

Research Article

The Impact of Hypertension on Renal Function A Retrospective Based Study in Tertiary Care Hospital

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Article History:

Received: 25-09-2022

Accepted: 15-10-2022

Published: 28-11-2022

Abstract

Objective: There is no huge number of studies conducted on impact of HTN on renal function. This main point is considered for the conductance of our study and this help to people for further conductance of our studies and gives brief idea about prevalence and predominance of renal failure. To rule out HTN cause renal damage. to evaluate the types of renal damage are more predominant was explained based on GFR rate, age, sex, sodium, potassium, calcium, social habits.

Methodology: A non-experimental prospective observational study was conducted in nephrology department Suraksha hospital Andhra Pradesh. The study was carried out around 3 years total 1000 patients were included in the study based on GFR rate, age, sex, social habits.

Results and Key Finding: According to data the patient with age groups 50 to 70 were highly affected and age group >70 is less affected. Gender wise distribution of patients affected with renal failure is total 1000 patients was diagnosed renal damage out of which 600(60%) were males and 400(40%) were female. Area wise distribution of patient with renal failure out of 1000 patients 625 belong to rural area where as 375 belong to urban area.

Conclusion: Our study concluded and reports HTN alter kidney function. HTN effect on kidney function more prone to males which is highly significant to the age group of 50 to 70 years. Untreated HTN damages the kidney function.

Keywords: HTN, renal failure, patients, age groups, nephrology department, social habits.

Introduction

The arteries are commonly affected by the condition of high blood pressure. Also referred to as HTN. If you have elevated blood pressure, the force of blood against artery walls is consistently too great. Blood circulation requires more labor from the heart. In millimeters of mercury (mm Hg), blood pressure is measured. In general, HTN is characterized by a blood pressure reading of 130/80 mm Hg or greater. The American College of Cardiology and the American Heart Association categorize blood pressure into four broad groups. Definition of normal blood pressure

Normal blood pressure -- acceptable blood pressure 120/80 mm hg or less

Elevated blood pressure is defined as having a top number between 120 and 129 mm Hg and a bottom number under 80 mm Hg.

Stage-IHTN: Between 130 and 139 mm Hg and 80 to 89 mm Hg separate the top and lower figures, respectively.

Stage-II HTN: The difference between the two numbers is at least 90mm hg and at least 140mm hg.

A hypertensive emergency is defined as a blood pressure reading of 180/120 mm Hg or greater. Anyone with these blood pressure results should seek medical attention right once. Blood pressure should be monitored at least every two years starting at the age of 18, as untreated HTN raises the risk of heart attack, stroke, kidney damage, and other serious health problems. HTN can be prevented and treated with the help of quitting smoking, regular exercise, and a good diet. To address high blood pressure, some people need medication¹¹.

SYMPTOMS:

The majority of hypertensive people don't show any symptoms. Headaches, blurred vision, uncomfortable chest pain, and other symptoms are all signs of extremely high blood pressure. If untreated, HTN can result in heart disease, renal disease, and stroke, among other illnesses. Severe headaches, chest discomfort, dizziness, breathing issues, nausea, vomiting, blurred or altered vision, anxiety, and disorientation, ringing in the ears, nosebleeds, and irregular heart rhythm are all signs of excessively high blood pressure.

Causes

The amount of blood pumps from the heart and the resistance to blood flow via the arteries are the two components that affect blood pressure. When the arteries are narrower and the heart pumps more blood, blood pressure rises.

Two basic types of high blood pressure exist.

1) Primary HTN also called essential HTN

2) Secondary HTN

1) Primary HTN, also referred to as essential HTN, occurs in the majority of adults without a discernible cause. This form of HTN is referred to as primary or essential HTN. It tends to

evolve incrementally over a number of years. Atherosclerosis, the accumulation of plaque in the arteries, raises the risk of elevated blood pressure.

2)SecondaryHTN: This form of HTN is caused by an underlying condition. It typically develops rapidly and causes greater blood pressure than primary HTN¹².

The following ailments and prescription drugs can result in secondary HTN:

- Adrenal gland tumors
- Over usage of Cough and cold medicines
- Over usage of Some NSAIDS
- Usage of oral contraceptives
- Illegal drugs (cocaine and amphetamine)
- Kidney disease
- Obstructive sleep apnea
- Thyroid problems

Risk Factors:

Numerous reasons can cause high blood pressure including:

Age

Age increases the risk of developing hypertension. Men have a higher prevalence of hypertension until around 64 years of age. After age 65, women are at a greater risk of developing Hypertension.

Race

Blacks have a disproportionately high prevalence of HTN. It develops at younger age in black peoples than in Caucasian peoples.

Family history

If parents or siblings havehypertension, increases the risk of developing the HTN.

Obesity or being overweight

A person who is overweight experiences changes to their blood vessels, kidneys, and other organs. These changes frequently cause the blood pressure to increase. Obesity and being overweight raise the risk of cardiovascular disease and associated risk factors, like high cholesterol.

Lack of exercise

Inactivity can result in weight accumulation. The risk of HTN is increased by gaining weight. The pulse rates of inactive individuals tend to be elevated.

Tobacco use or vaping

Immediately after smoking, ingesting tobacco, or vaping, blood pressure rises for a brief period. Tobacco consumption damages blood vessel walls and hastens the process of artery hardening. If you are a smoker, consult your healthcare provider for strategies to help you stop.

Too much salt

The body may retain water if there is an excessive amount of salt, commonly known as sodium. Blood pressure increases as a result of this.

Low potassium levels

Potassium helps maintain a healthy level of sodium in the cells of the body. Heart health is dependent on a correct potassium balance. Low potassium levels can result from a diet lacking in potassium or from certain illnesses, such as dehydration.

Drinking too much alcohol

Blood pressure has been linked to alcohol consumption, especially in men.

Stress

High levels of tension can cause a transient rise in blood pressure. Habits associated with stress, such as overeating, smoking or excessive alcohol consumption can exacerbate blood pressure elevations.

Certain chronic conditions

Some of the conditions that can cause excessive blood pressure are kidney disease, diabetes, and sleep apnea.

Pregnancy Occasionally, pregnancy can induce HTN.

Complications:

High blood pressure can harm blood vessels and organs by exerting an inordinate amount of pressure on the artery walls. The greater the blood pressure and duration of uncontrolled blood pressure, the greater the injury.

Uncontrolled high blood pressure can result in problems like:

Heart attack or stroke. A heart attack, a stroke, or other complications may occur as a result of the hardening and thickness of the arteries brought on by HTN or other conditions.

Aneurysm. An aneurysm can form when a blood vessel becomes weakened and swollen due to high blood pressure. A ruptured aneurysm can be potentially fatal.

Heart failure. When blood pressure is high, the heart must work harder to pump blood. The walls of the pumping chamber of the heart thicken as a result of stress. This disease is referred to as left ventricular hypertrophy. Heart failure occurs when the heart's ability to pump enough blood to meet the body's demands eventually fails.

Kidney problems. Blood vessels in the kidneys may become constricted or weakened due to HTN. This may cause injury to the kidneys.

Eye problems. Blood vessels in the conjunctiva may become thickened, constricted, or ruptured as a result of HTN. This can lead to a loss of vision.

Metabolic syndrome. This syndrome refers to a group of metabolic disorders. It involves the abnormal decomposition of sugar, also known as glucose. The syndrome is characterized by an increase in waist circumference, elevated triglycerides, a decrease in high-density lipoprotein (HDL or "good") cholesterol, high blood pressure, and elevated glucose levels. These conditions increase your risk for diabetes, heart disease, and stroke.

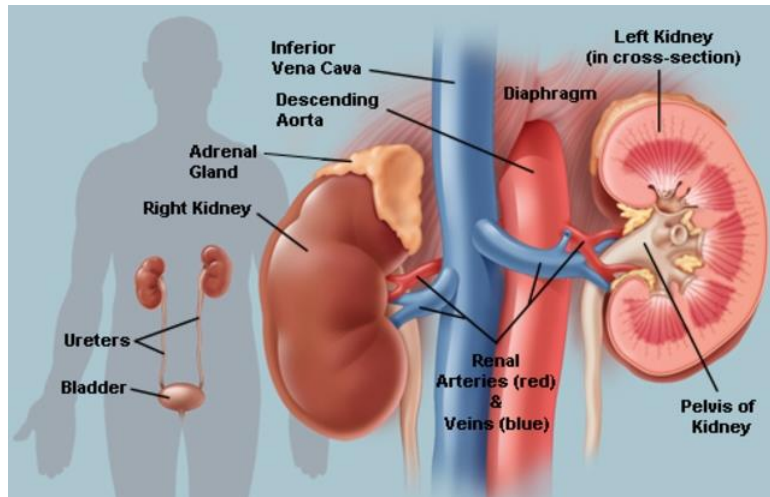
Changes with memory or understanding. The ability to comprehend, remember, and learn may be hindered by uncontrolled HTN.

Dementia. Brain blood flow can be restricted by constricted or obstructed arteries. This may result in vascular dementia. Vascular dementia can be caused by a stroke that impedes blood flow to the brain.

Kidney:

On the right and left sides of the abdomen, respectively, are two organs, including the right kidney.

kidneys get rid of control the body, amounts the body. blood through each day. kidney, of debris minerals



The purpose of the is to filter blood, contaminants, fluid balance within and keep the right of electrolytes in The entire body's supply goes them several times Blood enters the where it is cleaned and salt, water, and are adjusted as

needed. After being filtered, blood is given back to the body. Urine is produced as waste is transformed, and it is then gathered in the kidney's pelvis, a funnel-shaped organ that drains to the bladder through the ureter. Every kidney contains about one million nephrons. You might not notice any symptoms or issues even if only 10% of your kidneys are functioning. Kidney failure could occur if blood flow to a kidney is cut off, which could cause part or all of the kidney to die. (1)

Kidney Conditions

Pyelonephritis: Bacteria can infect the kidney, causing fever and back pain. Pyelonephritis is an infection of the renal pelvis. Bacterial transmission from untreated bladder infections is the most common cause of pyelonephritis¹.

Glomerulonephritis: An overreactive immune system can target the kidney, causing swelling and possibly damage. Blood and protein in the urine are common signs of glomerulonephritis.

Kidney stones (nephrolithiasis): Minerals in urine create crystals (stones) that can grow to a size where they impede the flow of urine. One of the most agonizing illnesses, according to many. Most kidney stones pass on their own, but others are so enormous that they need to be treated.

Nephrotic syndrome: Significant amounts of protein are excreted in the urine as a result of renal injury. Leg edema is one symptom that might occur.

Large lesions that compromise the function of both kidneys are a hallmark of the hereditary condition polycystic kidney disease.

A sudden decline in the functionality of the kidneys is known as acute renal failure (kidney failure). If caused by dehydration, a urinary tract obstruction, or kidney injury, acute renal failure may be treatable.

Chronic renal failure causes a persistent decrease of kidney function. Diabetes and high blood pressure are the two most common reasons.

End-stage renal disease (ESRD): a full lack of kidney function, usually due to chronic renal disease that is advancing. Patients with ESRD must have routine dialysis to stay alive.

Papillary necrosis: Kidney tissue fragments that break off after a serious injury may block the kidneys. Complete renal failure may follow from the resulting damage if it is not treated.

Diabetic nephropathy: Chronic renal disease finally results from kidney damage caused by diabetes-related elevated blood sugar levels. Protein in the urine (nephrotic syndrome) is another possibility.

Hypertensive nephropathy: High blood pressure may result in kidney damage, which causes kidney damage².

Renal cell carcinoma: is the most prevalent form of cancer afflicting the kidneys. The leading cause of renal cancer is smoking.

Interstitial nephritis: Inflammation of the connective tissue within the kidney, which causes acute renal failure frequently. Common causes include allergic reactions and adverse drug effects.

Minimal change disease: a form of nephrotic syndrome in which the kidney cells appear nearly normal under the microscope. The condition can result in leg edema. To treat minimal change disease, steroids are administered.

Nephrogenic diabetes insipidus: The kidneys lose the capacity to concentrate urine, typically as a result of a drug reaction. Despite its rarity, diabetes insipidus results in persistent thirst and frequent urination.

A renal cyst is a hollowed-out space within the kidney. Usually harmless, isolated kidney lesions are a common occurrence in aging individuals. Cancer can develop in complex cysts and masses⁽²⁾.

The symptoms of kidney disease include:

- High blood pressure
- Decreased the urine output or difficulty urinating
- Edema (fluid retention), particularly in the lower extremities
- Urinating more frequently, particularly at night

Chronic Kidney Disease Staging and Progression

Introduction

In order to effectively manage patients with chronic kidney disease (Kidney Damage), primary care physicians and nephrologists must work together, accurately interpret, and use the indicators and phases of Kidney Damage. Kidney Damage, also known as chronic renal disease, chronic renal failure, and chronic renal insufficiency, is the umbrella term for chronic kidney disease as defined by the National Kidney Foundation Kidney Disease Outcomes Quality InitiativeTM (NKF KDOQITM). It is easier for patients, families, healthcare professionals, and the general public to understand when kidney is used instead of renal. This

phrase covers the full spectrum of kidney dysfunction, including end-stage renal disease (ESRD) and kidney failure, ranging from mild kidney damage to kidney failure.

Definition and Interpretation

To effectively manage kidney damage, one must comprehend the proposed definition by the National Kidney Foundation (NKF). Since the glomerular filtration rate (GFR), the best overall indicator of kidney function in stable, outpatient patients, is still thought to be present, an informed interpretation of the estimated glomerular filtration rate (eGFR) is required. Kidney damage may be indicated by any one of the following factors:

- pathologic kidney abnormalities
- persistent proteinuria
- other urine abnormalities, eg, renal hematuria
- imaging abnormalities
- eGFR < 60 mL/min/1.73 m² on two occasions separated by ≤ 90 days and that is not associated with a transient, reversible condition such as volume depletion.

The 5 stages of Kidney Damage are based on eGFR

Classification of Chronic Kidney Disease

Stage	Estimated GFR (mL/min/1.73 m ²)	Comment
1	≥90	Normal GFR w/ proteinuria
2	60–89	Age-related decline in GFR w/proteinuria
3A	30–59	Low risk of progression to kidney failure
3B*		
4	15–29	High risk of progression to kidney failure
5	<15	Kidney failure
5D		
5T		

Kidney Damage Stage 3 is further broken down into Stages 3A (45-59 mL/min/1.73 m²) and 3B (30-44 mL/min/1.73 m²) due to higher cardiovascular disease risk and disease progression risk with lower eGFRs. Patients who may need or are receiving kidney replacement therapy are included in patients with renal damage stage 5. The designations 5D and 5T refer to people with end-stage renal illness who receive chronic dialysis (5D) or have had kidney transplants (5T).

$$eGFR(\text{mL}/\text{min}/1.73 \text{ m}^2) = 186 \times (\text{SCr})^{-1.154} \times (\text{Age})^{-0.203} \\ \times (0.742, \text{iffemale}) \\ \times (1.212,)$$

The body surface area-normalized, 4-variable Modification of Diet in Renal Disease Study (MDRD) Equation based on Serum Creatinine, Age, Gender, and Ethnicity is the best approach for estimating GFR. Serum Creatinine is the main factor that determines eGFR. Regular Kidney Damage screening does not require eGFRs based only on BUN and

creatinine or 24-h endogenous creatinine clearances. Like all tests, the eGFR has flaws. Acute hospitalizations, acute kidney injury (AKI)/acute renal failure (ARF), starvation, significant limb amputation, cirrhosis, severe obesity, and extreme ages are some situations where eGFR estimations may be incorrect⁶. It is not advised to use eGFR in place of serum creatinine during AKI/ARF.

While improved eGFR equations, Kidney Damage -EPI, and Cystatin-C equations are still used as research tools, the 4-parameter MDRD eGFR is still the industry standard. Whatever the measurement, the majority of cases necessitate an accurate assessment of kidney function, which must include an assessment of retrospective and prospective markers of kidney function in addition to eGFR, such as BUN and urinary protein excretion, in order to more accurately assess the cause, stability, progression, or improvement in renal function, as well as to guide therapy (6).

Aim

- To study the drugs and diseases effect kidney function.
- To provide statistical data of Kidney Damage patients.

Objective

- To analyse the proportion of the patients in area of Guntur with renal failure.
- To examine the persons with renal failure who have elevated BP.
- Reduce the number of deaths among persons with renal failure.
- To discuss the way which decrease the toxicity in the body to improve the function of kidney.

Methodology

Study Place:

Suraksha Hospital, Guntur.

Study Design

Retrospective Study

Sources of Data:

All The Relevant Data Are Collected From:

1. past Medical History
2. past Medication History
3. Age
4. Gender
5. Smoking and Alcohol

- This study was conducted in the outpatient, inpatient department of Suraksha hospital, Andhra Pradesh, India, for a period of 3 years.
- All the patients were systematically interviewed and their socio demographic details were noted.
- The diagnosis of these patients was made according to sodium, potassium calcium, urine output, GFR.
- Totally, 1000 patients in the geriatric age group from the outpatient departments of Suraksha Hospital were included in the study.

- The data were collected using predesigned proforma specially designed for this purpose. Patient's prescription sheet was evaluated and age and gender wise distribution of patients, diseases suffered, smoking, alcohol and drugs which are to be taken were examined. Analysis was carried out by using Microsoft excel
- The results and conclusions will be made by using SPSS 16.

Study Criteria

Inclusion Criteria

- Age above 30yrs were included
- Availability of reliable informant
- Patient or attendant given informant
- Both males and females were included

Exclusion criteria

- Those who are not willing to provide the information
- Pediatrics not to be considered

Tools

1. Socio demographic profile: The socio demographic and clinical profile sheet was administered on patients to record variables such as age, sex, level of education, employment status, type of family, locality, reason.
2. Past medication history
3. Microsoft excel.

Results

GENDER:

Table: 1 Gender analysis

Gender	No. of patients
Male	600
Female	400

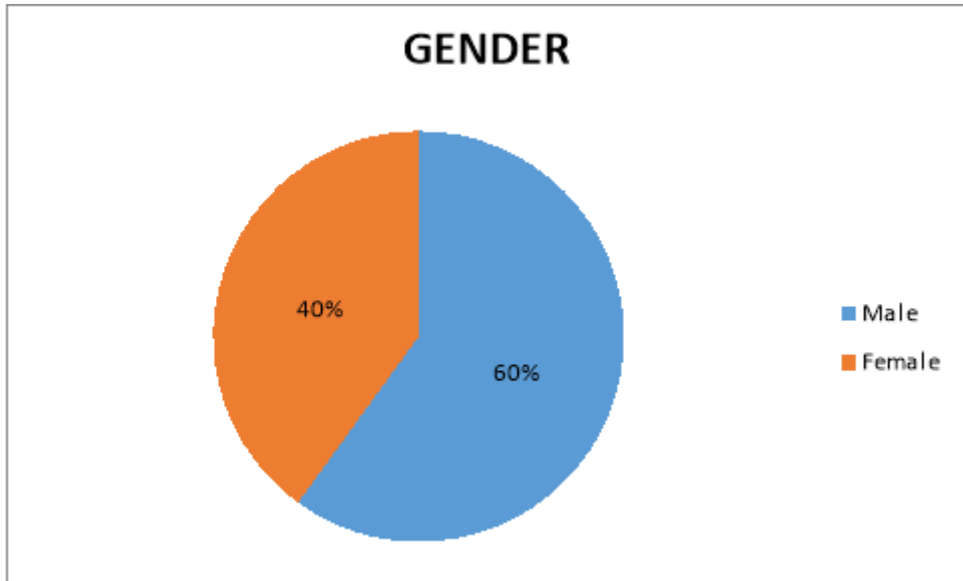


Figure: 1 Gender analysis in given population

AGE:

Table 2: Age analysis

Age	No. of patients
30-50	260
50-70	560
>70	180

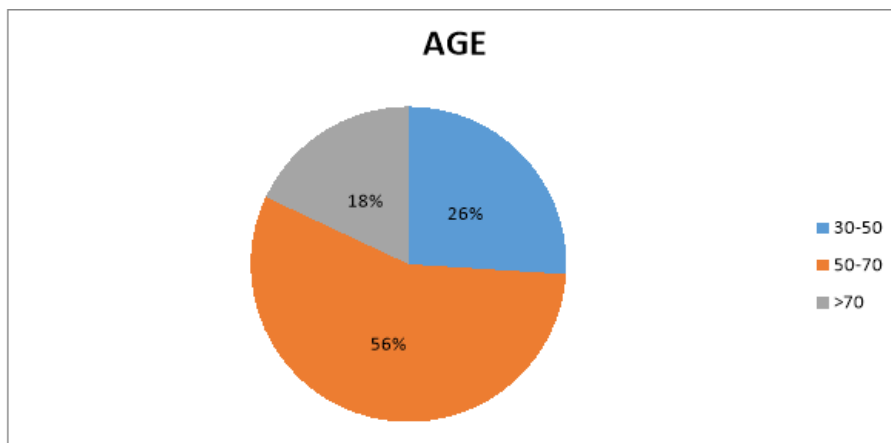


Figure:2 Age group analysis in given population

SOCIAL HISTORY:

Table 3: smoking and alcohol analysis

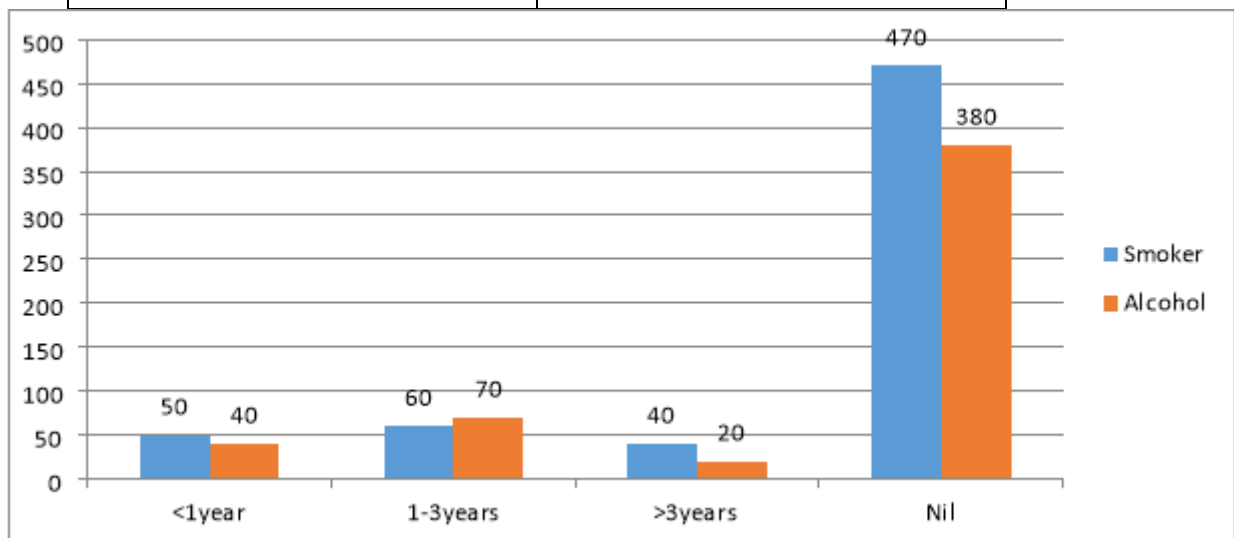
Social history	<1year	1-3years	>3years	Nil
Smoker	50	60	40	470
Alcohol	40	70	20	380

Figure :3 smoking and alcohol habits in given population

URINE OUTPUT:

Table 4 : urine output analysis

Range	No. of patients
800-2000 ml/day	320
<500 ml/day	580
<100 ml/day	100



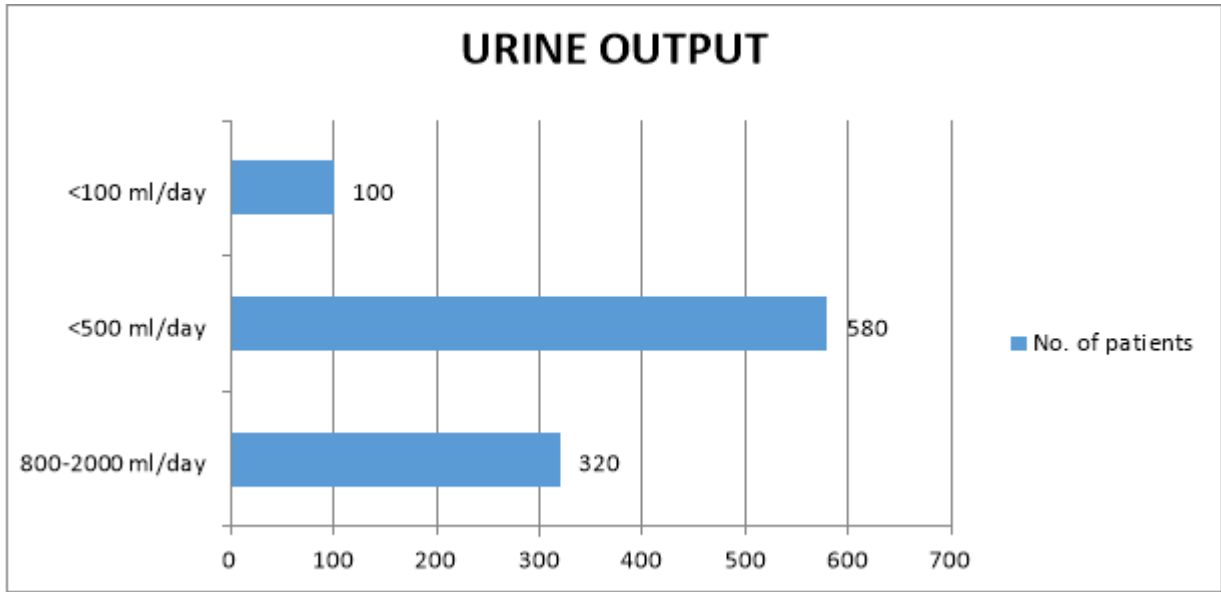


Figure 4: urine output analysis in given population

SODIUM:

Table 5: sodium analysis

Range	No. of patients
<135 meq/l	400
135-145 meq/l	380
>145 meq/l	220

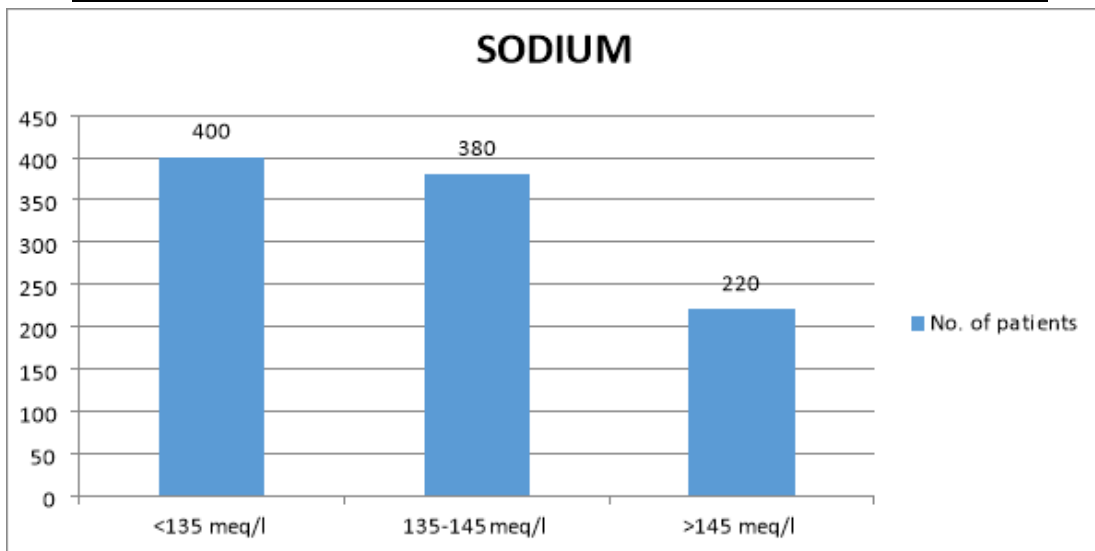


Figure 5: sodium level analysis in given population

SERUM CALCIUM:

Table 6: calcium analysis

Range	No. of patients
<8.41 mg/dl	250
8.41-9.2 mg/dl	580
>9.2 mg/dl	170

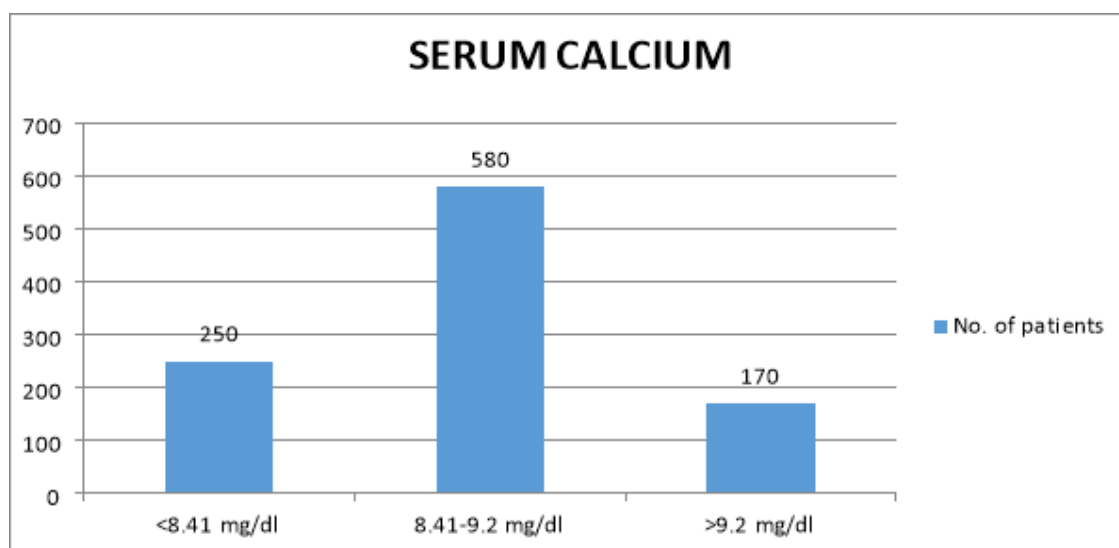


Figure 6 : sodium level analysis in given population

POTASSIUM:

Table 7: potassium analysis

Range	No. of patients
<3.5 meq/l	600
3.5-5.5 meq/l	250
>5.5 meq/l	150

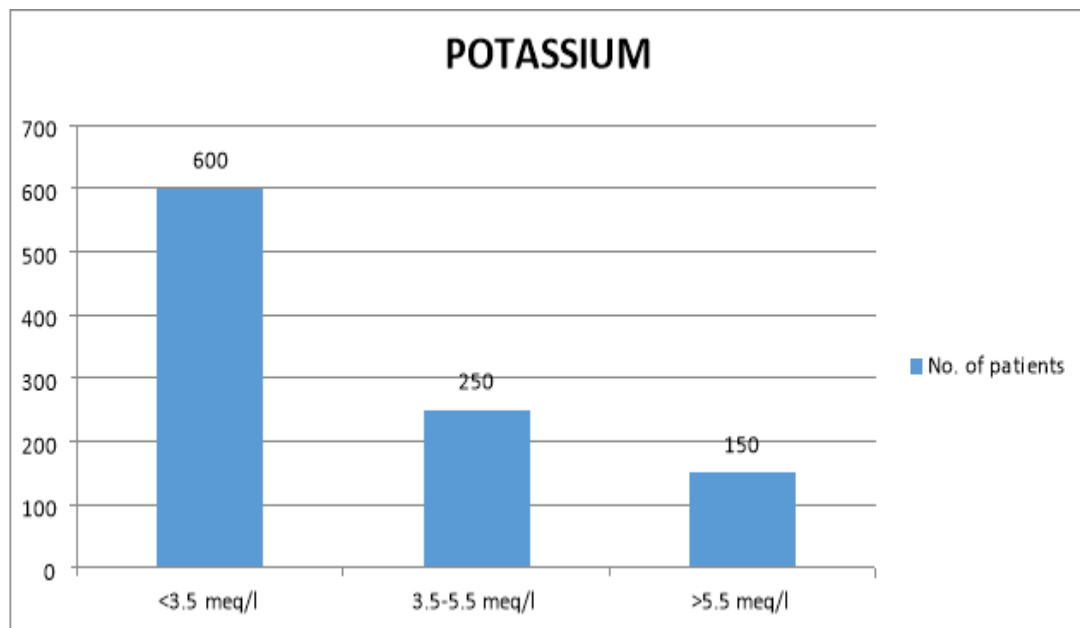


Figure 7: potassium level analysis in given population

Discussion

- The study was an attempt to assess the risk of Kidney Damage due to diseases.
- In the suraksha hospital we took 1000 cases. In these 1000 cases 600 were males (60%) and 400 females (40%).
- Different types of age groups are involved in Kidney Damage in this age of 50-70 years were 560 patients (56%), 30-50 years were 260 patients (26%), and >70 years were 180 patients (18%).
- By the above data the majorly affected were 50-70 years (56%) and lower were >70 years (18%).
- Smoking was prevalent in <1 year in 50 patients (5%), 1-3 years in 60 patients (6%), and >3 years in 40 patients (4%). Non-smokers were found to be 470 patients (47%).
- Alcohol was prevalent in <1 year 50 patients (5%), 1-3 years 70 patients (7%), >3 years 20 patients (2%). Non-alcoholic were found to be 380 (38%).
- In this study out of 1000 cases the urine output ranges from <500ml/day in 580 patients (58%), 800-2000 ml/day in 320 patients (32%), and <100 ml/day in 100 patients (10%).
- In this study out of 1000 cases the sodium level <135mmol/L 400 patients (40%), 135-145 mmol/L 380 patients (38%), >145 220 patients (22%).
- Calcium levels <8.41mg/dl 250 patients (25%), 8.41-9.2mg/dl 580 patients (58%), >9.2mg/dl 170 patients (17%).
- Potassium levels <3.5meq/L 600 patients (60%), 3.5-5.5meq/L 250 patients (25%), >5.5meq/L 150 patients (15%).

Conclusion

Our study concludes the Hypertension Effect Kidney function was more prone to males which are highly significant to the age group of fifty to seventy years. A subject with smoking history of one to three years was predicted to have Kidney Damage by the inhaled tobacco smoke. The severity of Kidney Damage is indicated by decreased urine output in which we observed the decrease of urine output by less than 500ml/day. To decrease the urine output and absorption and distribution electrolytes also changes. The above evidence indicates replacement single drug therapy with combination drug therapy reduces the risk of Kidney Damage.

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