Original Article

A Study on Prevalence, Quality of Life and Treatment Approach in The Management of Anemia in Pregnancy and Chronic Kidney Disease Patients Admitted in Tertiary Care Hospital

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ABSTRACT

Our study is aimed in determining prevalence of anemia, quality of life and therapeutic approach for management of anemia associated with pregnancy and chronic kidney disease. We divided our total sample size into two i.e. 75 anemic cases in pregnancy and 75 anemic cases in chronic kidney disease. In our study 50.66% of CKD patients had moderate anemia, 84% patients had stage 5 CKD, 91% of study population were accompanied with comorbid conditions, HrQOL assessment with SF-36 form showed that 40% of effect is seen in physical health of patient. Assessment of anemia condition in pregnancy cases showed finding that 58.66% were in between 20 to 25 years, 53.33% had gestational age of 30 – 36 week, 66.66% of patients had moderate anemia, HrQOL assessment with SF-36 form showed that 58% of effect was seen in the social well-being of the patients. The treatment approach of anemia in pregnancy and CKD patients varied based on the severity and emergency conditions. Early stage identification can prevent or treat anemia in certain population, hence specific preventive strategies should be developed. Our study found out that severity of anemia increases with stages of CKD and also increases with gestational age in pregnancy. Even though anemia is easily treatable and preventable disease, it has been well known complicating factor especially in CKD and pregnancy, hence correlate directly with treatment outcome and quality of life of patients. Hence it is important to adapt specific guidelines for the management rather than empirical therapy.

Keywords: Anemia, Pregnancy, Health-related quality of life, Iron supplementation, Anemia treatment, Drug of choice.

INTRODUCTION

Our study is aimed in determining prevalence of anemia, quality of life and therapeutic approach for management of anemia associated with pregnancy and anemia in chronic kidney disease. The World Health Organization defines anemia in adults as hemoglobin levels less than 13 g/dL for males and less than 12 g/dL for females. The low hemoglobin level results in a corresponding decrease in the oxygen-carrying capacity of the blood and results in various complications.

Compared to other emerging nations, India has the greatest prevalence of anemia. In India, forty percent of maternal deaths are caused by anemia, either directly or indirectly. About 80% of South Asian maternal mortality from anemia are attributable to India.[1]

According to a cross-sectional data analysis of the National Health and Nutrition Examination Survey (NHANES) conducted in 2007–2008 and 2009–2010, anemia was twice as common among CKD patients (15.4%) as that found in the general population. The prevalence of anemia raised with the progression of CKD: 8.4% at stage 1 to 53.4% at stage 5. Similar data was observed in a more recent paper by the CKD Prognosis Consortium.[2]Anemia though it is easily treatable and preventable disease, it has been well known complicating factor especially in CKD and pregnancy, hence typically correlate directly with treatment and quality of life of patient.

MATERIALS AND METHODS

A prospective observational study was conducted at Karnataka Institute of Medical Sciences, Hubballi. The study was carried out for a period of 6 months ,150 cases were collected and evaluated according to study. Data collection are performed using case sheets of every inpatient enrolled in the study. A suitably designed data collection form was used to record all the necessary data including patient demographic details, chief complaints, past medical and medication history, lab investigations and treatment, the results were analyzed in excel sheets and reports were obtained accordingly. SF 36 – item health survey form and online SF-36 OrthoTool Kit was used for assessing the impact of anemia in health related quality of life in pregnancy and CKD. Risk factor assessment was done with the help of a suitably prepared set of questionnaire.

Study criteria

Inclusion Criteria

- In patients of both gender with age>18years, diagnosed with CKD and having anemia.
- Pregnant woman of gestational age of 12 to 34 weeks

and above who are diagnosed with anemia.

Exclusion Criteria

- Psychiatry patients.
- Age<18 years.
- Outpatients.
- Patients who are not willing to participate in the study.

RESULTS AND DISCUSSION

Our study included a total of 150 patients, 75 patients with anemia in CKD and 75 patients with anemia in pregnancy.

Anemia in CKD

In the study population of 75 patients, 36 were male patients (48%) and 39 were female patients (52%). It indicates that female patients were found more.

Most of the patients in our study population had stage 5 CKD (84%), followed by 6 patients in stage 4, 4 patients in stage 3, 2 patients in stage 2 and none of the patients came under stage 1 CKD [figure 1].

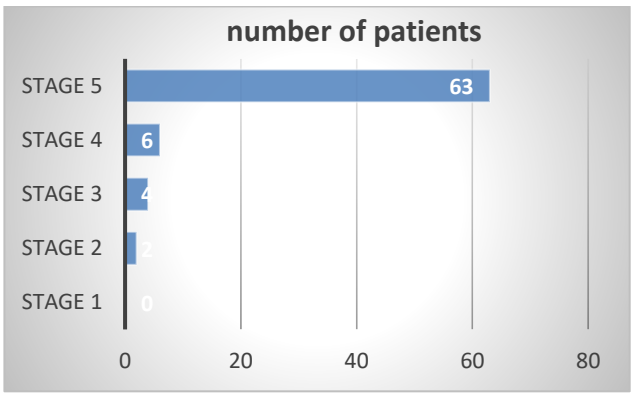

Figure 1: Number of patients in different stages of CKD

Figure 1 explains Anemia was found to be more prevalent in stage 5 of CKD with 41.3% with moderate anemia and 3.6% with severe anemia condition.

Patients with stage 5 CKD are at the higher risk of developing anemia than other stages of CKD. This is likely explained by as there is deterioration of renal function that is accompanied by reduction in erythropoietin production by kidney and loss of erythropoietin results decreased RBC production, increases the risk of development of anemia[4]most recent research has identified hepcidin as a key hormone implicated in disordered iron homeostasis in CKD patients. Elevated hepcidin impairs dietary iron absorption and reduces the mobilization of stored iron, further contributing to anemia[5,6,7] over all anemia in CKD is likely to involve other factors such as shortened RBC survival, greater blood loss especially in dialysis patients and impaired absorption of dietary iron may further exacerbate the condition.[8] [figure 1]

Out of 75 patients, 50.66% of patients had moderate anemia, 45.33% had severe anemia and only 4% had mild anemia. Patients were classified on the basis of WHO classification for anemia in CKD [Table 1]

Table 1: Distribution based on severity

Severity	Number (N=75)	Percentage
mild anemia	3	4%
moderate anemia	38	50.66%
severe anemia	34	45.33%

50.66% of patients got hospitalized with moderate anemia condition whereas 45.33% of patients got hospitalized with severe anemia, 4% of patients had mild anemia. [Table 1]

In the study population of 75 patients, 68 Patients had comorbid conditions (91%) and 7 Patients did not have comorbid conditions (9%), 51 patients have hypertension.

Table 2: Treatment pattern of anemia in CKD

Severity of anemia	Tablet Ferrous Sulphate	IV Iron Therapy	ESA Therapy	Blood Transfusion
Mild Anemia (3 patients out of 75)	3	0	0	0
Moderate Anemia (38 patients out of 75)	38	38	21	0
Severe Anemia (34 patient out of 75)	34	0	32	34

Assessment of treatment pattern of anemia in CKD patients

The treatment option was preferred based on the severity of anemia. The treatment option was preferred based on the severity of anemia. Out of 75 patients 3 patient had mild anemia i.e 4% of the patients. All the 3 patients were treated with Tablet Ferrous sulphate 200mg orally once daily. 38 patients had moderate anemia i.e. 50.6%, the treatment of choice was Tablet Ferrous sulphate and IV iron therapy, only 2.6% were treated with ESA therapy. All 34 patients with severe anemia were treated with Tab. Ferrous Sulphate and blood transfusion. Out of 34 patients 32 received ESA therapy along with it. Every patient with anemia was prescribed with Tablet Ferrous Sulphate 200mg 1-0-1 irrespective of severity. The patient with moderate

anemia was prescribed with IV Iron Sucrose 200mg in 100ml normal saline once daily along with Epoetinalfa injection 4000 IU subcutaneous if patient is at higher risk of developing severe anemia. The patient with severe anemia underwent blood transfusion and rise in Hb level was mentioned. Epoetinalfa injection subcutaneous 4000 IU was preferred in patient with severe anemia. The dose of Epoetinalfa was not increased or decreased based on Hct or Hb levels and kept the same [Table 2].

Treatment option was preferred based on the severity of anemia. All mild anemia patients received monotherapy with tablet ferrous sulphate 200mg BD.50.66% (38) patients had moderate anemia and received combination therapy with PO iron, IV iron and/or inj. Erythropoietin. All 38 patients were prescribed with tablet FS 200mg OD. All 38 patients received 200mg iron sucrose injection OD once in a week during hospital stay. 21 patients received erythropoietin 4000 IU SC once weekly. Epoetinalfa injection 4K subcutaneous was added if the patient is at higher risk of developing severe anemia. All the 34 severe anemia patients underwent blood transfusion and rise in Hb level was mentioned. 32 patients with severe anemia received ESA therapy. 29 patients received 4000 IU and 3 patients got 10000 IU of epoetinalfa.

The dose of Epoetinalfa was not increased or decreased based on Hct or Hb levels and kept the same during hospital stay. [Table 2]

Impact of anemia in HrQOL in anemic patients with CKD

Based on the assessment of HrQOL of anemia in CKD patients using SF-36 form the following results were obtained: mean percent. i.e 40% of effect is seen in physical health of patient, that includes sleep, diet, physical activities. Mean 42% of effect is seen in emotional wellbeing. A Mean of 44% of effect is seen in social well-being that mainly includes developing and maintaining positive interaction with the people around. A mean of 31% of overall health changes affected. HRQOL scores among CKD patients are reduced at advanced stages. Quality of life is significantly affected by the severity of CKD.CKD could progress into a more advanced stage if the patient does not undergo a suitable treatment. With renal functions worsening, patients tried to change their lifestyles to maintain the functions of the kidneys.[9,10]

ANEMIA IN PREGNANCY

We classified the patients into various age groups and found out that 58.66% were in between 20 to 25 years, 33.33% were in between 26 to 30, 4% were less than 20 years old and only 4% were above 30. According to our study the anemia in pregnancy was more prevalent in age group between 20-25years i.e the younger pregnant mothers, 58.66% and followed by 33.33% in age group 26-30years.

Majority of study population (53.33%) had gestational age of 30 – 36 weeks. 31(41.33%) patients with gestational age >36 weeks and 4 (5.33%) patients with GA <30 weeks.

Most of the anemic cases in pregnant women was seen in the gestational age between 30-36 weeks (53.33%), followed by 41.33% belonged to >36-week category. Least cases were seen in pregnant women <30 weeks GA. Out of 75 patients, 66.66% of patients had moderate anemia, 13.33% had severe anemia, 18.66% had mild anemia and only 1 patient had very severe anemia. Patients were classified on the basis of WHO classification for anemia in pregnancy. [Table 3]

Table 3: Severity of anemia among study population

Severity	No. of patients (N=75)	Percentage
Mild	14	18.66%
Moderate	50	66.66%
Severe	10	13.33%
Very severe	1	1.33%

Most of the pregnant women were admitted with moderate anemia i.e 66.6% of the total population and followed by 18.66%with mild anemia and 13.33% with moderate anemia. Most of the patients were admitted with moderate anemia with gestational age between 30-36 weeks (N=28) followed by 18 patients belonged to >36-week GA category.

In our study population, 38 were primigravida and 37 women were multigravida but our study won't show much clarity on prevalence of anemia in primigravida and multigravida conditions as there is no much difference in results, hence further detailed study in large population is necessary. Previous study indicated that the anemia prevalence is increasing with parity, with primigravida women anemia of 43% whereas in multigravida it was observed as 60%.[11]

Among the study population of 75 patients, 17 patients have preeclampsia, 2 patients with oligohydramnios, 8 patients with hypertension,3 patients with diabetes mellitus,3 patients with antepartum elampsia,2 patients with seizure disorder, 1 patient with thyroid disorder,6 patients with other comorbidities and 37 patients without any comorbidities.

Severity of anemia associated with different sociodemographic factors.

In our study, socio-demographic factors did not appear to be significantly associated with the severity of anemia although younger age and low socio-economic status are known to be associated with anemia as already explained in other research findings. Most patients with moderate anemia (31) belonged to age group of 20 – 25. The treatment was provided based on gestational age along with Hb levels. [Table 4]

We couldn't find out much relation between age at the time of marriage and severity of anemia as in the study conducted by anuradha Sinha et al.[12] In our study, socio-demographic factors did not appear to be significantly associated with the severity of anemia

although younger age and low socio-economic status are known to be associated with anemia as already explained in other research findings.[13,14] [Table 4]

Treatment of anemia in pregnancy

The treatment was provided based on gestational age along with Hb levels. The mild to moderate anemia in pregnant women with gestational week <30week was treated with Oral FS & folic acid. Whereas 30-36 weeks was treated with parenteral iron therapy and >36week were treated with blood transfusions. All 6 patients with mild anemia received blood transfusion had gestational age > 36 weeks. Severe anemic patients received blood transfusion irrespective of gestational age. Thus, blood transfusion is found to be the first option in severe anemia management. [Table 5]

Different treatment modalities are recommended by the guidelines according to the severity of anemia. Our study showed that anemia in pregnancy was treated based on the severity of anemia. The mild to moderate anemia in pregnant women with gestational week <30week was treated with Oral FS & folic acid. Whereas 30-36 weeks was treated with parenteral iron therapy and >36week were treated with blood transfusions. [Table 5]

Table 4: Severity of anemia based on different sociodemographic factors.

Sociodemographic factors	Anemia		
	Mild	Moderate	Severe + very severe
AGE			
<20 (total=3)	0	3 (100%)	0
20-25 (total= 44)	6 (13.63%)	31 (70.45%)	6 (13.63%)
26-30 (total=25)	6 (24%)	15 (60%)	4 (16%)
>30 (total=3)	2 (66.66%)	1 (33.33%)	0
INCOME			
Low (total=51)	12 (23.53%)	30 (58.82%)	9 (17.64%)
Middle (total=24)	2 (8.33%)	20 (83.33%)	2 (8.33%)
LEVEL OF EDUCATION			
Illiterate (total=5)	3 (60%)	0	2 (40%)
Primary (total=42)	7 (16.66%)	33 (78.57%)	2 (4.76%)
Secondary (total=6)	3 (50%)	2 (33.33%)	1 (16.66%)
Tertiary (total=1)	0	1 (100%)	0
AGE AT THE TIME OF MARRIAGE			
<20 (total=23)	2 (8.69%)	18 (78.26%)	3 (13.04%)
20-25 (total=51)	12 (23.52%)	31 (60.78%)	8 (15.68%)
>25 (total=1)	0	1 (100%)	0

Table 5: Treatment pattern of anemia in pregnancy

Severity	Tablet ferrous sulfate (n=75)	IV iron therapy (n=38)	Blood transfusion (n=35)
Mild (N=14)	14	8	6
Moderate (N=50)	50	29	19
Severe + very severe (N=11)	11	1	10

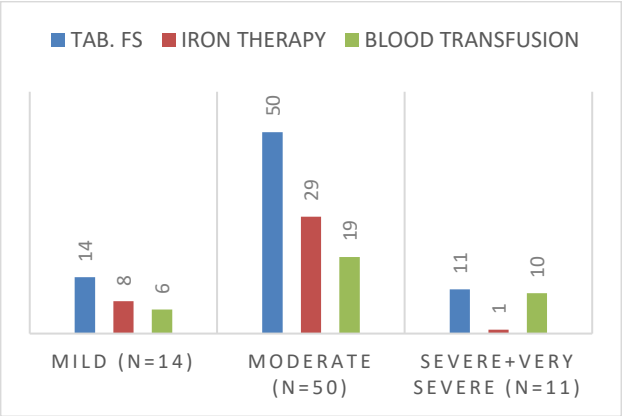

Figure 2: Assessment of treatment pattern based on severity

All 75 patients received ferrous sulfate tablet 200mg OD, irrespective of severity, among that 14 had mild anemia, 50 patients had moderate anemia, 11 had severe or very severe anemia. 38 patients received IV iron therapy: 8 had mild anemia, 29 patients had moderate anemia, 1 patient had severe anemia. The existing evidence argues the efficacy of parenteral iron compared to the oral iron in the management of mild to moderate anemia and this is faster and more effective at restoring hemoglobin and total body iron deficits compared to oral iron, and has the added advantage of avoiding gastrointestinal side effects which often interrupt the treatment compliance in the postnatal women[15,16,17]However, due to excellent safety and tolerance profile as well as easy availability at a cheaper

price IV iron (iron sucrose)could be an appropriate alternative to blood transfusions in hemodynamically stable moderate to severely anemic patients.[18]

Total 35 patients received blood transfusion, 6 had mild anemia, 19 had moderate anemia, 9 had severe anemia and 1 patients had very severe anemia.

All 6 patients with mild anemia received blood transfusion had gestational age > 36 weeks. Though blood transfusion is only recommended for very severe anemia, this high rate of transfusion potentially increases the risk of transfusion reactions, septicemia, delayed wound healing and thromboembolism, particularly in case of multiple transfusions.[20] Severe anemic patients received blood transfusion irrespective of gestational age. Thus, blood transfusion is found to be the first option in severe anemia management. [Figure 2]

The hospital followed the following treatment pattern after classifying anemia according to ICMR:

Table 6: Treatment pattern followed in hospital

Hb (gm/dl)	14wks*-16wks	20wks-24wks	26-30wks	30-36wks
9-11	Oral IFA	Oral IFA	Oral IFA	Parenteral iron
7-9	Parenteral iron	Parenteral iron	Parenteral iron	Parenteral iron
<7	BT	BT	BT	BT

*wks - weeks

The assessment of HrQOL of anemia in pregnancy is done using SF-36 form. Mean percent of 39% effect was seen in physical health, 54% of effect was seen in emotional health,58% of effect was seen in their social well-being. A mean of 63% pain and 46% of overall health changes affected the population. A mean of 46% of overall health changes affected the Health related quality of life in the population. Health related quality of life is the patient's self-report of how her/his well-being and functioning level are affected by individual health or medical treatment received.[20] Changes that occur during pregnancy may alter a women's ability to carry out her usual roles in her daily life so as to reduce her quality of life.[21]

CONCLUSION

Early stage identification can prevent or treat anemia in certain population, hence specific preventive strategies should be developed. Even though anemia is easily treatable and preventable disease, it has been well known complicating factor especially in CKD and pregnancy, hence correlate directly with treatment outcome and quality of life of patients. Effective treatment not only treat anemia but also reduce its complications. Hence it is important to adapt specific guidelines for the management rather than empirical therapy.

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REFERENCES

1. Kalaivani K. Prevalence & consequences of anaemia in pregnancy. Indian J Med Res. 2009 Nov;130(5):627-33. PMID: 20090119.
2. Portolés J, Martín L, Broseta JJ, Cases A. Anemia in Chronic Kidney Disease: From Pathophysiology and Current Treatments, to Future Agents. Front Med (Lausanne). 2021;8:1-14.doi: 10.3389/fmed.2021.642296. PMID: 33842503
3. McClellan W, Aronoff SL, Bolton WK, Hood S, Lorber DL, Tang KL, Tse TF, Wasserman B, Leiserowitz M. The prevalence of anemia in patients with chronic kidney disease. Curr Med Res Opin. 2004;20(9):1501-1510.doi: 10.1185/030079904X2763. PMID: 15383200.
4. Shiferaw WS, Akalu TY, Aynalem YA. Risk Factors for Anemia in Patients with Chronic Renal Failure: A Systematic Review and Meta-Analysis. Ethiop J Health Sci. 2020;30(5):829-842. doi: 10.4314/ejhs.v30i5.23. PMID: 33911845.
5. Zaritsky J, Young B, Wang HJ, Westerman M, Olbina G, Nemeth E, Ganz T, Rivera S, Nissenson AR, Salusky IB. Hepcidin--a potential novel biomarker for iron status in chronic kidney disease. Clin J Am Soc Nephrol.2009;4(6):1051-1056. doi: 10.2215/CJN.05931108.PMID: 19406957.
6. Tsuchiya K, NittaK. Hepcidin is a Potential Regulator of Iron Status in Chronic Kidney Disease.Therapeutic Apheresis and Dialysis.2013; 17(1): 1–8. doi:10.1111/1744-9987.12001.
7. Palaka E, Grandy S, Haalen HV, McEwan P, Darlington O. The Impact of CKD Anaemia on Patients: Incidence, Risk Factors, and Clinical Outcomes-A Systematic Literature Review. Int J Nephrol. 2020;1-21. doi: 10.1155/2020/7692376. PMID: 32665863;
8. Babitt JL, Lin HY. Mechanisms of anemia in CKD. J Am SocNephrol. 2012 ;23(10):1631-1634. doi: 10.1681/ASN.2011111078. PMID: 22935483.
9. Mujais SK, Story K, Brouillette J, Takano T, Soroka S, Franek C, Mendelssohn D, Finkelstein FO. Health-related quality of life in CKD Patients: correlates and evolution over time. Clin

J Am SocNephrol. 2009;4(8):1293-1301. doi: 10.2215/CJN.05541008. PMID: 19643926.

10. Cruz MC, AndradeC, UrrutiaM, Draibe S, Nogueira-Martins LA, SessoRDCC. Quality of life in patients with chronic kidney disease. Clinics. 2011; 66(6): 991-995.doi:10.1590/s1807-59322011000600012.

11. Shah T, Warsi J,Laghari ZA. Anemia and its association with parity. The ProfessionalMedicalJournal.2020;27(5):968–972doi:10.29309/tpmj/2020.27.05.3959.

12. Sinha A, Adhikary M, Phukan JP, Kedia S, Sinha T. A study on anemia and its risk factors among pregnant women attending antenatal clinic of a ruralmedical college of West BengalJFamilyMedPrimCare.2021;10(3):1327-1331. doi: 10.4103/jfmpc.jfmpc_1588_20. PMID: 34041173.

13. Lokare PO, Gattani PL, Karanjekar VD, Kulkarni AP. A study of prevalence of anemia and sociodemographic factors associated with anemia among pregnant women in Aurangabad city, India. Ann Nigerian Med. 2012; 6(1):30.doi:10.4103/0331-3131.100213.

14. Siddalingappa H, Narayana Murthy MR, Ashok NC. Prevalence and factors associated with anemia among pregnant women in rural Mysore, Karnataka, India. Int J Community MedPublic Health 2016; 3(9): 2532-2537.doi.org/10.18203/2394-6040.ijcmph20163067

15. Bhandal N, Russell R. Intravenous versus oral iron therapy for postpartum anaemia. BJOG.2006;113(11):1248-1252.doi:10.1111/j.1471-0528.2006.01062.x.PMID: 17004982.

16. Ehrenstein BP, Hanses F, Salzberger B. Influenza pandemic and professional duty: family or patients first? A survey of hospital employees. BMC Public Health. 2006 ;6(1):311. doi: 10.1186/1471-2458-6-311. PMID: 17192198.

17. Radhika AG, Sharma AK, Perumal V, Sinha A, Sriganesh V, Kulshreshtha V, Kriplani A. Parenteral Versus Oral Iron for Treatment of Iron Deficiency Anaemia During Pregnancy and post-partum: A Systematic Review. J ObstetGynaecol India. 2019;69(1):13-24. doi: 10.1007/s13224-018-1191-8.PMID: 30814805.

18. Hye RA, Sayeeda N, Islam GMR, Mitu JF, Zaman MS. Intravenous iron sucrose vs. blood transfusion in the management of moderate postpartum iron deficiency anemia: A non-randomizedquasi-experimental study. Heliyon. 2022;8(2):38-45. doi: 10.1016/j.heliyon.2022.e08980. PMID: 35243098.

19. 20.Chua S, Gupta S, Curnow J, Gidaszewski B, Khajehei M, Diplock H. Intravenous iron vs blood for acute post-partum anaemia (IIBAPPA): a prospective randomised trial. BMC Pregnancy Childbirth. 2017;17(1):424. doi: 10.1186/s12884-017-1596-x. PMID: 29258541.

20. Yilmaz E, Soysal C, Icer B,Yilmaz ZV, Ozkan S, Kucukozkan T. The Impact of Iron Deficiency Anemia on Health Related Quality of Life in the Last Trimester of Pregnancy.Eurasian Journal of Medical Investigation.2019;3(3):182–188. doi:10.14744/ejmi.2019.65035.

21. Calou CGP, Pinherio AKB, Castro RCMB, Oliveira MFD, Aquino PDS, Antezana FJ. Health Related Quality of Life of Pregnant Women and Associated Factors: An integrative Review. Health. 2014; 6(18):2375–2387. doi:10.4236/health.2014.618273.