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A PROSPECTIVE OBSERVATIONAL STUDY ON THE CLINICAL PROFILE AND MANAGEMENT OF ANEMIA IN CHRONIC KIDNEY DISEASE PATIENTS

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ABSTRACT

Background: Anemia is a condition in which there is A decline in quantity of erythrocytes or the quantity of blood hemoglobin levels is known as anemia. The function of hemoglobin is to carry oxygen to the tissues. Due to kidney failure and decreased erythropoietin synthesis, People with CKD frequently suffer from anemia. Over while, it can result in reduced oxygen supply to organs and other regions of the body. **Objective:** To determine anemia risk among CKD individuals with regards to Haemoglobin level. To examine The recommended course of action for those with an amplified risk of Anemia among CKD based on readings from hematology tests. **Methodology:** This is a prospective observational study to learn more about anemia and how to treat it in patients with CKD. The form for gathering data was created and utilised. This form primarily includes the patients clinical profile, hemoglobin levels, CKD Stage, treatment plan for managing anemia, and demographic information. Informational pamphlets were used for patient counselling, and follow-up will be ongoing. **Results:** A total of 170 cases of nephrology department were observed. Majority of cases were males 118 (69%). Most of them between age group 60 to 70 (41%). Hypertension with diabetes mellitus were the most common comorbidities observed in 68 patients (40%). majority of the patients had Hb levels 9-11 g/dL range (79 patients) indicating anemia was common in dialysis. In RBC Count most patients were in the range of 3-4 million/mm^3 range with 79 patients (46%), creatinine levels were studied in which majority of 60 patients (35%) were in 6-9 mg/dL range. majority of therapy to manage anemia is ESA + Iron + Folic acid with 73 of patients. **Conclusion**: The study highlights that CKD dialysis patients commonly present with anemia due to multiple factors including iron and folic deficiency and reduced erythropoietin production, combined therapy with ESA and iron plays a key role in improving haematological outcomes.

KEYWORDS: Chronic kidney disease, anemia, hemodialysis, erythropoiesis stimulating agents, iron deficiency.

INTRODUCTION

OVERVIEW OF KIDNEY AND ITS FUNCTIONS KIDNEY

The kidneys are in charge of maintaining the extracellular environment overall, controlling the balance of fluids and electrolytes, and excreting waste materials urea and creatinine. The majority of filtered solutes, such as amino acids, glucose, calcium, potassium, and phosphorus, must be recovered by the kidneys to avoid significant losses in the urine.

Erythropoietin production: EPO, a glycoprotein hormone, is crucial for the growth and survival of erythrocytic progenitors. The kidneys are the primary organ that produces EPO. Hypoxia-inducible transcription factors (HIF) stimulate the expression of the EPO gene. The cause of anemia is deficiency of EPO. Recombinant human EPO treatment can used to treat. Half lives in the circulation are prolonged. The recent finding of EPO receptors across a range of nonhemopoietic tissues, including tumor cells, is either hopeful or worrisome.

CHRONIC KIDNEY DISEASE

All stages of kidney dysfunction are collectively termed "chronic kidney disease" (CKD). It has taken the place of the phrase chronic renal failure(CRF), which previously used to characterize more severe types of chronic kidney disease. CKD is a worldwide public health concern. Kidney failure is becoming more prevalent America's death rate.

ETIOLOGY OF CKD

The following are:

- Diabetes
- Elevated blood pressure
- Vascular illness
- Primary or secondary glomerular disease Kidney illnesses caused by cysts
- Tubulointerstitial illness

EPIDEMIOLOGY

Chronic Kidney Disease (CKD) Epidemiology in India: Approximately 1 in 8 Indians, or 13.24% of the population have chronic kidney disease. Men (14.8%) have some slightly greater individuals compared to women (13.5%).

CKD STAGING

Urine albumin-creatinine ratio (uACR), a blood test, and glomerular filtration rate estimate (eGFR), a urine test, are two straightforward assays used to assess CKD.

FIG 6: eGFR LEVELS AND STAGES OF CRD.

THE 5 STAGES/PHASES OF CKD

Blood testing for eGFR (mL/min/1.73m²) and occasionally urine tests for albumin (uACR) are used to evaluate CKD staging.

- ✓ Stage 1 (G1): Normal or High Function (eGFR 90+)
- ✓ Stage 2 (G2): Mildly Decreased (eGFR 60–89)
- ✓ Stage 3a (G3a): Mild to Moderately Decreased (eGFR 45–59)
- ✓ Stage 3b (G3b): Moderate to Severely Decreased (eGFR 30–44)
- ✓ Stage 4 (G4): Severely Decreased (eGFR 15–29).
- ✓ Stage 5 (G5): Kidney Failure (eGFR <15)

CKD PATHOPHYSIOLOGY

Progressive nephropathies that are persistent and chronic cause ongoing kidney fibrosis and a gradual loss of normal renal architecture (Unlike AKI).

Histologically, glomerulosclerosis, tubulointerstitial fibrosis, and vascular sclerosis are the ha llmarks of CKD. Main process include

- Infiltration of damaged kidneys by extrinsic inflammatory cells
- Activation, proliferation, and death of intrinsic renal cells
- Activation of fibroblasts and myofibroblasts
- Extracellular matrix deposition.

CKD MECHANISMS OF ACCELERATED PROGRESSION

- Both intraglomerular and systemic hypertension
- Hypertrophy of the glomerulus

DIALYSIS

This treatment is for people whose kidneys are declining. Patients kidneys are unable to filter blood effectively because they have renal failure. Body accumulate toxins and waste products. Which are usually ejected leave body upon urination. Usually, when you urinate, they leave your body. 3 main principles on which dialysis relies on are: Diffusion, Convection, Ultrafiltration.

TYPES OF DIALYSIS

HEMODIALYSIS procedure requires a dialyzer or filtering device, to eliminate waste and additional fluid from your blood before returning it into your body. Hemodialysis before starting a minor surgery is needed to create a vascular access site (basically an opening into one of your blood vessels). Usually the duration is for 4 hours repeated for 3 times in a week.

PERITONEAL DIALYSIS utilises the peritoneum which is the inside lining of your abdomen to purify the blood. Dialysate which is a dialysis solution is injected into your peritoneum to support the local blood arteries in filtering your blood. This solution is then drained into an external bag. Two primary methods of peritoneal dialysis.

- Continuous ambulatory peritoneal dialysis, or CAPD
- Automated peritoneal dialysis (APD)

PHARMACOLOGICAL THERAPIES FOR CKD

1. SODIUM-GLUCOSE COTRANSPORTER-2 (SGLT2) INHIBITORS

The class of medications has grown to include

canagliflozin, dapagliflozin, empagliflozin, and ertugliflozin. These drugs lessen blood sugar levels in blood by reducing the renal filtrate's capacity to absorb glucose, hence removing extra glucose by a glucosuric effect. Eg: Empagliflozin.

2. GLP-1 ANALOGS

Glucagon-like peptide-1 (GLP-1) agonists of receptors that include exenatide, lixisenatide, semaglutide, and liraglutide. These drugs change the way incretin GLP-1 works through GLP-1 receptors. These drugs lessen BP, insulin, glucose and cause decrease of weight.
Eg: Exenatide

3. METHYLXANTHINE DERIVATIVE: Pentoxifylline

A derivative of methylxanthine, pentoxifylline (PTF) has a number of pharmacologic effects, such as immunological modulation, reduce proteinuria in diabetics. Often givien with an ACE inhibitor or an angiotensin-receptor blocker (ARB).

4. DIURETICS

Thiazide and loop diuretics are related to low chloride, high cholesterol, low glucose, low potassium, high uric acid, and low magnesium with high dosage levels are between the metabolic and electrolyte problems. Diuretics are important for CKD and they remove unnecessary water and sodium from the body, which are decrease the edema, high blood pressure and extra fluids.
Eg: Hydrochlorthiazide

5. RAAS BLOCKERS

They are important for CKD therapy to reduce proteniuria and slow progression. RAAS blockers are helpful in both early and later stages of chronic renal disease. RAAS blockers repeatedly they get AKI episodes of various degrees of seriousness. ACE Inhibitors (Enalapril) & Angiotensin-II Antagonist (ARBS) Losartan.

6. MINERALOCORTICOID RECEPTOR ANTAGONISTS

Finerenone, spironolactone, eplerenone, esaxerenone, apararenone are mineralocorticoid receptor antagonists. By inhibiting the action of aldosterone, these medications lower BP, heart damage, kidney damage, and sodium retention.

ANEMIA IN CKD (DIALYSIS)

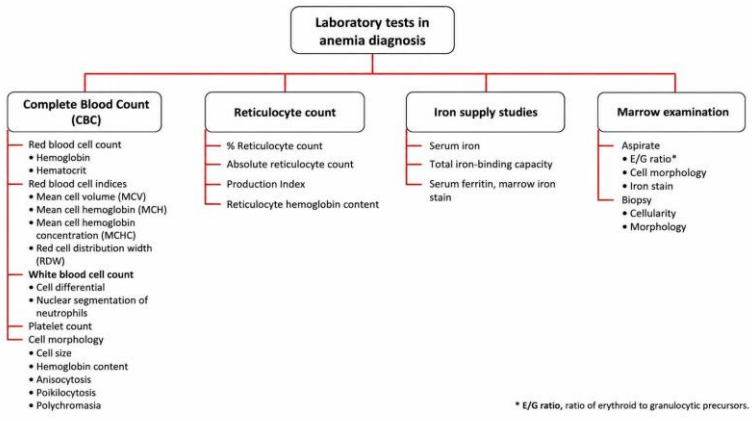
There are insufficient well erythrocytes in anemia. Red blood cells(RBC) are utilised by body to transport oxygen throughout. In anemia, the human body may not acquire adequate oxygen to function correctly.

SIGNS AND SYMPTOMS OF ANAEMIA IN CKD

- Feeling very tired or weak
- Shortness of breath (difficulty breathing)
- Feeling dizzy or lightheaded
- Headaches
- Pale skin or gums
- Body aches
- Trouble focusing or thinking clearly
- Having very little energy
- Fast or irregular heartbeat.[58]

DIAGNOSIS OF ANAEMIA

- Haemoglobin: The amount of oxygen-carrying protein in your blood is indicated by hemoglobin (Hb). Anemia is frequently described as a hemoglobin level of <12 g/dL for womankind and <13 g/dL for men who are Ages 15 and up
- Ferritin: indicates the amount of iron your body has stored. If your adult ferritin level is less than 100 ng/mL or less than 200 ng.
- Transferrin



PATHOPHISIOLOGY OF ANEMIA IN CKD

Hypoxia-Induced Factor Mechanism: The alpha and beta subunits make up the heterodimer that is the HIF. However, in the cell's nucleus, alpha and beta subunits unite and bind to a DNA sequence known as hypoxia-responsive elements. As a result, erythropoietin production is increased.

Erythropoietin Production & Action Mechanism: Erythropoietin functions as a genuine hormone, binding

to bone marrow cell receptors to create erythrocytes. It has a half-life of five to twelve hours.

Iron Deficiency Mechanism: Iron deficiency is seen in patients who have not in dialysis because loss of blood and poor absorption of iron. In CKD folks Iron deficiency is common. Low transferring saturation measure the normal or high levels of ferritin repeatedly showing the iron deficiency.

Hepticidin & Altered Iron Hemeostasis Mechanism: Hepcidin is also necessary for the control and preservation of systemic iron homeostasis, produced in the liver and causes hepatocytes, macrophages, and duodenal enterocytes to break down ferroportin, which stops iron from being properly absorbed and used. it mostly consists of erythropoietin insufficiency, erythrocyte life decrease, and altered iron homeostasis.

TREATMENTS FOR ANEMIA IN CKD

GENERAL MANAGEMENT: The doctor may recommend iron supplements, either as a pill or an intravenous (IV) infusion, if the patient has adequate iron in their body. A patient on dialysis may be given intravenous iron supplements. In a person with CKD in stages 3 or 4 and haemoglobin level <9 g/dL, other potential sources of anaemia should be ruled out.

Evolution of recombinant human erythropoietin (rHuEpo), which replaced blood transfusions.

REPLACEMENT OF IRON: The most recurrent cause of ESA hyporesponsiveness or resistance is insufficient iron reserves or low iron availability. Thus, it's critical to correct iron deficiency before administration of ESA drugs and to initiate sufficient iron storage during treatment. Iron replacement by oral or parenteral medications are feasible. Oral iron therapy has several potential problems, including poor absorption, drug-drug interactions and low compliance due to GI side effects. If stomach upset does occur, patients should consume oral iron drugs alongside meals but avoid dairy, eggs, fiber, bran, antacids, and vitamins for two hours afterwards.

ERYTHROPOIESIS-STIMULATING AGENTS: Control of anemia in CKD and ESKD, ESA products have been treated as considered the gold standard. Only accessible to folks with Hb below 10 g/dl. To address for anaemia treatment, a doctor may administer erythropoiesis stimulating drugs, which instruct the patient's bone marrow to produce more red blood cells. To achieve and sustain target, check haemoglobin levels and modify dosage by 25% no more than once a month.

Erythropoiesis stimulants may be given IV or SC
[1.]Epoetin alfa and beta.
[2.]Darbepoetin alfa
HIF-PH INHIBITORS: Drugs increase the body's synthesis of EPO and improve iron metabolism. HIF-PH is available in pill form and can be taken orally.

ADJUVANT THERAPY

- VITAMINS If the body is deficient in certain vitamins, such as folic acid or vitamin B12 (cobalamin), To produce healthy RBC, both are required.
- BLOOD TRANSFUSIONS Usage of IV to administer healthy red blood cells. These are only applied in cases of acute or urgent anaemia as they can create other health issues, such as severe allergic responses and iron overload.

METHODOLOGY

1. **STUDY DESIGN:** Prospective observational study.
2. **STUDY LOCATION:** At Tertiary care hospital, Hyderabad.
3. **STUDY DURATION:** 6 months prospective data collection.
4. **SAMPLE SIZE:** 120 samples

SAMPLE SELECTION

INCLUSION CRITERIA

Patients with undergoing dialysis or identified with CKD.

- ✓ People receiving therapy for anemia and CKD.
- ✓ Patients who meet normal clinical criteria for hemodialysis and have proven anemia.
- ✓ Patients of either aged 18 years and above.
- ✓ Patients with different stages of CKD (Stage 1 to stage 5). Including those on maintenance dialysis

EXCLUSION CRITERA

- ✓ Patients not diagnosed with CKD.
- ✓ Individuals suffering from anaemia because of causes Apart from CKD (eg. acute blood loss, hemolytic disorder).
- ✓ Pregnant and lactating women.
- ✓ Patients with severe multiple health problems or other major organ impairment affecting study outcomes.

METHODS OF DATA COLLECTION

Data was obtained from.

1. Prescriptions
2. Laboratory Reports
3. Treatment/medication charts.

STUDY PROCEDURE

- ✓ In order to learn more about anemia and how to manage in patients with CKD, eligible patients were enrolled in this prospective observational trial upon their informed agreement. The data collection form was made and used. The patient's clinical profile, hemoglobin levels, CKD stage, anemia treatment plan, and demographic data are the main contents of this form. Patient counseling was conducted through informational brochures, and follow-up will continue. The study conducted at the hospital. All relevant data was collected from the time of admission until the review/follow-up date. After that, the information was entered in Microsoft Excel

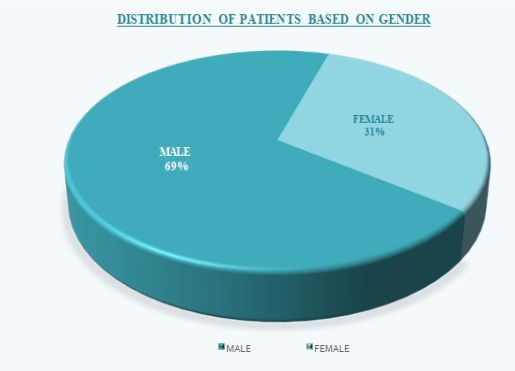
document for analysis. The proper statistical analysis methods were used to create frequency tables.

RESULTS

1. DISTRIBUTION OF PATIENTS BASED ON GENDER

From the sample size of 170 patients, number of male Individuals were discovered to be 118 (69%) and Female patients were 52 (31%). Hence this study shows higher proportion in male patient.

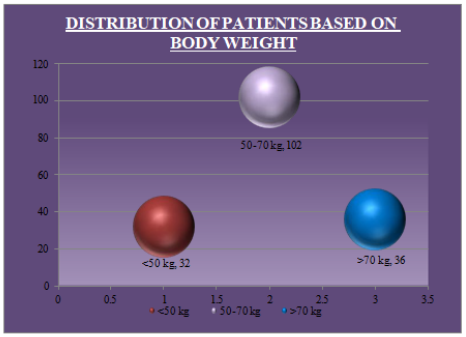
GENDER	NO. OF PATIENTS
MALE	118
FEMALE	52



2. DISTRIBUTION OF PATIENTS BASED ON AGE

The below table shows analysis of distribution of patients based on age in this study shows that 60-70 years age group constituted the largest proportion of patients. This suggests that significant number of patients undergoing dialysis with anemia belong to elderly population.

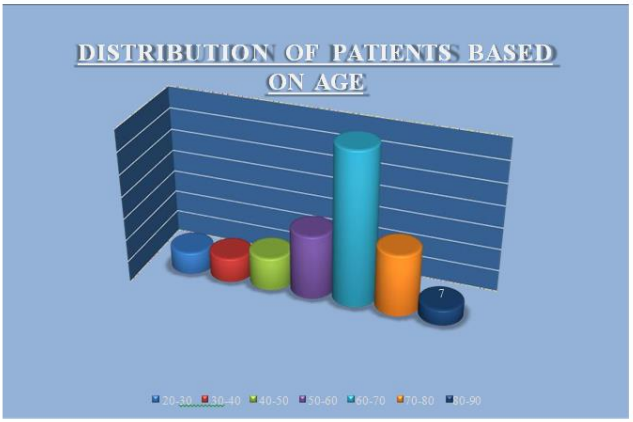
AGE GROUP (Yrs)	NO. OF PATIENTS
20-30	10
30-40	11
40-50	15
50-60	29
60-70	70
70-80	28
80-90	7



3. DISTRIBUTION OF PATIENTS BASED ON BODY WEIGHT

The above criteria is considered according to body weight of the patient were studied where majority of the patients were in 50-70 kg body weight.

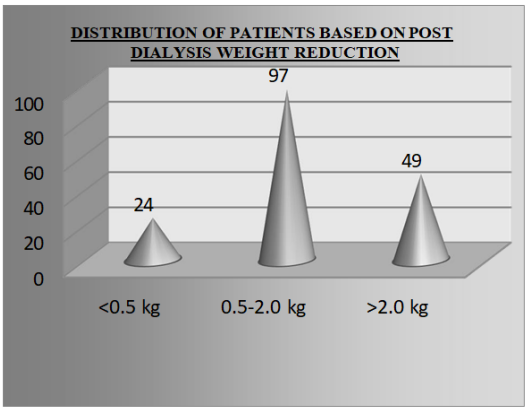
WEIGHT	NO. OF PATIENTS
<50 kg	32
50-70 kg	102
>70 kg	36



4. DISTRIBUTION OF PATIENTS BASED ON POST DIALYSIS WEIGHT LOSS

The above criteria is considered Post dialysis weight loss criteria was taken into studies where most of the patients showed 0.5 to 2 kg of weight loss with 97 patients.

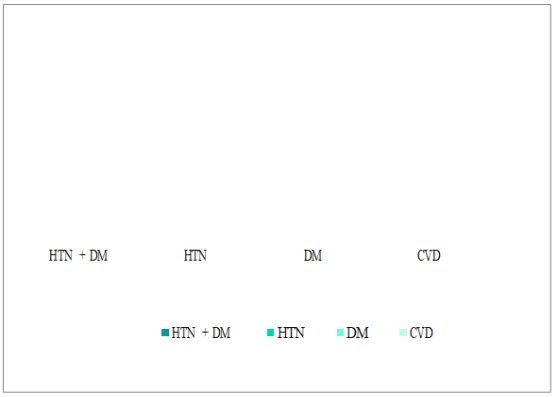
WEIGHT REDUCTION	NO. OF PATIENTS
<0.5 kg	24
0.5-2.0 kg	97
>2.0 kg	49



5. DISTRIBUTION OF PATIENTS BASED ON COMORBIITIES

It can be seen in above table that Comorbid conditions were evaluated among the study participants. Hypertension with diabetes mellitus were the most common comorbidities observed in 68 patients followed by hypertension alone with 55 patients and diabetes alone with 32 patients, least common was CVD with 15 patients.

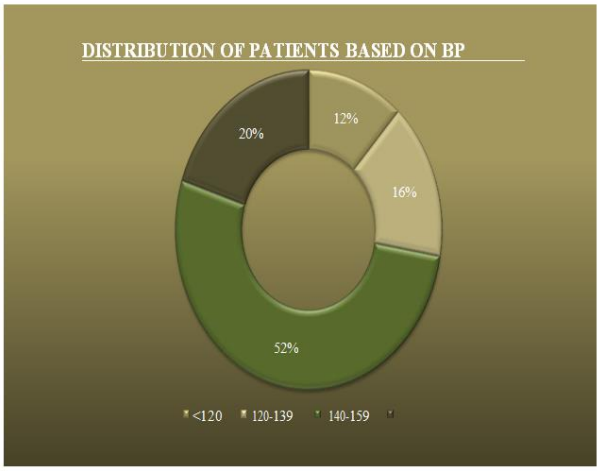
COMORBIDITIS	NO. OF PATIENTS
HTN + DM	68
HTN	55
DM	32
CVD	15



6. DISTRIBUTION OF PATIENTS BASED ON BLOOD PRESSURE

Evaluation of the Blood pressure levels showed most patients were in the range 140 to 159 mmHg with 89 patients.

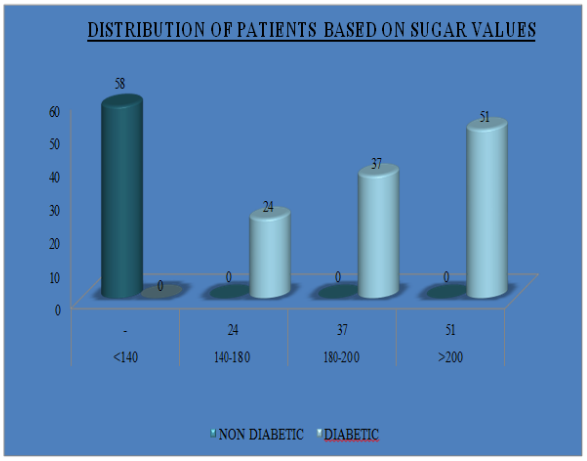
BP LEVELS (mmHg)	NO. OF PATIENTS
<120	20
120-139	27
140-159	89
>160	34



7. DISTRIBUTION OF PATIENTS BASED ON SUGAR LEVELS

As we can see in the above table assessment of the incidence of blood glucose levels was observed where large proportion of patients has >200 mg/dL with 51 patients. Total 65.5% cases in diabetic group and 34.1% cases in non-diabetic group with 58 patients.

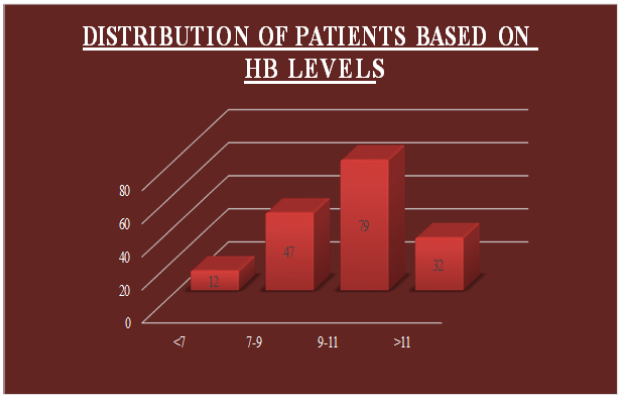
RANDOM BLOOD SUGAR (mg/Dl)	DIABETIC	NON DIABETIC
<140	-	58
140-180	24	-
180-200	37	-
>200	51	-



8. DISTRIBUTION OF PATIENTS BASED ON CLINICAL MANIFESTATIONS OF ANEMIC DIALYSIS PATIENTS

The above table shows research was proceeded based on Clinical manifestations of CKD anaemic dialysis patients with criteria pedal edema with 52 patients, headache 44 patients, nausea and vomiting 24 patients, fever and pruritus both 21 and 19 patients respectively. Lastly chest pain with 10 patients.

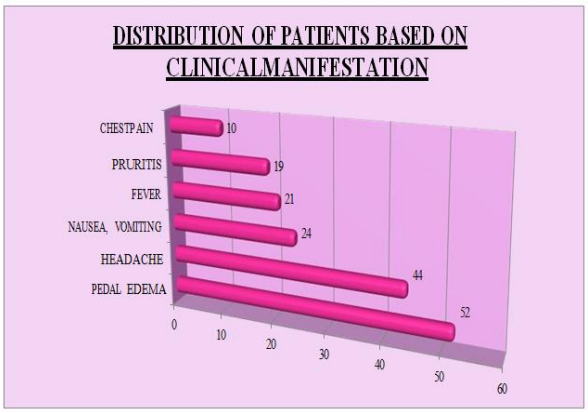
CINICAL MANIFESTATIONS	NO. OF PATIENTS
PEDAL EDEMA	52
HEADACHE	44
NAUSEA, VOMITING	24
FEVER	21
PRURITIS	19
CHESTPAIN	10



9. DISTRIBUTION OF PATIENTS BASED ON HEMOGLOBIN LEVELS

The above haematological parameter was considered ishemoglobin levels which shows the majority of the patients had 9-11 g/dL range (79 patients).

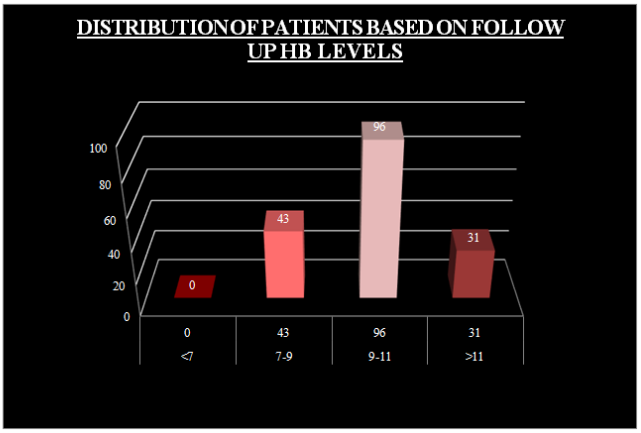
HB LEVELS (g/dL)	NO. OF PATIENTS
<7	12
7-9	47
9-11	79
>11	32



10. DISTRIBUTION OF PATIENTS BASED ON FOLLOW-UP HEMOGLOBIN LEVELS

Table isfollow-uphemoglobin levels which shows the majority of the patients had 9-11 g/dL range (96 patients).During follow up the hemoglobin levels showed overall positive trend, while fewer patients remained in lower or higher levels of hemoglobin categories.

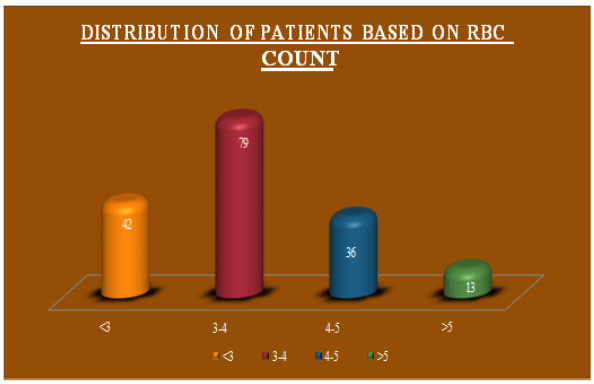
FOLLOW-UP HB LEVELS (g/dL)	NO. OF PATIENTS
<7	0
7-9	43
9-11	96
>11	31



11. DISTRIBUTION OF PATIENTS BASED ON RBC COUNT

Observational studies were carried out where Evaluation of the RBC Count revealed that most patients were in the range of 3-4 million/mm³ range with 79 patients, which naturally indicates gradual decrease in RBC levels very few patients had >5 levels.

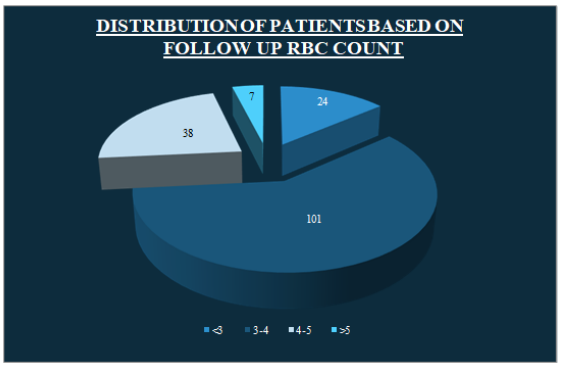
RBC COUNT(millions/mm³)	NO. OF PATIENTS
<3	42
3-4	79
4-5	36
>5	13



12. DISTRIBUTION OF PATIENTS BASED ON FOLLOW-UP RBC COUNT

The above paragraph shows that on follow-up, there was shift in the values where 101 patients shifted towards 3-4 million/mm³ which suggests reduction in severe low RBC count indicating overall improvement in haematological status.

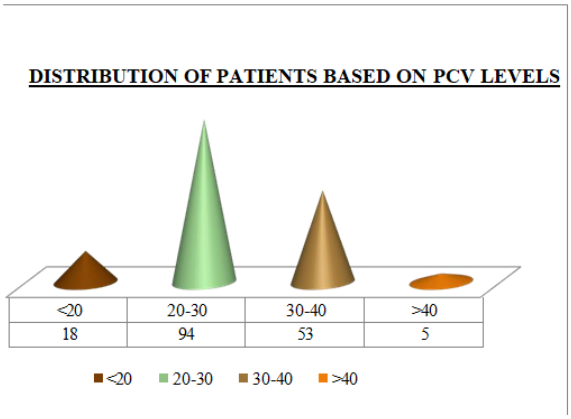
FOLLOW UP RBC COUNT (millions/mm³)	NO. OF PATIENTS
<3	24
3-4	101
4-5	38
>5	7



13. DISTRIBUTION OF PATIENTS BASED ON PCV LEVELS

The observational studies in PCV values were studied majority of patients has 20-30% range (94 patients) followed by 30-40% with 53 patients and minority of <20% and >40% with 18 and 5 patients.

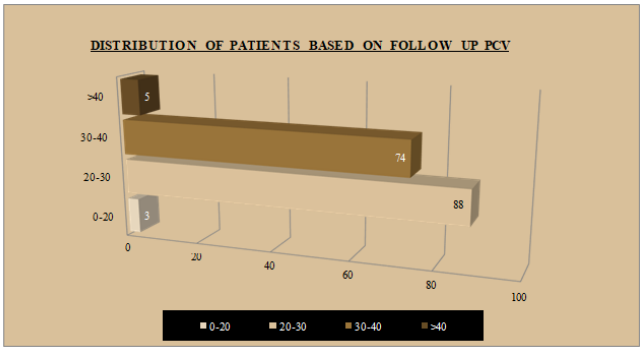
PCV %	NO. OF PATIENTS
<20	18
20-30	94
30-40	53
>40	5



14. DISTRIBUTION OF PATIENTS BASED ON FOLLOW-UP PCV LEVELS

Evaluation of follow-up PCV values showed majority of patients has 20-30% range (88 patients) followed by 30-40% with 74 patients. Patients showed improvement into 30 to 40%.

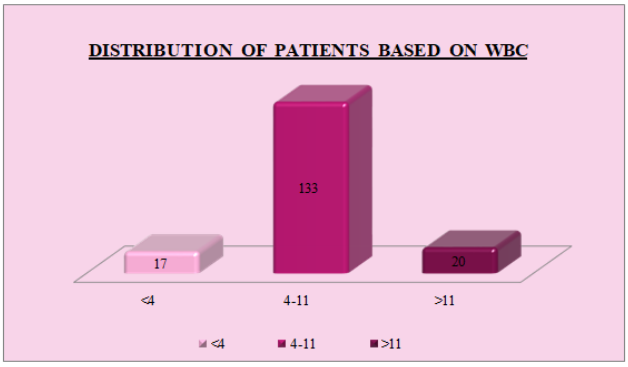
FOLLOW UP PCV %	NO. OF PATIENTS
<20	3
20-30	88
30-40	74
>40	5



15. DISTRIBUTION OF PATIENTS BASED ON WBC LEVELS

Research based on observations was conducted based on WBC levels in which most patients were in 4-11 x10³/mm³ range in 133 patients which indicates normal leukocyte levels.

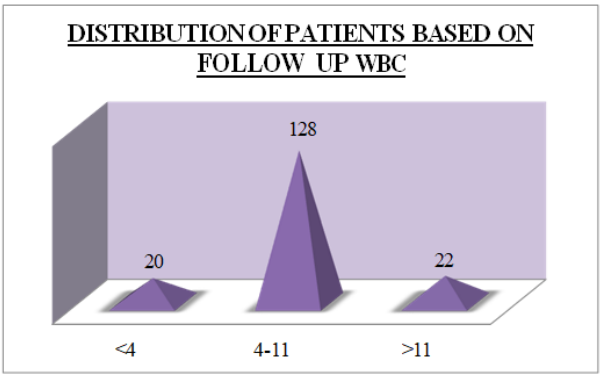
WBC (x10³/mm³)	NO. OF PATIENTS
<4	17
4-11	133
>11	20



16. DISTRIBUTION OF PATIENTS BASED ON FOLLOW-UP WBC LEVELS

Observation studies was conducted based on follow-up WBC levels in which most patients were in 4-11 x10³/mm³ range in 128 patients. On follow-up this pattern remains stable with slight increase in same range, although chronic low grade inflammation cannot be excluded in CKD dialysis patients.

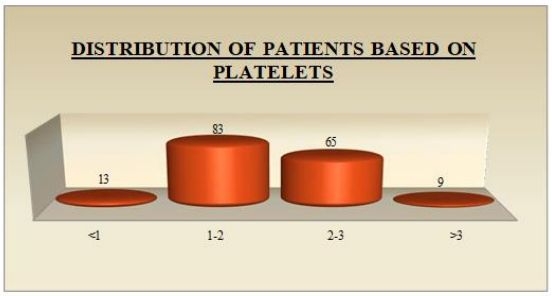
WBC FOLLOW-UP (x10³/mm³)	NO. OF PATIENTS
<4	20
4-11	128
>11	22



17. DISTRIBUTION OF PATIENTS BASED ON PLATELETS LEVELS

The above table shows Platelets count majority is in the range 1-2 lakh/mm³ with 83 patients, followed by 2-3 lakh/mm³ range with 65 patients.

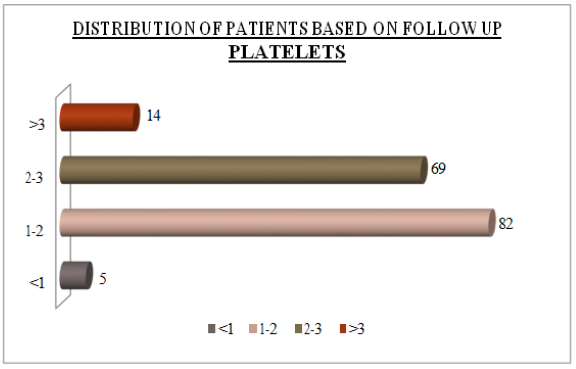
PLATELETS(lakh/mm³)	NO. OF PATIENTS
<1	13
1-2	83
2-3	65
>3	9



18. DISTRIBUTION OF PATIENTS BASED ON FOLLOW-UP PLATELETS LEVELS

The above table shows follow-up platelets count majority is in the range 1-2 lakh/mm³ with 82 patients, followed by 2-3 lakh/mm³ range with 69 patients. On follow-up major improvement is seen in >3 lakh/mm³ with 14 patients and <1 lakh/mm³ with decrease in 8 patients.

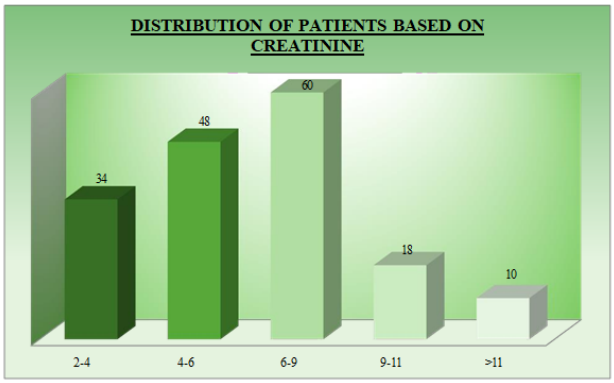
PLATELETS FOLLOW UP (lakh/mm³)	NO. OF PATIENTS
<1	5
1-2	82
2-3	69
>3	14



19. DISTRIBUTION OF PATIENTS BASED ON CREATININE LEVELS

The observational studies were based on creatinine levels in which majority of 60 patients were in 6-9 mg/dL range followed by 4-6 mg/dL indicating severe renal impairment.

CREATININE (mg/dL)	NO. OF PATIENTS
2-4	34
4-6	48
6-9	60
9-11	18
>11	10



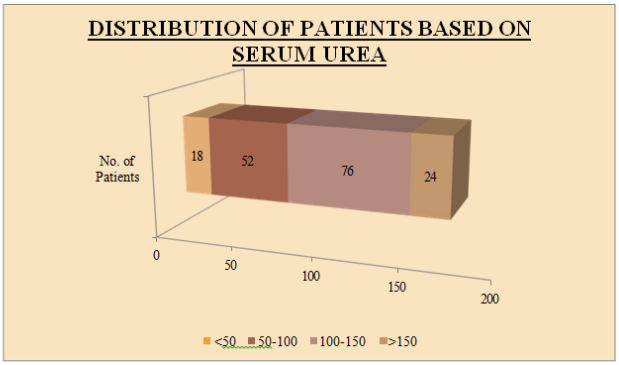
20. DISTRIBUTION OF PATIENTS BASED ON SERUM IRON LEVELS

Observational studies were seen based on serum iron levels 85 patients were in the range of 50-100 µg/d, <50 µg/dL has 38 patients which shows iron deficiency in the patients followed by 100-150 µg/dL with 32 patients.

21. DISTRIBUTION OF PATIENTS BASED ON SERUM UREA

Serum urea levels were mainly concentrated in 100-150 mg/dL, indicating persistently elevated.

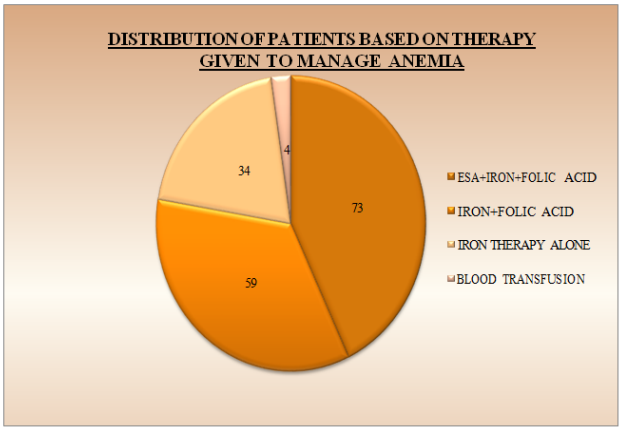
SERUM UREA (mg/dL)	NO. OF PATIENTS
<50	18
50-100	52
100-150	76
>150	24



22. DISTRIBUTION OF PATIENTS BASED ON THERAPY GIVEN TO MANAGE ANEMIA

Observational studies included patients in the Research depends on the type of therapy being given to manage anemia in which majority is ESA + Iron + Folic acid with 73 of patients.

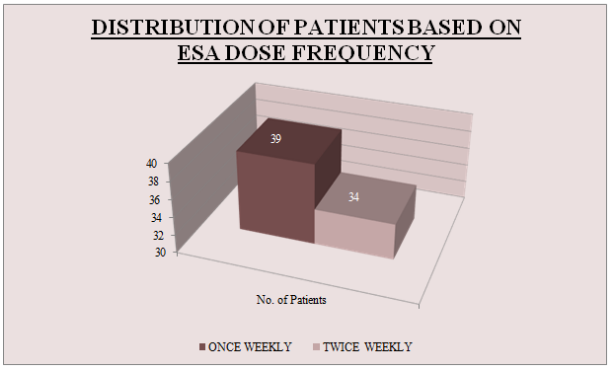
THERAPY GIVEN	NO. OF PATIENTS
ESA+IRON+FOLIC ACID	73
IRON+FOLIC ACID	59
IRON THERAPY ALONE	34
BLOOD TRANSFUSION	4



23. DISTRIBUTION OF PATIENTS BASED ON ESA DOSING FREQUENCY PRESCRIBED

The sample size above shows that studies were carried out on the observation of ESA dosing frequency in which weekly once had 39 patients and weekly twice had 34 patients.

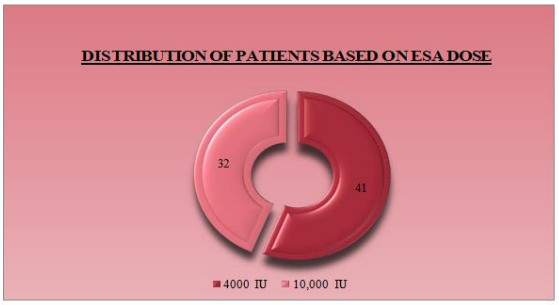
ESA FREQUENCY	NO. OF PATIENTS
ONCE WEEKLY	39
TWICE WEEKLY	34



24. DISTRIBUTION OF PATIENTS BASED ON ESA DOSING

Observational studies were seen based on dose management of ESA, 41 patients were Prescribed with the dose of 4000 IU and 32 patients were prescribed with the dose.

ESA DOSE	NO. OF PATIENTS
4000 IU	41
10,000 IU	32



DISCUSSION

- There were 52 (31%) females and 118 (69%) males among the 170 individuals in the sample. Hence this study proposes higher proportion in males.
- The age distribution analysis exposed that nearly all the patients were at age range of 60 and 70. Regarding the patients' body weight, the majority of them fell into the 50–70 kg range,
- Based on research hemoglobin levels were conducted which shows the maximum of the patients had 9-11 g/dL range (79 patients) indicating anemia was common in dialysis. Hemoglobin levels showed an overall upward trend during follow-up, however fewer people continued to fall into lower or higher hemoglobin categories.
- RBC count evaluation showed that 79 patients are in range 3 and 4 million/mm³, which naturally implies a progressive decline in RBC levels. On follow-up, there was shift in the values where 101 patients shifted towards 3-4 million/mm³ which suggests reduction in severe low RBC count indicating overall improvement in haematological status.
- PCV values were studied majority of of patients has 20-30% range (94 patients), during follow-up more patients showed improvement into 30 to 40% range with 74 patients indicating gradual positive trend. WBC levels in which most patients were in 4-11 x10³/mm³ range in 131 patients which indicates normal leukocyte levels.
- The majority of the 83 patients in the observational studies had platelet counts between 1-2 lakh/mm³. 14 patients with >3 lakh/mm³ showed a substantial improvement at follow-up, whereas 8 patients with <1 lakh/mm³ showed a decrease.
- Creatinine was studied in which majority of 60 patients were in 6-9 mg/dL range followed by 4-6 mg/dL indicating severe renal impairment.
- Serum iron levels 85 patients were in the range of 50-100 µg/d, <50 µg/dL has 38 patients which shows iron deficiency in the patients followed by 100-150 µg/dL with 32 patients. Serum levels were mainly concentrated in 100-150 mg/dL, indicating persistently elevated urea levels in majority of the proportion of patients.
- Clinical manifestations of CKD anaemic dialysis patients with criteria pedal edema with 52 patients, headache 44 patients, nausea and vomiting 24 patients, fever and pruritus both 21 and 19 patients respectively. Lastly chest pain with 10 patients.
- Type of therapy being given to manage anemia in which majority is ESA + Iron + Folic acid with 73 of patients. Frequency of ESA medication; 39 individuals were observed once a week. Most patients (41) received a prescription for 4000 IU of ESA.

CONCLUSION

The present study included 170 CKD patients with anemia on dialysis with majority of males (69%). Most of the patients were 60-70 years age group. Majority had a post dialysis weight loss of 0.5-2 kg observed. Among

comorbidities HTN+DM was most common. Bp was mainly in 140-159 mmHg range, while most patients showed poor glycemic control. Hematologic parameters showed most of patients had Hb levels in 9 to 11 g/dL, RBC Count in 3-4 million/mm³ range, Overall the study highlights that CKD dialysis patients commonly present with anemia due to multiple factors including iron and folic deficiency and reduced erythropoietin production, combined therapy with ESA and iron plays a key role in improving haematological outcomes.

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