

Comparative Study of Serum Creatinine Level in Normal and Hypertensive Persons

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Abstract

Introduction: Hypertension is one of the most common disorders. Persistent hypertension is a leading cause of chronic renal failure. One of the simple and most commonly performed renal function tests for diagnosis of the kidney dysfunction is determination serum creatinine level.

Aims and Objective: This study was undertaken with the aims to provide information about the importance of routine monitoring of serum creatinine in hypertensive patients for prevention of end-stage renal disease.

Materials and Methods: Blood pressure was measured using sphygmomanometer and serum creatinine was estimated by alkaline picrate method.

Results and Observations: In this study, we have observed that serum creatinine level is higher in Stage-1 ($P < 0.01$) and Stage-2 hypertensive subjects ($P < 0.01$) than normal.

Conclusion: From this study, it can be concluded that routine monitoring of serum creatinine level in hypertensive patients may be recommended to prevent end-stage renal disease.

Key words: Blood pressure, End-stage renal disease, Hypertension, Serum creatinine

INTRODUCTION

Hypertension is a one of the most common complex disorders. Persistent hypertension is a leading cause of chronic renal failure.¹

One of the simple and most commonly performed renal function tests to determine the functioning state of the kidney is determination of serum creatinine level.

Creatinine is a breakdown product of creatine phosphate. Creatine is synthesized in the liver, transported to the muscles for storage as creatine phosphate and then catabolized in the muscle to form creatinine. Creatinine is

removed from the body entirely by the kidneys. If kidney function is abnormal, creatinine level will increase in the blood.²⁻⁴

AIM AND OBJECTIVE

This study was carried out with following aim and objectives in mind.

To assess serum creatinine level in normal and hypertensive subjects and to compare it between normal and hypertensive subjects.

To provide information about the importance of routine monitoring of serum creatinine in hypertensive patients for prevention of end-stage renal disease.

MATERIALS AND METHODS

A group of 100 cases between 20 and 50 years of age forms the basis of this study, which was carried out in the

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Selection of Cases

Study group - a group of 50 cases irrespective of their sex, religion, caste, socio-economic status, and without any other major ailments such as diabetes mellitus who attended the Department of Cardiology and Medicine, Jorhat Medical College and Hospital, Jorhat, were selected.

Control group - a group of 50 subjects irrespective of sex, religion, caste, socio-economic status, attending Department of Medicine, Jorhat Medical College and Hospital, Jorhat, without any major ailments such as diabetes mellitus, hypertension, were selected.

Estimation of serum creatinine level:⁵⁻⁷

- Fresh sample of serum with no evidence of hemolysis was specimen of choice.
- Serum creatinine level was estimated by alkaline picrate method [Table 1].

Measurement of blood pressure:^{8,9}

- Blood pressure was measured by an indirect method using a sphygmomanometer.
- Current clinical criteria for defining hypertension are generally based on the average of two or more blood pressure readings during each or more outpatient visits.

RESULTS AND OBSERVATIONS

In this study, 50 hypertensive subjects and 50 normal subjects both male and female were selected.

The control group was matched with study group according to age and sex.

The significance of the difference of the mean was calculated by student's *t*-test and analysis of variance (ANOVA) test whichever is applicable.

In this study, out of 50 normal cases; 27 (54%) were male and 23 (46%) were female.

Out of 50 hypertensive cases, 4 (8%) cases were pre-hypertensive, 24 (48%) were of Stage-1, and 22 (44%) cases were of Stage-2 hypertension. No one was in the isolated hypertensive stage.

Again among the 4 (8%) pre-hypertensive cases, 3 (75%) were male and 1 (25%) was female. In Stage-1, among the 24 (48%) cases, 16 (66.67%) were male and 8 (33.33%) were female; and among 22 (44%) Stage-2 cases, 15 (68.18%) were male and 7 (31.82%) were female [Figure 1].

So, it is seen that majority of cases fall under Stage-1 and majority of them are male.

The mean serum level among the normal male was 1.06 mg % and among normal female was 0.91 mg%.

The mean serum creatinine among male pre-hypertensive cases was 1.2 mg% and among female pre-hypertensive cases was 0.90 mg%.

Mean serum creatinine among male Stage-1 hypertensive cases was 1.74 mg% and among female Stage-1 hypertensive cases was 1.50 mg%. Mean serum creatinine among the male Stage-2 hypertensive cases was 1.50 mg% and among female Stage-2 hypertensive cases was 1.83 mg% [Table 2].

The mean serum creatinine level in normal and hypertensive cases (male and female combined)-Among the 50 normal subjects, mean serum creatinine level is 0.99 mg%. Mean serum creatinine in pre-hypertensive cases is 1.10 mg %, in Stage-1 hypertensive cases is 1.67 mg%, and in Stage-2 hypertensive cases is 1.60 mg%.

The *t*-test has been applied to assess if there was any significant difference in serum creatinine level between control and different categories of hypertension. It was observed that there is no significant difference between normal and pre-hypertensive ($P > 0.05$), but there is a significant difference between normal and Stage-1 ($P < 0.01$) and Stage-2 ($P < 0.01$) hypertensive subjects. So, serum creatinine level is higher in Stage-1 and Stage-2 cases than normal subjects.

ANOVA test had also been applied to see whether there is any significant difference in serum creatinine levels in different stages of hypertension. However, it was found that there is no significant difference of serum creatinine in different stages of hypertension ($P > 0.05$).

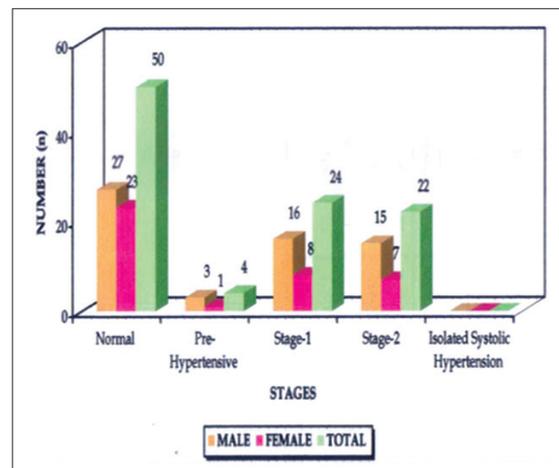


Figure 1: Distribution of subjects (Male/Female) in different blood pressure ranges [Table 3]

Table 1: Distribution of serum creatinine level in cases and controls (male and female combined)

Stages	Blood pressure (mmHg)		Number	Mean±S.D (mg%)	P value
	Systolic	Diastolic			
Normal	<120	And <80	50	0.99±0.27	-
Pre-hypertensive	120-139	Or 80-90	4	1.10±0.32	>0.05
Stage-1	140-159	Or 90-99	24	1.67±0.93	<0.01
Stage-2	≥160	Or 100	22	1.60±0.85	<0.001
Isolated systolic hypertension	≥140	And <90	0	0.00±0.00	-

SD: Standard deviation

Table 2: Distribution of serum creatinine level in male and female subjects in different blood pressure ranges

Stages	Blood pressure (mmHg)		Serum creatinine (mg%)			
	Systolic	Diastolic	Male		Female	
			N	Mean±SD	N	Mean±SD
Normal	<120	And <80	27	1.06±0.25	23	0.91±0.26
Pre-hypertensive	120-139	Or 80-90	3	1.20±0.35	1	0.90±0.00
Stage-1	140-159	Or 90-99	16	1.74±0.98	8	1.50±0.85
Stage-2	≥160	Or 100	15	1.50±0.86	7	1.83±0.85
Isolated systolic hypertension	≥140	And <90	0	0.00±0.00	0	0.00±0.00

SD: Standard deviation

Table 3: Distribution of subjects (male/female) in different blood pressure ranges

Stages	Blood pressure (mmHg)		N (%)		
	Systolic	Diastolic	Male	Female	Total
Normal	<120	And <80	27 (54.00)	23 (46.00)	50 (100.00)
Pre-hypertensive	120-139	Or 80-90	3 (75.00)	1 (25.00)	4 (8.00)
Stage-1	140-159	Or 90-99	16 (66.67)	8 (33.33)	24 (48.00)
Stage-2	≥160	Or 100	15 (68.18)	7 (31.82)	22 (44.00)
Isolated systolic hypertension	≥140	And <90	0 (0.00)	0 (0.00)	0 (0.00)

DISCUSSION

This study was carried out in the Department of Physiology, Jorhat Medical College and Hospital, Jorhat. In this study, 50 hypertensive patients without any evidence of diabetes mellitus or renal diseases were selected for the study group. Moreover, 50 non-hypertensive subjects without any evidence of diabetes mellitus or renal diseases, who had attended medicine outpatient department, were selected for the control group.

Among 50 cases, 4 (8%) were pre-hypertensive cases, 24 (48%) were Stage-1 hypertensive cases, and 22 (44%) were Stage-2 hypertensive cases.

Mean serum creatinine level among normal subjects is 0.99 mg%, among pre-hypertensive cases is 1.10 mg%, among Stage-1 cases is 1.67 mg%, and among Stage-2 hypertensive cases is 1.60 mg%.

Every effort was made to match the study and control group in regard to age sex, etc., which could effect serum creatinine level.

In this study group, we have found that serum creatinine level is higher in hypertensive subjects than non-hypertensive subjects.

CONCLUSION

In this study, with adequate statistical analysis, it is being observed that serum creatinine level is higher in hypertensive subjects in comparison to normotensive one.

So, from this study, it is concluded that serum creatinine is higher in hypertensive subjects than non-hypertensive subjects. As serum creatinine is an important indicator for determination of the functional state of the kidney, so routine monitoring of serum creatinine level in hypertensive patients to prevent end-stage renal disease and other consequences may be recommended in daily clinical practice.

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