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Effect of Erythropoietin with and without Iron Supplementation (Iv/Oral) in Anaemia with Chronic Kidney Damage Patients on Maintenance Hemodialysis

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ABSTRACT

Chronic Kidney Disease (CKD) / Chronic Renal Failure (CRF) is a progressive, long standing and irreversible impairment of renal functions for more than 3 months. Chronic kidney disease may also be identified when it leads to one of its recognized complications cardiovascular diseases, anemia, and pericarditis the most common causes of CKD are diabetes-mellitus, hypertension, and glomerulonephritis. Diagnosis of Chronic kidney disease involves urine, blood, and imaging tests (X-rays). In the present study, comparison between the hemodialysis and peritoneal dialysis patients in terms of the proportion of patients receiving erythropoietin in regular, irregular and no usage of erythropoietin doses, and hemoglobin levels after initiation of erythropoietin was seen. It was found that mean level of occurrence of CKD is more in male compared to female. The severity of CKD was mainly observed due to the reasons like hypertension, diabetes mellitus and improper usage of medication. Among all these diseased states hypertension may be the main factor which progresses the CKD due to decreased secretions of renin, which reduced the function of kidney and synthesis of erythropoietin which results in anemia.

Keywords: Chronic Kidney Disease (CKD), Erythropoietin, Hemoglobin, Anemia.

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INTRODUCTION

Chronic kidney disease (CKD) is a global threat to health in general and for developing countries in particular, because therapy is expensive and life-long. Chronic kidney disease (CKD) is an important predictor of end-stage renal disease (ESRD), as well as a marker of increased mortality. Chronic kidney disease is a worldwide public health problem[1]. World Kidney Day is celebrated on March 8; doctors all over the world opined that immediate measures should be taken to the control the kidney disorder[7]. Diseases like diabetes, high blood pressure, high cholesterol and high uric acid are one of the main reasons for kidney disorder[2,3,4,5], mostly it is associated with diabetes[6] (46%) cardiovascular disease[8,9] (25%). Anaemia[13, 14], a common complication of chronic kidney disease, usually develops as a consequence of erythropoietin deficiency. Recombinant human erythropoietin[16] (Erypro Safe) is indicated for the correction of anaemia associated with this condition. Renal transplant is the most suitable option for a majority of patients, but is dependent on living donors[10, 11, 12]. Indian government has recognized kidney disease as a major disorder, and it is taking necessary steps to provide medication at a subsidized rate for the patients[15]. According Indian Council of Medical Research, Kidney related diseases were found to be responsible for 4.8% death rate[17, 18]. There are around one million people in this world who are alive on bed taking dialysis. It is estimated that there are about 55,000 patients on dialysis in India, and the dialysis population is growing at the rate of 10–20% annually[19]. In 2005, the Indian Society of Nephrology set up a Registry to collect data to characterize and document the patterns of CKD. By the end of 2010, the Registry had data on about 55,000 adult subjects[20, 21]. Over 54% of the recorded subjects were in stage V at the time of inclusion, reflecting the hospital-based nature of the registry. In the USA, ~30 million people suffer from CKD. Incidence of CKD has doubled in the last 15 years[22, 23]. And by 2010 more than 600000 patients will require renal replacement therapy. Risk factors for developing CKD differ between races and countries. It would be interesting to know the incidence of CKD and its causes in India [(24.25)], which is a densely populated country with low income, different food, cultural traditions and lifestyle habits. In contrast to high-income countries, patients with ESRD have to pay for dialysis and transplantation themselves.

Site, Design, Span of Work, Source of Data

Site

The cross-sectional study was conducted in the department of Nephrology at King George Hospital, Visakhapatnam. It provides all facilities and health care services to the people in and

around the Visakhapatnam.

Design

The study was an observational descriptive study consisting of 83 patients with CKD. They were evaluated for the prevalence, etiology and therapy of the disease. An intervention based, randomized study was designed to evaluate the effect of erythropoietin in CKD patients. Study was conducted among the patients of regular, irregular and no usage of erythropoietin [ERYPRO SAFE].

Span of work

The study was conducted for a period of six months (Nov 2011 to June 2011) in a total population of 83 patients, 56 males and 27 females presented with Chronic Kidney Failure.

Source of data

Patient data relevant to the study was obtained from the following sources

- Patient data collection form
- Treatment chart
- Direct patient interview

The above mentioned criteria fulfill the materials required for the study.

MATERIALS AND METHOD

A patient data collection form was designed exclusively for this study and involved prospective study. It includes:

- Patient demographic data (Age, Weight, Sex)
- Medical history
- Socio-economic status
- Medication history
- Dosage, Clinical response
- Route of administration
- Cost
- Adverse effects
- Concomitant medication.

The study included patients between the age group 20 and 80 years. Treatment patterns for CKD patients is medication (iron supplementation, anti-hypertensives, anti-diabetics, calcium supplements and anti-ulcer drugs), Dialysis and con-commitant usage of erythropoietin. The patients were analyzed for their Clinical response, adverse effects and their blood & urine

profiles (clinical evaluation). In this study anemic condition, medical history, and their medication history has to be taken with utmost care. With the help of patient counseling the signs and symptoms from which the patient suffered from were carefully drawn. The treatment involves anti-hypertensives, iron supplementation, anti-diabetics with dialysis. Erythropoietin administration plays an important role the combination of these two therapies is very effective in those patients suffering from advanced stages of CKD. The treatment has to be given with utmost care as the side effects with these therapies are very adverse in the sense in the case of their diseased state (etiology); Treatment intended for the patients consists of the concomitant use of medication, hemo-dialysis and erythropoietin (IV). After collection of all the data, analysis has to be performed. In this study comparison is made for patients among the erythropoietin usage, hemodialysis and supportive medication. In this study, population of 80 was considered and age groups were categorized accordingly and the cases were separated based on the regular, irregular and no usage of erythropoietin.

Graphs were plotted between:

- Gender distribution of CKD patients
- Age groups Vs No. of male & female patients and their percentage.
- Age groups Vs No. Of male and female patients based on aetiology of the CKD (i.e. Diabetes mellitus), and their percentage.
- Age groups Vs No. of male and female patients based on aetiology of the CKD (i.e. hypertension), and their percentage..
- Age groups Vs No. of male and female anemia patients.
- Age group Vs no. of regular and irregular usage of erythropoietin and their percentage
- No. of erythropoietin patients Vs no. of patients taking iron supplementation.

RESULTS AND DISCUSSION

From the case study examined we can come to a conclusion and it is well illustrated with the help of tables and flowcharts below

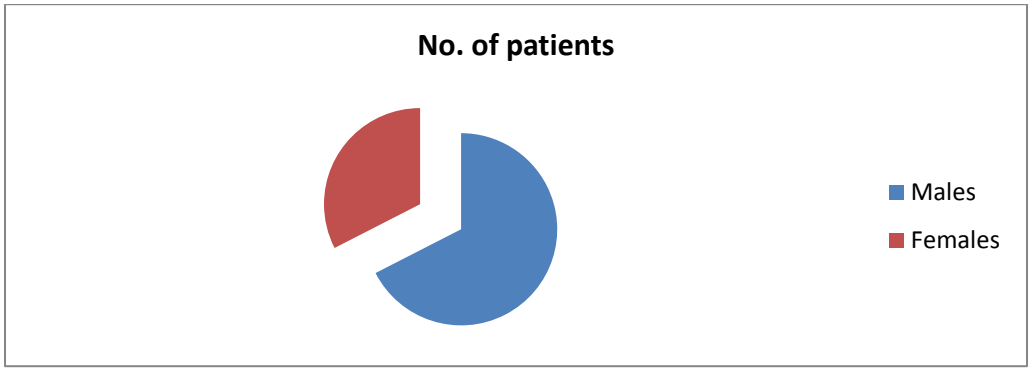

Figure 1: Gender distribution of study population

Figure 1: Indicated that of 83 patients included in the study, 56 (67.5%) were males and 27 (32.5%) were females.

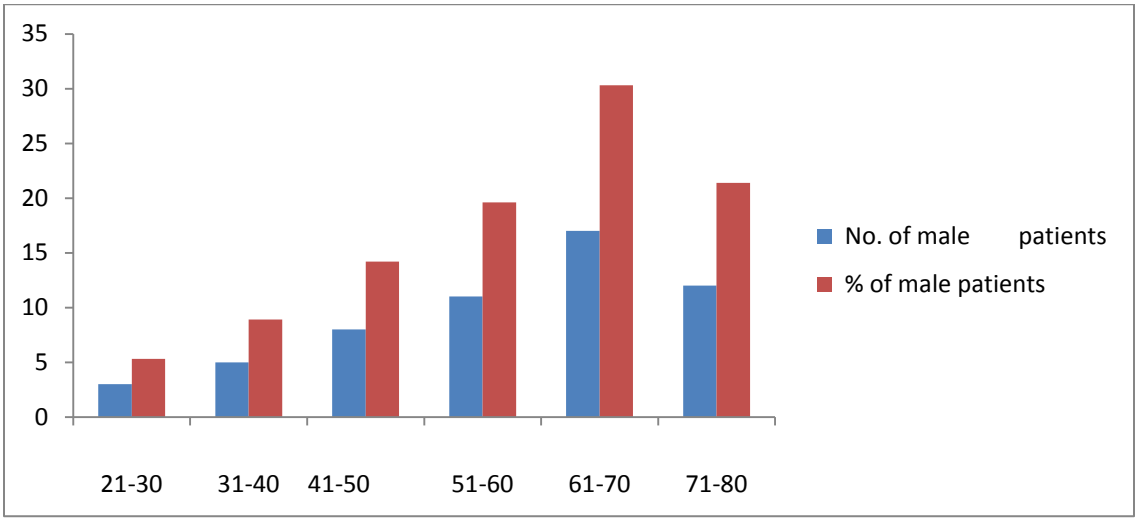

Figure 2: Age Vs No. of male patients

Figure 2: Indicated the increase in no of male patients as there is an increase in the age group.

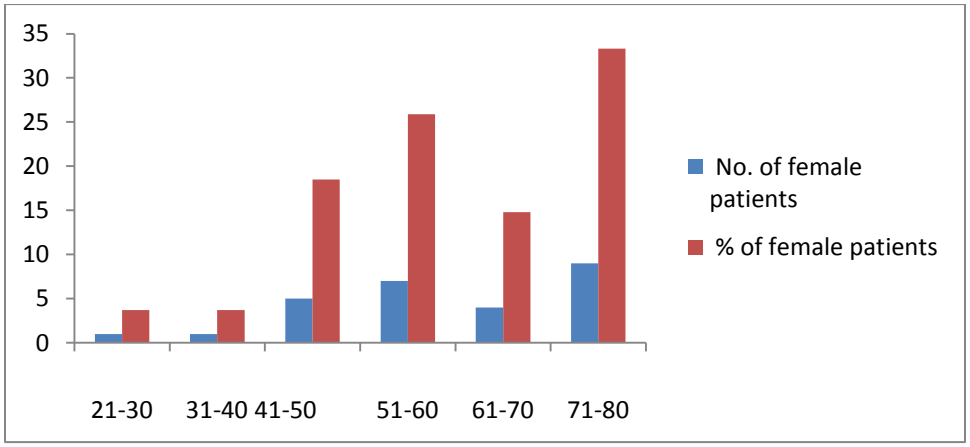

Figure 3: Age Vs No. of female patients

Figure 3: Indicated the % and no. of female patients due to CKD increase as age group increases.

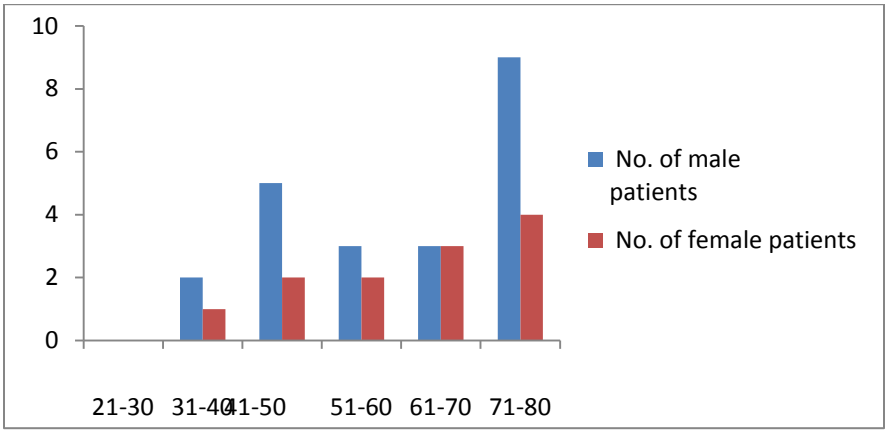

Figure 4: Age groups Vs No. of male and female patients based on etiology of the CKD (i.e. hypertension)

Figure 4: Indicated the increase in age of male and female patients, occurrence of CKD due to hypertension increases.

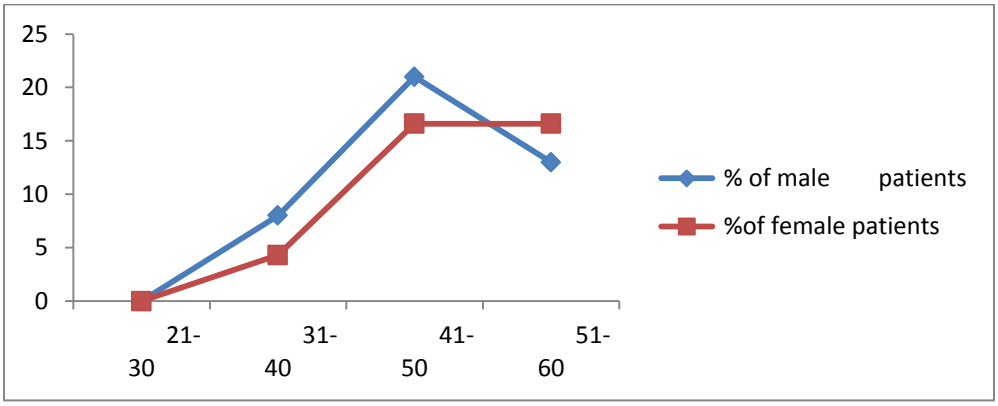

Figure 5: Age group Vs percentage of male &female patients based on etiology of the CKD (i.e. hypertension)

Figure 5: Represents the relationship between the % of male and female patients and age group. Indicated that as age progresses CKD due to hypertension increases.

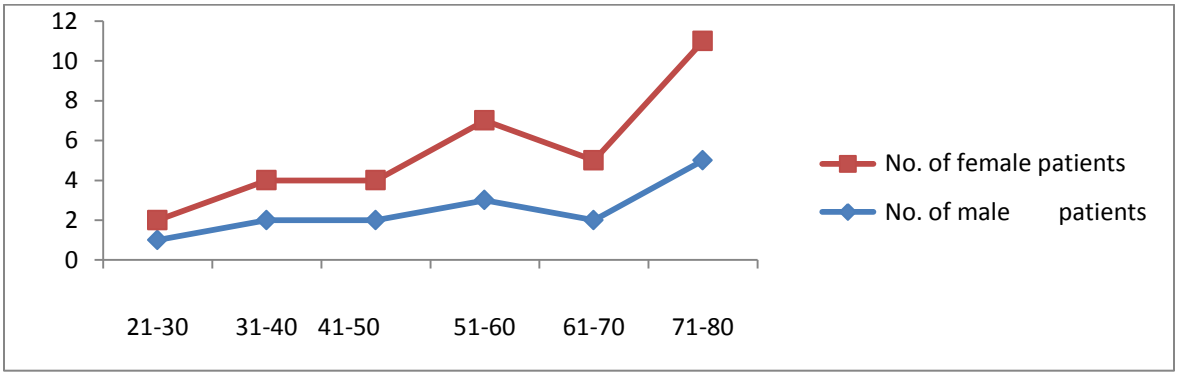

Figure 6: Age groups Vs No. of male and female patients based on aetiology of the CKD (i.e. Diabetes mellitus)

Figure 6: Represents the relationship between the no. of male and female patients and age group. Indicated that as age progresses occurrence remains same and gradually increases.

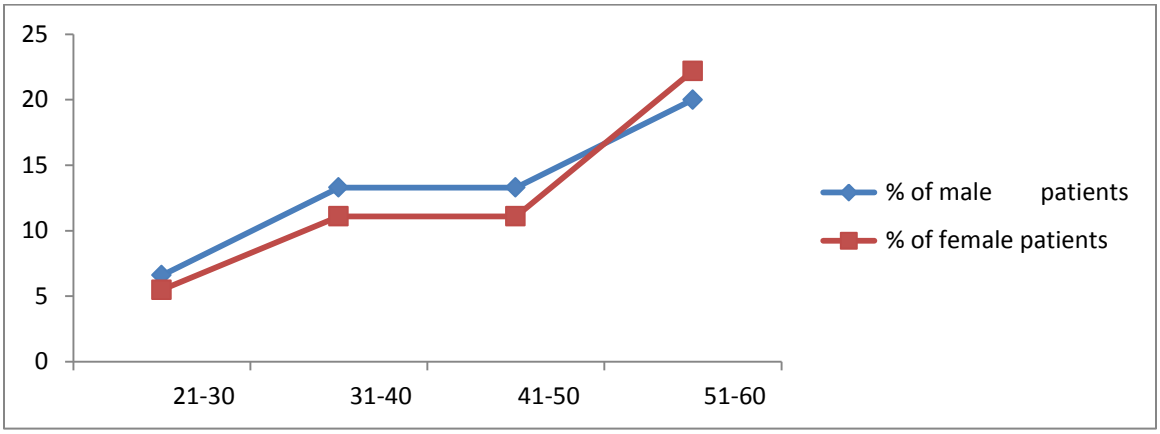

Figure 7: Age group Vs percentage of male &female patients based on etiology of the CKD (i.e. Diabetes Mellitus)

Figure 7: Represents the relationship between the % of male and female patients and age group. Indicated that as age progresses CKD due to DM increases.

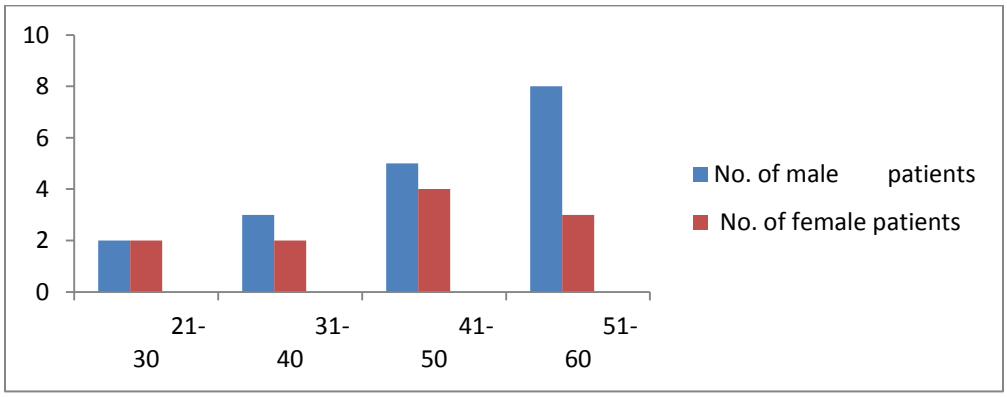

Figure 8: Age group Vs no. of anemic patients

Figure 8: Represents the relationship between the no. of male and female patients and their age group. Indicated that as age progresses occurrence of anemia due to CKD increases

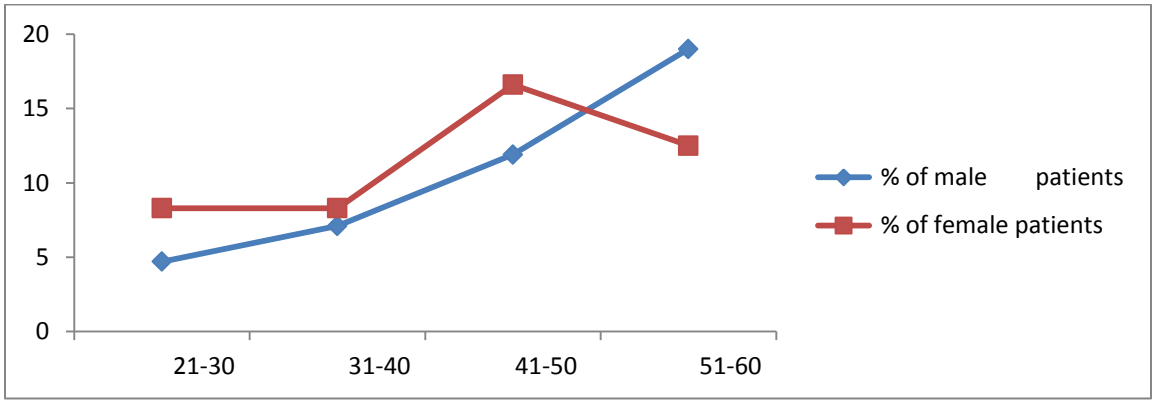

Figure 9: Age group Vs percentage of male & female anemia patients

Figure 9: Represents the relationship between the % of male and female patients and age group. Indicated that as age progresses % of prevalence of anemia increases.

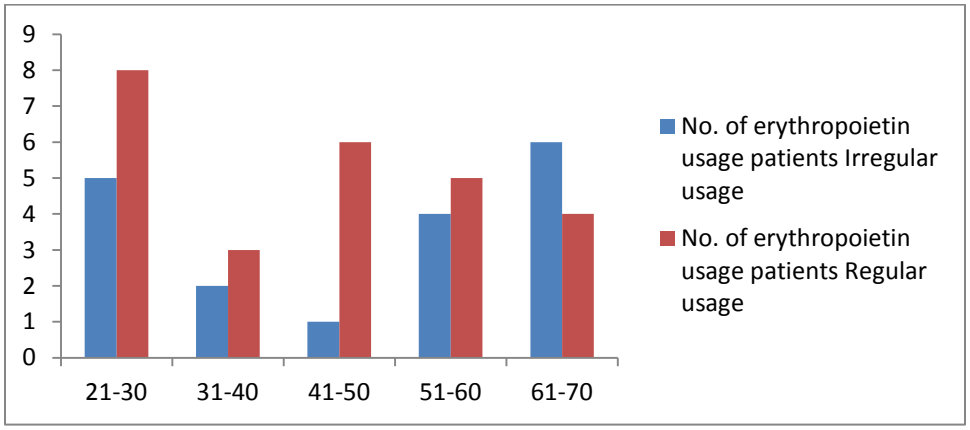

Figure 10: Age group Vs no. of regular and irregular usage of erythropoietin

Figure 10: Represents the relationship between the erythropoietin usage of no. of male and female patients and age group. Indicated that as age progresses occurrence increases.

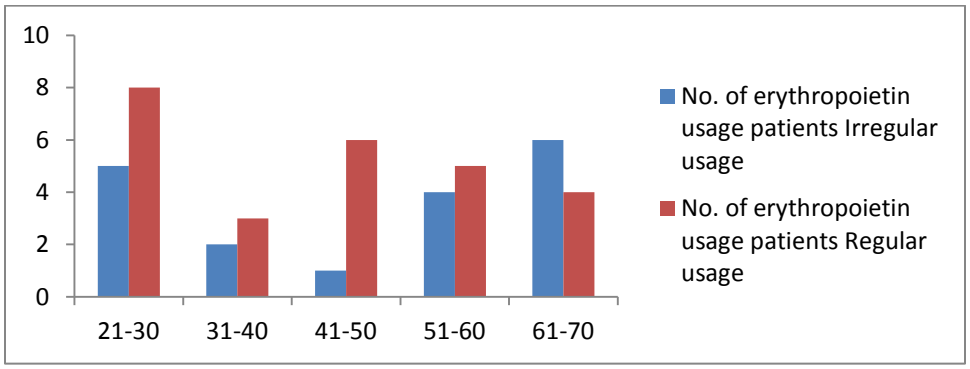

Figure 11: Age group Vs % of regular and irregular usage of erythropoietin.

Figure 11: Represents the relationship between the regular and irregular erythropoietin usage patients and their age group. Indicated that regular use of erythropoietin patients are less than the regular use of erythropoietin.

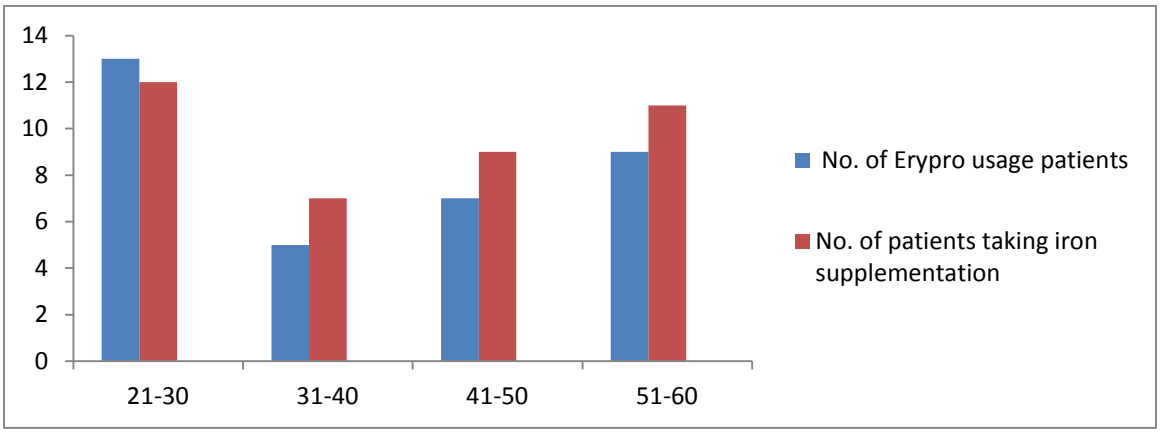

Figure 12: No. of erythropoietin patients Vs no. of patients taking iron supplementation

Figure 12: Indicates the relationship between no. of ERYPRO usage patients and no. of patients taking iron supplementation. Represented that usage of erythropoietin and iron supplementation are in linear proportion. The prevalence of CKD was abnormally high in the diabetes mellitus, hypertension, and chronic anemic patients. The points to can be drawn from the results are

- 67.5% (56/83) patients were male and 32.5% (27/83) patients were female Mean level of occurrence of CKD is more in male compared to female.
- Of all the patients, 70% (53/80) are suffering from CKD due to hypertension and diabetes mellitus
- 20% patients are due to accidents and severe anemic conditions.
- 10% patients are due to fluctuations on the haemoglobin levels due to other renal disease states like glomerulonephritis, pyelonephritis etc.
- In Women with age 41-50 and 71-80years had maximum occurrence as compared to other. Percentage occurrence in the female gradually increasing as age progresses may be due to decrease functioning of the excretory organs, suppressed immune system
- In younger patients (< 30 years) it was observed that they experienced lower CKD may be due to proper food habits, decreased disease state, and optimum functioning of the body immune systems.
- Better result and improvement in the functioning of kidneys were observed in the patients of regular haemodialysis and erythropoietin usage.

CONCLUSION

The following conclusions were drawn from the prospective study.

Out of 67.5% of male suffering from CKD, rural population is more severely affected may be due to alcohol, food habits, inhalation of toxic chemicals. So the pharmacist has the responsibility to educate the patients regarding the occurrence of CKD and their symptoms and precautions that should be taken in their work field. Among the other diseased states, hypertension may be one of the main factor which progresses the CKD due to decreased secretions of renin, as the renin secretions are reduced the function of kidney decreases and the synthesis of erythropoietin also decreased results in anemia. indicates the anemia condition of patients due decreased secretions of erythropoietin. Patients who are taking the erythropoietin (ERYPRO-SAFE) are mostly relieved from anemia and the patients of irregular usage are mostly suffering from anemia. The concomitant medication was iron supplementation (iv/oral) which was mainly helpful for the anemia patients.

Therefore more prevalence of CKD is observed in the following:

- ✓ Males
- ✓ Geriatric patients
- ✓ Disease condition like hypertension followed by diabetes mellitus
- ✓ Improper usage of medication

The study reveals the importance of a pharmacist in the management and treatment of CKD. The results clearly show that hypertension plays an important role in occurrence of CKD. The study also notifies the usage of drugs by different economical groups and the government of Andhra Pradesh has to take necessary steps to control and eradicate this dreadful disorder. It also should take necessary steps in providing proper medication and quality medicines for the population present below the poverty line. The print media and the electronic media also has to play an important role in educating the population both in rural and urban areas and create proper awareness. Pharmacist has to take a major part in counseling affected patients and educate them about the adverse drug effects. They should be properly guided and mostly pharmacist should fill confidence in them.

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