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# **Original Research**

# Analysis of serum sodium levels in patients with essential hypertension

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### ABSTRACT:

**Background:**The present study was undertaken for assessing the serum sodium levels in patients with essential hypertension. **Materials & methods:**A total of 100 patients with essential hypertension were enrolled. Complete demographic and clinical details of all the patients was obtained. A Performa was made and detailed medical history of all the patients was recorded. All the patients were classified into two stages of essential hypertension based on BP assessment. Stage 1 hypertension and Stage 2 hypertension. Blood samples were obtained and serum sodium levels were evaluated using autoanalyzer. **Results:**Mean sodium levels were 143.12 mmol/L. Majority of the patients had serum sodium levels between the range of 140.1 mmol/L and 145 mmol/L.Mean sodium levels among patients with stage 1 and stage 2 hypertension was 140.35 mmol/L and 144.29 mmol/L respectively. While comparing the means sodium levels are significantly altered in hypertensive patients. Also, serum sodium levels show significant correlation with severity grading of hypertension. **Key words:** Sodium, Hypertension

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#### **INTRODUCTION**

Abnormal sodium metabolism may be critical in the causation of certain forms of hypertension, particularly salt-sensitive hypertension. Long-term restriction of sodium intake in patients at high risk for the development of hypertension may reduce the chances of established hypertension occurring later. These high-risk patients in whom subsequent hypertension may be prevented include normotensive patients with family histories of hypertension, elderly patients, black patients, and those with low-renin hypertension.<sup>1, 2</sup>

Elevated blood pressure is the major cause of cardiovascular disease (ie, stroke, heart failure, and coronary heart disease). A recent World Health Organization report showed that raised blood pressure is responsible for 62% of stroke and 49% of coronary heart disease worldwide. Much evidence from epidemiological, migration, intervention, genetic, and animal studies suggests that salt intake plays an important role in regulating blood pressure. Furthermore, there is increasing evidence that a high salt intake has direct harmful effects on the cardiovascular system (eg, it increases the mass of left ventricular wall, stiffens conduit arteries, and thickens and narrows resistance arteries, independent of and additive to the effect of salt on blood pressure.<sup>4-6</sup> Hence; the present study was undertaken for assessing the serum sodium levels in patients with essential hypertension.

#### **MATERIALS & METHODS**

The present study was undertaken for assessing the serum sodium levels in patients with essential hypertension. A total of 100 patients with essential hypertension were enrolled. Complete demographic and clinical details of all the patients was obtained. A Performa was made and detailed medical history of all the patients was recorded. All the patients were classified into two stages of essential hypertension and Stage 2 hypertension. Blood samples were obtained and serum sodium levels were evaluated using autoanalyzer. All the results were recorded in Microsoft excel sheet and were subjected to statistical

analysis using SPSS software. Student t test was used for evaluation of level of significance.

#### RESULTS

Mean age of the patients was 43.6 years. Out of 100 patients, 63 patients were males and 37 patients were females. Mean sodium levels were 143.12 mmol/L. Majority of the patients had serum sodium levels

between the range of 140.1 mmol/L and 145 mmol/L.Mean sodium levels among patients with stage 1 and stage 2 hypertension was 140.35 mmol/L and 144.29 mmol/L respectively. While comparing the means sodium levels among patients with stage 1 and stage 2 hypertension, significant results were obtained.

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Table	1:	Distribution	<b>UI</b>	patients	according	w	souluin levels

Sodium levels range (mmol/L)	Number of patients	Percentage		
Less than 135	2	2		
135 to 140	15	15		
140.1 to 145	71	71		
More than 145	12	12		
Total	100	100		
Mean	143.12			
SD	3.26			

Table 2: Comparison	of serum sodium	levels among	g patients wi	th stage 1	and stage 2	2 hypertension

Sodium levels	Stage 1	Stage 2		
Mean	140.35	144.29		
SD	3.29	3.11		
p-value	0.001 (significant)			

#### DISCUSSION

"Salt" and "sodium" are used synonymously. In fact, salt is only 40% sodium; 1 g of salt has 400 mg sodium. The remaining 60% of salt-chloride-is an often forgotten but likely important part of the link between salt and blood pressure. Replacing sodium chloride with sodium citrate abolished the increase in plasma volume and blood pressure induced by sodium chloride. Similar effects have been observed when sodium chloride was replaced by sodium phosphate or sodium bicarbonate. Therefore, with regard to blood pressure effects, it is useful to speak in terms of salt intake.Although hypertension and age-related increases in blood pressure are virtually absent in populations in whom individual consumption of sodium is less than 50 mmol per day, sodium intake in most populations throughout the world exceeds 100 mmol per day in the majority of people, yet many remain normotensive. Therefore, sodium intake that exceeds 50 to 100 mmol per day is necessary but not sufficient for the development of hypertension.7-10 Several mechanisms exist by which sodium and potassium can influence blood pressure, and evidence indicates that the interaction between these nutrients plays a dominant role in the development of primary hypertension. Specifically, diets characteristic of the modern Western diet-which is high in sodium and low in potassium-produce a biologic interaction with the kidneys, resulting in excessive sodium and

the kidneys, resulting in excessive sodium and insufficient potassium concentrations in the human body; these biologic changes result in vascular smooth muscle cell contraction, followed by an increase in peripheral vascular resistance and higher blood pressure, and finally hypertension. The influence of sodium or potassium intake on the renin-angiotensin system, arterial stiffness, and endothelial dysfunction remains under study.  $^{11,\ 12}$ 

Mean age of the patients was 43.6 years. Out of 100 patients, 63 patients were males and 37 patients were females. Mean sodium levels were 143.12 mmol/L. Majority of the patients had serum sodium levels between the range of 140.1 mmol/L and 145 mmol/L.Appel LJ et al evaluated effects of sodium reduction on blood pressure (BP) and hypertension control in 681 patients with hypertension, aged 60 to 80 years, randomly assigned to a reduced sodium intervention or control group. Participants (47% women, 23% African Americans) had systolic BP less than 145 mm Hg and diastolic BP less than 85 mm Hg while taking 1 antihypertensive medication. Three months after the start of intervention, medication was withdrawn. The primary end point was occurrence of an average systolic BP of 150 mm Hg or more, an average diastolic BP of 90 mm Hg or more, the resumption of medication, or a cardiovascular event during follow-up (mean, 27.8 months). Compared with control, mean urinary sodium excretion was 40 mmol/d less in the reduced sodium intervention group (P<.001); significant reductions in sodium excretion occurred in subgroups defined by sex, race, age, and obesity. Prior to medication withdrawal, mean reductions in systolic and diastolic BPs from the reduced sodium intervention, net of control, were 4.3 mm Hg (P<.001) and 2.0 mm Hg (P = .001). During follow-up, an end point occurred in 59% of reduced sodium and 73% of control group participants (relative hazard ratio = 0.68, P<.001). In African Americans, the corresponding relative hazard ratio was 0.56 (P = .005); results were similar in other subgroups. In dose-response analyses, end points were

progressively less frequent with greater sodium reduction. A reduced sodium intake is a broadly effective, nonpharmacologic therapy that can lower BP and control hypertension in older individuals.<sup>12</sup>

In the present study, Mean sodium levels among patients with stage 1 and stage 2 hypertension was 140.35 mmol/L and 144.29 mmol/L respectively. While comparing the means sodium levels among patients with stage 1 and stage 2 hypertension, significant results were obtained.Buranakitjaroen P et al assessed 320 hypertensive patients. Epidemiologic data, e.g., age, sex, body mass index, duration of treatment, education level, salary, frequency of salty food consumed/week and clinical data, e.g., renal function. (creatinine clearance.CCr) and antihypertensive drug(s) received were collected using pre-defined questionnaires. All volunteers were asked tocollect 24-hour urine for 2 days to determine average daily amount of urine sodium (UNa). Those 24-hour UNa> 100 mmol/day were considered high salt intake. The prevalence of high salt intake was 73.4%. The mean total daily Na intake was 148 mmol/day i.e. 3.4 g of Na/day.When the influence of clinical characteristics on the risks of high salt intake was carried out, there were 2.42, 4.00 and 2.88fold increases among those who have higher education level, those who have CCr> 60 ml/min/1.73 m<sup>2</sup>, and those who knewthat salt could increase blood pressure (BP), respectively. About three-quarters (76.3%) of those patients who knew the effectof salt on BP consumed high salt diet.<sup>13</sup>

#### CONCLUSION

Serum sodium levels are significantly altered in hypertensive patients. Also, serum sodium levels show significant correlation with severity grading of hypertension.

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