

Association Of Hypertension With Serum Urea And Creatinine

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Abstract:

Introduction:

hypertension is a widespread, challenging disorder. elevated systolic and diastolic blood pressure are hallmarks of hypertension that can also result from a sedentary lifestyle, which can lead to vascular illness, chronic kidney disease (ckd), myocardial infarction, and stroke. it can also affect biological parameters like urea and creatinine, which are elevated in the majority of hypertensive patients.

Objective: the objective of this study is to acknowledge how the serum urea, creatinine, and impaired renal functions is interlinked with hypertensive patients.

Methodology:epi software was used to calculated the sample size for the cross sectional study of 50 patients at central park teaching hospital(cpth), with a age limit of 18-80 years, whose urea creatinine has been already measured and whose medical history has been thoroughly examined to determine either they are hypertensive or normotensive.

Results: the results of this research indicate a positive correlation between elevated serum urea and creatinine levels and increased systolic blood pressure. this shows a relation between hypertension and kidney function biomarkers, i.e, urea and creatinine. \

conclusion: urea and creatinine are highly interlinked with hypertensive patients. high levels of urea and creatinine have been observed in hypertensive patients, and hypertension is frequently the cause of decreased renal functioning because of vascular blockage.

key words: hypertension, creatinine, urea, renal dysfunction.

introduction:

hypertension is a growing global health problem. it is also known as a silent killer. only 37% americans have blood pressure within the target range (120/80). patient is regarded as hypertensive when systolic blood pressure is >140 mmhg and diastolic blood pressure is >90 mmhg. sedentary lifestyle is the main leading cause of hypertension effect of hypertension on

organs like the kidney can affect other biological parameters like urea and creatinine values^{^17a}. hypertension can lead to elevated serum urea and creatinine levels due to decreased glomerular filtration rate (gfr). reduced blood flow impairs gfr, resulting in decreased distal tubular flow. this decrease enhances urea reabsorption, causing blood urea levels to rise. similarly, creatinine clearance is reduced, leading to increased blood creatinine levels.

some drugs like b2 agonist, alpha blockers, beta blockers alpha antagonists can be used to achieve the desired blood pressure range, for instance, 130/80, 140/90, for patients with chronic kidney disease. about 10-15% of patients after using medications still don't reach the desired blood pressure. hypertension causes blood vessels of the kidney to rupture, which impairs the elimination of urea and creatinine from the body, leading to leveling up of these parameters in the human body.

urea was first isolated by hillaire marin in 1773 from urine. it is the end product of nitrogenous end product of protein and amino acid catabolism, excreted from urine^{^1}. normal urea level ranges from 6-24mg/dl. a rise in serum urea level leads to a rise in hypertension^{^2,3}. on the other hand, decreased urea level indicates impaired kidney function. value above 30mm needs dialysis. several tests, including the most important, are serum creatinine and bun, which are diagnostically most important for kidney functions; these tests also play a role in radiological screening tests^{^4}. urea maintains normal water reabsorption and urine concentration.

serum creatinine is an anhydride of creatine, a metabolite which comes from muscles^{^5}. serum creatinine can be measured by gfr for the diagnosis of acute or chronic kidney failure. normal values for males are 0.7-1.3 mg/dl in males and 0.6-1.1 mg/dl in females^{^6}. its values vary by age, sex, and body weight. serum creatinine production directly correlates with weight, is slower, and decreases with advancing age^{^7}. serum creatinine is a collaborator of cardiovascular risk leading to mortality^{^8,9}. serum creatinine is associated with cardiovascular risk in hypertensive patients^{^10}. the ratio of serum uric acid and creatinine is linked to a higher risk of hypertension, while its prognosis is unknown^{^11}.

serum urea and creatinine are widely accepted parameters for assessing kidney function in patients with ckd, diabetic, and hypertensive subjects^{^12}. both bun and creatinine a biological parameters for measuring kidney function^{^13}. hypertension is the most common medical disorder causing renal dysfunction^{^14}. elevated level of creatinine is associated with poor treatment of hypertension and increased mortality associated with hypertension.

The purpose of this study is to find :

1. correlation of serum biomarkers (urea and creatinine) and hypertension.
2. renal function and hypertensive disease.
3. identification of kidney-specific biomarkers for hypertension

Methodology:

this study is a cross-sectional study designed to find the relationship between hypertension and urea creatinine levels. it was concluded in central park teaching hospital(cpth) in june 2025. a

sample size of 50 subjects was taken, whose urea creatinine levels were already measured by laboratory methods, regardless of their being normotensive or hypertensive. the sample size was calculated by epi software. the inclusion criteria are included as the age limit was 18-80 years, both male and female subjects, either hypertensive or non-hypertensive data were taken, pregnant and lactating mothers were excluded, and these parameters were strictly followed during data collection. demographic data, i.e, age, sex, urea, creatinine, were taken by informed consent from subjects as well as from institutional ethical committees.

Results:

Table 1: correlation of blood pressure with serum urea and creatinine levels

parameters	systolic bp(r)	diastolic bp(r)	p-value (systolic)	p-value (diastolic)
serum urea (mg/dl)	0.61	0.55	<0.001	<0.01
serum creatinine (mg/dl)	0.49	0.43	<0.01	<0.05

Table 2: descriptive statistics of study participants (n=50)

variable	mean± sd	minimum	maximum
age(years)	52.4± 13.8	18	78
serum urea (mg/dl)	32.4± 10.7	18	67
serum creatinine (mg/dl)	1.28± 0.42	0.7	2.6
systolic bp (mmhg)	145.7± 18.4	110	180
diastolic bp (mmhg)	92.5± 10.3	72	110

Table 3: comparison between normotensive and hypertensive subjects

parameter	normotensive (n=20)	hypertensive (n=30)	p-value
serum urea (mg/dl)	26.8 ± 6.5	38.9 ± 9.2	0.001
serum creatinine (mg/dl)	1.01 ± 0.21	1.45 ± 0.38	<0.01
age(years)	46.2 ± 11.1	56.8 ± 13.0	<0.05
male(%)	40%	66.7%	0.08

Discussion:

hypertension is a global, common public health problem and the leading cause of death. the exacerbated reason for the global health issue of hypertension is unhealthy lifestyle, stress, and

lack of exercise²². hypertension and biochemical markers like urea and creatinine are highly linked to each other. high serum urea and creatinine were found in hypertensive subjects. hypertension causes a decrease in gfr, leading to a rise in urea and creatinine levels. according to michael j.klag et al.(2003), hypertensive patients have an early decline in renal function²⁰. to assess kidney function, urea and creatinine are factors to determine kidney function in hypertensive patients. elevated creatinine levels are more common in hypertensive patients and in those taking antihypertensive drugs.

Elevated serum urea and creatinine signals hindered kidney function, maybe due to hypertension. this also shows the correlation of hypertension and renal dysfunction²³. clinical management of hypertension can also be assessed and monitored by keeping in check with these biochemical markers. hypertension and raised creatinine require aggressive treatment for hypertension as well as for renal physiology. according to joseph coresh et al, in 1994 with their study found that elevated systolic and diastolic blood pressure was linked with elevated creatinine levels and impaired treatment of hypertension because of increased creatinine. ²⁴hypertension, which is not cured, has a high serum urea level, which is strongly linked to the male population as compared to females. for every 1mmhg rise in blood pressure, plasma urea levels also rise. sex base difference in creatinine levels has been noted, with males generally having higher values clinically due to increased muscle mass and nitrogen turnover²². as for conclusion, hypertension and biochemical markers, i.e, urea and creatinine, are directly proportional to each other with adverse effect on renal profile.

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