Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v29i04.7466

PREVALENCE AND RISK FACTORS OF ANEMIA IN CHRONIC KIDNEY DISEASE PATIENTS WITH DIABETES

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ABSTRACT

Objective: To assess the prevalence of anemia in patients of chronic kidney disease patients with diabetes.

Methodology: This study was Cross-Sectional Study carried out at department of medicine Hayatabad medical complex Peshawar from January 2022 to June 2022**.** Patients diagnosed with chronic kidney disease (CKD) stage 3 or higher with a GFR of less than 60 ml/min/1.73 m2 between the ages of 18 and 65 were recruited for the trial using a non-random convenient sampling strategy. Using the post-stratification chi-square test, p-values less than 0.05 were deemed statistically significant.

Results: A total of 300 patients between the ages of 18 and 65 were enrolled; their mean age was 44.56 + 10.94 years. All research participants had their anemia levels evaluated. The results indicated that 30% of patients with diabetes-related chronic renal disease had anemia, or 90 out of 300 individuals. With a p value of 0.041, females are more likely than males to develop anemia in diabetic chronic renal disease patients.

Conclusion: Clinical results can be improved by creating tailored therapies and individual treatments that are in line with the causes of anemia in this patient population.

Key Words: Chronic Kidney Disease; Diabetes; Anemia

INTRODUCTION

The main cause of the clinical complexity of the uremic syndrome in relation to CKD therapy is anemia, which is a prominent side effect of CKD1, albeit it is not the only factor. With a frequency estimated at 7.6% in the general population, this disorder is a fairly prevalent hematological ailment that is consistent with serum hemoglobin levels below 130 g/L for men and 120 g/L for women. On the other hand, the prevalence of renal disease is substantially greater, approaching 15%. Since there is a nearly linear relationship between eGFR and serum hemoglobin levels, anemia is typically linked to the severity of renal worthlessness2,3. Anemia is notably frequent in patients with Chronic Kidney

Disease Stage 3; it increases from 5% in CKD Stage 1 to around 75% to 80% in Pre Dialysis Stage CKD54,5. Regarding the kidney, the primary mechanism causing anemia in chronic renal disorders is a reduction in erythropoietin secretion6. Moreover, anemia may be brought on by decreased iron or iron that is not available because of elevated hepcidin levels brought on by the localized inflammation in chronic uremia7. Furthermore, many conditions including chronic inflammation and malnourishment can result in a drop in folate and vitamin B12 and an increase in the development of reticules (erythroblasts) and the death of immature cells. Aside from individuals with comparable chronic kidney illness, anemia has been linked to a lower quality of life, more hospital admissions, the advancement of renal disease, and a higher death rate8. In addition to being the main cause of CKD and ESRD, diabetes mellitus (DM) is also believed to be linked to the development of rain, even in the absence of renal impairment. Anemia has been found in around 10% of DM patients with normal renal function9. Diabetes independently impacted hemoglobin levels in a group of over 9000 individuals without renal impairment10. The pathogenesis of anemia in these patients has been attributed to a variety of factors, such as the use of renin-angiotensin aldosterone system (RAAS) blockers, which are crucial for the treatment of proteinuric diabetic nephropathy, erythropoietin deficiency brought on by the kidney's efferent sympathetic denervation in the context of diabetic neuropathy, and chronic inflammatory response that results in reduced iron levels in the body. In people with diabetes, anemia may be more common and show symptoms of chronic kidney disease (CKD) earlier11. This study's objective was to compare the prevalence of anemia in matched individuals with CKD who had diabetes mellitus and those who were not receiving dialysis.

METHODOLOGY

This Cross-Sectional Study carried out at department of medicine Hayatabad medical complex Peshawar from January 2022 to June 2022 for the assessment of anemia at various levels of diabetic patients who were not dependent on dialysis. Ethical approval was taken from the ethical and research committee of our hospital. Using the WHO sample size calculator, a sample size of 300 was determined, with a 95% confidence range and a 30% expected population percentage1-2. Patients diagnosed with chronic kidney disease (CKD) stage 3 or higher with a GFR of less than 60 ml/min/ 1.7 m^2 between the ages of 18 and 65years were recruited for the trial using a non-random convenient sampling strategy. Research participation was restricted to patients undergoing kidney transplants and those with anemia due to metabolic and other causes, including cancer. With written informed consent, a wealth of demographic information was collected, including gender, age, height, weight, and background BMI. It was formerly believed that having a body-mass index, which was calculated by dividing height by weight, increased the chance of developing diabetes mellitus, hypertension, hyperlipidemia, and coronary artery disease. Furthermore, 3 cc of venous blood was taken and put into EDTA/clot vials for the measurement of blood glucose, serum urea, and creatinine levels. Immediately after, the blood was centrifuged for 30 minutes at 4000 rpm in order to separate the serum and measure the parameters using ELISA kits that may be purchased commercially.

Statistical analysis: The statistical study was carried out using SPSS 24, a statistical tool. Age and other continuous data were shown as mean ± 1 SD, whereas gender, hypertension, dyslipidemia, and other categorical factors were reported as numbers or percentages (n, %). Age, gender, length of DM, Stage of CKD (3-5), HTN, and dyslipidemia were used to stratify the data. Using the post-stratification chi-square test, p-values less than 0.05 were deemed statistically significant.

RESULTS

A total of 300 patients were recruited with the mean age of 44.56 + 10.94 years with age range of 18 to 65 years.

48 percent of the participants in the gender evaluation (n = 144) were men, while the remaining 52% (n = 156) were women. The results of the assessment revealed that the mean duration of diabetes was 8.10 ± 6.01 years, and the body mass index (BMI) was 23.99 ± 2.97 kg/m2. The assessment of hypertension frequency revealed that 70% of the population (n = 210) also had hypertension, whereas

the remaining 30% (n = 90) did not, as seen in figure 1. As seen in figure 1, all of the patients underwent screening for dyslipidemias. The results indicated that 57% of the study population (n = 171) had dyslipidemia, whereas the remaining 63% (n = 129) did not.

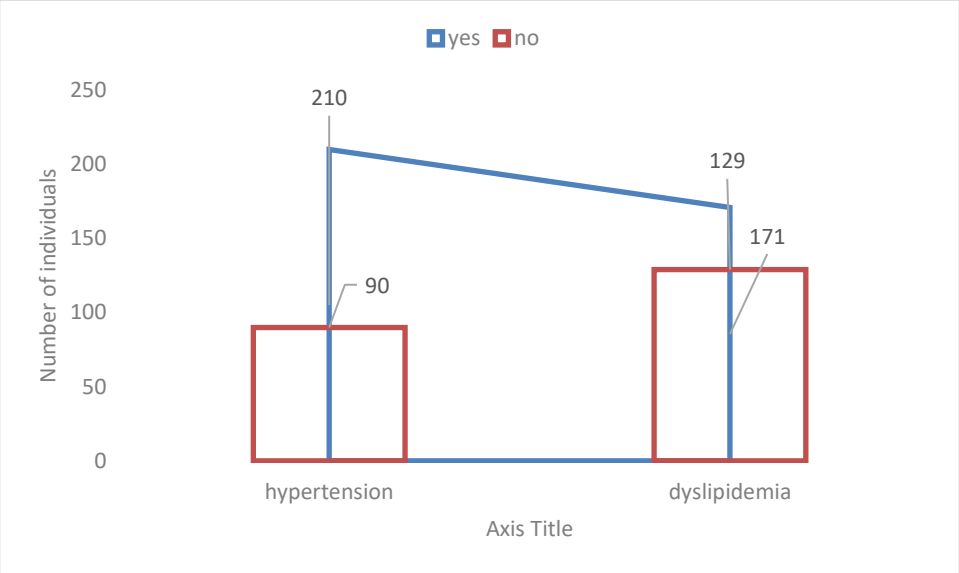

Figure 1: Evaluation of the Study Population's Frequency of Dyslipidemia and Hypertension.

Age stratification was used to evaluate the role of age as a risk factor in the development of anemia in patients with diabetic chronic kidney disease. The results showed that, with a p-value of 0.301, only 39 out of 97 patients under 40 years old and 63 out of 203 patients with above 40 years developed anemia. Similar to this, gender stratification was used to evaluate gender as a risk factor for the development of anemia in the study population, as table 1 explains. According to table 1, it shown that females with diabetic chronic renal disease patients are more likely than men to have anemia, with a p value of 0.041.

Table No.1 Evaluation of Anemia in the Research Sample according to Gender.

Presence of Anemia	Male	Female	Total	P-value
Yes	38	64	102	0.301
No	106	92	198	
Total	144	156	300	

All research participants had their anemia levels evaluated. The results indicated that 91 out of 300 patients had anemia, with the prevalence of anemia in patients with diabetes-related chronic renal disease being recorded at 30.3%. The chi-square test was used to evaluate the impact of the length of diabetes, with a cutoff point of 5.0 years, as shown in Table 2. Remarkably, it was discovered that, as Table 2 with a p-value of 0.397 illustrates, the length of diabetes has no correlation with anemia in individuals with chronic renal disease that are due to diabetes.

Table 2: Chi-square test applied to anemia using the duration of diabetes stratification.

Presence of Anemia	< 5 years	> 5 years	Total	P-value
Yes	22	65	87	0.397
No	49	164	113	
Total	71	229	300	

Chi-square analysis was used to determine how the body mass index affected the anemia in the study population. Of the 91 anemia patients, 50 had normal BMIs, while the other 41 had higher BMIs and showed an insignificant correlation between anemia and BMI (p = 0.126). Table 3 explains that 71 out of 99 patients had hypertension, which demonstrated a positive connection with anemia with a p

value of 0.021. Hypertension was also evaluated as an impact modifier in the presence of anemia. Anemia was also evaluated for dyslipidemias, and a p-value of 0.210 indicated that no correlation was found between dyslipidemias and anemia in individuals with diabetes-related chronic renal disease.

Table 3: Chi-square test use for anemia with hypertension stratification

Presence of Anemia	Yes	No	Total	P-value
Yes	71	28	99	0.021
No	115	86	201	
Total	186	114	300	

DISCUSSION

The goal of the study under discussion was to find out how common anemia is in diabetic CKD patients without dialysis. Anemia is a common blood ailment that is prevalent in people with chronic kidney disease (CKD) and plays a crucial role in the illness's progression. The results of the research showed that, out of the target population, 30.3% had anemia. This highlights the significant burden of the disease on this population. This result is consistent with recent studies that have demonstrated the high prevalence of anemia in CKD individuals, particularly those with diabetes. Our results are consistent with previously published reports: The relationship between diabetes, kidney disease, and anemia is fairly complicated.

Numerous studies have demonstrated the extensive link between diabetes and anemia among the etiologies of diabetic kidney disease, including decreased erythropoiesis, erythropoietin insufficiency, functional iron deficiency, and chronic inflammatory processes13, 14. Unexpectedly, the distributional difference favored women, suggesting that anemia may be more prevalent in female diabetic CKD patients than in male patients. This discovery suggests that there may be gender-specific variations in the etiology or treatment of anemia in this population, which will require more research in the future. However, it should be highlighted that women are more likely than males to develop anemia due to a combination of sociocultural and genetic variables. Additional research is needed to examine the effects of hormonal changes and nutritional condition on the occurrence of anemia 15. Therefore, our research did not contribute to a better understanding of the relationship between the duration of diabetes and the onset of anemia in individuals with chronic kidney disease. Conversely, the development of anemia is observed to be less closely associated with the length of diabetes, which is consistent with other studies that indicated anemia prevalence increased with diabetes duration. The lack of correlation in our study, however, may primarily point to a very intricate interconnected scenario of several factors that trigger the emergence of anemia in diabetic CKD and are not only related to the duration of diabetes16,17.

Thus, comorbid conditions including hypertension (high blood pressure) and BMI (body mass index) were thought to be potential impact modifiers for anemia. Despite the lack of a substantial correlation between BMI and anemia, hypertension has been found to be positively correlated with the existence of anemia18,19. This emphasizes the need of managing anemia in patients with chronic kidney disease (CKD), particularly those who have diabetes, and taking into account comorbidities. Furthermore, the lack of a significant association between anemia and dyslipidemia in the participants in our research suggests that dyslipidemia may not be the primary cause of anemia in patients with diabetic CKD. However, further research has to be done to determine if dyslipidemia contributes to the development of anemia in this particular patient population 20. Overall, this survey represents a significant advancement in the field of research on the prevalence and risk factors of anemia in non-dialysis dependent diabetic chronic kidney disease patients. Clarifying the underlying mechanisms and risk factors of anemia in this population will be essential for developing tailored interventions to lessen the effects of anemia and enhance clinical outcomes, as well as for customizing patient care. In addition, larger sample sizes and thorough examinations of possible confounders are needed in further longitudinal studies to confirm our results and provide light on the intricate process by which anemia develops in diabetic CKD patients.

CONCLUSIONS

Ultimately, our research sheds light on the frequency of anemia among DM-CKD patients who do not get dialysis. Anemia is another CKD consequence, and our research shows how serious the condition is in this population. Clinical results can be improved by creating tailored therapies and individual treatments that are in line with the causes of anemia in this patient population.

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