

A COMPARATIVE STUDY OF SERUM UREA LEVELS IN OBESE AND NON-OBESE HYPERTENSIVE PATIENTS IN A TERTIARY CARE CENTRE

Medical Science

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ABSTRACT

Objective: This study was undertaken to assess and compare the serum urea levels of obese and non-obese hypertensive patients. The study also aimed to establish the effect of obesity on renal function and the association of obesity and hypertension with serum urea levels. **Methods:** This comparative cross-sectional study was conducted among hypertensive patients divided into obese and non-obese groups based on their body mass index. Serum urea levels of the patients were estimated by standard biochemical procedures and compared between the two groups. **Result:** The study shows that obese hypertensive patients have higher serum urea levels compared to their non-obese, indicating possible negative effects of obesity on renal function associated with hypertension. **Conclusion:** Obesity increases serum urea levels in hypertensive patients. Comprehensive clinical approaches that focus on weight loss and blood pressure control are essential to reduce the risk of chronic kidney disease and related cardiovascular disease.

KEYWORDS

Body Mass Index (BMI), Hypertension, Serum Urea, Chronic Kidney Disease (CKD)

INTRODUCTION

Hypertension has emerged as one of the most significant public health challenges in the 21st century⁽¹⁾. It is complex, multifactorial condition that affects more than a billion individuals globally contributing to the most of the deaths due to cardiovascular events such as myocardial infarction, stroke and heart failure.⁽²⁾

Obesity is more than just excess body fat; it is now widely recognized as a metabolic and inflammatory state that disrupts multiple organ systems. This condition is linked with increased sympathetic nervous system activity, insulin resistance, chronic low-grade inflammation, and activation of the renin-angiotensin-aldosterone system (RAAS), all of which contribute to the development of sustained high blood pressure⁽³⁾.

The kidneys are central to the regulation of blood pressure, and even subtle alterations in renal function can initiate or exacerbate hypertension. Key markers such as serum urea and creatinine serve as indicators of glomerular filtration rate (GFR), while uric acid reflects systemic oxidative stress and purine metabolism⁽⁴⁾. In obese individuals, glomerular hyper filtration often precedes overt kidney damage, leading to increased levels of nitrogenous waste products in circulation. Several studies have demonstrated that individuals with elevated BMI tend to have altered renal profiles, even in the absence of clinically diagnosed renal disease⁽⁵⁾.

The present study was undertaken to assess and compare serum urea levels in obese and non-obese hypertensive patients that might help to understand the possible effect of obesity on kidney function and identify individuals who are at greater risk of renal complications.

AIMS AND OBJECTIVES

Aim –

To compare the levels of Serum Urea between hypertensive patients with BMI <30kg/m² and hypertensive patients with BMI ≥30kg/m²

Objectives –

- 1) To assess the levels of Serum Urea in hypertensive patients with BMI <30kg/m² and hypertensive patients with BMI ≥30kg/m²
- 2) To compare the levels of Serum Urea in hypertensive patients with BMI <30kg/m² and hypertensive patients with BMI ≥30kg/m²

MATERIAL AND METHODS

The present study was an Interventional; comparative type of study conducted at Department of Biochemistry and Department of Internal medicine at SMS Medical College and attached Hospitals, Jaipur (Rajasthan) from April 2025 to December 2025 after receiving the desired approval from the Research Review Board and the Institutional Ethics Committee. A total of 60 study participants were

selected within the criteria from both genders after obtaining the written informed consent of diagnosed hypertensive patients age group 30-60 years in which 30 are obese and 30 non obese.

Inclusion Criteria

- a) Patients who provide written informed consent to participate in the study.
- b) Diagnosed Hypertensive patients.
- c) Age between 30-60 yrs.
- d) BMI <30kg/m² in group A.
- e) BMI ≥30kg/m² in group B.

Exclusion Criteria

- a) Pre-existing renal disease and other co morbid conditions.
- b) Diabetes mellitus
- c) Patients on Thiazide group of diuretic drug.
- d) BMI <18.5kg/m².

After obtaining the written consent, the blood sample is collected after 8 to 12 hours of fasting using aseptic precautions. In sample 5ml blood is taken in plain vial and left for clotting for one hour. After that it will be centrifuged at 3500 rpm for 10 minutes. Serum will be separated and stored at 2-80°C temperature and will be analyzed on fully automated Beckman Coulter AU-5800 in central lab at Department of biochemistry serum urea investigation tests. The Serum urea level was determined by kinetic UV method.

Statistical Analysis

All the results will be expressed in Mean ± standard deviation. Data were compiled and analysed using SPSS version 27 and MS Excel 2019. Unpaired student 't' test will be used for comparison between the groups. A p-value of <0.05 was considered statistically significant.

RESULTS AND DISCUSSION

In this study there were 30 non-obese subjects in group-A and 30 obese subjects in group-B with hypertension with mean age 47.59yrs and 46.23yrs and average weight 68.02kg and 86.79kg respectively. There are 14 females and 16 males in group A and 10 females and 20 males in group B.

The mean average of systolic blood pressure in non-obese and obese group is 143.68 mmHg and 145.32 mmHg and diastolic blood pressure is 88.25 mmHg and 88.68 mmHg respectively.

Table 1 - Mean Average of Systolic Blood Pressure in Non-obese and Obese Group

	BMI Group	N	Mean	Std. Deviation	t value	Sig.
SBP (mmHg)	<30	30	143.68	8.941	0.757	0.452
	≥30	30	145.32	7.801		

Table 2 - Mean Average of Diastolic Blood Pressure in Non-obese and Obese Group

	BMI Group	N	Mean	Std. Deviation	t value	Sig.
DBP (mmHg)	<30	30	88.25	6.000	0.384	0.702
	≥30	30	87.68	5.500		

In this study we found that mean serum urea level in group-A is 16.86mg/dl and in group-B 25.64 mg/dl , which is statistically significant.

Table 3 - Mean Serum Urea Level in Non-obese and Obese Group

	BMI Group	N	Mean	Std. Deviation	t value	Sig.
S. Urea (mg/dL)	<30	30	16.86	3.427	-5.744	.001
	≥30	30	25.64	6.291		

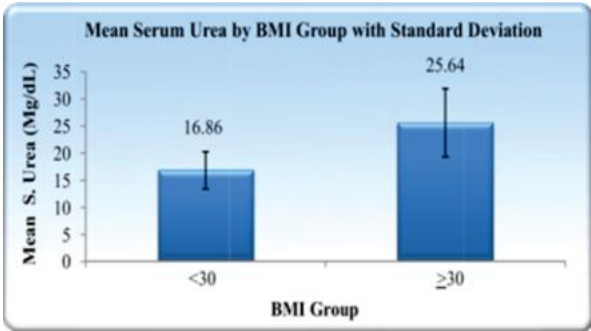


Figure 1: Comparison of Mean Serum Urea Level in Non-obese and Obese Group

Though there was hypertension in both non-obese and obese group but there were significantly higher levels of serum urea in obese group. Serum urea is a waste product produced from the breakdown of proteins, which is filtered out by the kidneys. Elevated urea levels typically indicate altered kidney function or increase the protein metabolism. The significant higher serum urea levels in obese patients shows that they may have early stage kidney dysfunction associated with hypertension.

Aktas G et al.⁽⁶⁾ (2020) similarly observed that morbid obese individuals exhibited a higher levels of serum urea levels associated with low grade inflammation and increased metabolic demand.

Nnoli MA and Ezech AO⁽⁷⁾ (2023) demonstrated that obese adults in South-eastern Nigeria had elevated serum urea concentration compared to non-obese individuals, suggesting that obesity independently contributes early renal impairment even in the absence of overt kidney disease.

Yang Y et al.⁽⁸⁾ (2025), analysing NHANES data, also found that obese males with hypertension had significantly higher levels than their non-obese counterparts further associating this elevation with micronutrient imbalance and reduced renal filtration efficiency in high BMI states.

These consistent findings affirms that increased serum urea levels in obese individual is relevant marker of renal stress in obese hypertensive patients and shows the importance of early biochemical monitoring to prevent progression of chronic kidney diseases.

CONCLUSION

The present study demonstrates that persons with BMI≥30 have significant metabolic changes compared to those with BMI <30 like serum urea and other factors. These factors suggest that the ≥30 BMI group is at a higher risk for metabolic and renal problems while blood pressure did not shows a significant difference. This study shows us importance of routine health monitoring and early intervention in individuals with higher BMI to mitigate the risk of chronic diseases such as cardiovascular disease and kidney dysfunction.

The obese people shows significant deterioration in renal function, as there is raised levels of serum urea and other markers. This suggests that individuals with higher BMI are at higher risk of chronic kidney disease (CKD) and other renal complications. The kidney damage likely results from obesity-related factors such as hypertension, insulin resistance, and increased metabolic demands.

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