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Safety and Efficacy of Furosemide and Other Anti-Hypertensive Drugs Of Chronic Kideny Disease Along With Comorbidites

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ABSTRACT:
To evaluate the safety and efficacy of Furosemide and other Anti-Hypertensive drugs of Chronic Kidney disease along with Co morbidities in Tertiary care Hospital. This study entitled "The study on safety and efficacy of Furosemide and other Antihypertensive drugs of Chronic kidney disease along with co morbidities in Tertiary care Hospital, To study the co morbidities related to Chronic kidney disease, To study the Adverse drug reactions of Furosemide and other Anti hypertensive drugs of Chronic kidney disease and KDIGO criteria is used to classify the patients disease and assess their management related to kidney disease. Our study is Prospective Observational study conducted in Nephrology ward of Govt. General Hospital attached to Kurnool medical college. The sample was collected based on inclusion and exclusion criteria in the patient collection proforma. A total of 120 patients the gender distribution of male(54), female(66) and most commonly seen symptoms are Oliguria, Anuria, Vomitings, Pedal edema, Shortness of Breath, Anemia and Dry Cough. Most of the adrs are observed in the patients who are prescribed with Amlodipine. Total of 30 adverse drug reactions are observed. The anti hypertensive therapy with combination drugs produce more rapid blood pressure control than monotherapy drugs. The efficacy of diuretics appeared to be the most effective drugs for significant weight reduction(pedal edema) in prescribed patients over 1-2 weeks of observance. Total of 30 ADR are observed in our study.

I. INTRODUCTION

ANATOMY: The kidneys are a pair of bean shaped organs. They are about approximately 11-14 cm in length and 6 centimeters in width and 4 cm thick in healthy individual. They are located retroperitoneal on either side of the aorta and inferior vena cava between the 12 the thoracic and 3 rd. lumbar vertebrae.

The right kidney is usually a few centimeters lower because the liver lies above it. During respiration, both kidneys rise and fall by a few centimeters. Each kidney weighs about 125-175 grams in males and 115-155grams in females. Based on its alignment, it receives 26□ of cardiac output which helps to better filtration.

Nephrons is defined as the structural and functional unit of kidney. Each kidney consists of 1 -1.3 million of nephrons. The number of nephrons starts decreasing after about 45 to 50 years of age at the rate of 0.8% to 1% every year.

Each Nephron is made by two parts – 1. Renal corpuscle 2. Renal tubule

Renal corpuscle: created by two portions

a. Glomerulus – filters your blood. As blood flows into each nephron, it enters a cluster of tiny blood vessels called glomerulus. The thin walls of glomerulus allow small molecules, water, and fluids, mostly water pass into the tubule.

b. Bowman's capsule – bowmans capsules is a capsular structure, which encloses the glomerulus. It is formed by two layers – outer vesicular layer, inner vesicular layer.

Renal tubule: it is made up of three parts

a. Proximal convoluted tubule
b. Loop of Henle
c. Distal convoluted tubule

The proximal renal tubule, loop of Henle, distal renal tubule and collecting ducts are responsible for absorption of water, electrolytes and other solutes, as well as regulating acid base balance, they also play a key role in regulating calcium homeostasis, failure of this process contributes to the pathogenesis of hypocalcaemia

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and bone diseases that occurs in chronic kidney disease.

PROCESS OF URINE FORMATION:

Normally about 1300ml of blood enters into the kidney.Kidneys excrete the unwanted substances along with water from the blood as urine. Normal urinary output 1litre per day to 1.5 liters per day. When blood passes through the glomerular capillaries the plasma is filtered into bow mans capsule this process is called glomerular filtration.

Urine formation includes three process:

1. Glomerular filtration
2. Tubular reabsorption
3. Tubular secretion

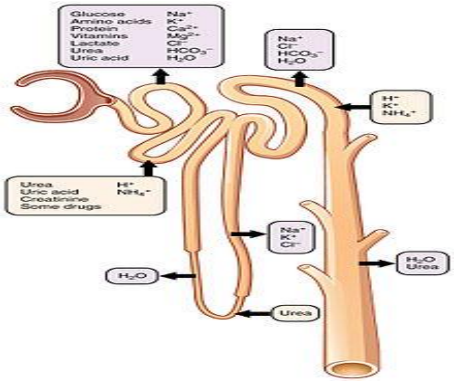

Fig:Process of urine formation

Glomerular filtration: When blood passes through the glomerular capillaries the plasma is filtered into bowman capsule. With the exception of the plasma protein, all plasma components are filtered. The filtered urine is called glomerular filtration.

Tubular Reabsorption: Tubular reabsorption is the process in which the other substances are transported from renal tubule back to the blood. So the entire process is called tubular reabsorption. 99% of filtrate is reabsorbed in different segments of renal tubule.

Tubular secretion: Tubular secretion is the process in which the substances are transported from blood into renal tubules.

Kidney disease:

Kidney is disease is defined as abnormality in either structure or function of kidney. decrease GFR rate below 90 GFR

Types of kidney diseases:

1. Acute kidney disease
2. Chronic kidney disease

Acute kidney disease:

Acute kidney disease is also called as Acute kidney injury or Acute renal failure. AKI is defined as decrease in Glomerular filtration rate occurring over hours to weeks associated with an accumulation of waste products including urea, creatinine and body fluids. It is a condition in which the kidney suddenly can't filtrate waste from the blood. It causes a buildup of waste products in your blood and make it hard for kidneys to maintain the ideal fluid balance in your body. AKI can also affect other organs such as brain, heart, lungs.

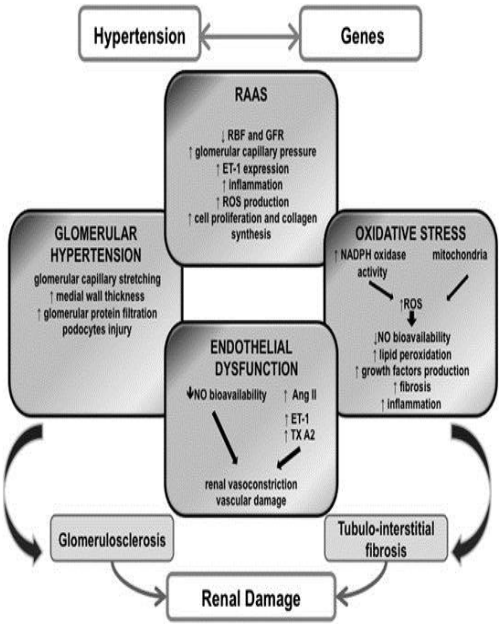

Fig : Pathophysiology

DIAGNOSIS: AKI must be detected as soon as feasible in order to prevent chronic renal damage or potentially kidney failure. Moreover, it might cause death or heart problems.

1. Blood urea nitrogen(BUN)
2. Serum creatinine
3. Urine analysis
4. Estimated glomerular filtration
5. Complete blood picture
6. Imaging test
7. Ultrasonography
8. CT scan helps to detect , if there is any blockage in the urinary tract

RISK FACTORS:

1. Kidney disease
2. Liver disease
3. Diabetes

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4. High blood pressure
5. Heart failure
6. Obesity

COMPLICATIONS:

1. CKD
2. Heart damage
3. End stage renal failure
4. Nervous system damage

TREATMENT:

1. Antibiotics helps in treating the infection
2. Diuretics helps in eliminating fluids
3. Calcium and insulin can help in maintaining the blood potassium levels
4. Proton pump inhibitors and H2 antagonists are used to reduced gastrointestinal bleeding.

DIALYSIS : Dialysis involves diverting blood out of the body in to the mission that filters out the waste materials. The clean blood then returns to the body. Dialysis is necessary in some conditions,pt may have high potassium, stop urinating, and has pericarditis or inflammation of the heart.

CHRONIC KIDNEY DISEASE: CKD is defined as kidney damage or glomerular filtration rate (GFR)<60 ml/min/1.73m2 for 3 months or more, irrespective of cause or CKD is defined as the presence of an abnormality in kidney function or structure persisting for more than 3 months.CKD refers to an irreversible deterioration in renal function that usually develops over a period of years.

ETIOLOGY

- Diabetes mellitus
- Interstitial disease
- Glomerular disease
- Hypertension
- Systemic inflammatory disease
- Reno vascular disease
- Congenital and inherited

SIGNS AND SYMPTOMS

1. Elevated serum electrolytes
2. Proteinuria
3. Albuminuria (foamy urine)
4. Hematuria
5. Electrolyte imbalance
6. Pedal edema
7. Fatigue
8. Nocturia
9. Muscle weakness

Other signs that can lead to chronic kidney disease

1. Autoimmune disorder
2. Systemic infections (HIV, Hepatitis)
3. Nephrotoxic medications (non-steroidal anti-inflammation drugs)
4. Recurrent urinary tract infection
5. Kidney stones
6. Urinary tract obstruction
7. Malignancy
8. Obesity
9. History if acute kidney injury
10. Intravenous drug use (heroin, cocaine)
11. Smoking
12. Family history of kidney disease

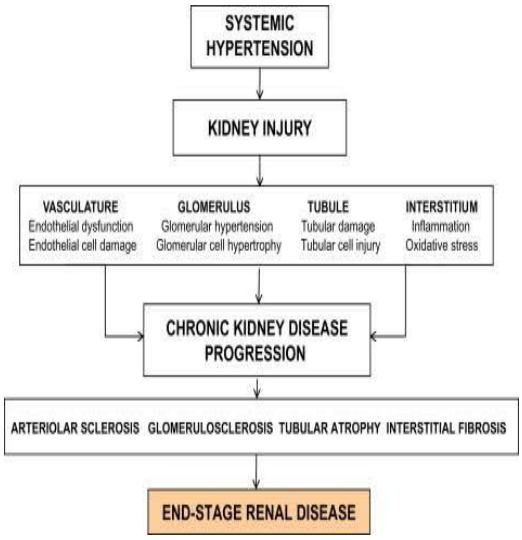

Fig: Pathophysiology

DIAGNOSIS:

1. Serum creatinine and urea
2. Complete urine evaluation
3. Renal biopsy
4. GFR
5. Albumin levels
6. Renal ultrasound
7. Chest x-ray
8. USG abdomen
9. Protein-creatinine ratio(PCR)
10. Liver function test
11. Renal function test

Risk factors:

1. Older age
2. High blood pressure
3. Diabetes mellitus
4. Obesity
5. Heart disease
6. Family history of CKD
7. Inherited kidney disorder

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8. Past damage to the kidney and Nephrotoxins(NSAIDS)

Complications:

1. Hypokalemia
2. Metabolic acidosis
3. Hyperphosphotemia
4. Vitamin D deficiency
5. Anemia
6. Secondary hyperparathyroidism
7. Heart disease

TREATMENT

1. Anti-hypertensive drugs
2. Statins
3. Vitamin and calcium supplements
4. Diuretics

ANTIHYPERTENSIVE DRUGS: Angiotension receptor blockers(ARB)– Telmisartan, Losartan, Valsartan

TELMISARTAN:

Dose- 20 mg Mechanism of action – angiotension 2 receptor blocker inhibits vasoconstrictor and aldosteron secretory effects of angiotension 2 Adverse effects: back pain, upper respiratory tract infection, diarrhea, cough Side effects: fainting, fast heartbeat, painful urination or changes in urinary frequency Calcium Channel Blockers(CCB) – Amlodipine, Nefidipine, Verapamil

AMLODIPINE

Dose: 10mg-80mg Mechanism of action – Ca Channel Blockers inhibits extracellular Ca ions across the membranes of myocardial cells and vascular smooth muscle cells, without changing serum calcium concentration, resulting in inhibition of cardiac & vascular smooth muscle contraction, thereby dilating the main coronary and systemic arteries.

Adverse effects - Peripheral edema, palpitations, rash, dizziness, Pruritis, nausea, weakness.

Side effects – Headache, pounding heartbeat, swollen ankles Beta blockers – Atenolol, Metoprolol, Propronolol, Labetolol

METOPROLOL

Dose – 25mg

Mechanism of action – Blocks the effects of the hormone epinephrine, also known as adrenaline. Beta blockers cause the heart to beat more slowly and with less force, which lowers blood pressure. Beta blockers also help widen veins and arteries to improve blood flow.

Adverse effects – headache, dizziness, bradycardia, rash, dyspnea, diarrhea, tiredness

Side effects – difficulty in sleeping or nightmares, feeling sick, short term memory loss, hypoglycemia

STATINS- Atorvastatin, Simvastatin

Vitamin supplements

Diuretics – Furosemide, Torsemide

Dietary supplements

Dialysis – a. Hemodialysis
b. Peritoneal dialysis

II. METHODOLOGY

STUDY DESIGN

Prospective observational study

STUDY PERIOD

The study is conducted over a period of six months.

SAMPLE SIZE

Sample size is 120

STUDY SITE

Nephrology department, Government General Hospital, Kurnool.

STUDY MATERIAL

Patient data collected proforma.

INCLUSION CRITERIA

All the patients of either gender is included

Geriatrics are included in study

EXCLUSIVE CRITERIA

Psychiatric patients are excluded in our study Patients with acute kidney disease Patients are excluded in our study.

III.RESULTS

A prospective observational study was conducted for six months in a tertiary case teaching hospital in department of nephrology at government general hospital, Kurnool. A total of 120 subjects were studies who comes under inclusive criteria.

Fig: Gender distribution of the study population

The total no of 120 subjects were collected among them the age distribution was

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followed 41-50 patients were more prevalance of CKD.

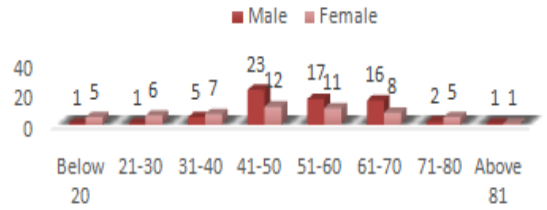

Fig: Age distribution of subjects

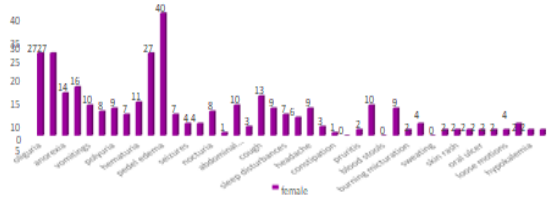

Fig:; clinical symptoms of CKD in female

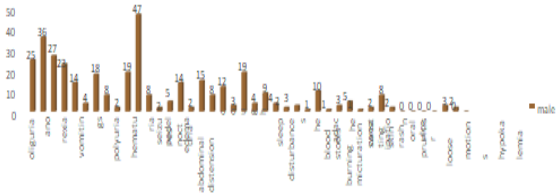

Fig : Clinical symptoms of CKD in Male

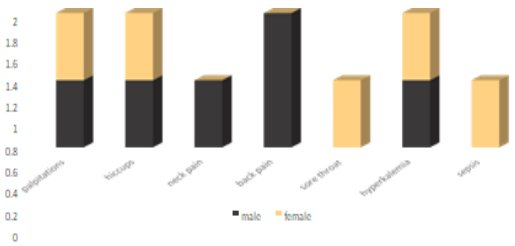

Fig:Other symptoms of CKD

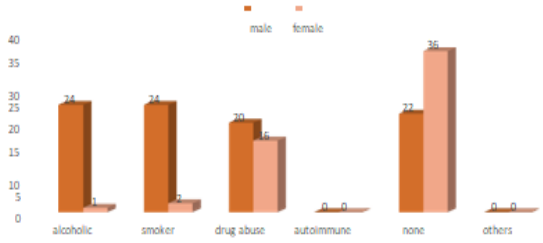

Fig: Personal history of study population

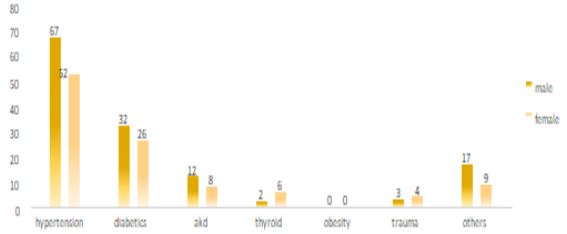

Fig : Past medical history of study population

Out of 120 subjects male had 67 hypertension, 32 diabetics, 12 AKD, 2 thyroid,3 trauma, 0 obesity and others are 17. Out of 120 subjects female had 52 hypertension,26 diabetic, 8 AKD, 6 thyroid, 0 obesity, 4 trauma and others are 9.

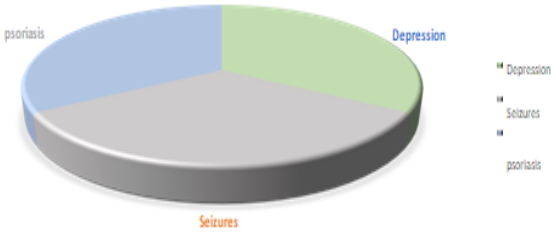

Fig: other comorbidities

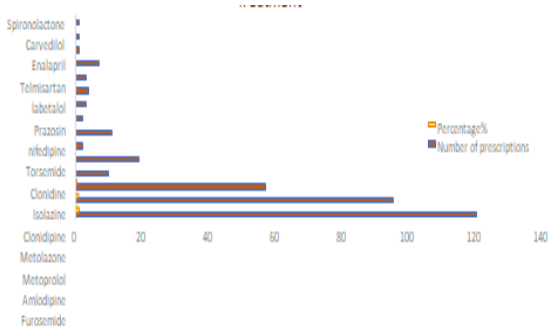

Fig : Treatment of CKD

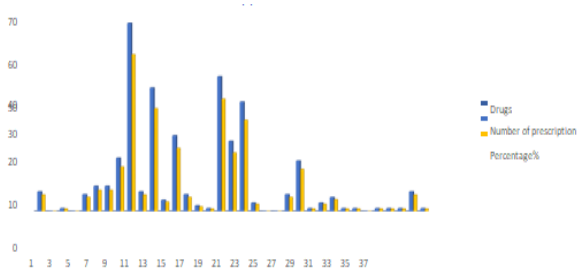

Fig : supportive treatment

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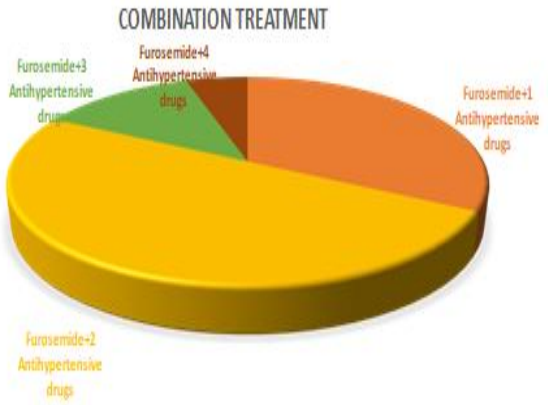

Fig : Combination treatment of study population

Table: Drugs showing ADR of study population

DRUG	REACTION
Lasix	Giddiness
	Increased liver Enzymes
	Headache
	Cough
Amlodipine	Constipation
	Headache Severe
	headache , Dry mouth
	Skin rash
Clonidipine	Dry mouth
	Weight loss
	Weight gain
	Anorexia
Metoprolol	Dyspnea
	Headache
Spironolactone	Vomiting
Enalapril	Constipation
Labetalol	dizziness
Torsemide	Vomiting

Table: Distribution of ADR by Probability scale

Probability of ADR	Males	females
Doubtful	0	0
Probable	8	4
Possible	8	8
Definite	1	1

IV. DISCUSSION

A prospective observational study wase conducted in a nephrology department of Government General Hospital for 6 months duration. A total of 120 patients were studied in our study.In our study, a total of 120 patients were studied among them, 66 were males and 54 were females.Total of 120 patients were collected, the age wise distribution as follows, males with age of below 20 (1), 21-30(1), 31-40(5), 41-50(23), 51-60(17), 61-70(16), 71-80(2), above 81(1). The study involved 120 patients, the personal history of the collected data among them male had 24 alcoholic, 24 smoker, 20 drug abuse, among them female had 1 alcoholic, 2 smoker, 16 drug abuse were observed.

The most common comorbidities in CKD are, Hypertension and diabetes were observed. Males had 63 Hypertension, 29 Diabetes, 8 Coronary Artery Disease, 2 Liver Disease, 2 Thyroid, 7 Tuberculosis, 2 COPD, 5 CVA. Females had 50 Hypertension, 25 Diabetes, 5 Coronary Artery Disease, 1 Liver Disease, 4 Tuberculosis, 0 COPD and CVA were observed. The study involved 120 patients,

The most common symptoms of both male and female had, pedal edema(104.4%), Oliguria (62.4%), anorexia(49.2%), vomiting's (28.8%), cough (30%), anemia (75.6%), SOB(55.2%), abdominal distension(30%), sleep disturbances(31.2%),nausea(46.8%) these symptoms were observed.

Out of 120 samples, 30 ADR's were observed in the collected sample. The mostly observed ADR is dry cough by Lasix, dry mouth by Amlodipine, headache by Metoprolol, anorexia by Clonidipine. The study aimed to evaluate the patients of AKI on survival and progression to CKD and to identify Co morbidities with these outcomes.

V. CONCLUSION

Men are more prevalence to CKD than females. Most commonly affected age group 41-50 with mostly developed symptoms are pedal edema, Oliguria, anuria, shortness of breath, anemia, cough. The safety, total no of adverse drug reactions in our study is 30, the most patients complained about dry cough, headache, anorexia, vomitings, sweating, skin rashes are observed. Most of the adrs are observed in the patients who are prescribed with Amlodipine (4.16%). These are minor reactions

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Calcium channel blockers were found to be the most frequently associated drugs with ADRs followed by diuretics, beta-blockers, ARBs and ACE inhibitors.8 anti hypertensive drug groups are included in our analysis. However, the average reduction in SBP& DBP over 1-2 weeks were most marked with calcium channel blockers, ARBs and beta blockers.

The efficacy of diuretics are appeared to be the most effective drugs for a significant weight reduction in prescribed patients over 1-2 weeks of observance. On assessment of casuality through Naranjo Algorithm, maximum of the ADRs have been categorized under possible which is being followed by category of probable.

The anti hypertensive therapy with combination drugs produce more rapid blood pressure control than monotherapy drugs.

REFERENCES

[1]. Teresa k. chen, md, mhs, daphne h. knicely, md, and morgan e. grams, md, phd chronic kidney disease diagnosis and management

[2]. Kidney failure : causes , symptoms and treatment https://my.clevelandclinic.org/health/diseases/17689-kidney-failure

[3]. Acute kidney failure : symptoms and causes https://www.mayoclinic.org/diseases-conditions/kidney-failure/symptoms-causes/syc-20369048

[4]. Andrew s. levey, kai- uwe eckardtyusuke tsukamoto, adeera levin, josef coresh, jerome rossert, dick d.e. zeeuw, thomas h. hostetter, norbert lameire, garabedeknoyandefinition and classification of chronic kidney diasease: a position statement from kidney disease : improving global outcomes (kdigo)

[5]. Georgi abraham, a almeida, […], and maithrayiekumaresanrenoprotective role of amlodipine in patients with hypertensive chronic kidney diseases

[6]. Marie briet, pierre boutouyrie, stephane laurent, and gerard m. london arterial stiffness and pluse pressure in ckd and esrd

[7]. Michael a. moore, md; murray epstein, md; lawrence agodoa, md; et al current strategies for management of hypertensive renal disease

[8]. Lukasz j. krzych and piotrfczempik impact of furosimide on mortality and the requirement for renal replacement therapy in acute kidney injury: a systematic review and meta-analysis of rendomized trails .

[9]. Dominik g. haider, md use of calcium channel blockers is associated with mortality in patients with chronic kidney disease