

# TO STUDY VARIOUS CO-MORBIDITIES AMONG HEMODIALYSIS PATIENTS

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## ABSTRACT

**AIM:** To study various co-morbidities among hemodialysis patients.

**OBJECTIVES:** To assess renal function by measuring serum creatinine, urinary Creatinine and blood urea and to evaluate the co morbidities among dialysis patients.

**METHODS:** The sample population (n=20) was chosen from one of the Hospital of Hyderabad. All the patients were of different age groups, sex, Biochemical parameters, food frequencies and with different co-morbidities. A format consisting of patient profile, subjective data, objective data, biochemical data and 24 hr recall followed during hospital stay

**RESULTS:** Among 20 subjects the study identified the co morbidities of hemodialysis patients. Hypertension and anemia are the major co morbidities for dialysis patients The bio marker studies showed a higher risk in age group of 41-50 years and mostly in males. Majority of the patients are with elevated serum creatinine, urea and low hemoglobin.

**CONCLUSION:** From the above results, it is very clear that Hypertension and Anemia are the major co morbidities and seen mostly in the age group of 41-50 among dialysis patients. And associated with elevated renal and blood biochemical parameters. Other co morbidities includes Diabetes mellitus, cardiovascular diseases, renal calculi, pyelonephritis.

**KEY WORDS:** Chronic Renal Failure, dialysis, hypertension, anemia, cardiovascular diseases, elevated creatinine, proteinuria.

## INTRODUCTION

Chronic renal failure is slow gradual loss of kidney function, some forms of CRF can be controlled or slowed down, but never cured. It is a condition that arises due to advanced and progressive damage of kidneys with impairment of renal function. Few functional nephrons remains and chronic renal failure results usually termed as uremia .chronic renal failure can range from mild dysfunction to severe kidney failure. It leads to severe illness and requires some form of renal replacement therapy such as dialysis, is called as End stage Renal disease.

**Symptoms:** progressive loss of nephrons and decrease in renal blood flow and glomerular filtration rate, sodium depletion, high serum potassium, edema, high blood pressure; loss of appetite, nausea, vomiting and hiccups.

**Co morbidities:** It includes hypertension, renal vascular diseases, chronic pyelonephritis, congenital abnormalities of both kidneys, Diabetes mellitus; these can cause extensive changes in kidney structure and function. It results in accumulation of fluids and waste products which lead to many complications.

**Dialysis:** It involves cleaning the blood of metabolic wastes, based on the principle of osmosis and diffusion. A semi permeable porous membrane is used to separate the blood carrying excess fluid and metabolic wastes, and hypotonic, dialysis fluid called as dialysate. It is a procedure that replaces some of the kidney normal functions. Mostly performed when a person has more than 95% of kidney failure. Dialysis specifically involves artificial filtering of blood by a machine, and it is a catabolic process. Like healthy kidneys, dialysis keeps the body in balance by removing waste products including salt and excess fluids, maintains a safe level of blood chemicals. There are 2 types of Dialysis.

**1. Hemodialysis:** An artificial kidney; haemodialyser is used to remove the waste products from the blood and restores body's chemical balance. In this the blood circulates, outside the body through commonly referred to as artificial kidney machine. An opening is created to connect an artery and a vein. In this less protein is lost than with peritoneal dialysis. In this patients usually have poor appetite.

**2. Peritoneal dialysis:** In this; the blood is cleaned continuously within the body, the blood stays in blood vessels, which line the patients abdominal peritoneal space, used as a semi permeable membrane and excess water and metabolic wastes removed by injecting the dialysis fluid into peritoneal cavity, its types includes Intermittent, Continuous cycling and Continuous ambulatory. The dialysate is slowly filled through catheter. Exchange volumes during peritoneal dialysis is commonly 1 – 3 liters' each hour

#### Complications of dialysis:

Hypo tension; this is the low blood pressure, most common and has several causes like brain does not receive enough blood, fainting or dizziness.

Fluid overload: patients can sometimes develop fluid overload.

Discomfort is seen when needles are inserted for hemodialysis, which commonly called bleeding from access point.

Most of the patients undergo symptoms like, restlessness, blurred vision, seizures, nausea and vomiting, headache and backache and chest pain.

It can only control the kidney failure and does not cure the diseased kidneys, it is too expensive and need to continue throughout their lives or until they receive a kidney transplant.

#### Objectives:

- The objectives include maintaining fluid imbalances.
- To correlate the levels of above biochemical parameters with clinical finding to get an insight into the basic pathology of disease.
- To assess renal function by measuring serum creatinine, urinary Creatinine and blood urea.
- To evaluate the co morbidities among dialysis patients.

## REVIEW OF LITERATURE

### DIABETES MELLITUS:

Diabetic patients have a high risk of developing micro- and macro vascular complications such as retinopathy, cardiovascular disease and renal disease. According to data in the ERA-EDTA Registry, 23% of the incident end-stage renal disease patients had diabetes as primary renal disease. Survival of diabetic dialysis patients appears inferior compared to ESRD patients without diabetes mainly due to cardiovascular disease. Mortality in the diabetic dialysis population is high but varies significantly among patients

Diabetes mellitus is the leading cause of chronic kidney disease (CKD) in the U.S., accounting for approximately 44% and 38% of incident and prevalent cases of end-stage renal disease, respectively.<sup>1</sup> While the total number of new patients with ESRD due to diabetes continues to rise (i.e., 49,603 new cases in 2011), there has been a plateau in the incidence rate over the past decade (i.e., 159 new cases per million in 2011). Over the past decade, the mortality rates for diabetic dialysis patients have also declined (i.e., 90 vs. 71 deaths per 1000 patient-years of at-risk time in 2000 vs. 2011, respectively). However, diabetic dialysis patients continue to have poor survival (i.e., 34% over 5 years), worse than those with ESRD due to hypertension and glomerular disease.<sup>[1]</sup>

### HYPERTENSION:

Hypertension is common, difficult to diagnose, and poorly controlled among patients with ESRD. Hypertension is a frequent finding in both acute and chronic kidney disease, particularly with glomerular or vascular disorders. The pathogenesis and preferred treatment of hypertension vary with the type of renal disease and its duration <sup>[2]</sup>

The prevalence of HTN in the total group of patients with renal diseases was 60.5%. The prevalence of HTN was practically universal in patients with renal vascular disease (93), 63% of the patients with chronic pyelonephritis and 54% of the patients diagnosed with glomerulonephritis were hypertensive. The prevalence of HTN in patients with renal insufficiency (80%) is significantly higher than that in patients without renal insufficiency (43% P<0.001). In a multiple logistic regression analysis, the independent risk factors defining HTN in renal patients were: renal failure, age, the presence of diabetes, hyper triglyceridaemia and proteinuria. <sup>[3]</sup>

**CARDIO VASCULAR DISEASE:**

Cardiovascular disease is a major concern for patients with end-stage renal disease (ESRD), especially those on hemodialysis. ESRD patients with coronary artery disease often do not have symptoms or present with atypical symptoms. Coronary lesions in ESRD patients are characterized by increased media thickness, infiltration and activation of macrophages, and marked calcification. Cardiovascular disease (CVD) is the main cause of death in patients with ESKD. It is estimated that ESKD patients are 5 to 20 times more likely to die because of cardiovascular causes than the general population [4]

It is estimated that 300,000 patients have chronic kidney disease in Peru, and more than 9,000 of them require renal replacement therapy. The incidence of ESKD patients receiving hemodialysis is increasing over time however the prevalence of CVD in these patients remains to be estimated.[5]

**RENAL CALCULI:**

The incidence of renal stones in patients on dialysis, while lower in number compared to the general population because of decreased renal function, is nonetheless a clinical dilemma. It is estimated that between 5 and 13% of all dialysis patients will develop symptomatic renal calculi and many more asymptomatic calculi. Many of the stone-forming dialysis patients will have recurring stone disease with one study finding an 83.3% recurrence rate.[6]

During a mean of 8.6 yrs of follow-up, stone formers were at increased risk for a clinical diagnosis of CKD, but an increased risk for ESRD or death with CKD was NS. Among patients with follow-up serum Creatinine levels, stone formers were at increased risk for a sustained elevated serum Creatinine and a sustained reduced GFR [7]

**ANAEMIA:**

The overall cost and health-related quality of life associated with current treatments for chronic kidney disease (CKD)-related anemia is not well characterized. Original studies published between January 1, 2000 and March 17, 2017 meeting the following criteria were included: adult population; study focus was CKD-related anemia; included results on patients receiving iron supplementation, red blood cell transfusion, or erythropoiesis stimulating agents (ESAs); reported results on Harord and/or costs.[8]

**PULMONARY TUBERCULOSIS:**

The incidence of tuberculosis (TB) has been increasing worldwide. One in every three people in

the world is infected with the tubercle bacillus bacteria (Hung et al., 2004). Many risk factors are associated with TB, such as human immunodeficiency virus (HIV) infections, transplant recipients, substance abuse, renal insufficiency, malignancy, and low socio-economic status (Lee et al., 2009; Li et al., 2011).

Increased TB incidence is also seen in dialysis patients (1974; 2010). Because of cellular immunity defects, patients with end-stage renal disease (ESRD) are at increased risk of developing TB (1994, 2001; 2007.2010). The incidence of TB in dialysis patients is 6–16 times higher than that in the general population (2001; 2006; 2009). However, the clinical manifestations of TB in patients on dialysis are quite non-specific (1999.2001, 2004), making a timely diagnosis difficult. Moreover, the infected locations are often extra-pulmonary (1998; Nakamura et al., 2009). Here we report four cases of extra-pulmonary TB in ESRD patients on dialysis.[9]

**HEPATITIS:**

After screening of 7311 documents, 56 studies were selected reporting the prevalence of HCV infection among hemodialysis patients from 10 countries of the region. Seven countries including United Arab Emirates, Afghanistan, Qatar, Bahrain, Kuwait, Oman, Israel, and Cyprus did not have any relevant document; thus, their latest reports were just mentioned. We performed the meta-analysis and determined the prevalence rates for each country as well as the whole region. The overall HCV infection prevalence among hemodialysis patients in the region was reported to be 25.3%; Egypt and Syria had the highest reported rates while Iran and Lebanon had the lowest. Further investigations are still needed to provide more reliable databases, find main risk factors, and to improve diagnosis and treatment plans, particularly in higher prevalent countries.[10]

**PYELONEPHRITIS:**

Emphysematous pyelonephritis (EPN) is a rare but serious necrotizing infection of the kidney, associated with the presence of gas in the kidney and peri-renal tissue. The most common pathogens are *Escherichia coli* and *Klebsiella pneumoniae*. [13]

The incidence rate (IR) of first-time hospitalization for pyelonephritis was 18.5 (95 % confidence interval per 1,000 person-years of follow-up, among renal transplant recipients ( $N = 2,656$ ) and 0.26 per 1,000 PYFU among population controls ( $N = 49,226$ ) yielding an incidence rate-ratio (IRR) of 72.0 (95 %).[14]

## METHODOLOGY

**DESCRIPTION:** The present study was conducted among 20 patients Underwent hemodialysis in a multi specialty hospital. A Structured questionnaire was administrated along with 24 hour recall and food frequency.

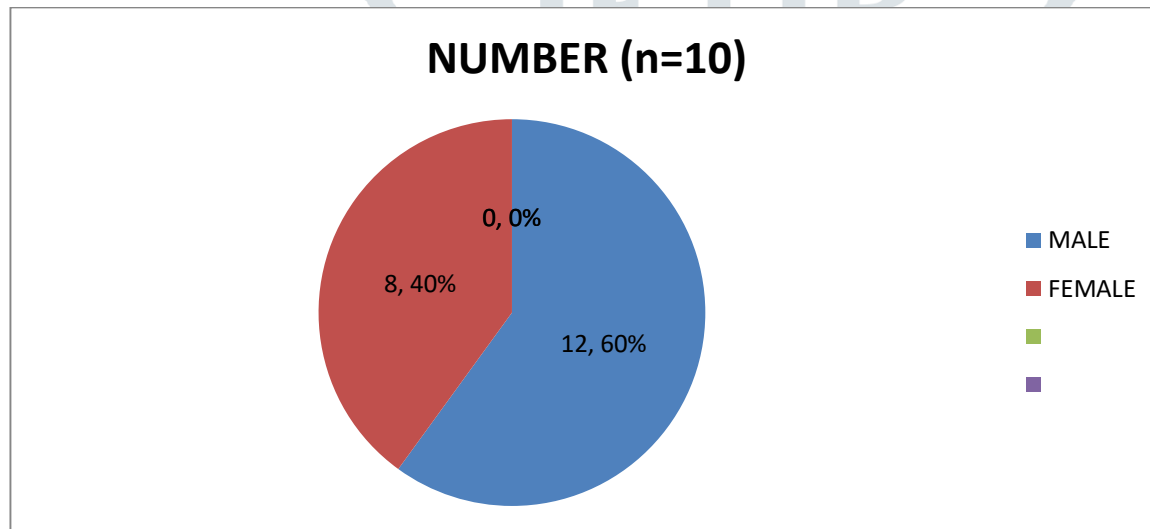
**MATERIALS AND METHODS:** In this study, designed the questionnaire method, for optimizing the detailed information among dialysis patients, like several co morbidities, biochemical parameters, and functional impairment, their past and present illness, subjective and objective data, medications, patients 24 hour dietary recall, food frequency, food habits, and diet on discharge of individual subject were followed. The entire data was collected, recorded and analyzed.

## GENDER CLASSIFICATION:

The total numbers of patients assessed were 20 of which male and female patients were.

Table (1) gives the break up

TABLE (1)



GENDER	NUMBER (n=10)	PERCENTAGE
MALE	12	60%
FEMALE	8	40%

From the above Pie chart male patients are about 12 and females are of 8. Men patients and women patients have different symptoms. Men will have decreased libido and women patients will have irregular menstruation. The impaired kidneys cannot inactivate estrogens' hormone and many men patients will become feminised and have the signs of female such as enlarged breast, reduced body hair, etc.

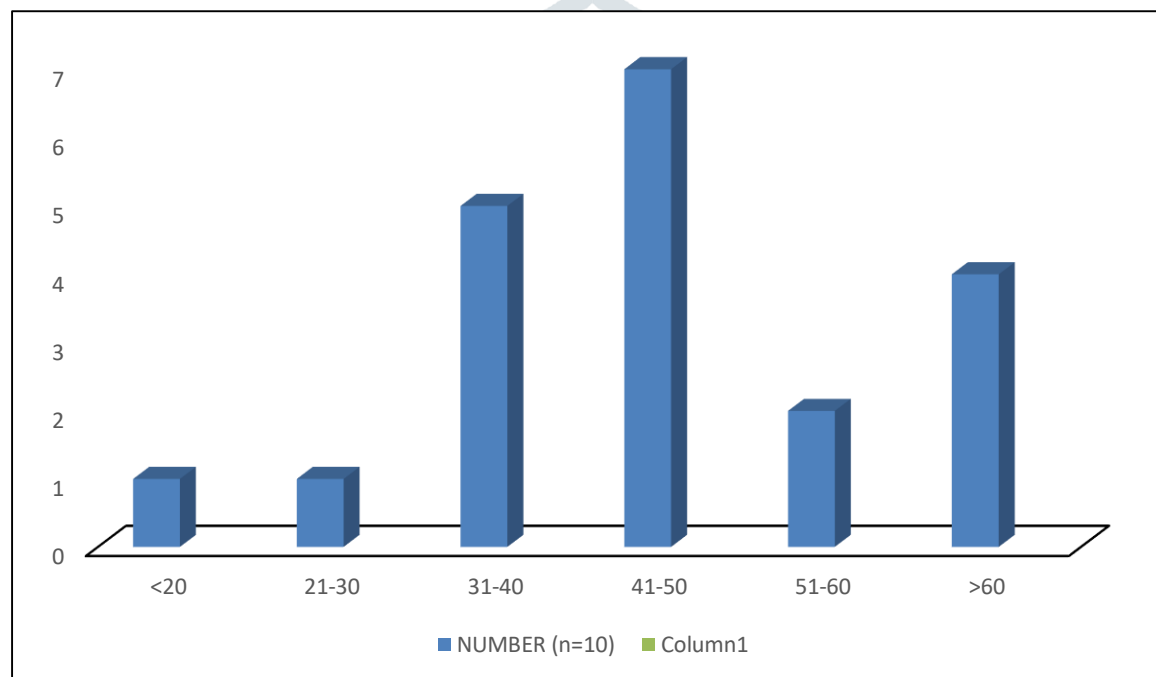
Other symptoms that both men and women patients are having high blood pressure, fatigue, anaemia, swelling, proteinuria, hematuria.

**AGE CLASSIFICATION:**

The age distribution of the patients is shown in table (2)

**TABLE 2**

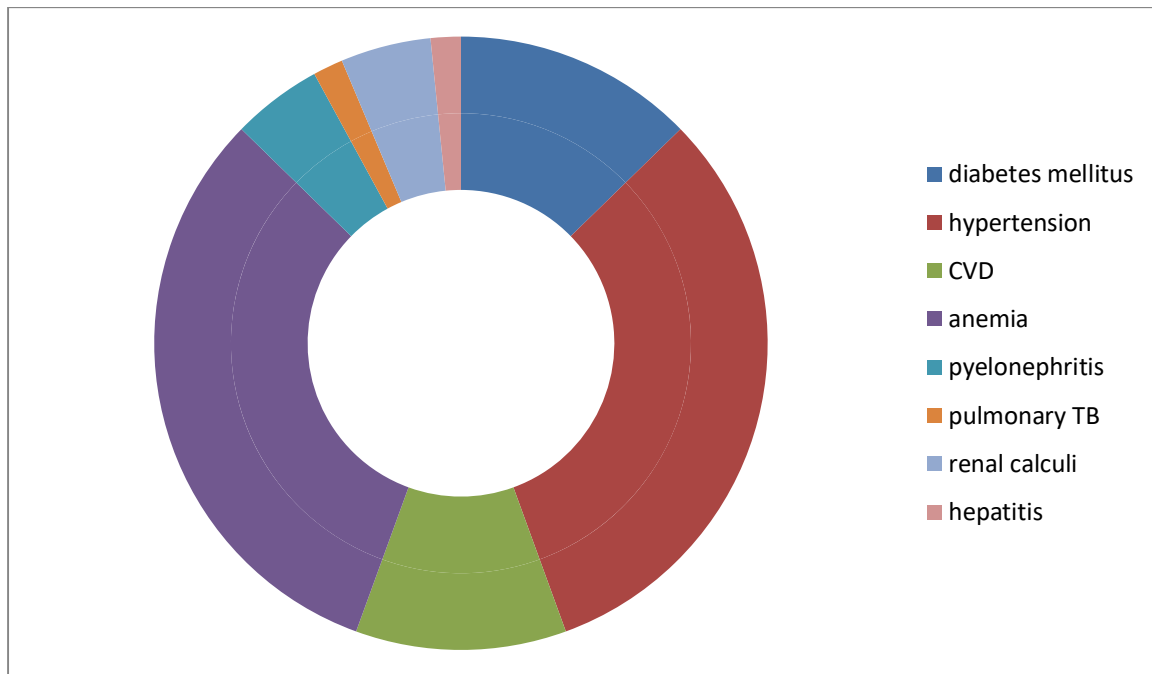
AGE (years)	NUMBER (N=10)	PERCENTAGE (%)
<20	1	10%
21-30	1	10%
31-40	5	50%
41-50	7	70%
51-60	2	20%
>60	4	40%



- From the collected data the above bar graph represents that most of the patients assessed were of about 41- 50 years of age. To estimate gender disparities, we calculated the male: female all-age prevalence rate ratio for each IKF condition. Global number of individuals with IKF reached 752.7 million, including 417.0 million females and 335.7 million males.[15]

**CO- MORBIDITES:**

CO-MORBIDITES	NUMBER	PERCENTAGE
Diabetes mellitus	8	80%
Hypertension	20	200%
Cardiovascular problem	7	70%
Anemia	20	200%
Pyelonephritis	3	30%
Pulmonary tuberculosis	1	10%
Renal calculi	3	30%
Hepatitis	1	10%

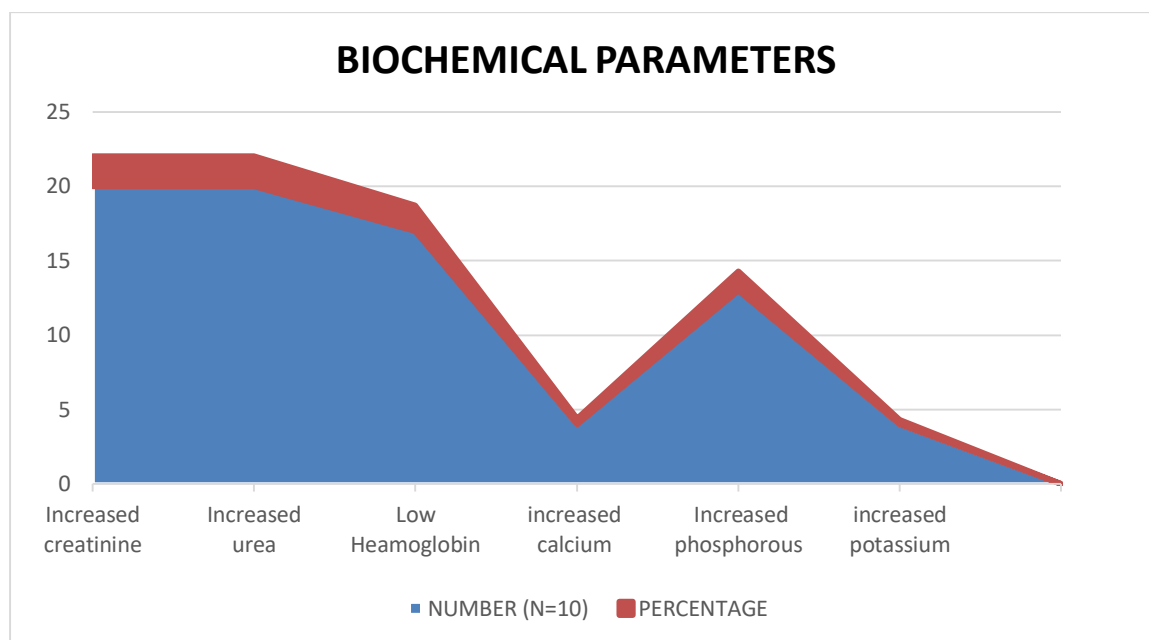


The prevalence of HTN in the total group of patients with renal diseases was 60.5%. Whereas 54% of the patients diagnosed with glomerulonephritis were hypertensive. In a multiple logistic regression analysis, the independent risk factors defining HTN in renal patients were: renal failure, age, the presence of diabetes, hyper triglyceridaemia and proteinuria. Anemia is a condition in which the body has fewer RBC than normal. It tends to worsen as CKD progresses. Most people who have total loss of kidney function, or kidney failure have anemia.

#### BIOCHEMICAL PARAMETERS:

The biochemical data of the patients were evaluated and interpreted. The details are given in table (3)

BIOCHEMICAL PARAMETERS	NUMBER (N=10)	PERCENTAGE
Increased creatinine	20	200%
Increased urea	20	200%
Low Haemoglobin	17	170%
increased calcium	4	40%
Increased phosphorous	13	130%
increased potassium	4	40%



From the collected data above bar graph indicates that all the patients assessed were having increased urea, creatinine and low levels of hemoglobin with increased phosphorous. Increased levels of urea and Creatinine, excretion in blood by impaired kidneys made vary complication in patients with renal failure before hemodialysis. Extra phosphorous causes a body changes that pulls calcium out of bones making them weak. [11]

#### FOOD FREQUENCY:

#### PULSES:

FREQUENCY	NUMBER	PERCENTAGE
Daily	10	100%
Alternative days	3	30%
Weekly thrice	3	30%
Weekly once	5	50%

#### MILK & MILK PRODUCTS:

FREQUENCY	NUMBER	PERCENTAGE
Daily	18	180%
Alternative days	0	0%
Weekly once	0	0%
No	2	20%

#### VEGETABLES:

FREQUENCY	NUMBER	PERCENTAGE
Daily	16	160%
Alternative days	1	10%
Weekly thrice	3	30%

#### NON-VEG:

FREQUENCY	NUMBER	PERCENTAGE
Daily	0	0%
Weekly 2-3 times	3	30%
Weekly once	11	110%
No	6	60%

**GREEN LEAFY VEGETABLES:**

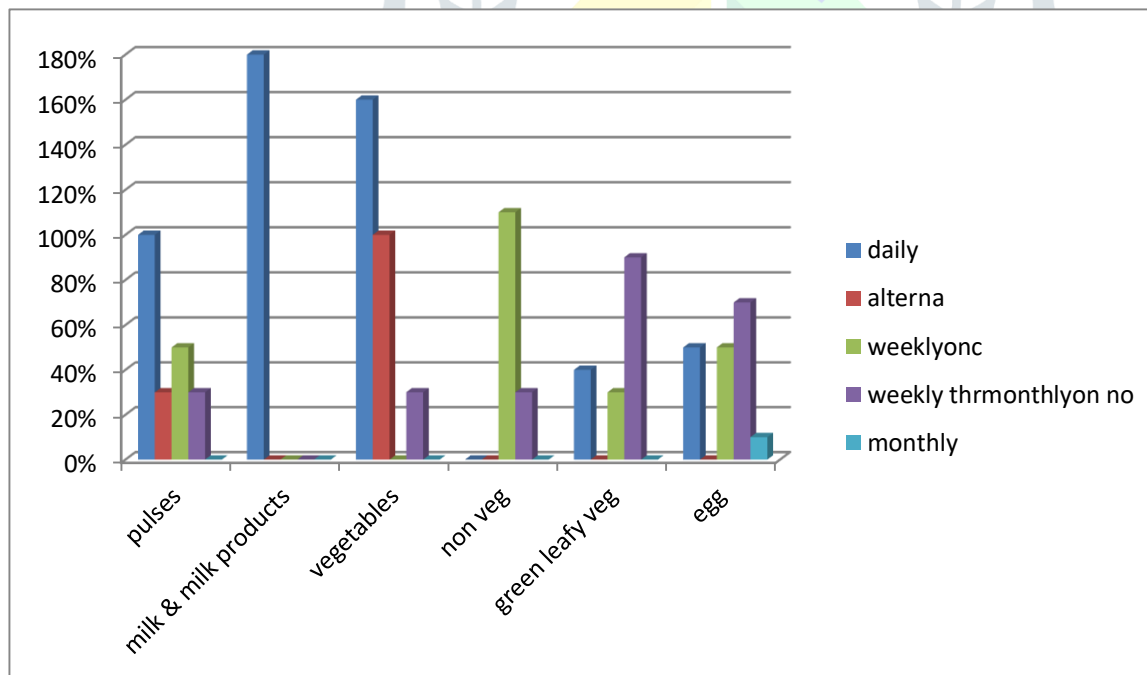
FREQUENCY	NUMBER	PERCENTAGE
Daily	4	40%
Weekly 2-3 times	9	90%
Weekly once	3	30%
No	4	40%

**EGG:**

FREQUENCY	NUMBER	PERCENTAGE
Daily	5	50%
Weekly 2-3 times	7	70%
Weekly once	5	50%
Monthly once	1	10%
No	2	20%

**FRUITS:**

FREQUENCY	NUMBER	PERCENTAGE
Daily	6	60%
Alternative days	4	40%
Weekly thrice	6	60%
Monthly once	3	30%
No	2	20%



From the collected data, many of them are not consuming sufficient amount of food group and their intake of quantity of protein is less as most of them are from vegetarian.

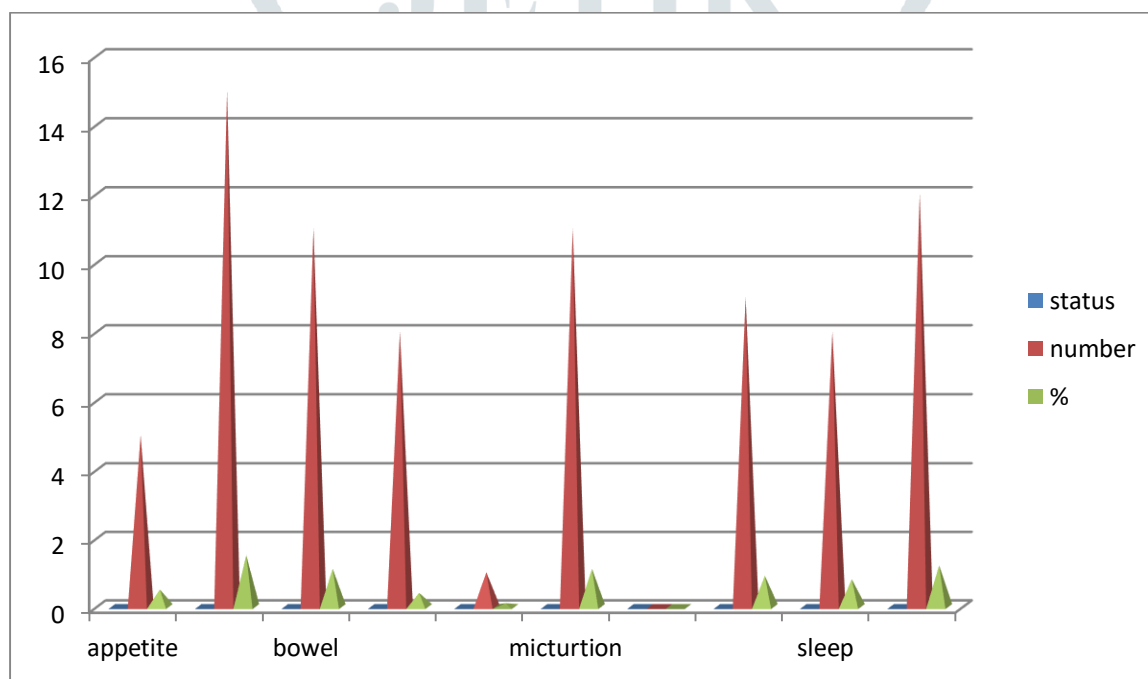


Even though they are consuming all types of food groups, but their intake of quantity is less due to poor GI function, poor dietary habits and poverty as with increased intake of energy dense foods and limited fruits and vegetable intake fresh fruits and vegetables are often not readily available in low income communities and if available they are expensive compared to other foods.[12]

### SUBJECTIVE DATA:

Subjective data of the patients were estimated in the table (5)

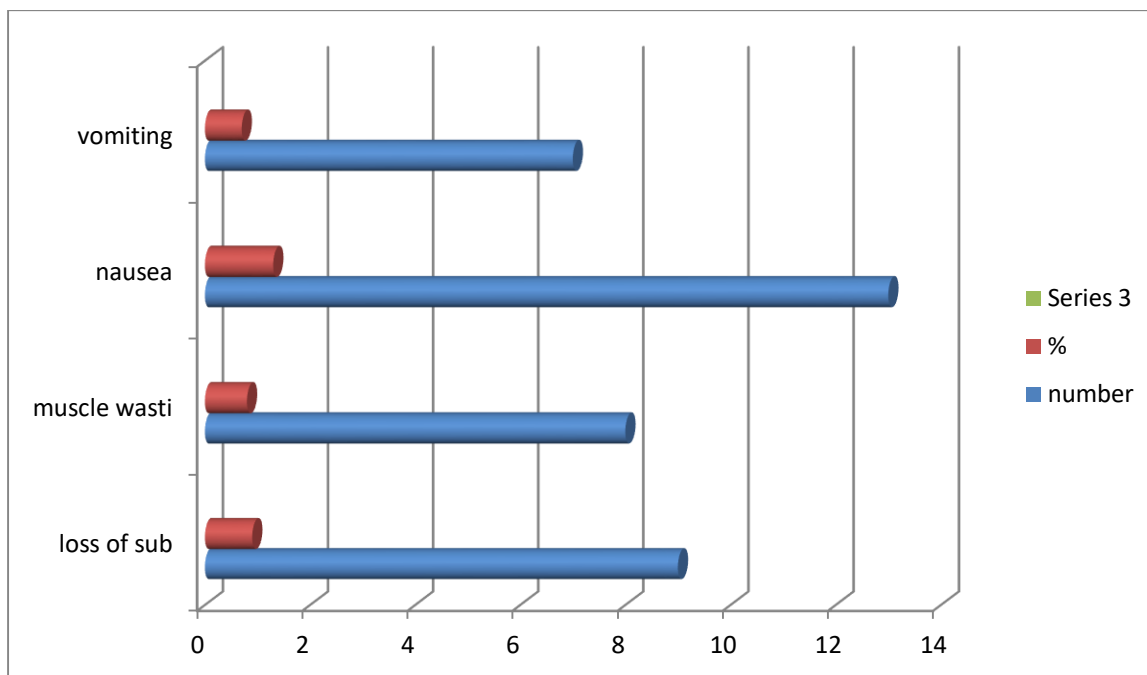
SUBJECTIVE DATA	STATUS	NUMBER	PERCENTAGE
Appetite	Normal	5	50%
	Decreased	15	150%
*Bowel	Normal	11	110%
	Constipated	8	80%
	Diarrhea	1	0%
Micturation	Normal	11	110%
	Polyuria	-	0%
	Oliguria	9	90%
Sleep	Normal	8	80%
	Lack of sleep	12	120%



Here , most of the people are undergoing with lack of appetite because of constipation, because the waste product that filled in the blood are not gets eliminated, due to the disturbance in GI functioning that leads to lack of sleep.

### FUNCTIONAL IMPAIREMENT:

SYMPTOMS	NUMBER	PERCENTAGE
Loss of subcutaneous fat	9	90%
Muscle wasting	8	80%
Nausea	13	130%
Vomiting	7	70%



Protein-energy wasting, which involves loss of subcutaneous fat and muscle mass, is prevalent and is associated with mortality in hemodialysis patients, the associations of fat tissue and muscle mass indices with all-cause mortality in hemodialysis patients.

## RESULTS AND DISCUSSION:

In this cross sectional study among 20 dialysis patients of both the genders, of different age groups, sex, their biochemical parameters, food frequency along with several co morbidities, all twenty of them are having high blood pressure along with anemia, followed by diabetes mellitus and cardiovascular diseases, remaining co morbidities like renal calculi, pyelonephritis, tuberculosis are seen in minute cases.

Hyper tension in renal patients is very common and it is the leading cause of kidney failure and it shows the higher risk in the age group of 41-50 years, it damages blood vessels in the kidneys reducing the ability to work properly and if blood vessels are damaged, they may stop removing wastes and extra fluid from the body., in some patients it is linked with presence of diabetes, hyper triglyceridaemia and proteinuria, hyper parathyroid is another cause of increase in blood pressure in dialysis patients with chronic kidney failure, calcification of arterial causes an increase in vascular resistance, causing increased pulse pressure.

Anemia it is caused due to low hemoglobin levels, it commonly occurs in kidney patients, it begins at the early stage of chronic renal failure it tends and worsen the kidney functions, immunosuppressant medicines can have side effects and particularly causes anemia, and also iron levels are low from losing blood.

## SUMMARY AND CONCLUSION:

In this cross sectional study, we took 20 subjects of both the genders male and female. Of them 12 are male and 8 are female. It is associated more in men because of consumption of alcohol, high blood pressure due to stress and later prone to cardiovascular diseases. When kidneys filtration gets damaged, it can cause an increase in the urge to urinate. Sometimes this can also be a sign of urinary infection or enlarged prostate in men, and leads to uremia.

Men and female patients have different symptoms, men will have decreased libido and women patients will have irregular menstruation. The impaired kidneys cannot inactivate estrogen hormone and many men patients will become feminized and have the signs of female such as enlarged breast, reduced body hair etc. other complications includes cardio vascular problems, Anemia, proteinuria, hematuria.

Most of the patients assessed were above 41- 50 years of age. Once the body reaches physiologic maturity, the rate of catabolic changes become greater than the anabolic changes the resultant loss of the cells can lead to varying degrees of decreased efficiency and impaired function.

This is the major analyses among dialysis patients, which includes their several co morbidities for dialysis. Almost all are patients are having high blood pressure along with anemia and then diabetes mellitus as the immunosuppressant's having many side affects leads to anemic and patients iron levels are low from losing blood, increase

Among 40 patients, all are having elevated creatinine, urea and low hemoglobin levels. Elevated creatinine levels are the signs of impaired kidney functioning, the creatinine levels in the blood will rise due to poor clearance of creatinine by kidneys. The filtration process breaks down and so the glomeruli and tubules do no work as well. Toxins such as urea can start to buildup and cause problems. And most of them are anemic because the intake of iron is very less and kidneys are not making enough of a hormone called erythropoietin that helps our body to make red blood cells.

Of the patients with dialysis, the intake of dairy products and consumption of vegetables are very high. And the intake of the protein content is low as most of the patients are from vegetarian background and the remaining foods groups are taken in a moderate way.

Most of the people are undergoing with lack of appetite because of constipation, the waste product that filled in the blood are not gets eliminated, due to the disturbance in GI functioning that leads to lack of sleep. Some people even they are consuming all types of food groups, but their intake of quantity is less due to poor GI function, poor dietary habits and poverty as with increased intake of energy dense foods and limited fruits and vegetable intake fresh fruits and vegetables are often not readily available in low income communities and if available they are expensive compared to other foods.

Protein-energy wasting, which involves loss of subcutaneous fat and muscle mass, is prevalent and is associated with mortality in hemodialysis patients, the associations of fat tissue and muscle mass indices with all-cause mortality in hemodialysis patients. Patients can feel nauseous or experience vomiting for a number of reasons during and after dialysis treatment. These symptoms are commonly associated with kidney diseases. Sometimes nausea and vomiting causes disturbance to some patients to avoid further dialysis treatment.

## ANNEXURE – 1

**Name:**

**Age:**

**Gender:**

**Diagnosis:**

### Anthropometric measurements

Height:

Weight:

### NUTRITIONAL SCREENING

#### GI SYMPTOMS

Difficulty in chewing

Difficulty in swallowing

Constipation

#### FUNCTIONAL IMPAIRMENT

Loss of subcutaneous fat

Muscle wasting

Persistent Nausea

Persistent Vomiting

Diarrhoea

### FOOD INTAKE

Appetite: Normal

Decreased

### BIOCHEMICAL PARAMETERS

Haemoglobin	
Urea	
Creatinine	
Phosphorus	
Potassium	
Calcium	
RBS/FBS	
Sodium	

### ANNEXURE –2

Since how long are you on dialysis?

Do you have any co-morbidities?

Do you have any of the symptoms?

- Anorexia
- Nausea
- Vomiting

Micturation Normal

Oliguria

Polyuria

### EATING HABITS

Do you consume pulses?

- Daily
- Alternate days
- Weekly thrice

- Weekly once

Do you consume milk and milk products?

- Daily
- Alternate days
- Weekly thrice
- Weekly once

Do you consume non vegetarian foods?

- Daily
- Weekly 2-3 time
- Weekly once
- Monthly once

How often do you take green leafy vegetables?

- Daily
- Weekly 2-3 time
- Weekly once
- Monthly once

How often do you take fruits?

- Daily
- Weekly 2-3 time
- Weekly once
- Monthly once

How often do you consume vegetables?

- Daily
- Weekly 2-3 time
- Weekly once
- Monthly once

How many hours do you sleep?

- 5 hours
- 6-7 hours
- Lack of sleep

#### SUGGESTIONS:

- Dialysis patients need to limit their fluid intake to be healthy as possible. Too much fluid can raise blood pressure, damage the heart, cause swelling and make dialysis uncomfortable.
- Limit the amount of dietary sodium in the diet. Salt makes your body hold on water and limiting salt helps to control thirst.
- Physical activity is very essential for patients undergoing with dialysis, as it decreases the blood pressure, reduces peripheral vessel resistance.
- Limit the intake of alcohol consumption as further it causes the risk of cardiovascular diseases and alcohol abuse was associated with lower serum albumin levels
- Diuretics are not commonly used because of lack of efficacy. The choice of anti hypertensive depends upon the co morbidities .
- Treat hypertensive aggressively and keeps blood pressure healthy, and keep blood sugar levels in control and HbA<sup>1</sup>C of 7.
- Have regular checkups with doctor and include serum creatinine to measure GFR. Restore and maintain electrolyte balance
- Preserve residual renal function and compensate and spare protein losses, for tissue repair and synthesis replace lost amino acids without causing uremic symptoms
- Manage hyperphosphatemia in patients with renal insufficiency, which causes hypocalcaemia and hyperparathyroidism.

- Improve patient survival, reduce patient morbidity, increase efficiency of care and improve quality of life
- Counsel patient regarding managing a healthy diet to prevent or control heart diseases and diabetes.
- The first step in treating anemia, as it is caused by iron, vit B<sup>12</sup>, or folic acid deficiencies to include sources of these nutrients in their diet. Some of these foods are high in sodium or phosphorous which people with CKD should limit in their diet.
- Before making any dietary changes, people with chronic renal failure should talk with a Dietician whose specializes in helping people with kidney diseases. A Dietician can help a person to plan healthy meals.
- Eat the right amount and right types of proteins to protect yours kidneys when the body uses proteins, it produces wastes. Kidneys remove these wastes, eating more protein than you need may make your kidneys work hardly.

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