Assessment of Quality of Life in Patients with Chronic Kidney Disease on Maintenance Haemodialysis with Regard to Anaemia - A Descriptive Cross-Sectional Study at a Tertiary Hospital in Kuppam

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ABSTRACT

BACKGROUND

Anaemia is common among chronic kidney disease (CKD) patients. Quality of life (QOL) is a broad multidimensional concept and many factors affect QOL in CKD patients. This study attempted to measure QOL with varying levels of haemoglobin in CKD patients.

METHODS

The present study was a descriptive cross-sectional study done on CKD patients on maintenance haemodialysis (MHD) after ethical committee approval. All patients aged more than 18 years on MHD for at least 3 months were enrolled in the study. Patients were categorised into 4 separate groups as Hb 4 to < 6 g/dl, 6 to < 8 g/dl, 8 to < 10 g/dl and 10 - 12 g/dl. After obtaining informed consent, participants were given the study questionnaire - kidney disease quality of life (KDQOL) short form (SF - 36) ™ V1 .2.

RESULTS

At 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) at different Hb levels. For mental domain components, the differences between four groups of Hb levels were significant in the variety of quality of life domains: emotional wellbeing score (P = 0.006), role emotion scores (0.000), social function scores (P = 0.000) and energy/fatigue scores (0.026).

CONCLUSIONS

KDQOL, SF - 36 showed that the QOL scores are strongly related to Hb concentrations. The higher scores in various quality of life domains were mostly associated with higher Hb levels in the KDQOL - SF scores. Efforts to optimize haemoglobin in CKD patients may show QOL improvement.

KEYWORDS

Chronic Kidney Disease, Haemodialysis, Anaemia, Quality of Life

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BACKGROUND

Chronic kidney disease has been one of the most important causes of morbidity and mortality in the modern era. CKD accounted for 9,56,200 deaths worldwide as per the Global burden disease study in 2013. There have been an approximately 134 % rise in deaths from CKD compared in the last 20 years.[1] The prevalence of CKD in India is 800 per million population.[2] Since the advent of renal replacement therapy (RRT), survival among CKD patients has been prolonged. Globally 1.1 million people are on RRT and every year this is increasing by 8 %.[3,4]

Anaemia is defined as a haemoglobin (Hb) concentration of less than 12.0 g/100 ml in women and less than 13 g/100 ml in men by the Kidney Disease Improving Global Outcomes (KDIGO).[5] The presence of anaemia may lead to a worsening of cardiovascular problems such as increased cardiac workload, left ventricular failure and angina. Functional and mobility impairment, a greater risk of falls, the decline in health-related quality of life (HRQOL) have also been attributed to anaemia in CKD patients.[6]

Anaemia in CKD is a result of decreased production of red blood cells in the bone marrow due to diminished production of erythropoietin. Furthermore, accumulation of uremic toxins, excess of aluminum in patients on long - term haemodialysis may contribute to anaemia as well.[7]

Quality of life (QOL) is a broad multidimensional concept that includes positive and negative life aspects of the subject.[8] Many factors affect QOL in CKD patients like gender, education, social factors, anaemia, and chronic inflammation. CKD severely impacts QOL with social, environmental, physical, and psychological domains getting affected adversely.[9,10] Despite haemodialysis having a therapeutic effect on end-stage renal disease, these patients may face many physical, psychological, and social stressful factors that lead to a decrease in their quality of life.[11]

Anaemia by itself is associated with poor outcomes. Multiple studies document a consistent relationship between anaemia and decreased quality of life, increased rates of cardiovascular disease and hospitalisation. Treatment of anaemia in CKD patients improves energy and activity level, functional and cognitive ability, life satisfaction, and happiness. Management of anaemia has shown to constantly enhance the HRQOL parameters as described in various studies.[12,13]

In India, especially in rural areas, many CKD patients may not receive optimal doses of erythropoietin therapy due to financial constraints. Along with this, there might be the use of less expensive dialyzers, re-use of dialyzers, and often reduction in dialysis sessions.[14] Earlier in patients with CKD, priority was to increase longevity but now the equal emphasis is given to improve the quality of life.[15] The concept of QOL in India is still in its nascent stage as compared to developed countries.

Objectives

This study attempted to measure HRQOL with respect to varying levels of haemoglobin in CKD patients. This study also tries to seek out different domains and dimensions which are affected the most by anaemia. Hence this study was done to assess the impact of anaemia in CKD patients on MHD regarding the quality of life.

METHODS

The present study was a descriptive cross-sectional study done on CKD patients on maintenance haemodialysis after ethical committee approval. All patients aged more than 18 years on MHD for at least 3 months were enrolled in the study. The study was conducted from April 2020 to November 2020. Patients whose haemoglobin was more than 12 grams/dl, patients with malignancies, major surgical intervention in the last three months, and patients not willing to answer the questionnaire were excluded from the study.

After obtaining informed consent, participants were administered with the study questionnaire as a face to face interview which included the kidney disease quality of life (KDQOL) SF - 36™ V1. 2.[16,17] The scores of quality of the KDQOL questionnaire were transformed onto 0 to 100 possible ranges, with higher scores reflecting better QOL. 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 included overall health rating items along with physical and the mental domain. The physical domain consisted of physical functions, role limitations due to physical health problems, pain and general health perceptions. The mental domain consisted of emotional well-being or mental health, role limitations due to emotional health problems, social functioning, energy/fatigue, or vitality. The particular health-related concerns of individuals with kidney disease on dialysis were symptoms/problems, effects of kidney disease on daily life, the burden of kidney disease, work status, cognitive function and quality of social interaction, sexual function, and sleep. Social support, dialysis staff encouragement, and patient satisfaction scales were also included. Patient-specific information regarding demographics, clinical, and laboratory data was collected from all study subjects. The haemoglobin (Hb) percentage was estimated by Sahli's method and patients were categorised into four separate groups as Hb 4 to < 6 g/dl, 6 to < 8 g/dl, 8 to < 10 g/dl, and 10 - 12 g/dl.

Statistical Analysis

Statistical analysis was done using percentages and mean ± SD for categorical and continuous variables. Chi Square test was used for statistical significance between QOL scores and haemoglobin levels.

The data was entered into MS Excel 2007 version and was further analysed using statistical package for social sciences (SPSS) 20.For descriptive analysis, the categorical variables were analysed by using percentages and the continuous variables were analysed by calculating mean ± standard Deviation. For inferential analysis, the numerical data was analysed using analysis of variance (ANOVA), and the categorical data was analysed using chi square test. "P - value" of < 0.05 was considered as statistically significant.

RESULTS

The present study was conducted on CKD patients undergoing maintenance haemodialysis at a tertiary health care centre in Andhra Pradesh for a period of one 1 year. A total of 100 CKD patients on MHD were approached during the study period. Out of 100 patients, 80 responded to the survey. The response rate was 80 %. Full information as per KDQOL - SF 36 was available for 60 patients. Out of 60 patients, 43 (71.66 %) were males and 17 (28.33 %) were females. In the study population, 20 (33.33 %) patients were less than 40 years of age, 26 (43.33 %) were in the age group of 40 to 60 years and 14 patients (23.33 %) were above 60 years of age.

Patients were classified into four groups based on haemoglobin levels as Hb 4 to < 6 g/dl, > 6 to 8 g/dl, > 8 to 10 g/dl, and > 10 to 12 g/dl. Comparison of age, gender, and risk factors with haemoglobin groups are depicted in Table 1. The basic characteristics of all 4 groups of patients were not significantly different (P > 0.05).

The mean Hb for all patients was 7.54 ± 2.03 g/dl. 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 g/dl groups. Creatinine, blood urea and glomerular filtration rate (GFR) levels were similar in all four groups and was not statistically significant (P > 0.08) except for creatinine (P = 0.036). (Table 2)

This study evaluated the relationship between the various KDQOL domains and the difference in Hb levels in a cohort of haemodialysis patients. As shown in table 3, it was found that at 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). Other kidney disease-specific parameters showed a statistically non-significant change in their QOL scores.

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 (0.000), social function scores (P = 0.000) and energy/fatigue scores (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 (0.058) scores.

The highest score was mostly seen in the > 10 – 12 g/dl haemoglobin group. As shown in Table 2, it was found that kidney disease scores, work satisfaction scores and cognitive function scores showed a statistically significant difference with increasing haemoglobin values. When SF - 36 data was evaluated, physical function scores, pain scores, and general health component (P < 0.05), there was a statistically significant association with increasing haemoglobin values.

For mental domain components, the differences between four Hb level groups were significant in the variety of quality of life domains: emotional wellbeing score (P = 0.006), role emotion scores (P = 0.0000), social function scores (P = 0.000) and energy/fatigue scores (P = 0.026). But the difference was not statistically significant in physical component summary (P = 0.236) and overall general health (0.058) scores (Table 3).

Age Groups	Number	Percentage (%)
≤ 40 years	20	33.33
40 – 60 years	26	43.33
> 60 years	14	23.33
Haemoglobin		
≤ 4 – 6 g/dl	14	23.33
> 6 – 8 g/dl	22	36.66
> 8 - 10 g/dl	14	23.33
> 10 – 12 g/dl	10	16.66
Gender		
Male	43	71.66
Female	17	28.33

Table 1. Clinical and Laboratory Data among Patients with Anaemia

Data	Haemoglobin Groups ≤ 4 - 6 (N = 14)	> 6 - 8 (N = 22)	> 8 - 10 (N = 14)	> 10 - 12 (N = 10)	P Value
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)	168.51 ± 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

Table 2. Laboratory Parameters vs Haemoglobin Groups

Parameter	Haemoglobin Groups (g/dl) 4 - < 6 (N = 14)	> 6 - 8 (N = 22)	> 8 - 10 (N = 14)	> 10 - 12 (N = 10)	P Value
Symptom/problem list	37.35	54.35	68.89	79.16	0.000
Effects of kidney disease	27.00	40.05	40.17	46.87	0.159
Burden of kidney disease	2.23	7.38	16.51	30.00	0.000
Work status	14.28	15.90	17.85	50.00	0.014
Cognitive function	54.28	62.12	63.80	66.66	0.000
Quality of social interaction	50.95	53.33	60.00	80.00	0.073
Sexual function	38.39	47.15	40.17	38.75	0.114
Sleep	25.00	47.15	35.00	46.00	0.114
Social support	33.33	42.42	39.28	56.66	0.159
Dialysis staff encouragement	91.07	96.02	89.28	91.25	0.483
Patient satisfaction	47.61	59.08	57.14	46.66	0.105

Table 3. Kidney Specific Parameters vs HB Groups & QOL (Quality of Life)

Parameter	Hb Levels(g/dl) ≤ 4 - 6 (N = 14)	> 6 - 8 (N = 22)	> 8 -10 (N = 14)	> 10 - 12 (N = 10)	P Value
Physical functioning	33.57	31.59	51.42	85.00	0.000
Role-physical	12.50	15.90	17.85	50.00	0.045
Pain	20.17	14.77	55.17	69.50	0.000
General health	13.21	17.95	26.07	43.50	0.004
Emotional wellbeing	31.42	34.18	39.14	70.40	0.006
Role-emotional	21.42	21.21	35.71	100	0.000
Social function	14.28	21.59	28.57	50.00	0.000
Energy/fatigue	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

Table 4. Quality of Life Scores Using Short Form 36: Parameters vs HB Groups

DISCUSSION

In recent years, the evaluation of health-related QOL has emerged as an important and useful tool for studying the

efficacy of the net benefit of medical therapies.[18] Patients with chronic kidney disease face many challenges due to their ill-health which may leave them feeling fatigued and depressed. Due to financial constraints and non-availability of donors, renal transplant is rarely done. These patients are on long-term maintenance haemodialysis which can be debilitating resulting in loss of independence, problems in marital and social life.[11,15]

The present study conducted explored the relationship between various KDQOL domains and different haemoglobin levels in a cohort of haemodialysis patients at our hospital. The higher score in various QOL domains was mostly associated with high Hb levels. The highest score was mostly seen in the group with Hb > 10 – 12 g/dl. Studies have been conducted to identify the factors that contribute to the QOL in patients who are on MHD to determine the strategies which can be implemented to improve QOL. QOL is worse in end-stage renal disease (ESRD) patients and anaemia is one of the main contributing factor. Even partial correction of anaemia and improvement in haemoglobin levels with epoetin alfa is associated with an improvement in QOL in both pre-dialysis and dialysis patients. In normal haematocrit trial which assessed patients with SF-36 questionnaire showed that physical function improved by 0.6 points for each percentage point increase in haematocrit.[18]
In the present study it was observed that with increasing haemoglobin levels, a higher score was obtained in kidney disease domain scores on the kidney disease component of the questionnaire (P + 0.042). It was also found that with higher Hb levels there was a statistically significant improvement in scores in the following domains: kidney symptoms/problem score (P = 0.000), the burden of kidney score (P = 0.000), the work satisfaction scores (P = 0.014), and the cognitive function scores (P = 0.000). When the scores of SF-36 were analysed among different Hb groups, a statistically significant difference was seen among physical function scores (P = 0.000), pain scores (P = 0.000) and general health component scores (P = 0.004). For mental domain components, the differences between four Hb level groups were significant in a variety of QOL domains; emotional well-being score (P = 0.006), role of emotion scores (0.000), social function scores (P = 0.000), and energy/fatigue scores (P = 0.026). But the difference was not statistically significant in physical component summary (P = 0.352), mental component summary (P = 0.236), and overall general health scores (P = 0.058).

Carmichael P et al. conducted a study on CKD patients using the KDQOL SF questionnaire. The health-related quality of life (HRQOL) of these patients were impaired compared to the general population for all SF = 36 subscales. Satisfactory sleep, dialysis-related symptoms, effects of kidney disease on lifestyle, and burden of kidney disease were found to be the most important determinants of HRQOL.[19] In this study, similar results were observed for the burden of kidney disease (P = 0.000). Scores for other parameters like satisfactory sleep, dialysis-related symptoms and effects of kidney disease also improved with increasing Hb levels but statistically were not significant.

Singh et al. examined the effect of increasing Hb levels in CKD patients and found that with increasing haemoglobin levels to 11.3 g/dl, there was an improvement in all Linear Analog Scale Assessment (LASA) scores, the total KDQ score, and few SF 36 scores which are similar to the results obtained in the present study.[12] QOL measures were compared in a study done in Bangkok. Patients were categorised depending on different haemoglobin levels. This study observed that with increasing haemoglobin levels, there is an improvement in scores obtained in the kidney disease domain (P = 0.042) and general health (P = 0.023) summary scores (P = 0.039). They concluded that with higher Hb levels, better scores were obtained in multiple domains of the KDQOL SF questionnaire like general health, effects of kidney disease, social function scores, and mental component summary scores.[20]

In the Canadian multi-centre study, fatigue, depression, and relationship capacities improved significantly when normal Hb concentrations were achieved.[21] The Spanish cooperative renal patients QOL study group examined the effect on the QOL and functional status in 156 HD patients after achieving a haematocrit close to normal. After increasing the epoetin dose by approximately 50 %, QOL was measured using sickness impact profile (SIP) and functional status was measures using the Karnofsky scale. The results showed that normalised HCT is associated with an improvement in physical and psychological scores as well as in mean global SIP scores and functional status.[22]

A study done by Haalen et al.[23] showed a significant association between Hb levels, physical component summary, mental component summary, and the three KDQOL and SF 36 subscales (P < 0.0001). This study also showed similar associations. A recent study was done by Kefale et al. also showed findings similar to this study.[24]

The use of erythropoietin stimulating agents in the management of anaemia in CKD patients is being reconsidered as some studies have suggested increased morbidity and mortality with high Hb and also shown that high Hb is not associated with an improved QOL.[12] A study was done by Sathvic BS et al.[25] using the WHO QOL BREF questionnaire, found no influence of co-morbidities of the type of primary kidney disease on the QOL of HD patients. Higher the number of co-morbidities, lower was the physical functioning. An increase in the number of co-morbidities worsened QOL of patients due to physical, psychological, and emotional reasons. Likewise, in a study done by Roger et al. no significant difference could be demonstrated in HRQOL measured by SF 36 and Renal Quality of Life profile. This negative result was attributed to a minimal difference of haemoglobin between the two treatment groups.[26]

CONCLUSIONS

Anaemia is common among patients with CKD and prevalence and severity increases with increasing severity of CKD. KDQOL, SF - 36 showed that the QOL scores are strongly related to Hb concentrations. Higher scores in various quality of life domains were mostly associated with higher Hb levels in the KDQOL - SF scores. All possible measures should be taken to optimize haemoglobin which may in turn show positive impact on QOL.

Limitations of the Present Study

The small sample size was a limiting factor in statistically analysing the data to draw reasonable conclusions. A larger and more diverse population can be utilized to generalize study findings more appropriately. The study was confined to a single interview with respondents and hence it was not possible to examine the associations of the KDQOL - SF 36 with long-term clinical outcome.

Scope for Further Study

There is an urgent need for further studies to identify with certainty which quality of life parameters are being influenced by the severity of anaemia in ESRD patients on renal replacement therapy with haemodialysis. To draw better conclusions further studies need to be randomized, longitudinal and conducted on a properly selected larger cohort, over a longer period.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.
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REFERENCES

[1] Global, regional and national age- sex specific all cause and cause specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet 2015;385(9963):117-171.
[2] Agarwal SK, Srivastava RK. Chronic kidney disease in India: challenges and solutions. Nephron Clin Pract 2009;111(3):c197-c203.
[3] Moeller S, Giobege S, Brown G. ESRD patients in 2001: global overview of patients, treatment modalities and development trends. Nephrol Dial Transplant 2002;17(12):2071-2076.
[4] Schieppati A, Remuzzi G. Chronic renal disease as a public health problem: epidemiology, social and economic implications. Kidney Int Suppl 2005;(98):S7-S10.
[5] KDIGO Clinical Practice Guideline for Anemia in Chronic Kidney Disease. Kidney International Supplements 2012;2(4):282-287.
[6] Muzzarelli S, Pfisterer M, TIME Investigators. Anemia as independent predictor of major event in elderly with chronic angina. Am Heart J 2006;151(5):991-996.
[7] Strippoli GF, Navaneethan SD, Craig JC. Hemoglobin and hematocrit targets for the anemia of chronic kidney disease. Cochrane Database of Systematic Reviews 2006;(4):CD003967.
[8] Central. New information about health related quality of life. NACCHO News 1998.
[9] Edgell ET, Coons SJ, Carter WB, et al. A review of health related quality of life measures used in end-stage renal disease. Clin Ther 1996;18(5):887-938.
[10] Fox E, Peace K, Neale TJ, et al. 'Quality of life' for patients with end stage renal failure. Renal Fail 1991;13(1):31-35.
[11] Heidarzadeh M, Atashpeikar S, Jalilazar T. Relationship between Quality of life and self-care ability in patients receiving hemodialysis. Iran J Nurs Midwifery Res 2010;15(2):71-76.
[12] Singh AK, Szchech L, Tang KL, et al. Correction of anemia with epoetin alfa in chronic kidney disease. New Engl J Med 2006;355(20):2085-2098.
[13] Parfrey PS, Foley RN, Wittreich BH, et al. Double blind comparison of full and partial anemia correction in incident hemodialysis patients without symptomatic heart disease. J Am Soc Nephrol 2005;16(7):2180-2189.
[14] Jha V. End-stage renal disease in developing countries: The India experience. Ren Fail 2004;26(3):201-208.
[15] Cukor D, Ver Halen N, Frutcher Y, et al. Psychosocial issues in chronic kidney disease patients. Chronic Renal Disease 2015: p. 229-236.
[16] Stewart AL, Hays RD, Ware JE Jr. The MOS short-form general health survey. Reliability and validity in a patient population. Med Care 1998;26(7):724-735.
[17] Finkelstein FD, Story K, Firanek C, et al. Health-related quality of life and hemoglobin levels in chronic kidney disease patients. Clin J Am Soc Nephrol 2009;4(1):33-38.
[18] Kaufman SE. The increasing importance of quality of life research. Clin Res 2001;1:18-22.
[19] Drueke TB, Locatelli F, Clyne N, et al. Normalisation of hemoglobin level in patients with chronic kidney disease and anemia. N Eng J Med 2006;355(20):2071-2084.
[20] Carmichel P, Popoola J, John I, et al. Assessment of Quality of life in a single centre dialysis population using KDQOL- SF questionnaire. Qual Life Res 2000;9(2):195-205.
[21] Thweethamcharoen T, Sakulbumrungsil R, Vasuvattakul S, et al. Quality of life and hemoglobin levels of hemodialysis patients at Siriraj hospital. Siriraj Med J 2011;63(1):12-16.
[22] Canadian Erythropoietin Study Group. Association between recombinant human erythropoietin and quality of life and exercise capacity of patients receiving hemodialysis. BMJ 1990;300(6724):573-578.
[23] Moreno F, Sanz-Guajardo D, Lopez-Gomez JM, et al. Increasing the hematocrit has a beneficial effect on Quality of life and is safe in selected hemodialysis patients. JASN 2000;11(2):335-342.
[24] Van Haalen H, Jackson J, Spinowitz B, et al. Impact of chronic kidney disease and anemia on Health related Quality of Life and work productivity: analysis of multinational real-world data. BMC Nephrol 2020;21:88.
[25] Kefale B, Alebachew M, Tadesse Y, et al. Quality of life and predictors among patients with chronic kidney disease. A hospital based cross sectional study. PLoS One 2019;14(2):e0212184.
[26] Sathvic BS, Parthasarathi G, Narahari MG, et al. An assessment of quality of life in hemodialysis patients

using the WHOQOL- BREF questionnaire. Indian J Nephrol 2008;18(4):141-149.