

## “CLINICAL AND BIOCHEMICAL SPECTRUM OF CHRONIC KIDNEY DISEASE IN TERTIARY CARE CENTER”

Renuka Prasad. Y. S, Krishna Murthy. H. A.

1. Assistant Professor, Department of General Medicine, SIMS and RC, Mukka, Surathkal, Mangalore
2. Associate Professor, Department of General Medicine, SIMS and RC, Mukka, Surathkal, Mangalore

### CORRESPONDING AUTHOR

Dr. Krishna Murthy. H. A.  
Associate Professor  
Dept of General Medicine  
SIMS and RC, Mukka,  
Surathkal, Mangalore  
E-mail: kmha79@gmail.com,  
Phone: 0091 9880668121, 0091 9744730070.

**ABSTRACT:BACKGROUND OF THE STUDY :**The chronic kidney disease (CKD) is a known end result of type2 Diabetes mellitus and hypertension in recent times. It is associated with many features like hyperkalemia,hypocalcemia,hyponatremia,anaemia, hypoalbuminemia,multidrug resistant high blood pressure etc.So if we detect all these features early,we can extend the quality life of CKD patients. **OBJECTIVES:** The present study is undertaken with the following objective, to assess the clinical profile , biochemical profile and to determine the aetiology of chronic kidney disease, wherever possible at the time of presentation. **MATERIALS AND METHODS:** This is a descriptive study in which 50 patients with chronic kidney disease (CKD) ,who admitted at Chigateri General Hospital and Bapuji Hospital, attached to J.J.M. Medical College, Davangere, between year 2009 to 2011 were included.They were all fulfilled the criteria set by the National Kidney Foundations, Kidney Disease outcome quality initiative for diagnosing CKD by subjecting them to clinical assessment, laboratory analysis and ultrasonography of the abdomen and pelvis.The descriptives were reported based on frequencies and percentages (statistical method). **RESULTS:** The aetiology of CRF in our patients were found to be diabetic nephropathy in 38%, hypertensive nephropathy in 28%, chronic glomerulonephritis in 24%, obstructive uropathy in 6%, polycystic kidney disease in 2% and chronic pyelonephritis in 2%. The abnormality in the laboratory profile of the patients were found to be anaemia in 90%, hypocalcemia in 46%, hypoalbuminaemia in 34%, pedal edema in 78% and oliguria in 76%. The commonest clinical signs were high blood pressure in 92% and pallor in 90% of patients. **CONCLUSIONS:** The following conclusions can be drawn by our study,

1. The major symptoms were swelling of feet,oliguria and breathlessness, the major signs were pallor and persistent high blood pressure.
2. The major causes of CKD in descending order were, type2 diabetes mellitus,hypertension,chronic glomerulonephritis,and obstructive uropathy.
3. The lab features which commonly seen in our study were hypocalcemia, hyponatremia , hyperkalemia, anaemia and hypoalbuminemia in significant number of patients.

All the above features needs prompt detection and correction to prevent early mortality.

**KEYWORDS :** Chronic kidney disease; Chronic glomerulonephritis; Serum creatinine, Diabetes mellitus; Hypertension;

**INTRODUCTION:** Chronic kidney disease is characterized by a decrease in glomerular filtration rate and histological evidence of reduction in nephron population. The clinical course is typically one of a progressive and unrelenting loss of nephron function ultimately leading to end stage renal disease. There are multiple causes of kidney injury that lead to the final common pathway of End stage renal disease (ESRD), and this syndrome is characterized by hypertension, anemia, renal bone disease, nutritional impairment, neuropathy, impaired quality of life, and reduced life expectancy. Early stages of CKD can be detected through laboratory testing only. 1,2 The CKD is a known end result of type2 diabetes mellitus and hypertension in recent times, it is associated with many features like hyperkalemia, hypocalcemia, hyponatremia, anaemia, hypoalbuminemia etc. So if we detect all these features early, we can extend the quality life of CKD patients by timely interventions. 1,2,3.

The CKD is defined as kidney damage for  $\geq$  3 months, as shown by structural or functional abnormalities of the kidney, with or without decreased GFR, manifest by either pathological abnormalities or by markers of kidney damage, including abnormalities in the composition of the blood, urine, or in imaging tests and also defined by GFR  $<$  60 ml/min/1.73 m<sup>2</sup> for  $\geq$  3 months, with or without kidney damage.

The GFR is considered as the best measure of overall kidney function. A GFR below 60 mL/min/1.73m<sup>2</sup> represents loss of one half or more of the adult level of normal kidney function. Normal GFR varies according to patient's age, sex, and body size. Recommended equations for estimation of GFR using serum creatinine (plasma creatinine), Age, Sex, Race and Body weight.

## 1) Cockcroft - Gault formula<sup>5</sup>

Estimated creatinine clearance

$$\frac{((140 - \text{age}) \times \text{body weight in kg})}{(72 \times \text{plasma creatinine})}$$

(multiply by 0.85 for women).

## 2) MDRD formula (Modification of diet in renal disease study)<sup>5</sup>

**Estimated GFR (ml/min per 1.73 m<sup>2</sup>).**

$$= 1.86 \times (\text{plasma creatinine})^{-1.154} \times (\text{age})^{-0.203}$$

Multiply by 0.742 for women

Multiply by 1.21 for African Americans.

**AGE AND GENDER DIFFERENCES : AGE:** In young adults, the normal GFR is approximately 120 to 130 mL /minute / 1.73 m<sup>2</sup> and declines with age.<sup>6</sup> A decreased GFR in an elderly patient appears to be an independent predictor of adverse outcomes such as mortality and cardiovascular disease<sup>7,8</sup>.

# ORIGINAL ARTICLE

---

**GENDER:** Male gender has been recognized as an important factor in the development of CKD. In India studies have shown that upto 0.8% of the population may suffer from chronic kidney disease thereby putting the number at about 8 million of the 1 billion population.<sup>2</sup>

**OBJECTIVES:** The present study is undertaken with the following objectives:

To assess the clinical profile , biochemical profile of patients with chronic kidney disease at the time of presentation and to determine the aetiology of chronic kidney disease wherever possible.

**METHODOLOGY:** Source of data :This is a descriptive study in which CKD patients, who admitted at Chigateri General Hospital and Bapuji Hospital, attached to J.J.M. Medical College, Davanagere between year 2009 to 2011 were taken as study sample.

**METHOD OF COLLECTION OF DATA :** The fifty patients of both male and female with CKD, who were admitted as in patients and out patients were included, according to inclusion criteria set by National Kidney Foundation. , Kidney Disease Outcome Quality Initiative for diagnosing CKD.<sup>4</sup>

## **INCLUSION CRITERIA :**

A .Patients with serum creatinine above 2mg% with abnormal findings on renal ultrasound , asymmetric kidney size, small kidneys (less than 9cm), large polycystic kidneys and also normal sized kidneys especially in diabetes and amyloidosis were taken.

B . Elevated serum creatinine with no improvement for more than 3 months were also included.

Exclusion criteria :

Patients below the age of 17 years, CKD with heart failure, malignancy, liver disorders, hyperuricemia, on drugs like antimetabolites were not included in this study.

A detailed history and thorough physical examination were carried out in all patients. Data recorded on each patient by including age, sex, the underlying primary renal disease, clinical and biochemical features of chronic renal failure on a standard proforma..

**STATISTICAL METHODOLOGY:** The descriptives ( frequencies along with the percentages ) were reported. The Comparison between parameters based on Serum Creatinine levels, in terms of haemoglobin, potassium, calcium and albumin levels were done by using ANOVA.(TABLE. 5 )

**RESULTS:** In our study the mean age was 49.3 years, the youngest patient was 17 years and the oldest was 80 years of age(table1). The causes of CKD includes, 38% patients had diabetic nephropathy, 28% had hypertensive nephropathy, 24% were having chronic glomerulonephritis and 6% were having obstructive uropathy(table2).

The 84% of the patients had their haemoglobin level in the range of 5-10 gm%, the 6% of patients had the value below 5gm%, and 10% of patients had their haemoglobin level more than 10gm%(table3). The 62% of patients had their blood urea level in the range 101-150 mg/dl, only 12% of patients had their urea level more than 200 mg/dl and hardly 2 % had the value below 50 mg/dl. In 62% of patients the Serum Creatinine value was in the range of 5.1-12 mg/dl, 2% of patients had their value greater than 12.1 mg/dl and 36% of patients exhibit

their serum Creatinine value in the range of 2-5 mg/dl(table4).The 34% of patients had hyperkalemia and 62% had their value within normal limits (3.5-5 mEq/l). Only 4% had the value less than 3.5 mEq/l.

The hyponatremia (Serum sodium level < 130 mEq/L) was present in 24% of patients. Further in 74% cases this value lies between the normal limits (130-145 mEq/L)and only 2% had the value > 145 mEq/L. The hypocalcaemia (<8 mg/dl) was seen in 46% of cases, 52% of cases have this value within normal limits (8-10 mg/dl). The hypoalbuminemia (Serum Albumin < 3.5g/dl) was seen in 34% of cases, 66% of cases have this value within normal limits (3.5 - 5 g/dl).The total 64% of the cases seen to have decreased kidney size and 6% had an increased kidney size, where as 30% of the patients have exhibited normal size.

The clinical examination reflects that almost 90 % of the patients had pallor, 92% had hypertension , 78% had pedal edema,24% of had ascites and all the other signs were found to be below 6%(graph1). The most common symptoms found were Oliguria in 76%, anorexia in 32%. generalised weakness in 26% , vomiting in 46%,facial oedema in 22% and breathlessness in 68% of patients(graph2).Based on serum creatinine level we have compared the values of Hb%(P value-0.14),serum potassium(P value-0.18) and serum calcium(P value-0.58) among patients,which was statistically not significant.

**DISCUSSIONS:** The present study consists of 50 patients of CKD, who were admitted to the hospital or were on regular dialysis on OPD basis. These patients fulfilled the criteria set by the National Kidney Foundations , Kidney Disease Outcome Quality Initiative for diagnosing CKD. They were studied and evaluated by clinical and laboratory investigation including ultrasonography of abdomen .

The mean age was 49.3 years, the youngest patient was 17 years and the oldest was 80 years of age.. Our studies showed that the prevalence of chronic kidney damage as a result of hypertension and diabetes is far lower in younger age groups than in adult patients above the age of 30 years. Our findings were similar to those reported by the National Kidney Foundations KVDOQI subgroup on children and adolescents study conducted by Fivush et al 10.

In our study an increasingly high number of patients were found to be diabetic(38%) and hypertensive(28%). This trend is similar to that reported by Dash and Agarwal in the study conducted at the All India Institute of Medical Sciences<sup>11</sup>.Lysaght et al have also demonstrated similar trends in American populations<sup>12</sup>. In the study conducted by Xue et al the number of patients with diabetic nephropathy were almost 50% of the study groups<sup>13</sup>. The Chronic glomerulonephritis was seen in 23% patients, which is concurrent with the data of other developing countries like Egypt and Bolivia.<sup>14,15</sup>

The haemoglobin levels were below 10 gm/dl in 90% of the patients.The McGonigle and Wallin et al studied 863 patients for anaemia and found upto 90% of patients to have haemoglobin less, than 10 gm/dl<sup>16</sup>. Our study showed that patients with creatinine levels above 12 mg/dl had an average haemoglobin of less than 5gm/dl, emphasizing again that greater the kidney damage, more the severity of the anaemia.

The hyperkalemia was found in 34% of patients and which is responsible for sudden cardiac death due to rhythm disturbances. As per.the study conducted by Lisa. M Einhorn et al on the frequency of hyperkalemia and its significance in CKD, the hyperkalemia increases the odds of mortality within 1 day of presentation.<sup>17</sup>The hyponatremia was reported in 24%patients in our study, which is a known association with CKD. Study conducted by Sushrut

S and Waiker et al showed that even mild hyponatremia is associated with increased risk of mortality in CKD patients<sup>18</sup>. The hypocalcemia is a known entity in patients with CRF and our study showed the prevalence of 46%. In another study on CKD patients by Coen et al found that, with the creatinine clearance of 20 to 59 ml/min, 87% of patients had abnormal bone histology and the majority had lesions of high bone formation rate associated with hyperparathyroidism<sup>19</sup>.

The kidney size was decreased in 64% of the patients. The normal sized kidneys were seen in 30% of the patients, which is attributable to the large number of diabetic nephropathy cases in which normal kidney size is a known entity. The serum Albumin levels were decreased in 34% of the patients and which is consistent with the study done by Kopple et al.<sup>20</sup> The most common symptoms in our patients were pedal oedema (78%), oliguria (76%), breathlessness (68%), vomiting (44%) and anorexia (32%). CNS symptoms like convulsion and altered sensorium were found in 4% and 10% of patients respectively. The most common signs were high blood pressure (92%) and pallor (90%). Pedal oedema (78%) and ascites (24%). National Kidney Foundations K/DOQI evaluated 26 studies which related blood pressure to the level of GFR decline in univariate and/or multivariate analysis. In another study conducted by Yuichiro Yano et al on the association between prehypertension and CKD showed that, the prevalence of CKD increased with the severely raised blood pressure.<sup>21</sup> The comparison of parameters like Hb%, potassium and calcium based on serum creatinine level was not statistically significant, which indicates that irrespective of serum creatinine level clinical manifestations will be the same.

**CONCLUSIONS:** The following conclusions can be drawn by our study,

1. The major symptoms were swelling of feet, facial puffiness, oliguria and breathlessness, the major signs were pallor and persistent high blood pressure. So if any patient presents with these features, they need to be evaluated thoroughly to detect renal disease as early as possible.
2. The major causes of CKD in descending order were, type 2 diabetes mellitus, hypertension, chronic glomerulonephritis and obstructive uropathy. So if we detect and treat these conditions early, we can prevent further progression and irreversible damage to the kidney.
3. The lab features which commonly seen in our study were Hypocalcemia, Hyponatremia, Hyperkalemia, anaemia and hypoalbuminemia in significant number of patients. So early detection and correction of all these features needed to prevent mortality.

**LIMITATIONS OF STUDY:**

1. The study population is less, so it needs to be correlated with large number of population included study.

2. The renal biopsy is required for exact correlation with clinical features, for treatment and to know the prognosis of the patients.

**ACKNOWLEDGEMENTS:** Our sincere thanks to all teachers and authors for helping to bring out this study successfully.

## BIBLIOGRAPHY:

1. Mani M.K Prevention of chronic renal failure at the community level. *Kidney International* 2003; 63: 586-9
2. Agarwal SK, Dash SC, Mohammad I, Sreebhuan R, Singh R, Pandey RM Prevalence of chronic renal failure in adults in Delhi, India. *Nephrology Dial Transplantation* 2005;21:232-233.
3. Agarwal, S. K. Chronic kidney disease and its prevention in India. *Kidney International*, 2005 ,Vol. 68; 98;S41-S45
4. National Kidney Foundation. K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification. *Am J Kidney Dis* 2002; 39:S18.
5. Levey AS, Greene T, Kusek J, et al. Simplified equation to predict glomerular filtration rate from serum creatinine. *J Am Soc Nephrol* 2000;11:A828
6. Lindeman RD, Tobin J, Shock NW. Longitudinal studies on the rate of decline in renal function with age. *J Am Geriatr Soc* 1985;33:278-85.
7. Shlipak MG, Fried LF, Crump C, Bleyer A J, Manolio TA, Tracy RP, et al. Cardiovascular disease risk status in elderly persons with renal insufficiency. *Kidney Int* 2002;62:997-1004.
8. Manjunath G, Tighiouart H, Coresh J, Macleod B, Salem DN, Griffith JL, et al. Level of kidney function as a risk factor for cardiovascular outcomes in the elderly. *Kidney Int* 2003;63:1121-9.
9. Silbiger SR, Neugarten J: The impact of gender on the progression of chronic renal disease. *Am J Kidney Dis* 1995;25: 515 -533.
10. Fivush BA, Jabo K, Sullivan EK, Feld, Kohaut E, Fine N. *Paediatr Nephrol* 1998;12:328-377.
11. Dash SC, Agarwal SK. *Neprhol dial transplant* 2006;21:232-233.
12. Lysaght MJ. Maintenance dialysis population dynamics : Current trends and long-term implications. *J Am Soc Nephrol* 2002;13:S37-S40.
13. Xw JL, Ma LZ, Louis TA, et al. Forecast of the number of patients with the end stage renal disease in United States. *Am J Kidney Dis* 2001;12:2753-2758.
14. Kurokawa K, Nangaku M, Saito A, Inagi R, Miyata T. Current Issues and Future Perspectives of Chronic Renal Failure. *J Am Soc Nephrol*, 13. 2002.
15. Barsoum RS : The Egyptian transplant experience. *Transplant Proc* 24 : 2417-2420, 1992.
16. McGonigle RJ, Wallin JD, Shaddock RK, Fisher JW. Erythropoietin deficiency and inhibition of erythropoiesis in renal insufficiency *Kidney. Int*1984;25:437-444.
17. Lisa M. Einhorn et al; The Frequency of Hyperkalemia and Its Significance in Chronic Kidney Disease, *Arch Intern Med.* 2009;169(12):1156-1162.
18. Sushrut S. Waikar et al; Mortality after Hospitalization with Mild, Moderate, and Severe Hyponatremia *Am J Med.* 2009 September; 122(9): 857-865.
19. Coen G, Manni M, Addari O, Ballanti P, Pasquali M, Bonucci E. Metabolic acidosis and osteodystrophic bone disease in predialysis chronic renal failure. *Miner Electrolyte Metabo* 1995;21:375-382.
20. Kopple JD, Greene T, Chumlea WC, Hollinger D, Manoni BJ, Merrill D, Zimmer GS. Relationship between nutritional status and the albumin levels : results from MDRD study. *Kidney Int* 2000;57:1688-1703.
21. Yui. Yano, S. Fujimoto, et at; Association between prehypertension and chronic kidney disease in, the Japanese general population, *Kidney International* , September 2011;346.

**Table 1 Age and Sex Incidence**

	Male	Female	Total
Number of patients	34	16	50
Mean Age	50.9 yrs	46.1 yrs	49.3 yrs
Youngest Patient	17 yrs	23 yrs	-
Eldest Patient	80 yrs	70 yrs	-

**Note : Male Female ratio : 2.12 : 1**

**Table 2 Aetiology of Chronic Kidney Disease**

<b>Aetiology</b>	<b>No.of pateints</b>	<b>Percentage</b>
Chronic glomerulonephritis	12	24
Diabetic nephropathy	19	38
Hypertensive nephropathy	14	28
Obstructive uropathy	3	6
Polycystic disease of kidney	1	2
Chronic pyelonephritis	1	2
<b>Total</b>	<b>50</b>	<b>100</b>

**Table 3: Haemoglobin levels in chronic Kidney Disease**

<b>Haemoglobin (gm%)</b>	<b>No.of pateints</b>	<b>Percentage</b>
<5	3	6
5-10	42	84
>10.1	5	10
<b>Total</b>	<b>50</b>	<b>100</b>

**Table 4 : Serum Creatinine Values in Chronic Kidney Disease**

<b>Serum creatinine (mg/dl)</b>	<b>No.of pateints</b>	<b>Percentage</b>
2-5	18	36
5.1-12	31	62
>12.1	1	2
<b>Total</b>	<b>50</b>	<b>100</b>



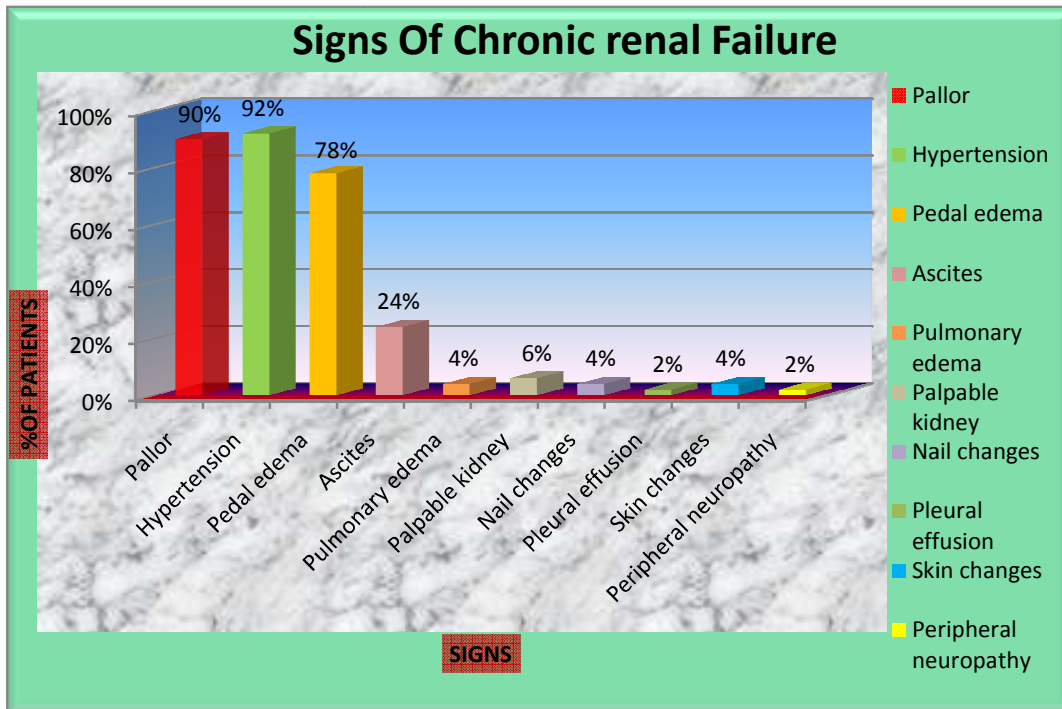
# ORIGINAL ARTICLE

**Table- : The Comparison between based on Serum Creatinine levels in terms of Haemoglobin, Potassium, Calcium and Albumin Levels.**

Group	Sr.Creat (mg/dl)	Patients		Hb% (gm/dl)		S.Potassium (mEq/L)		S.Calcium (mg/dl)		S.Albumin (gm/dl)	
		No.	%	Mean	SD	Mean	SD	Mean	SD	Mean	SD
I	2-5	18	36	8.31	2.48	4.51	0.75	8.14	1.10	3.59	0.45
II	5.1-12	31	62	7.48	1.55	4.85	0.88	7.94	0.89	3.56	0.53
III	>12.1	1	2	5.00		5.80		7.60		2.20	
ANOVA		F		2.03		1.76		0.55		3.62	
		P		0.14		0.18		0.58		0.03	
Statistical Significance				NS		NS		NS		S	

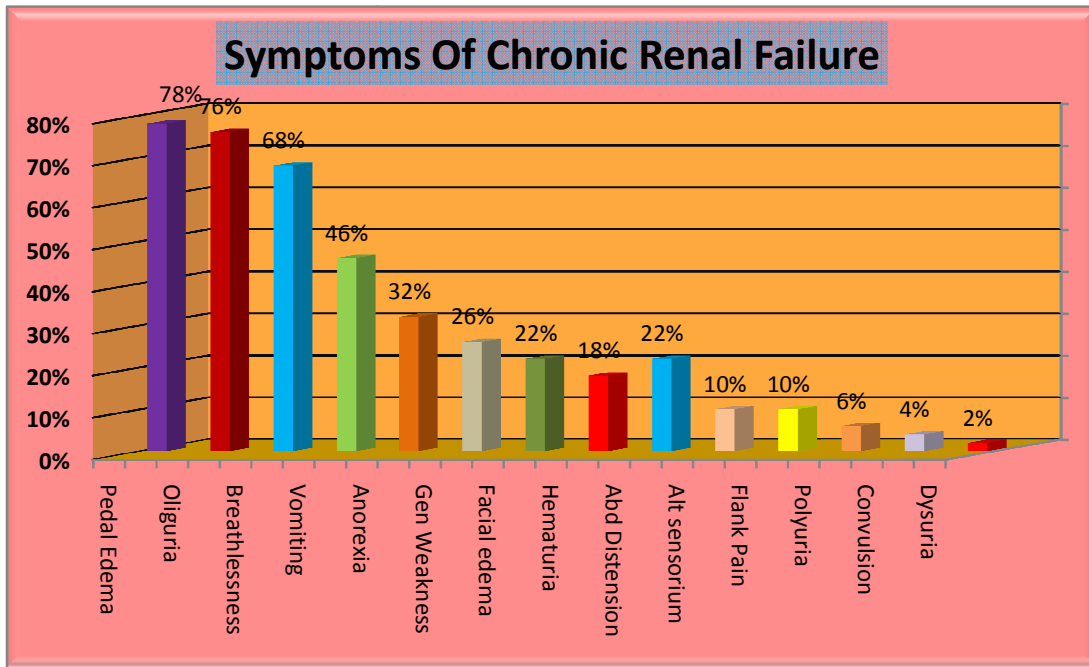
p>0.05 Non significant (NS), p<0.05 Significant (S)

**Graph- Signs of Chronic Kidney Disease**





Graph - : Symptom of Chronic Kidney Disease



LIST OF ABBREVIATIONS USED

CGN	:	Chronic glomerulonephritis
CKD	:	Chronic kidney disease
CPN	:	Chronic pyelonephritis
CRF	:	Chronic renal failure
ESRD	:	End stage renal disease
GFR	:	Glomerular filtration rate
HD	:	Hemodialysis
HTN	:	Hypertension
K/DOQI	:	Kidney disease outcome quality initiative