Balancing Efficacy, Health Status, and Cost-Effectiveness: A Comparative Study of Desidustat and Erythropoietin in Chronic Kidney Disease Patients on Hemodialysis

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Yarramachu Dharanidhar Reddy[1], K. Sai Sindhu Singh[1], Pavuluri Lakshmi Aishwarya[2], Manoj Kumar K.[2], Indhumathi Elayaperumal[3]

1 Senior resident, Department of Nephrology, Saveetha Institute of Medical and Technical Sciences, Chennai, Tamil Nadu, India
2 Assistant Professor, Department of Nephrology, Saveetha Institute of Medical and Technical Sciences, Chennai, Tamil Nadu, India
3 Professor and Head, Department of Nephrology, Saveetha Institute of Medical and Technical Sciences, Chennai, Tamil Nadu, India

Yarramachu
Dharanidhar Reddy

Corresponding author:
Yarramachu Dharanidhar Reddy
Senior resident, Department of Nephrology, Saveetha Institute of Medical and Technical Sciences, Chennai Tamil Nadu, India
Tel: +91-9513894603
E-mail: yarramachudharanidharreddy@gmail.com

ABSTRACT
Background. Anemia is a common problem that greatly affects the quality of life and prognosis of those with CKD (chronic kidney disease). The conventional course of treatment has traditionally used ESAs (erythropoiesis-stimulating agents) such as erythropoietin; however, more recent medications, such as Desidustat, a hypoxia-inducible factor prolyl hydroxylase inhibitor (HIF-PHI), may be more advantageous in terms of both efficacy and cost. In this study, CKD patients receiving hemodialysis are compared for efficacy, safety, and cost-effectiveness between Desidustat and erythropoietin treatment.
Methods. This prospective, single-center, open-label study with parallel groups was carried out at Saveetha Institute of Medical Sciences in Chennai. A total of 60 patients with CKD on maintenance hemodialysis were randomized to receive either Desidustat (100 mg orally, 3 times a week) or Erythropoietin (subcutaneous injections) for 12 weeks. At baseline, four weeks, eight weeks, and 12 weeks, hemoglobin levels, biomarkers (TSAT, ferritin, and hepcidin), and status of physical and mental health had been noted. The key finding was the proportion of hemoglobin responders (defined as a rise from baseline of ≥1g/dL). Secondary outcomes included predictors of hemoglobin response, adverse effects, and cost-effectiveness.
Results. The proportion of hemoglobin responders was 83.33% in the Desidustat compared to 73.33% in the Erythropoietin group (p = 0.530), indicating no significant difference in efficacy. Hemoglobin levels increased gradually in both groups over 12 weeks. Higher serum albumin (OR = 3.32, 95% CI: 1.54-7.16, p = 0.008) and lower iPTH levels (OR = 0.98, 95% CI: 0.97-0.99, p = 0.004) have been important indicators of hemoglobin response. Hepcidin levels decreased significantly in the Desidustat group in contrast to Erythropoietin (p = 0.038), suggesting improved iron metabolism with Desidustat. No significant differences were noted in TSAT or ferritin levels. Adverse effects were comparable between the groups, with similar hospitalization and infection rates. Desidustat demonstrated better cost-effectiveness, with a lower monthly cost compared to Erythropoietin.
Conclusions. When treating anemia in individuals with CKD receiving hemodialysis, Desidustat is a safe and efficient substitute for erythropoietin, with the added advantage of cost-effectiveness. Serum albumin and iPTH were significant predictors of hemoglobin response. To validate these results larger multicentric studies are necessary.

KEYWORDS: Chronic kidney disease, anemia, Desidustat, Erythropoietin, hemodialysis, hemoglobin response, biomarkers, cost-effectiveness, hepcidin, iron metabolism

Introduction

Chronic kidney disease (CKD) affects millions of people globally and is often accompanied by anemia, which significantly impacts the quality of life and contributes to increased morbidity and mortality [1]. Anemia prevalence can reach up to 90% in patients with ESRD (end-stage renal disease) [2]. The management of anemia in CKD changed dramatically with the introduction of recombinant human erythropoietin (EPO) in the late 1980s, which effectively increased hemoglobin levels and reduced the need for blood transfusions [3, 4]. In 1989, the FDA approved EPO for anemia treatment in CKD patients [3].

However, ESAs (erythropoiesis-stimulating agents) like EPO present challenges, including risks of cardiovascular events [5], the burden of regular injections, and significant healthcare costs. Additionally, some patients' responses to ESA therapy are insufficient, highlighting the need for alternative treatments [6].

The high prevalence of anemia in CKD, combined with the limitations of current therapies, necessitates exploring new options that improve patient outcomes and reduce costs [2, 5, 7]. Desidustat, an oral HIF-PHI (hypoxia-inducible factor prolyl hydroxylase inhibitor), is emerging as a promising alternative. By stabilizing hypoxia-inducible factors, Desidustat stimulates endogenous erythropoietin production and enhances iron metabolism [8]. Its oral administration and potential for a better safety profile compared to ESAs make it appealing [8]. Furthermore, Desidustat may offer a more cost-effective solution for anemia management in CKD patients, especially when considering long-term ESA therapy costs [9].

While early trials show that Desidustat effectively raises hemoglobin levels, more studies are needed to compare it directly with traditional ESAs, especially regarding clinical outcomes, health status, and cost-effectiveness [10]. Currently, few studies have been conducted in India [11]. This study aims to compare Desidustat and EPO in CKD patients, focusing on hemoglobin response, health status, predictors of response, and cost-effectiveness, offering a comprehensive evaluation of Desidustat as an alternative to ESA treatment.

Materials and Methods

Study Design

This single-center, prospective, open-label, parallel-group trial was conducted at Saveetha Institute of Medical Sciences & Research, Chennai, to compare the efficacy, health status, and cost-effectiveness of Desidustat with erythropoietin in treating anemia in CKD patients on hemodialysis. This study was conducted from June 2023 to July 2024 in patients aged 18 to 75 years. The inclusion criteria werepatients undergoing maintenance hemodialysis for at least three months with hemoglobin levels between 8.0 and 10.0 g/dL, TSAT greater than 20%, and no deficiencies in folate, vitamin B12, or iron [12]. Patients had to be off erythropoiesis-stimulating agents or iron therapy for four weeks, provide informed consent, and meet the exclusion criteria, including recent or active malignancy, uncontrolled hypertension, or liver disease. All participants granted written in formed consent, and the Institutional Ethics Committee (No.012 /06/2023/IEC) authorized the research.

Sixty patients were randomized into 2 groups using a computer-generated sequence. One group (30 patients) received Desidustat, and the other group (30 patients) received Erythropoietin-epoetin alfa. Desidustat was administered orally (100 mg three times weekly), whereas Erythropoietin was given subcutaneously following standard protocols. Hemoglobin levels were closely monitored throughout the study, and dosages were adjusted based on individual responses.

Enrollment and Screening

Baseline data collected included demographic information, medical history, and current medications. There were no substantial differences in current medications between the Desidustat and Erythropoietin groups. Patients in both groups were not on vitamin B12 or folic acid tablets during this period. Laboratory tests were administered to measure hemoglobin, MCV (mean corpuscular volume), PCV (packed cell volume), ferritin, TSAT, hepcidin, MCH (mean corpuscular hemoglobin), erythrocyte sedimentation rate (ESR), serum albumin, body mass index (BMI), Kt/V (a measure of dialysis adequacy), URR (urea reduction ratio), and intact PTH (parathyroid hormone) levels.

Treatment and Follow-Up

Following a 12-week course of treatment, follow-up evaluations were carried out at baseline, four, eight, and twelve weeks. Clinical evaluations included physical examination and laboratory tests to monitor hemoglobin, PCV, MCV, MCH, MCHC, ferritin, TSAT, and hepcidin. ESR, serum albumin, BMI, Kt/V, URR, and intact PTH were also measured. Hemoglobin responders were defined as those achieving hemoglobin levels between 10 to 12 g/dL, increasing by at least 1 g/dL [13] by week twelve.

The "medical outcome study questionnaire SF-36", was used to measure the overall physical and mental health status at baseline and twelve weeks [14].

Monitoring and Dose Adjustments

Dosages were adjusted based on hemoglobin levels and other clinical parameters to ensure patient safety and optimize treatment efficacy. Adverse events were documented and managed throughout the study. The primary focus was maintaining patient safety while ensuring effective treatment.

Data Collection and Statistical Analysis

Data collected during the study, including baseline characteristics, laboratory results, status of heath scores, and adverse events, were securely documented for comparison between treatment groups.

Baseline Characteristics

Baseline characteristics, such as hemoglobin, PCV, MCV, MCH, MCHC, TSAT, ferritin, hepcidin levels, markers of dialysis efficacy like URR, Kt/V and ESR were assessed. Comparisons between Desidustat and Erythropoietin groups were made using separate t-tests at baseline and twelve weeks. Statistical significance has been established as a p-value of less than 0.05.

Hemoglobin Responders

The proportion of hemoglobin responders (patients with hemoglobin levels between 10-12 g/dL and an increase of ≥1 g/dL) was compared using a chi-square test, with odds ratios and 95% confidence intervals calculated. To determine the effects of both duration and treatment, levels of hemoglobin were computed at baseline, 4 weeks, 8 weeks, and12 weeks using repeated-measures ANOVA.

Multivariate Logistic Regression

Multivariate logistic regression was used to identify predictors of hemoglobin response, including ESR, serum albumin, BMI, Kt/V, URR, intact PTH, age, and comorbidities such as hypertension and diabetes. After setting the significance level at p < 0.05, odds ratios with confidence intervals of 95% were computed.

Hemoglobin Rise Over Time

Repeated-measures ANOVA was used to examine hemoglobin levels at four, eight, and twelve

weeks. Line graphs were used to depict trends and compare the Desidustat and Erythropoietin groups.

Ferritin, TSAT, and Hepcidin Levels

Ferritin, TSAT, and hepcidin levels have been assessed at baseline, four, eight, and twelve weeks. and compared between the two groups using repeated-measures ANOVA. Line graphs illustrated these trends.

Health status

The SF-36 survey [14, 15] was used to measure physical and mental health changes, and paired t-tests within groups and independent t-tests across groups were utilised to compare the results. Results have been summarized as mean scores and standard deviations.

Cost-Effectiveness

Cost-effectiveness was evaluated by comparing total costs (drugs, administration, monitoring, and adverse events) and QALYs (Quality-Adjusted Life Years) gained. The ICER (Incremental Cost-Effectiveness Ratio) [16] has been computed to assess the cost per QALY gained by switching from Erythropoietin to Desidustat.

Safety Outcomes

The incidence of treatment-related events, including hospitalization rates, infections, volume overload, nausea, abdominal pain, headache, fatigue, and insomnia, was assessed using chi-square or Fisher's exact tests based on expected frequencies. Results were summarized as the number of patients experiencing each event in both groups, with p-values used to identify significant differences. Hospitalization rates were specifically analyzed using chi-square tests, with relative risks calculated to compare the frequency of hospitalizations between Desidustat and Erythropoietin groups.

Results

The baseline characteristics of patients in the Desidustat and Erythropoietin groups were generally comparable, with no significant differences seen in the majority of variables which have been outlined in Table 1. The average age was around 52 years in both groups, and the BMI (body mass index) was slightly elevated in the Desidustat group, though this difference approached statistical significance (p = 0.059). Hemoglobin (Hb) levels were similar between groups (p = 0.335). However, the Desidustat group had significantly higher MCV and MCH compared to the Erythropoietin group, with p-values of 0.001 and 0.005, respectively. There were no discernible variations in other measures, including albumin, packed cell volume (PCV), ESR, and markers of dialysis efficacy (Kt/Vand URR). The gender distribution in this study demonstrated a significant imbalance between the two treatment groups. In the Desidustat group, 86.67% of participants were male, compared to 43.33% in the Erythropoietin group (p = 0.001). Despite this disparity, no gender-related analyses were conducted, as gender was not hypothesized to influence the outcomes. There were no appreciable variations in the prevalence of heart failure between the two groups, and both had comparable rates of diabetes and hypertension.

The proportion of hemoglobin responders was 83.33% (n=25) in the Desidustat group and 73.33% (n=22) in the Erythropoietin group, p=0.530 indicates that there is no statistically significant variation among the groups, indicating similar efficacy in achieving a hemoglobin rise of ≥1 g/dL by week 12as given in Figure 1.

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Variable	DESIDUSTAT		ERYTHROPOIETIN		p-value
	Mean	**SD**	**mean**	**SD**	
Age in years	52.30	11.83	52.70	10.52	0.935
BMI	22.60	2.39	21.54	1.83	0.059
Hb	8.89	0.43	8.98	0.36	0.335
PCV	27.56	3.73	26.36	4.42	0.260
MCV	92.66	5.69	87.68	5.82	**0.001**
MCH	30.57	10.64	27.12	1.96	0.005
MCHC	33.56	1.23	32.80	1.16	0.813
HEPCIDIN	200.07	67.30	199.10	61.86	0.954
ESR	27.73	12.85	28.73	12.17	0.758
ALBUMIN	3.70	0.44	3.63	0.39	0.517
kt/v	1.25	0.15	1.22	0.20	0.519
URR	64.3	4.7	63.1	4.56	0.318
iPTH	314.57	142.31	316.13	113.93	0.963
	Count n=30	**Frequency**	**Count n=30**	**Frequency**	
Male	26	86.67%	13	43.33%	**0.001**
Female	4	13.33%	15	50.00%	**0.006**
HTN	30	100%	30	100%	1.000
DM	12	40%	13	43%	1.000
Heart failure	7	23.33%	8	26.67%	1.000

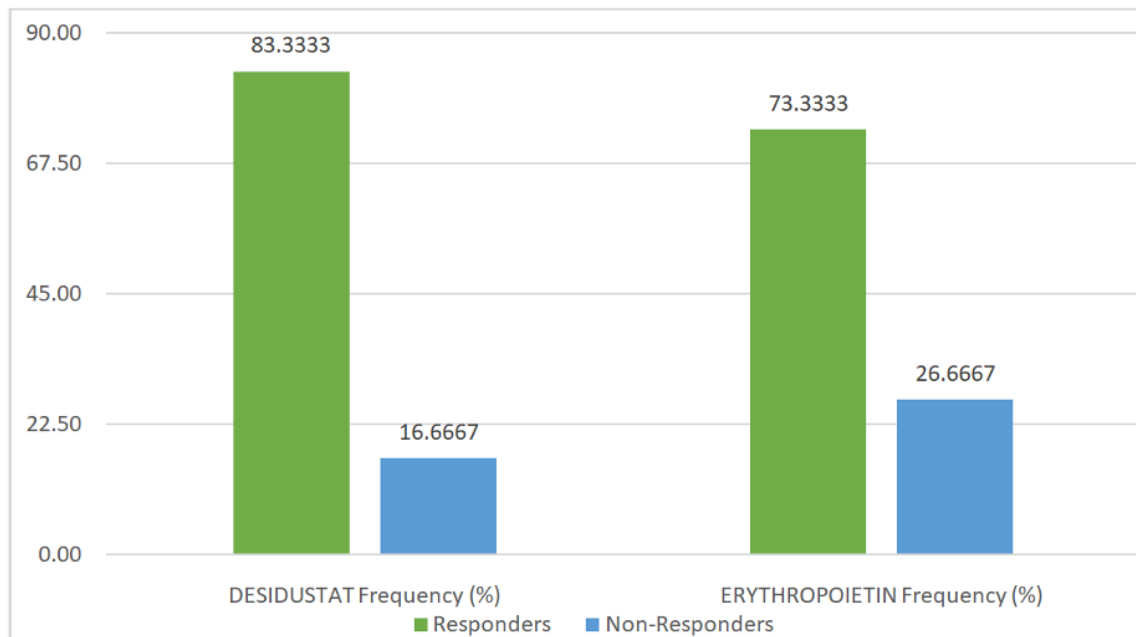**Table 1. Baseline characteristics of the study participants.**

Figure 1. Comparison of responders and non-responders to treatment between the Desidustat and the Erythropoietin groups.

At baseline, four weeks, eight weeks, and twelve weeks, hemoglobin levels were assessed. Both Desidustat and Erythropoietin groups demonstrated a gradual increase in haemoglobin levels over time, with no significant variation among groups at any time point(p>0.05). At baseline, there was no significant variation among groups(p=0.795). At 4 weeks, the mean hemoglobin levels were nearly identical (p=0.967), and similar trends were observed at eight weeks(p=0.642) and twelve weeks(p=0.724). These results suggest that both treatments are equally effective in raising hemoglobin levels over the 12-weeksas explained in Figure 2.
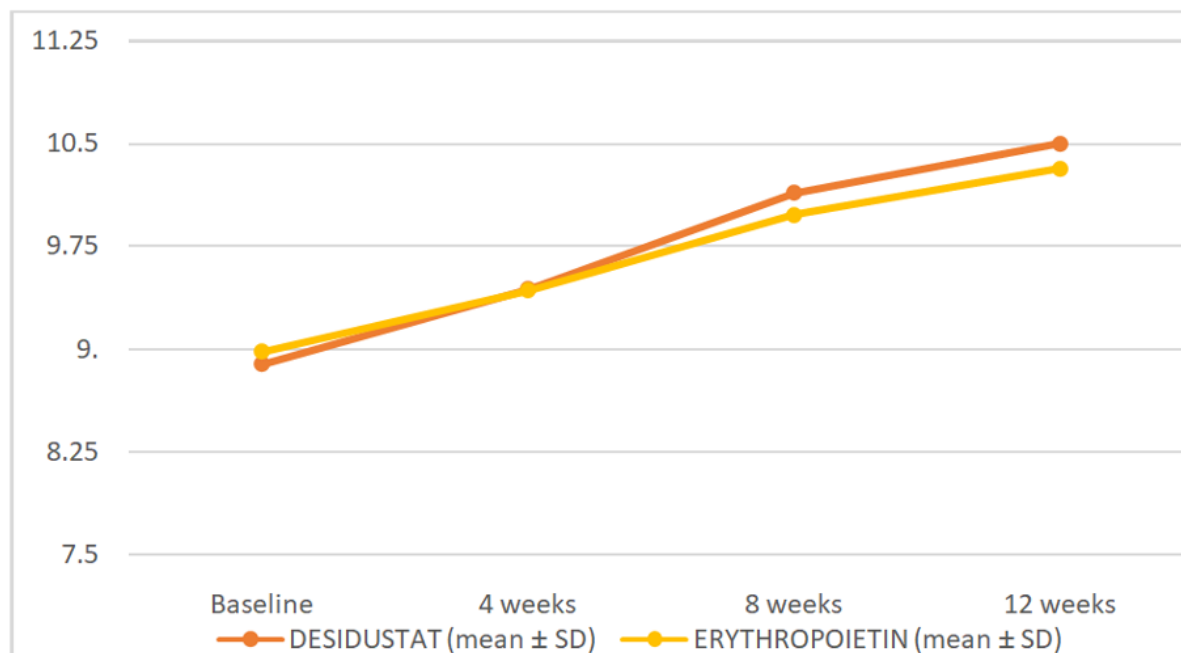
Figure 2. Comparison of the increase in hemoglobin levels between the Desidustat and the Erythropoietin groups.

The hemoglobin levels and biomarkers (TSAT, Ferritin, and Hepcidin) were assessed at baseline, four weeks, eight weeks, and twelve weeks in both Erythropoietin and Desidustat groups.

The study also measured changes in several biomarkers, including transferrin saturation (TSAT), ferritin, and hepcidin. TSAT scores indicated a marginally significant increase in both groups over the 12 weeks (p = 0.715) as outlined in figures 3, 4 and 5 respectively. Ferritin levels decreased in both groups without statistical significance (p = 0.544). In contrast, Hepcidin levels decreased significantly in the Desidustat group compared to the Erythropoietin group (p = 0.038), recommending a potential advantage of Desidustat in enhancing iron metabolism.

The study examined several cytological parameters, including total leukocyte count (TLC), PCV, MCV, mean corpuscular hemoglobin (MCH), and RBC count given in Table 2. Baseline values for RBC and PCV were similar between the groups, and changes at 12 weeks were also comparable, with no significant differences. The MCV was noticeably greater in the Desidustat group at baseline (p=0.001), but the difference decreased by 12 weeks (p=0.281). MCH was also higher in the Desidustat group at baseline(p=0.005), but at 12 weeks, this change was not statistically significant (p = 0.725). At any given moment, there were no discernible variations between the groups' MCHC or TLC.

Multivariate logistic regression identified higher serum albumin (OR = 3.32, 95% CI: 1.54-7.16, p = 0.008) and lower iPTH levels (OR = 0.98, 95% CI: 0.97-0.99, p = 0.004) as significant predictors of hemoglobin response. Reduced ESR (p = 0.051) also trended toward significance. These results suggest that favorable baseline nutritional and inflammatory profiles enhance treatment outcomes. While Kt/V showed a positive but nonsignificant association with hemoglobin response (OR = 2.50, p = 0.179), URR displayed a significant negative association (OR = 0.741, p = 0.003). This indicates that higher URR values may decrease the likelihood of achieving hemoglobin response, despite dialysis adequacy (Table 3).

Parameter	DESIDUSTAT		ERYTHROPOIETIN		p-value
	mean	**SD**	**mean**	**SD**	
Baseline RBC	2.99	0.57	3.01	0.51	0.813
RBC at 12 weeks	3.22	0.43	3.21	0.57	0.921
Baseline PCV	27.56	3.73	26.36	4.42	0.26
PCV at 12 weeks	29.82	3.52	29.04	5.52	0.516
Baseline MCV	92.66	5.69	87.68	5.82	**0.001**
MCV at 12 weeks	91.5	5.35	89.99	5.43	0.281
Baseline MCH	30.57	10.64	27.12	1.96	**0.005**
MCH at 12 weeks	28.4	2.31	28.2	1.91	0.725
Baseline MCHC	30.57	1.23	32.80	1.16	0.813
MCHC at 12 weeks	30.24	3.41	31.13	1.36	0.652
Baseline TLC	8434.67	2318.02	8625.47	3903.85	0.579
TLC at 12 weeks	8121.33	2431.05	8036.23	2225.63	0.739

Table 2. Comparison of Increase in Hematological parameters between the two groups.
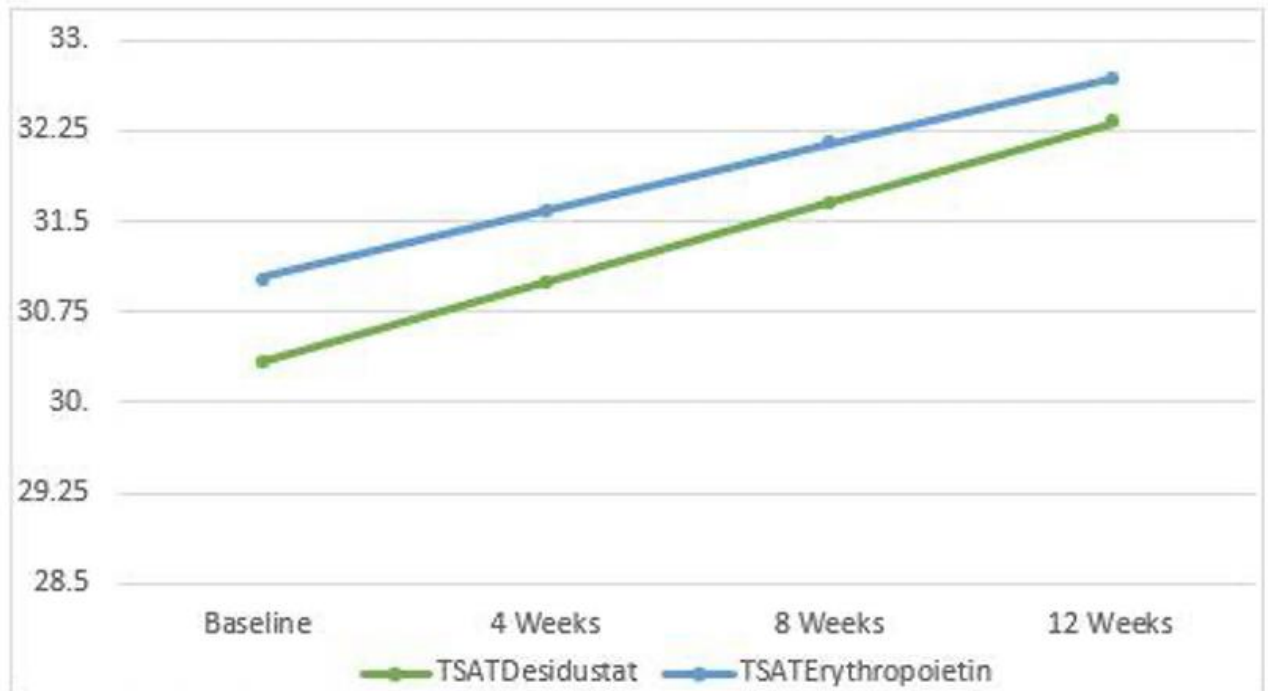

Figure 3. Comparison of TSAT between the Desidustat and the Erythropoietin groups.
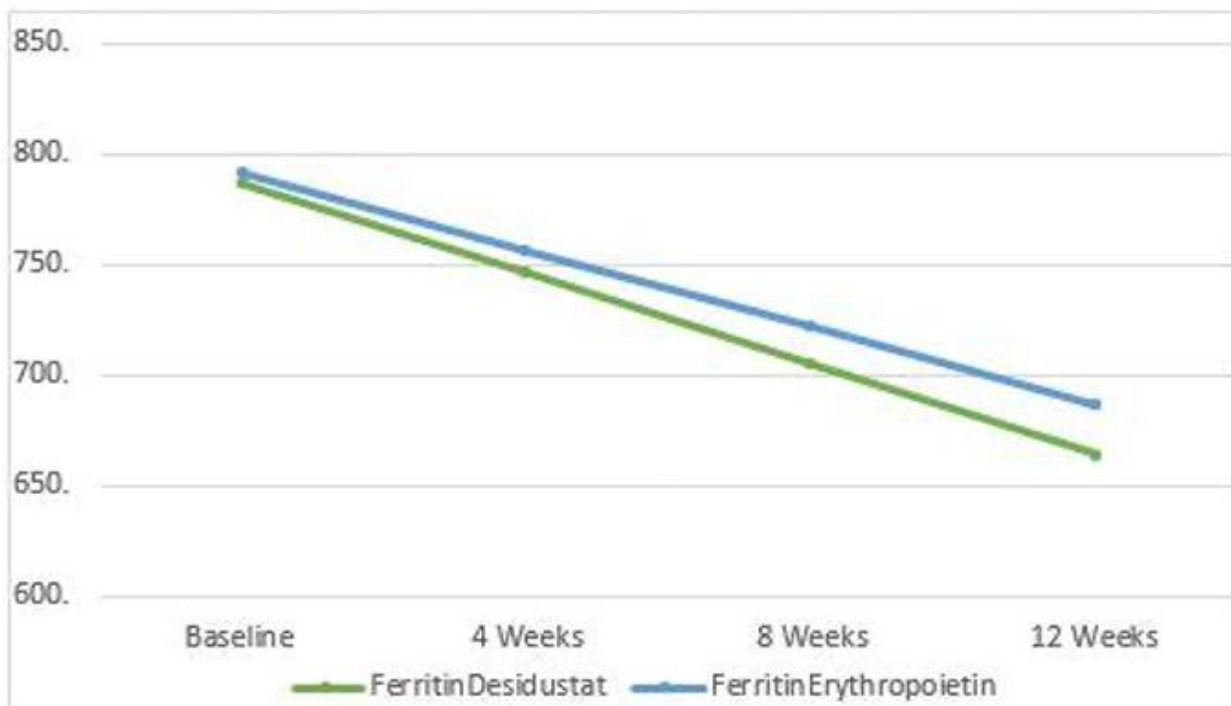
Figure 4. Comparison of ferritin between the Desidustat and the Erythropoietin groups.
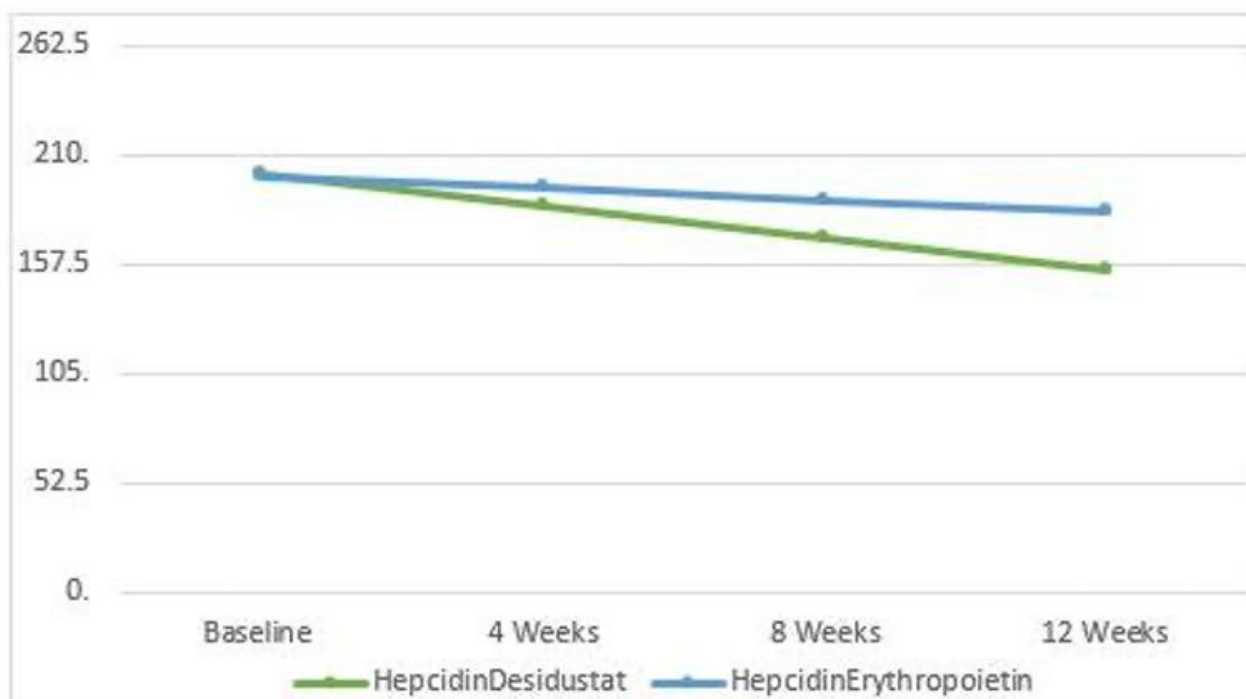

Figure 5. Comparison of hepcidin between the Desidustat and the Erythropoietin groups.

In this study, both the Desidustat and Erythropoietin groups showed improvements in overall health status over the course of three months, as determined by the SF-36 survey (Table 4).Although both groups exhibited increased scores in domains like physical functioning, role physical, and mental health, among the groups, there were no statistically significant differences ($p > 0.05$).

Variable	Coefficient	Standard Error	z	p-value	Odds Ratio
ESR	-0.101	0.051	-1.955	**0.051**	0.904
ALBUMIN	1.2	0.45	2.667	**0.008**	3.32
BMI	0.165	0.194	0.85	0.395	1.18
Kt/V	5.354	3.984	1.344	0.179	2.5
URR	-0.3	0.1	-3	**0.003**	0.741
IPTH	-0.02	0.007	-2.857	**0.004**	0.98
Age	0.055	0.039	1.417	0.156	1.057
DIABETES	-0.374	0.904	-0.413	0.68	0.688
HYPERTENSION	-2.308	9.27	-0.249	0.803	0.099
Heart failure	-0.289	0.916	-0.315	0.753	0.749

Table 3. Multivariate logistic regression analysis with hemoglobin responders.

Domain	Time Point	Desidustat Group	Erythropoietin Group	P-values
Physical Functioning (PF)	Baseline	55.8 ±22.6	56.2 ± 23.1	0.946
	3 months	68.3 ± 18.2	65.8 ± 19.7	0.612
Role Physical (RP)	Baseline	56.7 ± 32.4	54.9 ± 31.8	0.829
	3 months	66.5 ± 27.8	61.3 ± 30.6	0.494
Bodily Pain (BP)	Baseline	47.8 ± 23.5	48.3 ± 24.1	0.935
	3 months	59.2 ± 20.7	58.7 ± 20.8	0.926
General Health (GH)	Baseline	47.3 ± 13.4	48.1 ± 14.1	0.823
	3 months	58.4 ± 12.4	56.7 ± 12.9	0.605
Vitality (VT)	Baseline	42.6 ± 15.3	41.9 ± 15.6	0.861
	3 months	55.8 ± 14.2	57.4 ± 16.8	0.692
Social Functioning (SF)	Baseline	57.8 ± 18.5	56.4 ± 19.3	0.775
	3 months	64.7 ± 17.4	65.5 ± 18.7	0.864
Role Emotional (RE)	Baseline	42.6 ± 33.7	41.8 ± 34.1	0.927
	3 months	58.7 ± 30.3	56.6 ± 32.7	0.797
Mental Health (MH)	Baseline	46.9 ± 13.9	46.8 ± 14.2	0.978
	3 months	56.3 ± 12.8	54.5 ± 13.4	0.597

Table 4. Comparison of Physical and Mental health status using SF-36 between the two groups.

Desidustat's monthly cost totals $51.61, offering 0.025 QALYs over three months, while Erythropoietin costs $58.43 monthly, yielding 0.020 QALYs. Both treatments share $11.45 administration and monitoring costs, with $8.43 per treatment related event. Desidustat's lower costs and higher QALYs lead to an ICER of $-1,493.98, indicating greater cost-effectiveness (Table 5).

Category	Desidustat	Erythropoietin
Drug Costs	$2.65 per dose, thrice a week ($31.81 /month)	$4.82 per dose, twice a week ($38.55 /month)
Administration Costs	similar	similar
Monitoring Costs	$11.45/month	$11.45/month
Treatment Related Event Management Costs	$8.43 per event	$8.43 per event
Total Cost (Monthly)	$51.61	$58.43
Incremental Cost-Effectiveness Ratio (ICER)	$-1,493.98	–

Table 5. Comparison of cost-effectiveness between the two groups.

Safety outcomes have been comparable among the groups, with no significant differences in hospitalization rates (11 vs 13, p=0.782), infections (11 vs 8, p=0.631), or volume overload (p=0.650).Gastrointestinal symptoms, like nausea and vomiting, were more common (3 vs1, p=1.0) in the Desidustat group; nevertheless, the differences did not reach statistical significance. Other adverse effects, such as headache, fatigue, and insomnia, occurred at similar rates across both groups (Table 6).

Safety outcomes	Desidustat	Erythropoietin	p-value
Number of Hospitalizations	11	13	0.782
Infections	8	11	0.631
Volume Overload	3	2	0.650
Nausea and Vomiting	3	1	1
Abdominal Pain	1	0	1
Headache	0	1	0.462
Fatigue	3	2	1
Insomnia	0	1	0.462

Table 6. Comparison of safety outcomes between the Desidustat and the Erythropoietin groups.

Discussion

The findings of this study demonstrate that Desidustat is a viable alternative to Erythropoietin in controlling anemia in patients with CKD. Both drugs showed similar efficacy in raising hemoglobin levels over 12 weeks, with no significant difference in hemoglobin response rates. These results are consistent with those reported by Gang et al., who found Desidustat to be equally effective as Erythropoietin in increasing hemoglobin levels in CKD patients [17].

Although this study lacked gender-specific analyses, a significant imbalance was observed, favoring males in the Desidustat group (p = 0.001). Hemoglobin response and secondary outcomes were unaffected, consistent with standardized dialysis protocols minimizing gender-related differences. Joharapurkar et al. (2024) reported similar findings [13]. The results support the applicability of both drugs and highlight the importance of representative sampling in future research.

A notable observation from this study was the significant decrease in hepcidin levels in the Desidustat group. One important regulator of iron metabolism is hepcidin, which saw a reduction that likely enhanced iron availability for erythropoiesis, contributing to Desidustat's efficacy. Chen et al. (2019) similarly observed a reduction in hepcidin levels, which was linked to improved iron mobilization in patients treated with Roxadustat [8], while Gang et al. (2022) reported similar findings for Desidustat in dialysis-dependent CKD patients [17]. Both groups showed slight increases in TSAT levels, with no significant difference (p = 0.715), as well as a non-significant reduction in ferritin levels (p = 0.544), consistent with the DREAM-D trial findings, where Desidustat had a minimal effect on iron metabolism markers during anemia treatment in CKD patients [17].

The multivariate logistic regression analysis revealed that higher serum albumin, lower iPTH levels, and reduced ESR were significant predictors of hemoglobin response. This aligns with literature suggesting that inflammation, indicated by elevated ESR, can impair erythropoiesis and diminish the efficacy of anemia treatments [18]. Higher albumin levels, reflecting better nutritional status, were also associated with improved responses to anemia therapy [19].

In this study, multivariate regression analysis showed that dialysis adequacy, as measured by Kt/V, was not significantly associated with hemoglobin response (p = 0.179), possibly due to the influence of nutritional status and inflammation. In contrast, a significant negative association was found between URR and hemoglobin response (p = 0.003), suggesting that higher URR might reflect more aggressive dialysis or underlying conditions, such as malnutrition or inflammation, that impair erythropoiesis [20]. This underscores the complex interplay between dialysis and anemia, as highlighted by Owen et al. [20] and Liu et al. [21], and suggests the need for further research on how dialysis metrics interact with nutritional and inflammatory factors in CKD.

Regarding safety, the safety outcomes of Desidustat and Erythropoietin were comparable, with no significant differences in hospitalization rates, infections, or other complications. This safety profile aligns with previous clinical trials, which found Roxadustat (a HIF-PHI) to be well-tolerated and similar in safety to Erythropoietin [22].

Physical, emotional and mental health improvements have been noted in both groups, as measured by the SF-36 survey. Significant enhancements across all domains suggested that effective anemia management, regardless of the drug, improved patients' well-being. These results mirror those reported by Provenzano et al. (2021), who also found significant quality of life improvements in individuals receiving Roxadustat (HIF-PHI) treatment [6].

One of the study's most significant findings was the cost-effectiveness of Desidustat. The lower monthly costs, combined with slightly better QALY outcomes, produced a favorable ICER. This economic advantage is especially important in resource-limited settings where the high cost of Erythropoietin poses a barrier to treatment. Desidustat's cost-effectiveness has also been highlighted in other studies, which identified it as a key benefit over traditional erythropoiesis-stimulating agents (ESAs) [13].

Similar cost advantages were noted with Roxadustat, another HIF-PHI. Dhillon et al. (2019) reviewed Roxadustat and found that it improved iron metabolism by lowering hepcidin and reducing the need for iron supplements, which contributed to its lower treatment costs compared to ESAs [10]. This suggests that Desidustat, a similar HIF-PHI, may offer comparable economic benefits. Provenzano et al. (2016) further demonstrated that Roxadustat effectively increased hemoglobin in non-dialysis CKD patients with good safety, reinforcing Desidustat's potential as a cost-effective alternative for anemia management [7].

These studies collectively support the potential of Desidustat as a cost-effective and efficacious treatment option for anemia in CKD patients. The ability of HIF-PHIs like Desidustat to manage anemia while improving iron metabolism and reducing treatment costs makes them valuable alternatives to traditional therapies, particularly in settings where cost-effectiveness is crucial. While this study provides valuable insights into cost-effectiveness, future research should consider indirect costs and other health-economic factors.

Overall, the results suggest that Desidustat is not only an effective and safe alternative to Erythropoietin but also a more cost-effective option for anemia management in CKD patients, aligning with existing literature on the potential benefits of Desidustat.

Conclusion

This study demonstrated that Desidustat is not only comparable to Erythropoietin in terms of improving hemoglobin levels and enhancing health status but also offers significant advantages in cost-effectiveness. Desidustat's unique mechanism of action, which positively influences iron metabolism, alongside its lower treatment costs, positions it as a promising alternative to traditional erythropoiesis-stimulating agents.

Limitations

The study's limitations include its relatively short duration, specific population and small sample size, as it was conducted in a single centre. Longitudinal multicentric studies with more diverse populations are required to thoroughly evaluate the long-term effectiveness and safety of Desidustat compared to Erythropoietin.

Future implications

The study findings suggest that Desidustat could be a valuable option for anemia management in

CKD on hemodialysis, particularly in settings where cost considerations are paramount. It paves the way for conduction of longitudinal multicentric studies to assess Desidustat's wider relevance in a variety of patient demographics.

Ethical issues

The study was initiated after obtaining institutional ethics approval (No.012 /06/2023/IEC) and informed consent of participants and undertaken following the revised Declaration of Helsinki (2008) guidelines.

Data availability

The data regarding study findings are available with the corresponding author and is accessible on request.

Abbreviations

CKD: Chronic Kidney Disease

ESA: Erythropoiesis Stimulating Agent

HIF-PHI: Hypoxia-inducible factor prolyl hydroxylase inhibitor

ESRD: End-stage Renal Disease

EPO: Erythropoietin

TSAT: Transferrin Saturation

QALYs: Quality-Adjusted Life Years

ICER: Incremental Cost-Effectiveness Ratio

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