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DESCRIPTIVE ANALYSIS OF ANEMIA MANAGEMENT IN HEMODIALYSIS PATIENTS AND ASSOCIATION WITH ITS QUALITY OF LIFE.

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ABSTRACT:
Aim & Objectives: This study aims to conduct a descriptive analysis of anemia management approaches in hemodialysis patients and their association with quality of life (QOL). Specifically, it will assess the efficacy of iron supplementation and erythropoietin-stimulating agents (ESAs) in managing anemia, monitor patient responses to treatment, and evaluate the impact of anemia on QOL using a self-prepared questionnaire.
Methodology: The Cross-sectional study conducted over six months in the Dialysis Department Vivekanandha Medical Care Hospital, this Cross-Sectional study involved 54 patients diagnosed with CKD, selection based on inclusion and exclusion criteria. The enrolled patients were assessed for anemia management and health related quality of life by using AMQLAS self-prepared questionnaire for CKD patients who underwent in Baseline, follow up 1, follow up 2 and follow up 3.
Results: Out of 54 patients, only 48 patients of them participated in the follow up session. Among 48 patients 42 male patients (87.5%) were predominantly affected with CKD rather than female. The highest frequency of CKD was among the age group of 41-50 (22.9%), 51-60 (52.0%). Improvements in Quality of life were improved and statically significant results (< 0.004*).
Conclusion: Overall, the study underscores the importance of evaluating both clinical outcomes and quality of life in CKD patient undergoing maintenance hemodialysis. It suggests that while demographic factors like age and gender play a role in treatment efficacy and addressing quality of life are crucial for improving patients care and outcomes.

Keywords: Hemodialysis, Anemia, Quality of life, Iron sucrose, Erythropoietin.

INTRODUCTION:-

Chronic Kidney Disease (CKD) is a prevalent and progressive medical condition that results in the gradual decline of kidney function. [1] It affects millions globally, and its incidence is rising alongside major health trends such as increasing rates of diabetes, hypertension, and aging populations. [2] CKD

progression is divided into five stages based on the glomerular filtration rate (GFR), with Stage 5 indicating end-stage renal disease (ESRD), where the kidneys can no longer support the body's needs. Patients at this stage require renal replacement therapies, such as dialysis, or a kidney transplant to survive. [3]Without timely and effective intervention, CKD can lead to severe complications, including cardiovascular disease and high mortality rates. [4]

The public health and economic burden of CKD is substantial, particularly in countries with limited access to advanced healthcare resources. As the disease progresses, costs increase due to the need for treatments like dialysis, medications, and frequent healthcare visits. In advanced CKD stages, the healthcare requirements can be overwhelming for patients and their families, contributing to economic strain and reduced quality of life (QoL). [5]Furthermore, CKD patients are at risk for various complications, including anemia, which is common in later stages due to decreased production of erythropoietin—a hormone produced by the kidneys that stimulates red blood cell production .

Anemia in CKD is a significant complication that impairs patients' overall health, contributing to symptoms such as chronic fatigue, shortness of breath, and a diminished capacity for daily activities. These symptoms not only worsen physical well-being but also impact emotional health, often leading to feelings of depression and isolation. [4] The cumulative effect is a decline in QoL, making anemia management a crucial component of CKD treatment, especially for those on hemodialysis. Effective management of anemia typically involves the use of erythropoiesis-stimulating agents (ESAs) and iron supplementation. ESAs help to increase red blood cell production by mimicking the role of erythropoietin, while iron supplements address iron deficiency, which commonly accompanies anemia in CKD patients. [6]

The role of hemodialysis adds complexity to managing anemia in CKD patients. Hemodialysis, a life-sustaining procedure for ESRD, involves regularly filtering the blood to remove toxins and excess fluids. [7] However, the process can lead to further blood loss and exacerbate anemia, requiring close monitoring and intervention. Therefore, evaluating how anemia management influences QoL in hemodialysis patients is essential, as these individuals are at a particularly high risk of experiencing the debilitating effects of anemia.+ [8]

This study aims to assess the impact of anemia management strategies on QoL in hemodialysis patients, focusing on two interventions: ESAs and iron supplementation. By examining the physical and emotional outcomes associated with each treatment, the study seeks to clarify which approach provides greater benefits for CKD patients' QoL. Ultimately, this research offers insights into optimizing anemia management in CKD care and underscores the importance of tailoring treatments to enhance both clinical outcomes and QoL for hemodialysis patients.

SCOPE OF STUDY

This study investigates the impact of anemia management strategies, specifically focusing on erythropoietin and iron supplementation, on the quality of life (QoL) of CKD patients undergoing hemodialysis. By assessing both physical and emotional well-being, as well as patient satisfaction with treatment, this research underscores the essential role of effective anemia management in improving patient outcomes. The findings are intended to guide optimized treatment protocols that enhance clinical care and QoL for CKD patients. Additionally, this study establishes a framework for future research in CKD management, aiming to support individualized and more effective anemia management approaches for hemodialysis patients.

METHODOLOGY:-

Study Design

A cross-sectional study design was chosen to examine the impact of anemia management on the quality of life (QoL) in chronic kidney disease (CKD) patients undergoing hemodialysis. This design allows for a snapshot assessment of the effectiveness of two primary anemia treatments—iron supplementation and erythropoietin-stimulating agents (ESAs)—in improving physical and emotional well-being among patients. Conducted in the Dialysis Department of Vivekanandha Medical Care Hospital, the study spanned a six-month period from April to September 2024. This setting was

selected due to its established patient base of CKD individuals undergoing regular hemodialysis, providing an appropriate population for evaluating anemia management interventions. The study was ethically approved, with adherence to ethical guidelines that ensure patient safety, confidentiality, and informed consent.

Study Population
The study initially recruited 54 CKD patients undergoing maintenance hemodialysis at the Dialysis Department. To maintain relevance and accuracy in results, specific inclusion and exclusion criteria were applied.

Inclusion Criteria:-
- Patients over 18 years of age, ensuring the legal ability to provide informed consent.
- Patients actively receiving hemodialysis treatments, reflecting the population for whom anemia management is critical.
- Participants willing to comply with the study's requirements, including follow-up assessments and response to treatment protocols.

Exclusion Criteria: -
- Patients under 18, to avoid variability in treatment responses that might arise from younger age groups.
- Patients with cognitive impairments or mental health conditions that could interfere with their ability to understand and complete the QoL assessments accurately.
- Individuals unwilling to provide informed consent, to uphold ethical research standards.

Out of the 54 patients initially recruited, 48 completed all follow-up assessments. The remaining six participants were lost to follow-up due to various reasons, including personal circumstances and treatment discontinuation. This final sample of 48 participants allowed for a sufficiently powered analysis of treatment effects on QoL.

PHASE OF STUDY: -
This study was conducted in three phases, each essential for ensuring thorough data collection, patient monitoring, and robust analysis. The structured approach allowed for a systematic assessment of anemia management in hemodialysis patients, focusing on quality of life (QoL) outcomes.

1. Phase I: Preparation and Ethical Approval
The initial phase involved preparing the study's framework, which included selecting the study site within the hospital's Dialysis Department and finalizing departments and protocols. Institutional Ethical Committee (IEC) approval was secured to ensure the study adhered to ethical guidelines for clinical research. The research team also developed detailed data entry formats and finalized the study protocol to standardize data collection across all participants. This preparatory work was critical for establishing a rigorous, ethically sound foundation for the study, focusing on patient safety and confidentiality.

2. Phase II: Data Collection and Patient Monitoring
With IEC approval, the second phase involved obtaining informed consent from each participating patient. Baseline data were collected, encompassing demographic information, medical history, hemoglobin levels, and initial QoL scores using the AMQLAS questionnaire. Patients were then divided into two treatment groups—those receiving iron supplementation and that administered erythropoietin. Each patient underwent three follow-up assessments at scheduled intervals to monitor changes in hemoglobin levels and QoL outcomes, allowing for ongoing evaluation of treatment effectiveness and adjustments as necessary.

3. Phase III: Data Analysis and Report Creation

In the final phase, the research team compiled and analyzed the collected data, focusing on comparing QoL impacts and treatment efficacy between the iron and erythropoietin groups. Statistical analyses helped determine significant improvements across QoL domains, offering insights into which intervention provided more meaningful benefits for patients. This phase concluded with a comprehensive report that presented the findings, evaluated the implications for anemia management in CKD patients, and identified potential areas for future research.

Data collection tools

Data collection was accomplished using a combination of structured forms and the Assessment of Quality of Life for Hemodialysis Patients (AMQLAS) questionnaire. These tools were selected to comprehensively assess both clinical and QoL aspects relevant to anemia management in CKD patients.

1. Structured Data Entry Forms: These forms were designed to capture essential demographic details (age, gender, occupation, and socioeconomic status), medical history (duration of CKD, comorbid conditions, and previous anemia treatments), and baseline hemoglobin levels. This information provided a foundation for understanding patient background and determining potential confounding factors in the analysis.

2. AMQLAS Questionnaire: The AMQLAS questionnaire, a validated tool specific to hemodialysis patients, was used to measure QoL across three domains: physical well-being, emotional stability, and treatment satisfaction. The questionnaire contains 15 items scored on a Likert scale, with higher scores indicating better QoL. Each patient completed the questionnaire at baseline (prior to intervention) and during follow-up assessments. This tool enabled the study to evaluate changes in QoL related to the anemia management strategies under review.

PROCEDURE

Upon inclusion in the study, patients were randomly assigned to one of two treatment groups to reduce selection bias and enhance the reliability of comparative results.

- **Group A** received erythropoietin (ESA therapy) as their anemia treatment, with dosages adjusted to body weight and hemoglobin levels. Erythropoietin was administered subcutaneously, with doses ranging from 4000 to 6000 IU, aimed at stimulating red blood cell production to counteract the erythropoietin deficiency seen in CKD patients.
- **Group B** received iron sucrose as the primary intervention for anemia management. Iron supplementation was administered intravenously (5 ml in 100 ml normal saline), a common approach for CKD patients with iron deficiency anemia undergoing hemodialysis. This treatment was given at regular intervals based on each patient's iron levels and clinical condition.

Patients underwent three follow-up assessments over the course of the study, where hemoglobin levels and QoL were measured. These follow-ups were essential for monitoring treatment responses and evaluating the efficacy of each intervention.

FOLLOW-UP ASSESSMENTS AND MONITORING

The follow-up schedule was designed to provide regular monitoring and capture gradual improvements in hemoglobin and QoL. Each follow-up visit included:

1. Hemoglobin Measurements: Blood samples were collected to monitor hemoglobin levels and assess anemia improvement. The target hemoglobin levels were aligned with guidelines suggesting levels between 10–11 g/dL for CKD patients on hemodialysis.

2. AMQLAS Questionnaire Administration: Patients completed the AMQLAS questionnaire at each follow-up to track changes in QoL. This regular assessment helped in identifying patterns and trends in physical, emotional, and treatment satisfaction responses.

DATA ANALYSIS

The collected data were analyzed using statistical methods to compare the efficacy of erythropoietin and iron treatments. The main outcome measures included changes in hemoglobin levels and QoL scores across the physical, emotional, and satisfaction domains.

1. **Descriptive Statistics**: Initial data analysis focused on descriptive statistics, summarizing demographic characteristics and baseline health information for the study population. These summaries provided insight into the overall population profile and helped identify any potential confounding variables.
2. **Comparative Analysis**: Paired t-tests and ANOVA tests were conducted to evaluate changes in hemoglobin levels and QoL scores between baseline and follow-up periods within each treatment group. Additionally, independent sample t-tests were applied to compare treatment efficacy between the two groups. The primary variables of interest were changes in hemoglobin levels and improvements in QoL scores.
3. **Significance Testing**: Statistical significance was determined with p-values, set at a threshold of $p < 0.05$, indicating a meaningful impact of the interventions on QoL and anemia management.

RESULTS:

Demographics

The study sample comprised a total of 54 chronic kidney disease (CKD) patients undergoing hemodialysis, of whom 48 completed all scheduled follow-ups. Among the participants, 87.5% were male, illustrating a notable gender skew within the CKD and hemodialysis patient population. Age distribution revealed that 52% of participants were over 60 years, reflecting the higher prevalence of CKD and associated anemia in older adults. The patients' occupations varied, encompassing individuals from both agricultural and labor backgrounds, which highlights the socioeconomic diversity of the population receiving hemodialysis at this facility. This variation in demographics provided a well-rounded perspective on how anemia management interventions impact quality of life (QoL) across a broad socioeconomic spectrum.

Hemoglobin Levels

Hemoglobin levels were a primary indicator of anemia management effectiveness in this study. Baseline measurements showed that most patients had hemoglobin levels below the target threshold of 11 g/dL, confirming the necessity of anemia interventions. Over the course of the three follow-up assessments, both treatment groups (iron supplementation and erythropoietin) demonstrated notable improvements in hemoglobin levels. However, the extent of these improvements varied significantly between the two groups. By the third follow-up, 31.2% of patients achieved hemoglobin levels above 11 g/dL, with the majority of these patients belonging to the erythropoietin group.

In Group A (iron supplementation), hemoglobin levels increased modestly, but many patients did not reach the target threshold by the study's conclusion. Conversely, Group B (erythropoietin recipients) showed substantial improvements, with a significant proportion achieving optimal hemoglobin levels. These findings underscore erythropoietin's efficacy in stimulating red blood cell production, directly addressing the erythropoietin deficiency inherent in CKD-related anemia.

Quality of Life (QoL) Findings

The AMQLAS questionnaire provided comprehensive QoL assessments, covering three primary domains: physical well-being, emotional stability, and treatment satisfaction. Baseline QoL scores indicated that most patients experienced significant challenges across these domains, attributable to the physical and psychological burdens of CKD and anemia. Improvements in QoL were noted across both groups, though the extent and significance of these improvements differed.

In Group A, patients receiving (erythropoietin recipients) reported slight increases in physical energy and a modest reduction in fatigue. However, emotional stability scores remained relatively low, and patients reported minimal changes in overall treatment satisfaction. In contrast, Group B iron supplementation demonstrated marked improvements across all QoL domains. Physical well-being scores increased significantly, reflecting reduced fatigue, improved physical capacity, and better tolerance of daily activities. Emotional stability also improved, with patients reporting fewer feelings of depression and frustration, likely due to the alleviation of anemia-related symptoms.
Treatment satisfaction was notably higher among Group A participants, who perceived erythropoietin as a more effective and responsive intervention. Overall, QoL improvements were significantly more pronounced in the erythropoietin group, reinforcing the treatment's efficacy not only in managing anemia but also in enhancing patients' everyday experiences and mental well-being.

Statistical Outcomes
Statistical analysis confirmed the observed differences between the two treatment groups. Paired t-tests and ANOVA tests showed that the QoL improvements in Group A (erythropoietin recipients) were statistically significant across all domains when compared to Group B (iron supplementation). Specifically, p-values were below 0.05 for physical well-being, emotional stability, and treatment satisfaction in the erythropoietin group, indicating substantial enhancements in these areas. In contrast, Group B's results, though positive, did not reach the same level of statistical significance, suggesting that iron supplementation alone may not provide sufficient improvement in QoL for hemodialysis patients with anemia.
Additionally, the study found a strong correlation between improved hemoglobin levels and enhanced QoL scores in the erythropoietin group. This correlation suggests that the physiological benefits of elevated hemoglobin levels, such as increased energy and reduced fatigue, play a critical role in shaping patients' physical and emotional experiences.

Summary of Findings
In summary, the study's results highlight erythropoietin's superiority over iron supplementation in managing anemia and enhancing QoL for CKD patients undergoing hemodialysis. Hemoglobin levels improved significantly among erythropoietin recipients, reaching or exceeding the target threshold in a larger proportion of patients. QoL assessments confirmed that erythropoietin effectively addresses both the physical and emotional dimensions of anemia, leading to meaningful improvements in daily life and patient satisfaction. These findings emphasize the need for a personalized approach to anemia management in CKD, with a focus on treatments that optimize both clinical outcomes and QoL enhancements.

DISCUSSION:-
Chronic renal failure is a significant health problem. A high percentage of these patients require renal replacement therapies, among which hemodialysis is one of the most common treatments. Hemodialysis alleviates symptoms and helps maintain the life of these patients. This procedure is typically performed 2-4 times per week for 3-4 hours per session. There is a notable relationship between hemodialysis and the patient's quality of life. Assessing the impact of hemodialysis on the quality of life in CKD patients is increasingly recognized as an important outcome measure. The AMQLAS (Anemia Management & Quality of life Assessment Scale) is used to measure quality of life in chronic kidney disease patients undergoing hemodialysis. Therefore, the impact of hemodialysis on the quality of life of patients with CKD was assessed using the AMQLAS. This study aimed to recognize and illustrate the impact of hemodialysis on the quality of life in CKD patients. It was conducted at Vivekanandha Medical Care Hospital, Elayampalayam, over a period of six months.

BASELINE CHARACTERISTICS OF HAEMODIALYSIS PATIENTS:

In this study, the majority of patients undergoing maintenance hemodialysis were observed to be over the age of 60 (52.0%) (Table 1). Studies conducted by Allison Tong et al. (2021) show somewhat similar results, indicating that maintenance hemodialysis for chronic kidney disease (CKD) is predominantly performed in the age group of 60 years. This may be attributed to factors such as the decline in renal function, comorbidities, and social history, including smoking, tobacco use, and alcohol consumption. In our study, the hemodialysis procedure was predominantly performed in male patients (87.5%) compared to female patients (12.5%) (Table 2). This result is consistent with the study conducted by Hossein Ebrahim et al. (2015), which indicates a higher prevalence of chronic kidney disease (CKD) in men. This discrepancy may be attributed to the faster decline in kidney function in men, often due to unhealthier lifestyles and a higher prevalence of hypertension, diabetes, and high cholesterol.

Among a total of 48 patients, 43.7% had a normal Body Mass Index (BMI) (Table 3). Additionally, 27.1% were underweight, 18.7% were overweight, and 10.4% were obese. Obesity is a known risk factor for kidney disease because it can lead to chronic kidney disease through a compensatory mechanism. The increased metabolic demand due to higher body weight forces the kidneys to undergo hyperfiltration, which can contribute to kidney damage. In our study of 48 patients, the majority exhibited various social habits (Table 4). A 41.6% had other social habits, 16.6% consumed alcohol, 12.5% were smokers, and 29.1% both consumed alcohol and smoked. The patients had quit smoking and alcohol intake by the time they were diagnosed with chronic kidney disease. Out of these 48 patients, 24 (50%) had a family history of CKD (Table 5). This suggests that half of the patients may be at a higher genetic age | 57c risk for CKD, given the known association between genetics and the predisposition to kidney diseases.

Table 1: Frequency Distribution of Age

S.NO	AGE GROUPS	NUMBER OF PATIENTS (n =48)	PERCENTAGE (%)
1.	30-40	6	12.5
2.	41-50	11	22.9
3.	51-60	6	12.5
4.	Above 60	25	52.0

Table 2: Gender - Wise Distribution

S.NO	GENDER	NUMBER OF PATIENTS (n=48)	PERCENTAGE (%)
1.	Male	42	87.5
2.	Female	6	12.5

Table 3: Level of Body Mass Index

S.NO	BMI	NUMBER OF PATIENT (n=48)	PERCENTAGE (%)
1	Obese(>30)	5	10.4
2	Overweight(25 – 30)	9	18.7
3	Underweight(>18)	13	27.1
4	Normal	21	43.7

Table 4: Social History of hemodialysis patients

S.NO	SOCIAL HISTORY	NUMBER OF PATIENTS (n=48)	PERCENTAGE (%)
1	Alcohol	8	16.6
2	Smoker	6	12.5
3	Alcohol & Smoker	14	29.1
4	Others	20	41.6

Table 5: Family history of hemodialysis patients

S.NO	FAMILY HISTORY	NUMBER OF PATIENTS (n=48)	PERCENTAGE (%)
1	Yes	24	50.0
2	No	24	50.0

INTER-GROUP COMPARISON OF DRUG -1 AND DRUG -2

In this study, we employed Friedman's test to assess the effects of two drugs, Drug 1 and Drug 2, on various dependent variables across different time intervals before and after intervention. The dependent variables were categorized into three domains: Physical Well-Being (Domain 1), Emotional Well-Being (Domain 2), and Treatment Satisfaction (Domain 3). For Physical Well-Being (Domain 1), Drug 1 had a mean rank of 27.21 (sum of ranks = 653) compared to Drug 2, which had a mean rank of 21.79 (sum of ranks = 523). The p-value for this comparison was 0.173, indicating that the difference in Physical Well-Being between the two drugs was not statistically significant. In the Emotional Well-Being (Domain 2) category, Drug 1 showed a mean rank of 30.17 (sum of ranks = 724), while Drug 2 had a significantly lower mean rank of 18.83 (sum of ranks = 452), with a p-value of 0.004. This result highlights a statistically significant improvement in Emotional Well-Being with Drug 1 compared to Drug 2. Treatment Satisfaction (Domain 3) analysis revealed that Drug 1 had a mean rank of 31.52 (sum of ranks = 756.5) whereas Drug 2 had a mean rank of 17.48 (sum of ranks = 419.5). The p-value for this comparison was <0.001, showing a highly significant difference in treatment satisfaction between the two drugs, with Drug 1 yielding better satisfaction scores.

In summary, the analysis indicates that Drug 1 generally performed better than Drug 2 across the domains of emotional well -being and treatment satisfaction, both before and after the intervention. The significant difference observed in these domains suggest that Drug 1 may be more effective in improving emotional well-being and treatment satisfaction compared to Drug 2. Conversely, the lack of significant difference in physical well- being implies that both drugs have comparable effect of this aspect. These findings highlight the importance of considering multiple domains when evaluating the efficacy of drugs, as improvements in emotional and treatment satisfaction may have significant implication for patient outcomes and overall treatment success.

Domain 1 – Physical well-being in hemodialysis patients

DOMAIN 1	PRE		POST		P VALUE
	MEAN	SD	MEAN	SD	
Q1	4.17	0.38	2.92	1.07	
Q2	4.00	0.42	2.88	1.25	**0.000****
Q3	3.98	0.84	3.04	1.34	
Q4	4.10	0.56	2.94	1.29	
Q5	4.29	0.74	2.64	1.04	

Domain-2 - Emotional well-being in hemodialysis

DOMAIN 2	PRE		POST		P VALUE
	MEAN	SD	MEAN	SD	
Q6	4.54	0.51	2.08	0.41	
Q7	4.13	0.45	1.87	0.85	**0.000****
Q8	4.67	0.56	2.00	0.59	
Q9	4.17	0.57	1.83	0.64	
Q10	3.79	0.72	1.79	0.59	

Domain-3 Treatment satisfaction in Hemodialysis

DOMAIN 3	PRE		POST		P VALUE
	MEAN	SD	MEAN	SD	
Q11	3.92	0.65	1.29	0.46	**0.000****
Q12	4.12	0.45	1.96	0.62	
Q13	3.67	0.64	2.00	0.59	
Q14	4.58	0.58	1.75	0.68	
Q15	4.62	0.65	4.21	0.42	

CONCLUSION

This study highlights the critical role of effective anemia management in enhancing the quality of life (QoL) for chronic kidney disease (CKD) patients undergoing hemodialysis. CKD patients commonly experience anemia due to reduced erythropoietin production, which significantly impacts both physical and emotional well-being. Anemia symptoms, such as fatigue, weakness, and shortness of breath, compound the already challenging circumstances faced by hemodialysis patients, often leading to a lower QoL and increased risk of cardiovascular complications. Therefore, managing anemia is essential not only to improve clinical outcomes but also to positively influence the everyday experiences of CKD patients.

The study's findings emphasize erythropoietin's effectiveness over iron supplementation in managing anemia and improving QoL for hemodialysis patients. By analyzing changes in hemoglobin levels and QoL metrics across physical, emotional, and satisfaction domains, the study demonstrates that erythropoietin-stimulating agents (ESAs) provide significant benefits for CKD patients. Patients receiving erythropoietin reported marked improvements in energy levels, reduced fatigue, and greater emotional stability. Furthermore, their satisfaction with treatment outcomes was notably higher than those receiving iron alone, indicating a more comprehensive improvement in QoL.

Importantly, these findings underscore the necessity of individualized anemia management strategies in CKD. Factors such as age, gender, baseline health conditions, and lifestyle can influence how patients respond to different anemia treatments. Therefore, a one-size-fits-all approach may not be effective in addressing the diverse needs of hemodialysis patients. Personalized treatment plans, which consider patient demographics and clinical history, have the potential to maximize benefits while minimizing potential side effects associated with high-dose erythropoietin or long-term iron therapy.

The study also highlights the relevance of QoL assessments in CKD management. Traditional anemia management strategies often focus solely on achieving target hemoglobin levels, but this study shows that improving QoL is equally important. QoL is a multidimensional construct that reflects patients' physical health, emotional well-being, and satisfaction with treatment. Tools like the AMQLAS questionnaire, which assess QoL specifically for hemodialysis patients, offer valuable insights that can guide patient-centered care. By prioritizing QoL alongside clinical measures, healthcare providers can develop a more holistic approach to CKD management, addressing both the medical and psychological needs of patients.

Furthermore, this study's findings provide a foundation for future research in anemia management for CKD patients. The observed benefits of erythropoietin on QoL suggest that it could be considered a preferred therapy, but long-term studies are needed to confirm these effects and identify the optimal dosing regimen. Additional research could also examine the safety and efficacy of combination therapies, such as using erythropoietin with intravenous iron, to see if combining treatments could offer enhanced anemia management while potentially reducing side effects.

In conclusion, this study supports erythropoietin's use as a primary anemia management strategy for CKD patients on hemodialysis, given its positive impact on both clinical outcomes and QoL. Future protocols for CKD treatment should consider the importance of individualized anemia management, aiming to balance hemoglobin optimization with QoL enhancements. Tailored approaches that factor in individual patient characteristics and preferences will be key to maximizing the benefits of anemia treatments. As research progresses, it is hoped that anemia management in CKD will continue to

evolve toward more effective, patient-centered care, ultimately improving the lives of those affected by this challenging condition.

CONFLICT OF INTEREST STATEMENT:-
The author declare no conflict of interest.

FUNDING

ETHICS STATEMENT:-
Ethical approval was obtained from the Institute Ethics Committee of Vivekanandha Medical Care Hospital, File Ref. No: EC/NEW/INIT/2O21/1811 reviewed and discussed to conduct the study [Study Ref. no: SVCP/IEC/DEC/2023/89.

ABBREVIATIONS:
ACE - Angiotensin-Converting Enzyme
ACR - Arteriovenous fistula
AKI - Acute Kidney Injury
AMQLAS - Anemia Management and Quality of life Assessment Scale
ARB - Angiotensin II Receptor Blocker
AVF - Anteriovenous Fistula
AVG - Arteriorvenous Graft
BFR - Blood Flow Restriction
CAPD - Continuous Ambulatory Peritoneal Dialysis
CCPD - Continuous Cyclic Peritoneal Dialysis
CKD - Chronic Kidney Disease
CRF - Chronic Renal Failure
CRP - C-reactive Protein
CRRT - Continuous Renal Replacement Therapy
CUC - Chronic Ulcerative Colitis
CVD - Cardiovascular Disease
DFR - Diastolic Hyperemia-Free Ratio
DM - Diabetes Mellitus
DPI - Dialysis Prescription
EPO - Erythropoietin
ESA - Erythropoiesis-Stimulating Agents
ESRD - End-Stage Renal Disease
GFR - Glomerular Filtration Rate
HB - Hemoglobin
HD - Hemodialysis
HDF - Hemodiafiltration
HHD - Home Hemodialysis
HRQOL - Health Related Quality of Life
HTN – Hypertension
KDOQI - Kidney Disease Outcome Quality Intiative
KDIGO - Kidney Disease Improving Global Outcome
LMIC - Low-And Middle-Income Countries
MHD - Maintenance Hemodialysis
PD - Peritoneal Dialysis
QOL - Quality of Life
RR - Recirculation Ratio
RRT - Renal Replacement Therapy
TSAT - Transferrin Saturation

WHOQOL - World Health Organization Quality of Life
UF – Ultrafiltration

SUMMARY

This cross-sectional study analyzed anemia management in 54 chronic kidney disease (CKD) patients undergoing hemodialysis at Vivekanandha Medical Care Hospital over six months. The focus was on evaluating the effectiveness of iron supplementation and erythropoietin-stimulating agents (ESAs), monitoring treatment responses, and assessing quality of life (QOL) using a self-prepared questionnaire.Of 54 patients, 48 completed follow-up; most were male (87.5%) and aged 41–60.Anemia management primarily involved iron and ESA therapy, aligning with current guidelines that recommend individualized treatment and regular monitoring.The study found statistically significant improvements in QOL after anemia management interventions ($p < 0.004$).Results reinforce that effective anemia treatment in hemodialysis patients not only improves clinical outcomes but also enhances QOL, particularly by reducing fatigue and related symptoms.Demographic factors like age and gender influenced treatment efficacy, highlighting the need for tailored approaches.In conclusion, the study underscores the importance of comprehensive anemia management-including both clinical and QOL assessments-to optimize care for hemodialysis patients.

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