinine was estimated, compared and correlated in hypertensive case group with healthy normotensive group. This was carried out on total 100 subjects, which were divided into two groups-case group consists of 50 subjects of known hypertensive patient and control group consists of 50 subjects who were healthy normotensive.

Figure 1: Shows that the Mean age group of case study was 33.38 ± 5.33, in which the age group consisted 34% of 25-30 years, 54% where in age group of 31-40 years, followed by 12% in the range of 41-50 years. Whereas the control group Mean was 33.84 ± 5.15, consisting of 28% age

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group of 25-30 years , 58% seen in 31-40 years remaining 14% in 41-50 years age group. Suggesting the samples were age matched with p = 0.662

Figure 2: The percentage of gender studied showed that the control group with 50% male and 50% female when compared to case group male 54% and 46% female. Gender distribution was statistically similar between two groups with p = 0.689.Hence in the present study there is no significant difference in the prevalence of hypertension in between males and females.

Table 1: Shows that elevated levels of serum creatinine was more in cases, but showed only suggestive significant and hence the differences were not statistically significant with p = 0.242, since only 6% of case group had creatinine levels above normal range (< 1.4 mg/dl) whereas remaining 94% where lying in normal range. Whereas in the control group all the subjects (100%) had serum creatinine level in normal range.

Table 2: Shows the comparison of Mean values of serum creatinine in two groups studied where serum creatinine is significantly increased in case group with the Mean of 1.17 ± 0.25 when compared to control group Mean of 1.05 ± 0.14 with p = 0.002. Thus, showing a suggestive significant of serum creatinine levels in cases when compared to control group.

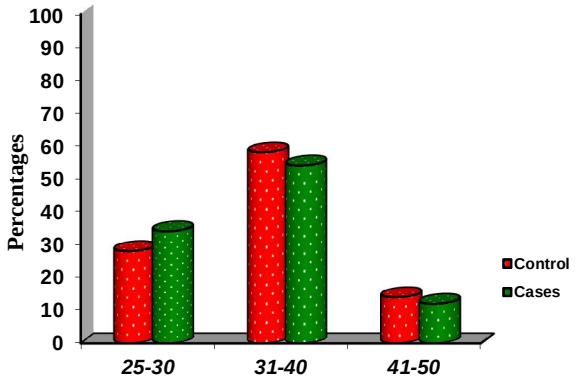

Figure 1: *Age distribution of subject studied*

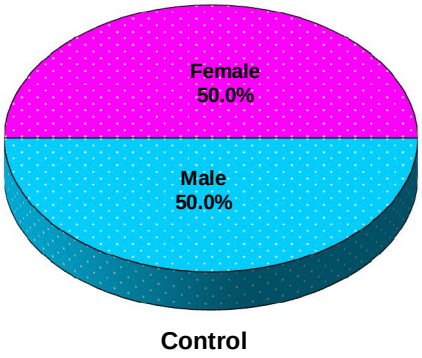

Figure 2: *Gender distribution of subject studied*

Table 1: Levels of serum creatinine in case and control

Serum creatinine (mg/dl)	Control		Cases	
	No	%	No	%
< 1.4 mg/dl	50	100.0	47	94.0
> 1.4 mg/dl	0	0.0	3	6.0
Total	50	100.0	50	100.0
Inference	Elevated levels of serum creatinine is more in cases with p = 0.242			

Table 2*: Mean levels of serum creatinine in two groups*

	Controls	Cases	P value
Serum creatinine	1.05 ± 0.14	1.17 ± 0.25	0.002**

Discussion

Hypertension is major health problem in developing countries. Hypertension affects nearly 25% of the adult around the world and its prevalence is predicted to increase by 60% by 2025 A.D[11]. Elevated blood pressure is major cause of development and progression of renal disease and leads to morbidity and mortality among patients with chronic renal disease[12]. In the general population, assessment of Blood pressure and creatinine level shows association which became stronger when a number of years had elapsed. These finding are consistent with the hypothesis that even minor rise in blood pressure, may lead

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to early renal damage [5]. Third National Health & Nutrition Examination Survey (NHANES III) found that serum creatinine level, an indicator of chronic renal disease was common among improper treatment of high blood pressure [13]. In this present study serum creatinine level were suggestive significance and was elevated in hypertensive patients compared to healthy individuals which is a match with previous studies [4,9].

Conclusion

Hypertension is an asymptomatic and severe disease of modern life which have been reported to have prevalence rate of 6-32%. comparing with non-hypertensive patients (control) having 100% serum creatinine levels falling in normal range (< 1.4 mg/dl), the serum creatinine levels were elevated in cases (hypertensive).

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