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**Research Article**

# Quality of Life in Relation to Severity of Anemia in End Stage Renal Disease Patients on Maintenance Hemodialysis

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**Abstract:** Anemia affects 90% of end stage renal disease (ESRD) patients on maintenance hemodialysis. The aim and objective of the study was to evaluate the relationship of severity of anemia and quality of life (QOL) in ESRD patients on hemodialysis. It was a cross sectional study carried out in a Tertiary care teaching hospital. Face-to-face interviews using a Kidney Disease Quality of Life - Short Form (KDQOL-SF™ v 1.3) questionnaire (consisted of SF-36 and kidney disease questionnaires) were conducted during November 2009 and October 2011 with 60 patients receiving hemodialysis at tertiary care hospital. QOL measures were compared in 4 hemoglobin (Hb) level groups of ≥4-6, >6-8, >8-10, >10-12g/dl. Scores of QOL and Hb levels were analyzed. Statistical analysis was performed by Chi-square test. It was found that Increasing Hb levels increases QOL by affecting some components of both kidney domain scores and SF36 scores while others were not affected. Highest scores were observed in Hb group of >10 – 12g/dl.
**Keywords:** Anemia, QOL, ESRD.

## INTRODUCTION

Anemia commonly contributes to poor quality of life (QOL) in patients with end stage renal disease (ESRD). Although hemodialysis (HD) has a therapeutic effect patients encounter many physical, psychological, and social stress full factors that lead to a decrease in their QOL [1]. Studies over the past decade documented consistent relationship between increasing levels of hemoglobin (Hb) and improvement in the QOL [2, 3], but equally good number of studies reported an increased risk of mortality and cardiovascular events in those treated to achieve higher hematocrit levels [4-7]. Today, the target hemoglobin levels remain uncertain and the management of anemia of ESRD is at cross roads [8-12]. In this study beside of determining the quality of life and its dimensions and severity of anemia in hemodialysis patients, an attempt is made to evaluate their relationship with each other and arrive at safe target Hb level.

## METHODOLOGY

Present study is a prospective, descriptive, and exploratory, cross sectional clinical study done on ESRD patients admitted to the medical wards of a tertiary care hospital which predominantly serves the poorer strata of the society of three states viz., Andhra Pradesh, Tamil Nadu and Karnataka. The study was conducted during November 2009 to October 2011 on 60 ESRD patients on maintenance hemodialysis having anemia, but excluded the patients who were under 18 years, hemoglobin more than 12 g/dl and those who could not answer the KDQOL-SF™v1.3 questionnaire and/or not willing to participate in the study. The study was approved by institutional review board.

After obtaining informed consent, participants were administered the study questionnaire as a face-to-face interview which included the KDQOL-SF™v1.3 (which consisted of SF-36 and kidney disease questionnaires). The scores of quality of the KDQOL questionnaire were transformed onto 0 to 100 possible ranges, with higher scores always reflecting better quality of life. The KDQOL questionnaire was used for measuring a variety of health-related quality of life domains, the questionnaire included 36 generic items (the SF-36) which include overall health rating items and 2 domains; (a) the physical domain consisted of physical functioning, role limitations due to physical health problems, pain, and general health perceptions and (b) the mental domain consisted of emotional well being or mental health, role limitations due to emotional health problems, social functioning, and energy/fatigue or vitality. The particular health-related concerns of individuals with kidney disease and on dialysis were: symptom/problems, effects of kidney disease on daily life, burden of kidney disease, work status, cognitive function, and quality of social interaction, sexual function, and sleep. Items also included were 3

additional quality of life scales: social support, dialysis staff encouragement and patient satisfaction. Patient specific information regarding demographics and clinical laboratory data were collected at baseline and on an ongoing basis at the time of the face to face interview. The demographic data which were obtained included age, gender, marital status, underlying disease (diabetes, hypertension, myocardial infarction). All patients who agreed to participate in the study were medically stable and were face to face interviewed to complete the KDQOL- KDQOL-SF™v1.3. The Hb% of the patients was estimated by Sahli's laboratory method. Patients were randomized to different Hb levels and separated the study population into 4 Hb level groups i.e., ≥4-6, >6-8, >8-10, >10-12 g/dl. Scores of QOL and Hb levels were examined for the relationship and statistical significance using Chi-square test. The P-value of <0.05 was accepted as statistically significant.

## RESULTS

The demographic data regarding age, gender. Risk factors of the 60 patients included in this study are shown in Table 1. Significant representation of all four Hb levels of HD patient was present in the cohort. The mean age of the patients was 48.28 ± yrs. Out of 60 patients 43 (71.66%) were males and 17(28.33%) were females. Male to female ratio was 2.5:1. 46.66% patients had diabetes mellitus, 73.33% had hypertension. 5% had Ischemic heart disease and 6.66% had other risk factors. These percentages were similar in all four Hb level groups. The basic characteristics of all 4 groups of patients were not significantly different (p>0.05).

The mean Hb levels for all patients were 7.54± 2.03. The mean Hb levels were 4.98±0.56, 6.85±0.56, 8.91±0.58 and 10.73±0.49 in ≥4-6, >6-8, >8-10 and>10-12 group respectively as shown in Table 2. Creatinine and blood urea and GFR level were similar in all four Hb level groups. The laboratory parameters of all 4 groups of patients were not significantly different (p>0.05) except for Creatinine (p=0.036).

**Table 1: Demographic data & risk factors by Hb groups**

| Parameter | Hb groups | | | | p-value |
|---|---|---|---|---|---|
| | ≥4-6 (n=14) | >6-8 (n=22) | >8-10 (n=14) | >10-12 (n=10) | |
| Age (yrs mean ±sd) | 45.28 ±11.91 | 47.95 ±15.09 | 53.42 ±11.02 | 50.3 ±15.57 | 0.342 |
| Gender (%) | | | | | 0.293 |
| Male | 64.28 | 68.18 | 78.57 | 80 | |
| female | 35.71 | 31.81 | 21.42 | 20 | |
| Risk factors (%) | | | | | |
| Diabetes | 50 | 40.90 | 42.85 | 60 | 0.673 |
| Hypertension | 85.71 | 63.63 | 78.57 | 70 | 0.908 |
| IHD | 7.14 | 4.54 | 0 | 10 | 0.809 |
| others | 7.14 | 4.54 | 7.14 | 10 | 0.673 |

**Table 2: Laboratory parameters by Hb groups**

| Data | Hb groups | | | | p-value |
|---|---|---|---|---|---|
| | ≥4-6 (n=14) | >6-8 (n=22) | >8-10 (n=14) | >10-12 (n=10) | |
| Hb (g/dl) | 4.98 ±0.56 | 6.85 ±0.56 | 8.91 ±0.58 | 10.73 ±0.49 | 0.066 |
| Creatinine (mg/dl) | 11.96 ±5.93 | 10.95 ±4.44 | 8.95 ±2.72 | 7.97 ±1.52 | 0.035 |
| Blood urea (mg/dl) | 168.57 ±85.27 | 179.90 ±76.90 | 163.21 ±37.04 | 135.3 ±51.60 | 0.167 |
| GFR (ml/min/1.73m$^2$) | 7.05 ±3.44 | 7.55 ±4.22 | 7.69 ±3.20 | 8.22 ±2.03 | 0.129 |

The scores of quality of life in KDQOL SF-36 questionnaire were transformed onto a 0-100 scale range shown in Table 3 & 4 between symptom/problem, effects of kidney disease, burden of kidney disease, work status, cognitive function, quality of social interaction, sexual function, sleep, social support, dialysis staff encouragement, patient satisfaction and the SF-36 items which include overall health rating items and 2 domains; 1) the physical domain components consisted of physical functioning, role limitations due to physical health problems, pain, and general health perceptions and 2) the mental domain components consisted of emotional well being or mental health, role limitations due to emotional health problems, social functioning, and energy/fatigue or vitality. The better status patients had the higher

score. For our hemodialysis patients; we compared the quality of life measured in 4 groups of patients according to the Hb level ≥4-6g/dl, >6-8 g/dl, >8-10 g/dl and >10-12 g/dl.

**Table 3: Kidney disease specific parameter score and Hb groups**

| Parameter | Hb groups | | | | p-value |
|---|---|---|---|---|---|
| | ≥4-6 (n=14) | >6-8 (n=22) | >8-10 (n=14) | >10-12 (n=10) | |
| Symptom/problem list (12items) 14a-k, l | 37.35 | 54.35 | 68.89 | 79.16 | 0.000 |
| Effects of kidney disease (8items) 15a-h | 27.00 | 40.05 | 40.17 | 46.87 | 0.159 |
| Burden of kidney disease (4items) 12a-d | 2.23 | 7.38 | 16.51 | 30.00 | 0.000 |
| Work status (2items) 20, 21 | 14.28 | 15.90 | 17.85 | 50.00 | 0.014 |
| Cognitive function (3items) 13b, d, f | 54.28 | 62.12 | 63.80 | 66.66 | 0.000 |
| Quality of social interaction (3items) 13a, c, e | 50.95 | 53.33 | 60.00 | 80.00 | 0.073 |
| Sexual function (2items) 16a, b | 38.39 | 47.15 | 40.17 | 38.75 | 0.114 |
| Sleep (4items) 17,18a-c | 25.00 | 47.15 | 35.00 | 46.00 | 0.114 |
| Social support (2items) 19a, b | 33.33 | 42.42 | 39.28 | 56.66 | 0.159 |
| Dialysis staff encouragement (2items) 24a, b | 91.07 | 96.02 | 89.28 | 91.25 | 0.483 |
| Patient satisfaction (1item) 23 | 47.61 | 59.08 | 57.14 | 46.66 | 0.105 |

As shown in Table 3, it was found that at the different Hb levels, there were significant differences in the kidney symptom / problem scores (p=0.000), the burden of kidney disease scores (p=0.000), the work satisfaction scores (p=0.014) and the cognitive function scores (p= 0.000). About SF-36, all of the physical domains were significantly different: physical function scores (p=0.000), role physical scores (p=0.045), pain scores (p=0.000) and general health component scores (p = 0.004) in the different Hb level groups as shown in Table 4. For mental domain components, the differences between 4 groups of Hb levels were significant in the variety of quality of life domains: emotional wellbeing score (p=0.006), role emotion scores (p=0.000), social function scores (p=0.000) and energy/fatigue scores (p=0.026). But the difference was not significant statistically in physical component summary (p=0.352), mental component summary (p=0.236) and overall general health (p=0.058) scores.

**Table 4: SF-36 parameter scores and Hb groups**

| Parameter | Hb groups | | | | p-value |
|---|---|---|---|---|---|
| | ≥4-6 (n=14) | >6-8 (n=22) | >8-10 (n=14) | >10-12 (n=10) | |
| Physical functioning (10items) 3a-j | 33.57 | 31.59 | 51.42 | 85.00 | 0.000 |
| Role-physical (4items) 4a-d | 12.50 | 15.90 | 17.85 | 50.00 | 0.045 |
| Pain (2items) 7, 8 | 20.17 | 14.77 | 55.17 | 69.50 | 0.000 |
| General health (5 item) 1,11a-d | 13.21 | 17.95 | 26.07 | 43.50 | 0.004 |
| Emotional well being (5items) 9b, c, d, f, h | 31.42 | 34.18 | 39.14 | 70.40 | 0.006 |
| Role-emotional (3items) 5a-c | 21.42 | 21.21 | 35.71 | 100 | 0.000 |
| Social function (2items) 6, 10 | 14.28 | 21.59 | 28.57 | 50.00 | 0.000 |
| Energy/fatigue (4items) 9a, e, g, i | 23.57 | 27.95 | 36.07 | 65.00 | 0.026 |
| Physical component summary | 19.86 | 20.05 | 37.62 | 61.87 | 0.352 |
| Mental component summary | 22.67 | 26.23 | 34.87 | 71.35 | 0.236 |
| Overall health | 26.42 | 43.18 | 46.42 | 66.00 | 0.058 |

## DISCUSSION

Anemia affects almost all patients with end stage renal disease, reduces quality of life, and is a risk factor for early death [13, 14]. Higher hemoglobin (Hb) targets have been widely advocated because of data from observational studies showing that higher Hb is associated with improved survival and quality of life [15-17], but higher Hb targets may cause access thrombosis and hypertension and are costly [18]. Earlier Food and drug administration in United States (US FDA) suggested that increase in Hb levels to values more than 12 g/dl may be associated with increased morbidity and mortality and asserted a safe Hb target of 10 g/dL, but in 2007 US FDA again recommended a Hb level of 10 to 12 g/dl [9]. Amidst these controversies coupled with the paucity of such studies in this region of the country, the present study has been under taken to evaluate various KDQOL domains at different Hb levels in a cohort of 60 ESRD patients on maintenance hemodialysis at our institution. An attempt is also made to arrive at safe Hb target level.

The improvement in various quality of life domains was mostly associated with increasing Hb levels in the KDQOL-SF 36 scores. The highest scores mostly occurred in the >10-12 group. Table-3 clearly shows that at the different Hb levels, there were statistically significant differences in the kidney symptom / problem scores, the burden of kidney disease scores, the work satisfaction scores and the cognitive function scores. But for effects of kidney disease, quality of social interaction, sexual function, sleep, social support, and dialysis staff encouragement and patient satisfaction scores the difference was not significant.

About SF-36, all of the physical domains were significantly different: physical function, role physical, pain and general health component in the different Hb level groups as shown in Table 4. For mental domain components, the differences between four Hb level groups were significant in the variety of quality of life domains: emotional wellbeing, role emotion, social function and energy/fatigue. But the difference was not significant statistically in physical component summary, mental component summary and overall general health scores.

Table 5 & 6 below compares the results of our study with previous studies. Our study is in correlation with Alexander M *et al*. [22], in not showing any association between increasing Hb levels and emotional status, sexual activity or cognition. As in Nancy G [24] study target range of 11-12 g/dl yielded significant improvements in both physical and mental health related QOL evaluations. Compared to all previous studies more number of KDQOL SF-36 parameters has shown statistically significant improvement with increasing Hb levels especially at Hb levels of 10-12 g/dl.

**Table5: Comparison of kidney disease specific parameter with previous studies**

| Author | Year | Symptom / Problem list | Effect of Kidney dis. | Burden of kidney dis. | Work status | Cognitive function | Quality of social life | Sexual life | Sleep | Social support | Dialysis staff Encourage. | Patient satisfaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Carmichael P *et al*. [19] | 2000 | ns | ++ | ++ | ns | ns | ns | ns | ++ | ns | ++ | ns |
| Rachael L *et al*. [20] | 2005 | + | + | + | + | + | + | + | + | + | + | + |
| Fernando V. [21] | 2005 | + | + | + | + | + | + | + | + | + | + | + |
| Alexander M *et al*. [22] | 2007 | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| Joshi VJ *et al*. [23] | 2010 | ++ | ++ | ++ | + | + | + | + | ++ | ++ | ++ | ++ |
| Nancy G. [24] | 2011 | + | + | + | + | + | + | + | + | + | + | + |
| Present study | 2012 | ++ | ns | ++ | ++ | ++ | ns | ns | ns | ns | ns | ns |

++ $p<0.01$ + $p<0.05$ ns=not significant

**Table 6: Comparison of SF-36 kidney parameter with previous studies**

| Author | Year | Physical Functioning | Role physical | Pain | General health | Emotional wellbeing | Role emotion | Social functioning | Energy/ fatigue | Physical comp.sum. | Mental comp.sum. | Overall health |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Carmichael P *et al*. [19] | 2000 | + | + | + | + | + | + | + | + | + | + | + |
| Rachael l *et al*. [20] | 2005 | + | + | + | + | + | + | + | + | + | + | + |
| Fernando V [21] | 2005 | + | + | + | + | + | + | + | + | + | + | + |
| Alexander M *et al*. [22] | 2007 | ++ | ns | ns | ns | ns | ns | ns | ++ | ns | ns | ns |
| Joshi VJ *et al*. [23] | 2010 | ++ | ns | ns | ns | ++ | ns | ns | ns | ns | ns | ++ |
| Nancy G [24] | 2011 | + | + | + | + | + | + | + | + | + | + | + |
| Present study | 2012 | ++ | + | ++ | ++ | ++ | ++ | ++ | ++ | ns | ns | ns |

++ $p<0.01$ + $p<0.05$ ns=not significant

## CONCLUSION

Early treatment of anemia targeting Hb between >10-12 g/dl in ESRD patients on maintenance hemodialysis increase the scores of some of the KDQOL SF 36 domains and definitely improve the QOL of these patients. Small sample size, nonrandomized, unselected cohort are the limitations of our study To draw better conclusions further studies need to be randomized, longitudinal, conducted on properly selected larger cohort over longer period.

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