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Original Article

Anaemia in Chronic Kidney Disease

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ABSTRACT

Objective: To gauge the frequency of iron deficiency anaemia among chronic renal disease patients and factors related to the presence of anaemia at our hospital.

Study Design: Cross-sectional study.

Place and Duration of Study: Department of nephrology Pak Emirates Military Hospital Rawalpindi Pakistan**,** Nine months, Sep 2019 to May 2020.

Methodology: Three hundred patients suffering from the chronic renal disease were included in the study. Iron deficiency anaemia was diagnosed based on haemoglobin and ferritin levels. In addition, the relationship between age, gender, duration of chronic kidney disease and stage of chronic kidney disease was assessed with the presence of iron deficiency anaemia among the patients suffering from chronic kidney disease.

Results: Out of three hundred patients studied, 139 were males, and 161 were females. Out of 300 patients with chronic kidney disease included in our study, 159 (53.0%) showed the presence of iron deficiency anaemia, while 141 (47.0%) had no anaemia. Chi-square analysis showed that female gender, long duration of illness and more severe illness had a significant association with iron deficiency anaemia among the patients with chronic kidney disease.

Conclusion: High frequency of iron deficiency anaemia among the patients of chronic kidney disease in a tertiary care hospital of Pakistan. Routine screening for anaemia should be done, especially on female patients and patients with more severe and long-standing illnesses.

Keywords: Anaemia, chronic kidney disease, Socio-demographic factors.

How to Cite This Article*: Ali I, Khan MNA, Ali A, Hussain MZ, Khan MS, Ahmed SN. Anaemia in Chronic Kidney Disease. Pak Armed Forces Med J 2022; 72(4): 1306-1309. DOI: https://doi.org/10.51253/pafmj.v72i4.4710*

INTRODUCTION

One of the leading causes of mortality and morbidity for humans worldwide is an end-stage kidney disease which has posed a real challenge to health care systems globally.[1] No part of the world has been free from this chronic debilitating illness, and the incidence is rising in western and eastern countries.[2,3] Kidneys not only affect the excretory function of the body, but the whole homeostasis becomes altered, & the patient may require lifelong management in one way another.[4]

Many haematological and biochemical problems arise in the body if the renal system is compromised long-term.[5] Various forms of anaemia may occur in the clinical course of CKD. However, iron deficiency anaemia is the most common and sometimes most difficult to manage.[6] Anaemia and problems related to anaemia have especially been studied in non-dialysis dependent CKD patients. These patients may have more problems than those undergoing dialysis and requiremore specialized surveillance for all the haematological and biochemical profiles.[7,8]

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Received: 03 Jul 2020; revision received: 24 Aug 2020; accepted: 31 Aug 2020

Chronic kidney disease may be dialysis-dependent or managed conservatively with medications that prone the patients to developing iron deficiency anaemia.[6,7]`Gaffer-Gvilli *et al*. concluded that patients with chronic renal disease are at high risk of developing iron deficiency anaemia for multiple reasons. Anaemia also is a predicting factor of mortality in these patients, and mortality depends upon the severity of anaemia as well. Patients with CKD should be screened in routine for the presence of iron deficiency anaemia.[9] Robles *et al*. revealed interesting results and came up with the conclusion that the presence of diabetes in CKD patients is an additional risk factor for the presence of iron deficiency anaemia among patients of chronic renal disease. Diabetes, renal failure and depletion of iron stores have been linked with each other and management plan should address these correlations.[10]

Limited work has been done on assessing the actual burden of this problem and the risk factors predisposing the patient to develop this haematological deficiency. Therefore, we planned this study to determine the of iron deficiency anaemia among patients with chronic kidney disease (CKD) and factors related to the presence of anaemia at a tertiary care hospital in Pakistan.

METHODOLOGY

This cross-sectional study was conducted at the Department of Nephrology, Pak Emirates Military Hospital Rawalpindi Pakistan from September 2019 to May 2020. The sample size was calculated by WHO Calculator with the population prevalence of anaemia in CKD as 52.4%.[10] Non-probability consecutive sampling technique was used to gather the sample.

Inclusion Criteria: All patients with chronic kidney disease between 18 and 65 were included in the study. Diagnosis and staging of chronic kidney disease were made per the NKF/Kidney Disease Outcome Quality Initiative (NKF/KDOQI) 2002.[11-13]

Exclusion Criteria: Patients with anaemias prior to diagnosis of chronic kidney disease, malignancies (solid or haematological), severe infection or any organ failure other than kidneys in the past six months were excluded. In addition, patients with B-12 or folate deficiency or replacement therapy had recent surgery, had non-steroidal anti-inflammatory agents abuse or had any autoimmune disorder. Patients who were using illicit substances or could not be followed up were also not recruited in the study.

The Ethical Review Board Committee of the hospital was approached to get the ethical approval for this study. Written informed consent was taken from all the potential participants of this study before the start after a complete description of the study. CKD patients fulfilling the inclusion criteria presenting at nephrology OPD were included in the study. Venous blood was taken from the participants between 9 and 11 a.m. after 12 hours of fasting. Complete blood count (CBC), serum ferritin, vitamin B12, and folic acid were measured. CBC was measured using a flow cytometer and an automated analyzer. Iron deficiency anaemia was defined as blood haemoglobin values of < 12 g/dl and serum ferritin levels of 15 ng/mL.[14,15]

All statistical analysis was performed using Statistics Package for Social Sciences version 24.0 (SPSS-24.0). Characteristics of participants and the distribution of the iron deficiency anaemia were described using descriptive statistics. First, Chi-square was applied to look for the association of age, gender, duration and stage of CKD with the presence of iron deficiency anaemia among the target population. Differences between groups were considered significant if *p*-values were less than or equal to 0.05.

RESULTS

The target population was all CKD patients reported in the nephrology department during the study period. However, after the inclusion and exclusion criteria and consent of the individuals, 300 patients were finally recruited for the study from whom data could be collected and analyzed. Out of 300 CKD patients studied in the given period, 141 (47.0%) had no anaemia, while 159 (53.0%) had the presence of iron defi-ciency anaemia. The mean age of the study participants was 43.51±5.652 years, and the mean duration of CKD was 4.36±3.712 years. The Table showed that 139 patients were males and 161 were females, and gender, along with more duration and severity, had a significant relationship with the presence of anaemia upon applying the chi-square test.

Table: Outcome Of Various Variables (n=300)

Factors	No Iron Deficiency Anaemia Frquency(%)	Iron Deficiency Anaemia Frequency (%)	*p*-value
Total	141 (47.0)	159 (53.0)	
Stage of Chronic Kidney Disease			
I & II	82 (43.2)	69 (43.8)	
III & IV	59 (56.7)	90 (56.2)	0.011
Gender			
Male	84 (58.5)	55 (46.1)	<0.001
Female	57 (41.5)	104 (53.9)	
Duration of Chronic Kidney Disease			
<2years	108 (39.6)	92 (35.9)	0.593
>2 years	33 (60.4)	67 (64.1)	
Age			
18-40 years	106 (57.6)	119 (37.1)	0.947
>40 years	35 (42.4)	40 (62.9)	

DISCUSSION

Patients with deranged renal functions have to face many health-related problems. However, despite many treatment modalities available with advancements in the medical field, these patients' quality of life remains compromised in one domain or another.[15,16] Park *et al*. did a large study on anaemia management in patients with chronic renal disease. They came up with the findings that anaemia management is a crucial step in overall CKD management and should be detected early. Furthermore, each patient should be treated according to the level of iron and haemoglobin deficiency.[7] Our results did not involve any therapy but showed a high frequency of anaemia among CKD patients from a developing country.

Fishbane *et al*. in 2018 concluded that iron deficiency anaemia had been a common finding across various stages of chronic renal disease, and multiple causes may be attributed to this finding. A lot of symptoms patients face during illness in CKD may be explained by the presence of iron deficiency anaemia.[17]

Our scope was not to assess the pathophysiology of anaemia in CKD patients, but similar findings regarding the epidemiology of anaemia strengthen the findings generated by past literature. A recent Nigerian study is also important and showed that iron deficiency anaemia is common among individuals with CKD. At the same time, female gender and severity of CKD were factors that independently predicted iron deficiency anaemia.[11] An Indian study concluded that chronic renal insufficiency predisposes the patient to develop anaemia. The deficiency of iron remains the commonest cause of anaemia among these patients. However, iron may be restored in these patients by either oral or parenteral route, depending upon the severity and choice of the patient and the clinician.[12] Electrolyte balance and urea/creatinine are usually talked about more in patients with CKD, and physicians usually miss this aspect which may be the first cause of referral to a tertiary care centre. Unfortunately, few interesting local studies were done in this regard. One of managing various haematological and biochemical presentations in CKD,[13] and the other on left ventricular hypertrophy secondary to anaemia in CKD patients is also important in this regard.

Ryu *et al.* in their study in order to look for the prevalence and management options for the presence of iron deficiency anaemia among patients suffering from chronic renal disease, concluded that out of more than 2000 patients they studied, 45% patients had the presence of iron deficiency anaemia across all stages of CKD. They also came up with the finding that anaemia has been more common in female patients than in male patients.[18] Our results strengthened their findings as the female gender was also associated with the presence of anaemia in our target population.

Kang *et al. in* 2017, published a study to look for clinical courses and complications faced by patients suffering from CKD. They concluded that the severity of the illness was directly related to the low haemoglobin levels. Furthermore, stage 1 and 2 patients showed fewer chances of having anaemia than patients with stages 3; to 5.[19] Results of our study were quite similar to their results in this regard as the advanced stage of illness had a strong relationship with iron deficiency anaemia in our study.

The long-term follow-up would have been a major limitation in our study. The results might have differed if the subjects had been followed up for a long period. Moreover, nutritional patterns and deficiencies were not considered as they could play a major role in developing deficiency diseases like iron deficiency anaemia. A multicenter study involving large public sector hospitals with large sample size and more-strict inclusion and exclusion criteria may generate generalizable results.

CONCLUSION

High frequency of iron deficiency anaemia among the patients with chronic renal disease included in our study. Therefore, routine screening for anaemia should be done, especially on female patients and patients with more severe and long-standing illnesses.

Conflict of Interest: None.

Author's Contribution

IR: MNAK: Data analysis and design, AA: Data analysis, MZH:, MSK: Design, SNA: Data anaysis.

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