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Clinical investigation of iron supplements response for anaemia in chronic kidney disease patients

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Abstract

Aim and Objective: To evaluate the effect of iron supplements response for Anaemia in chronic kidney disease patients.

Materials and methods: A prospective study was carried out in Chronic Kidney Disease patients who were suffering from anaemia and were on dialysis. Patient's demographic details, previous medical history of chronic kidney disease were collected and the effectiveness of iron supplement response on Anaemia by using one way ANOVA followed by Tukey- Kramer multiple comparison test. Patient information leaflet was prepared and distributed.

Results: The study result showed that 111 were enrolled in the study over a 12 month period. Patients were randomized as follows: regular oral iron; 31 patients; (ii) regular intravenous iron; 34 patients; (iii) Intravenous iron along with Oral iron; 41 patients. Results are expressed \pm SD, Analysis of variance and paired t -tests were used to compare the data. A P value of less than 0.05 was considered significant. The parameters like RBC, Haemoglobin, Hematocrit and Mean Corpuscular Volume were found significant.

Conclusion: We compare the haematological parameters with three different regimens of iron supplements like regular oral iron supplements, regular intravenous iron supplements and intravenous along with oral iron supplements. Our review shows that Patients given intravenous along with oral iron supplements shows significant improvement in haematological parameters like RBC, Haemoglobin, Hematocrit and Mean Corpuscular Volume. Patient information leaflet was prepared and distributed through Nephrology department to improve patients understanding of disease management.

Keywords: Chronic kidney disease, iron supplements, Hemodialysis, Anaemia

Introduction

Chronic Kidney Disease is an irreversible, Progressive reduction in renal function. Chronic Kidney Disease is defined as the sustained kidney damage indicated by the presence of structural or functional abnormalities and / or reduced glomerular filtration rate to less than 60ml/min/1.73 m² for at least 3 months [1]. Anaemia is a decrease in the Red Blood Cell count, Hemoglobin and / or Hematocrit values resulting in a lower ability for the blood to carry oxygen to body tissues. Anaemia is a common comorbidity of Chronic Kidney Disease [3]. Anaemia has been recognized as a serious health problem in patients on dialysis. Anaemia is common in hemodialysis patients, and a relative deficiency of erythropoietin (EPO) is the predominant cause [2]. So in this study we have evaluated the effect of iron supplements response for anaemia in chronic kidney disease patients.

Materials and Methods

This was a prospective study conducted in the dialysis department for a period of 10 months. The study was conducted on 111 patients who were suffering from anaemia in Chronic Kidney Disease and were on Hemodialysis. Patients undergoing peritoneal dialysis and having gastrointestinal bleeding was excluded from the study. We have evaluated the effect of iron supplements response for anaemia in chronic kidney disease patients by using one way ANOVA followed by Tukey-Kramer multiple comparison test. Patients were provided with information leaflet to improve understanding of disease management.

Results

The present study included 111 patients as the total number of patients, out of which 26 were females and 85 males. In our study we found that majority of the patients belonging to the age group of 61 - 80 years and 41 - 60 years (50% and 39.63% respectively) shows that older people are more vulnerable to Chronic Kidney Disease.

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In our study 52.25% patients were in normal body weight, 34.38% were in over body weight, 7.20% were underweight and 6.30% were obese. According to social habits smokers were accounted for 14.41%, non-smokers were accounted for 85.58% and 8.1% were alcoholic and 91.89% were non-alcoholic. Effect of hematological parameters on three

different regimens of iron treatment by comparing before treatment values were shown in table 1. The percentage increase of hematological parameters on three different regimens of iron treatment was shown in table 2. Over all comparison of after value of laboratory parameters with iron supplementations are shown in table 3.

Table 1: Effect of Hematological Parameters on three different regimens of iron treatment by comparing before Treatment value (n=111)

Hematological parameters	Oral Iron		Intravenous Iron		Intravenous + Oral Iron	
	Before Treatment	After Treatment	Before Treatment	After Treatment	Before Treatment	After Treatment
Red Blood Cell count	3.1 ± 0.45	3.2 ± 0.46	2.97 ± 0.82	3.63 ± 0.77	3.07 ± 0.67	4.13 ± 0.60
Hemoglobin	7.35 ± 1.073	8.39 ± 1.078	7.88 ± 1.55	8.35 ± 1.46	8.61 ± 1.17	8.66 ± 1.13
Hematocrit	25.3 ± 4.94	25.4 ± 4.38	24.4 ± 5.46	28.4 ± 8.28	22.45 ± 4.36	32.58 ± 4.87
Mean Corpuscular Volume	80.02 ± 11.15	81.13 ± 10.50	82.65 ± 6.62	85.89 ± 6.55	80.55 ± 10.37	85.15 ± 7.61
Mean Corpuscular Hemoglobin	28.46 ± 11.26	28.1 ± 12.37	28.42 ± 2.91	30.09 ± 3.13	26.17 ± 2.99	29.48 ± 2.50
Mean Corpuscular Haemoglobin Concentration	33.2 ± 2.27	33.85 ± 2.37	33.33 ± 1.70	34.45 ± 1.94	32.73 ± 3.52	33.18 ± 5.81
Platelet Count	208477.4 ± 115377.1	231301 ± 113398.5	225858.8 ± 104083.9	243836 ± 104614.2	179841.5 ± 52989.08	2435551.2 ± 65149.5

Table 2: Percentage Increase of Hematological Parameters on Three Different Regimens of Iron Treatment (n=111)

Percentage of Hematological Parameters	Oral Iron	Intravenous Iron	Intravenous + Oral Iron
Red Blood Cell Count	3.23	20	29.40
Hemoglobin	0.54	5.79	13.21
Hematocrit	0.47	15.05	36.82
Mean Corpuscular Volume	1.38	3.84	5.55
Mean Corpuscular Haemoglobin	1.26	5.71	11.89
Mean Corpuscular Haemoglobin Concentration	1.95	3.30	1.36
Platelet Count	10.38	7.65	30.89

Table 3: Over all comparison of after value of laboratory parameters with iron supplementations (n=111)

S. No	Hematological Parameters	Oral iron	Intravenous iron	Intravenous + oral iron	P value
1.	Red Blood Cell count	3.20	3.63	4.13	***P<0.001
2.	Hemoglobin	8.39	8.35	8.66	**P<0.05
3.	Hematocrit	25.42	28.42	32.58	***P<0.001
4.	Mean Corpuscular Volume	81.13	85.89	85.15	*P<0.05
5.	Mean Corpuscular Hemoglobin	28.10	30.09	29.48	-
6.	Mean Corpuscular Hemoglobin Concentration	33.85	34.45	33.18	-
7.	Platelet Count	231301	243836.2	245551.2	-

Discussion

In this study totally 111 patients were treated with three different regimens of iron supplementations were analysed. In our study effect of Red Blood Cells was analysed all three regimens of iron supplements were found significant when compared to before treatment. Effect of haemoglobin was analysed intravenous (**P<0.0001) and intravenous along with oral iron supplements (**P<0.0001) was found significant when compared to before treatment. Analysis of hematocrit showed that both intravenous (***p value 0.001) and intravenous along with oral iron (**P<0.0001) supplement was found significant when compared to before treatment. Effect of Mean Corpuscular Volume showed that all three regimens of iron treatment were found significant when compared to before treatment (**P<0.0001). Effect of Mean Corpuscular Hemoglobin showed that all three regimens of iron treatment were found significant when compared to before treatment (*P<0.0001). Effect of Mean Corpuscular Hemoglobin Concentration showed that all three regimens of iron treatment were found significant when

compared to before treatment (***P<0.001). Effect of Platelet count showed that oral and intravenous along with oral iron was found significant when compared to before treatment (**P<0.0001). All observation where shown in (Table1).

In our study the percentage increase of hematological parameters based on three different regimens of iron treatment were analysed and the percentage increase of Red Blood Cell count was calculated. In this intravenous along with oral iron supplement was high (29.40) when compared to oral and intravenous iron supplements. Percentage increase of haemoglobin parameter shows intravenous along with oral iron supplement was high (13.21%) when compared to oral and intravenous iron supplements. Percentage increase of hematocrit shows intravenous along with oral iron supplement was high (36.82%) when compared to oral and intravenous iron supplements. Percentage increase of Mean Corpuscular Volume shows intravenous along with oral iron supplement was high (5.55%) when compared to oral and intravenous iron supplements. Percentage increase of Mean Corpuscular

Hemoglobin shows increase in intravenous along with oral iron supplementation (11.89%) when compared to oral and intravenous iron supplements. Percentage increase of Mean Corpuscular Hemoglobin Concentration shows increase in intravenous iron supplementation (3.30%) when compared to oral iron supplementation and intravenous along with oral iron supplementation. Percentage increase in Platelet count shows intravenous along with oral iron was high (30.89%) when compared to oral iron treatment and intravenous iron treatment. Observation was shown in (Table 2).

In this study over all comparison after value of hematological parameters with three different regimens of iron supplements are like regular oral iron supplement, regular intravenous iron and intravenous along with oral iron supplement were compared. In that intravenous along with oral iron supplement was found to extremely significant when compared to oral iron supplement alone and intravenous iron supplement alone in parameters like RBC, Haemoglobin, Hematocrit and Mean Corpuscular Volume. Observation was shown in (Table 3).

Conclusion

Anaemia has been recognized as a serious health problem in patients on dialysis. Anaemia is common in hemodialysis patients, and a relative deficiency of erythropoietin (EPO) is the predominant cause. Anaemia is the most common finding among these hematological manifestations and its severity increases with disease progression. We compare the hematological parameters with three different regimens of iron supplements like regular oral iron supplements, regular intravenous iron supplements and intravenous along with oral iron supplements. Our review shows that Patients given intravenous along with oral iron supplements shows significant improvement in hematological parameters like RBC, Haemoglobin, Hematocrit and MCV.

Patient information leaflet was prepared and distributed through Nephrology department to improve patients understanding of disease management.

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