



A Retrospective Based Study on the Impact of Distinctive Drugs on Kidney Function

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Abstract

Objective: There is no huge number of studies conducted on impact of different diseases 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 diseases cause renal damage. To evaluate the types of renal damage are more predominant was explained based on drugs, diseases, age, sex, 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 diseases, 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 belongs to urban area. In this study by the above information NSAIDS are more responsible for kidney failure when compared to the other drugs.

Conclusion: Our study concluded and reports diseases alter kidney function. Diseases effect on kidney function more prone to males which is highly significant to the age group of 50 to 70 years. Untreated diabetes millitus damages the kidney function. A non-steroidal anti-inflammatory drug that belongs to analgesic category shows a higher significance in causing Kidney Damage among those drugs ibuprofen.

Keywords: prospective observational study, kidney failure, NSAIDS, kidney function.

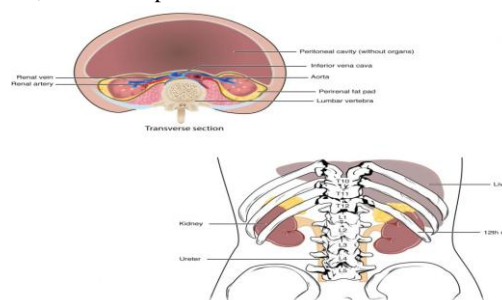
Introduction

The kidneys are located in the retroperitoneal region, which is well-protected by muscle, fat, and ribs in the body, on either side of the spine between the parietal peritoneum membrane and the posterior abdominal wall.

While the right kidney is lower due to a minor liver displacement, the left kidney is situated about between the T12 and L3 vertebra. The 11th and 12th ribs guard the upper section of the kidneys.

Each kidney weighs between 125–175 g in men and 115–155 g in women. They are directly covered by a fibrous capsule made of dense and irregular connective tissue, which helps to keep their shape and protect them in the body. They are around 11–14 cm long, 6 cm wide and 4 cm thick. This capsule is shielded by a thick renal fascia that is encircled by a shock-absorbing layer of adipose tissue known as the renal fat pad. The kidneys are securely fastened to the posterial abdominal wall in a retroperitoneal position by the fascia and, to a lesser

extent, the peritoneum that covers them.



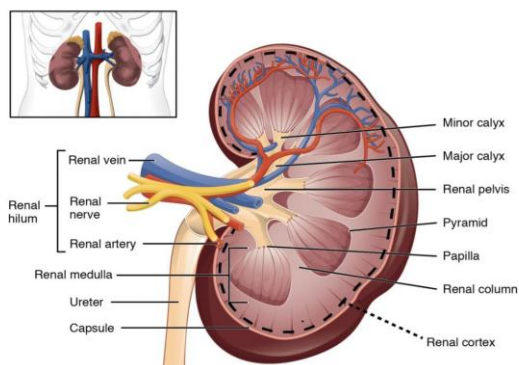
The ribs and the fat around them provide protection for the kidneys. The adrenal gland is located above each kidney.

The renal hilum serves as the entry and departure point for structures in the kidneys, arteries, nerves, lymphatics, and uterus. Each kidney resembles a kidney bean. The kidney's convex indentation is where the medial facing hila are nestled.

Internal structure

The renal medulla, an outer part of the kidney, can be seen in a frontal section. Between each of the 5-8 renal

pyramids in the medulla are renal columns made of connective tissue. Every kidney pyramid that ends in a renal papilla produces urine. Each renal papilla empties into a collecting pool known as a minor calyx. A major calyx is formed when numerous minor calyces unite.

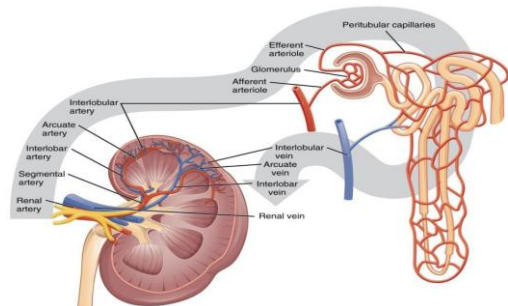


Blood supply of the kidney and nephrons

The kidneys have an abundant blood supply and at rest get roughly 25% of the cardiac output. The paired renal arteries, which originate straight from the descending aorta and individually enter the kidney at the renal hila, are the means by which blood reaches the kidney. Each renal artery first divides into segmental arteries while inside the kidney, and then it continues to branch out to produce interlobar arteries, which go through the renal columns to reach the cortex. The interlobar arteries divide into afferent arterioles, cortical radiate arteries, and arcuate arteries in turn. The glomerulus, a part of the kidney's functional unit, receives blood from the afferent arterioles and filters it before it enters the body.

Renal veins immediately return blood to the inferior vena cava after the nephrons have filtered it. The peritubular capillaries and vasa recta, which surround the proximal and distal convoluted tubules and the loop of henele, are where blood travels from the glomerulus to the efferent arteriole to form the portal system. With the aid of this second capillary bed, water and solutes are retrieved.

The collecting ducts that empty into the minor calyx's process and then collect this glomerulus filtrate. After that, the filtrate travels to the renal pelvis, followed by the ureters, where it fills the bladder.



Anatomy of the Nephron

Nephron is the, functional unit and structural unit of the kidney, the structure that actually produces urine in the process of removing waste and excess substance from the blood by filtration.

There are 1,000,000 nephrons in each human kidney. The most primitive fish, amphibian larvae and embryos of more advanced vertebrates are present. The nephrons found in the kidneys of amphibians and mostly in the fishes and in the late embryonic development of more advanced vertebrates are only slightly more advanced in structure of nephron. The most advanced nephrons only occur in the adult kidneys or metanephrosis, of land vertebrates, such as reptiles, birds and mammals also.

NSAIDS

Non-steroidal anti-inflammatory medications are used to reduce bodily discomfort and inflammation. List of drugs are Diclofenac, Acelofenac, ibuprofen, ketoprofen, Naproxen, ketorolac, indomethacin, piroxicam, mefenamic acid, phenylbutazone, paracetamol, etc.

Mechanism involved in the nsaid is inhibition of cyclooxygenase enzyme.

Anti-diabetic drugs

These drugs used for lower the blood glucose levels. Normal glucose levels is 70-140mg/dl. >160mg/dl its consider as diabetic mellitus. Diabetic mellitus is two types 1) Type 1 diabetes. 2) Type 2 diabetes.

List of drugs are metformin, limipride, pioglitazone, glipizide, Insulin, meglitinides, etc.

Mechanism involved in these drugs to promote the insulin production.

Anti-emetic drugs

These drugs used for to control the nausea and vomiting and GERD problems. Long term usage of these drugs effect on renal function.

List of drugs are asprepitant, ondansetron, dexamethasone, dolasetron, metoclopramide, etc.

Mechanism of action involved due to its antagonist activity at D₂ receptor in the chemoreceptor trigger zone in the central nervous system.

Antibiotics

so many antibiotics present in the Indian market some antibiotics are most prepared in Indian market. Some antibiotics are penicillin, oxacillin, amoxicillin with clavulanic acid, ceftriaxone, cefixime, cefazolin, doxycycline, sarecycline, azithromycin, erythromycin, clarithromycin, ofloxacin, levofloxacin, sulfasalazine, vancomycin, macrolide, propofin, sulfadiazine, amikacin, etc.

Antibiotics are used to control so many bacterial infections in the human body

Mechanisms involved for antibiotics are inhibition of cell wall synthesis, inhibition of protein synthesis, inhibition of DNA replication, inhibition of bacterial metabolism, etc.

Antiviral drugs

Antiviral drugs used to control viral infections like human immunodeficiency virus (HIV), herpes virus, hepatitis B virus (HBV), Hepatitis C virus (HCV) and respiratory viruses, variola (smallpox), etc. some antiviral drugs are acyclovir, ribavirin, famciclovir, valacyclovir, etc.

Mechanisms involved for antiviral drugs are prevent replication of specific viral protein, prevent replication of viral genome, prevent viral attachment.

Anti-hypertensive drugs

A consistently increased arterial blood pressure [BP] is referred to as hypertension. Adult blood pressure is categorized in the seventh report of the joint National committee on prevention, detection, evaluation, and treatment of high blood pressure (JNC7).

[Mm/hg] SYSTOLIC (mm/hg)	DIASTOLIC
Normal	<120
<80	
Prehypertension	120-139
80-89	
first-stage hypertension	140-159
90-99	
Stage 2 hypertension	>160
>100	

Diastolic blood pressure (DBP) levels less than 90 mm Hg and systolic blood pressure (SBP) values of 140 mm Hg or more are considered to be isolated systolic hypertension.

Hypertensive crisis [BP-180/120 mm Hg] can be classified as either hypertensive urgency [high BP Elevation without acute or progressing target organ injury] or hypertensive emergency [severe BP evaluation with acute or progressive target organ damage].

Anti-hypertensive medications are used to manage high blood pressure. Diuretics, alpha-blockers, beta-blockers, ACE inhibitors, angiotensin II receptor blockers, calcium channel blockers, vasodilators, aldosterone receptor antagonists, direct renin inhibitors, and peripheral adrenergic inhibitors are a few anti-hypertensive medications.

Mechanism involved anti-hypertensive drugs are decrease blood pressure by diminishing sympathetic outflow from the vasomotor center.

H₂ blockers

H₂ receptors antagonists also known as H₂ blockers are used to treat gastric secretion, peptic ulcers, duodenal ulcers and prevent their return.

H₂ blockers drugs are famotidine, cimetidine, ranitidine. Mechanism involved in H₂ blockers are decrease acid production in stomach by reversibly binding to H₂ receptors on gastric parietal cells.

Aim

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

Objective

- To evaluate drugs and diseases which damage the kidney function.
- To analyses 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 Hospitals.

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 serum creatinine, BUN, GFR, urine output, drugs used.
- Totally, 1000 patients in the geriatric age group from the nephrology 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 information
- Patient or attendant given information
- Both males and females were included

Exclusion criteria

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

Tools

- 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.
- Past medication history
- Microsoft excel.

Results and Discussion

Gender:

Table: 1 Gender analysis

Gender	No. of patients
Male	600
Female	400

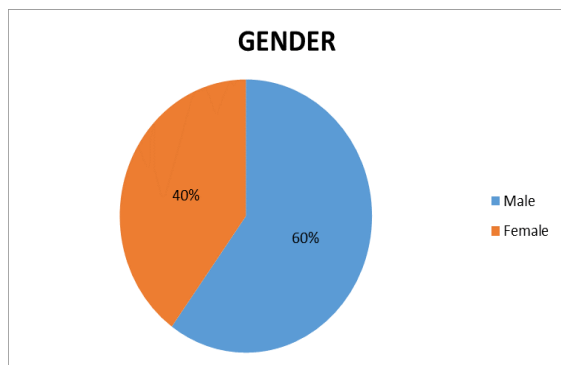


Figure: 1 Gender analysis in given population

Age

Table: 2 Age analysis

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

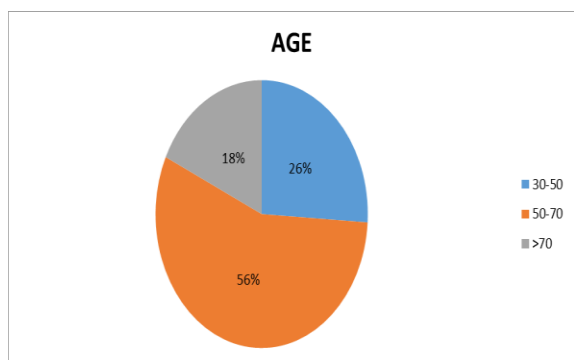


Figure: 2 Age group analysis in given population

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

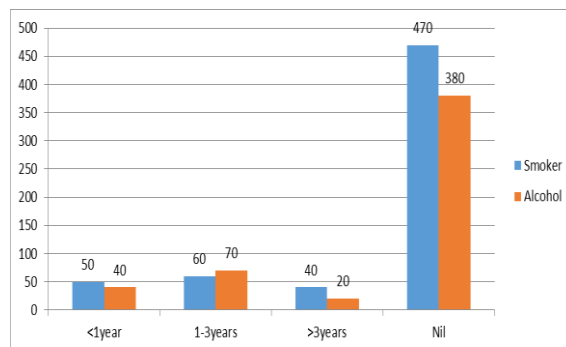


Figure: 3 smoking and alcohol habits in given population

Serum Creatinine

Table:4 Serum creatinine analysis

Range	No. of patients
0.7-1.6 mg/dl	150
1.6-3.8 mg/dl	40
3.8-5.6 mg/dl	80
5.6-7.8 mg/dl	80
>7.8 mg/dl	650

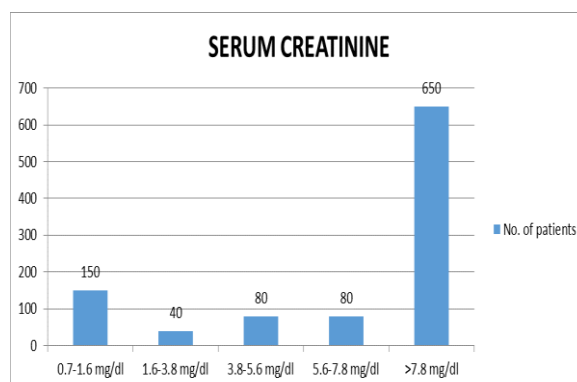


Figure: 4 serum creatinine analysis in given population

Blood Urea Nitrogen

Table: 5 Blood urea nitrogen analysis

Range	No. of patients
10-45 mg/dl	180
45-90 mg/dl	70
90-180 mg/dl	300
>180 mg/dl	450

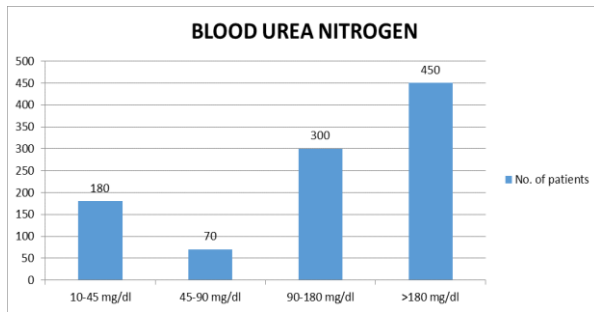


Figure:5 Blood urea nitrogen analysis in given population

Glomerular Filtration Rate

Table:6 Glomerular filtration rate analysis

Range	No. of patients
>90 ml/min	150
60-89 ml/min	50
30-59 ml/min	350
15-29 ml/min	300
<15 ml/min	150

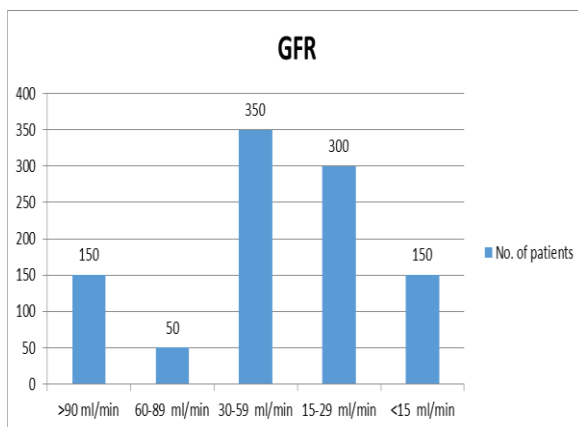


Figure: 6 Glomerular filtration rate analysis in given population

Urine Output

Table: 7 urine output analysis

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

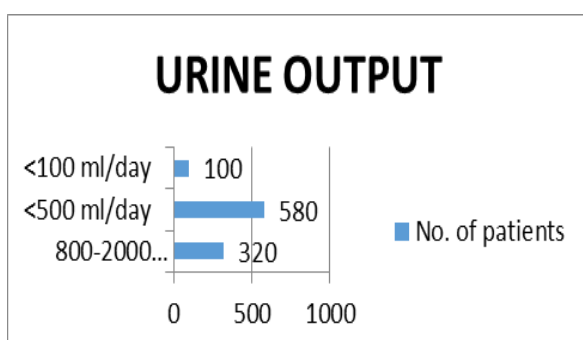


Figure:7 urine output analysis in given population

Drugs

Table: 8 Drugs analysis

DRUGS	No. of patients
NSAIDS	320
METFORMIN	230
ACYCLOVIR	70
AMLORIDE	80
METOCLOPRIMIDE	50
MEGLITINIDES	100
TELMISATRAN	30
PROPLOPRIN	10
FERUMOXYTOL	10
MACROLIDE	20
AMIKCIN	30
VANCOMYCIN	20
CIMETIDINE	20
SULFADIAZINE	10
INSULIN	10

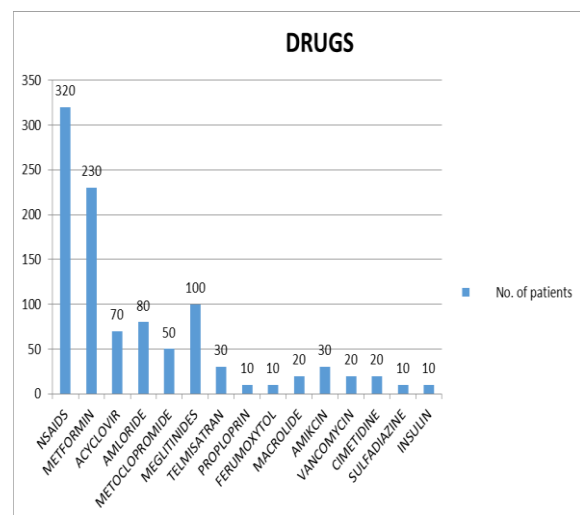


Figure: 8 different drugs analysis in given population

Discussion

- The study was an attempt to access the risk of Kidney Damage due to diseases.
- In the suraksha hospital we taken 1000 cases. In this 1000 cases 600 were males (60%) and 400 females (40%).
- Different types of age groups are involving in the 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 effected 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 < 1year 50 patients (5%)
1-3 years 70 patients (7%) >3 years 20patients (2%). Non-alcoholic were found to be 380 (38%)
- In this study out of 1000 cases serum creatinine levels are elevated. The ranges are >7.8mg/dl in 650 patients (65%),0.7-1.6mg/dl in 150 patients (15%),3.8-5.6mg/dl in 80 patients (80%) and 1.6-3.8mg/dl in 40 patients (4%).
- In this study out of 1000 cases blood urea nitrogen ranges from >180mg/dl in 450 patients (45%), 90-180mg/dl in 300 patients (30%), 10-45 mg/dl in 180 patients (18%) and 45-90mg/dl in 70 patients (7%).
- In this study out of 1000 cases Glomerular filtration rate ranges 30-59 ml/min in 350 patients (35%), 15-29 ml/min 300 patients (30%), >90ml/min in 150 patients (15%), < 15 ml/min in 150 patients (15%) and from 60-89 ml/min in 50 patients (5%).
- 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 patients NSAIDS drugs were taken by 330 patients (33%)(n=1000) out of then ibuprofen was mainly cause of Kidney Damage and the paracetamol drugs is the less cause of Kidney Damage.
- In this study out of 1000 patient's metformin drug was taken by 230 patients (23%)(n=1000), meglitinides 100 patients (10%), Amloride 80 patients (8%), Acyclovir 70 patients (7%), metoclopramide 50 patients (5%), Amikacin 40 patients (4%), Cimetidine 40 patients (4%), Telmisatran 30 patients (3%), Vancomycin 30 patients (3%), macrolide 20 patients (2%), Sulfadiazine 20 patients (2%) Proploprim 10 patients (1%), Ferumoxytol 10 patients (1%).
- In this study by the above information NSAIDS are more responsible for kidney failure when compared to the other drugs.

Conclusion

Our study concludes and reports the drugs and diseases which alters the kidney function. The risk of Kidney Damage was more prone to males which is highly significant to the age group of fifty to seventy years. Subjects with smoking history of one to three years was predicted to have Kidney Damage by the inhaled tobacco smoke. Among study population we observed to have serum creatinine levels greater than 7.8mg/dl. Increased serum creatinine level indicates the severity of damage to kidney. Blood urea nitrogen has a higher significant diagnostic agent representing Kidney Damage by the range greater than 180mg/dl. Glomerular filtration rate was a major role by kidney, abnormalities in GFR indicates Kidney Damage. Major subjects in study population produce an abnormality in the GFR reduction by 30-15 ml/min that indicates stage 3 and 4 kidney

failure. 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.

Non-steroidal anti-inflammatory drugs that belongs to analgesic category shows a higher significance in causing Kidney Damage among those drugs ibuprofen. Next significant number of subjects were recognized with Kidney Damage by Metformin and the other drugs that slightly alters the kidney function was Acyclovir, Amloride, Metcloropromide, Meglitinides, Telmisatran, Proploprim, Ferumoxytol, Macrolides, Amikacin, Vancomycin, Cimetidine, Sulfadiazine. The above evidence indicates replacement single drug therapy with combination drug therapy reduces the risk of Kidney Damage.

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