



Original Research Article

Comparison of quality of life in hemodialysis and pre dialysis patients: A cross sectional study

Ashok Bhat ^{1*}¹Dept. of Nephrology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Mangalore, Karnataka, India

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ABSTRACT

Aims and Objectives: To evaluate and compare quality of life in pre dialysis (CKD stage4) and patients with End stage renal disease (ESRD) on maintenance hemodialysis and to analyze the correlation of sociodemographic, clinical and laboratory parameters with quality of life

Materials and Methods: This was a cross-sectional study in which 100 pre dialysis(CKD stage4) and 100 ESRD patients on maintenance hemodialysis were enrolled. SF 36 questionnaire was used to assess quality of life. Quality of life was compared between the two groups and the correlation of quality of life with sociodemographic ,clinical and laboratory parameters was assessed.

Results: Pre dialysis group had better SF 36 scores than patients on hemodialysis (64.93±13.05 vs. 59.55±13.29 p=0.004). Erythropoietin use, higher albumin and more frequent dialysis emerged as independent predictors of better quality of life.

Conclusion: Perceived quality of life was worse for patients on hemodialysis when compared to pre dialysis patients. Use of erythropoietin, higher albumin levels, and more frequent dialysis were independent predictors of better quality of life.

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1. Introduction

Chronic kidney disease (CKD) is a major public health problem worldwide. The global prevalence of CKD has increased from 147.6 million in 1990 to 275.9 million in 2016 amounting to a 87% increase.¹ CKD is very common in India but the true magnitude is not known. In a study by Apollo hospital Chennai the prevalence of impaired renal function(GFR<80ml) was seen in 8.6-13.9 per thousand population.² A multistage cluster sampling done in south Delhi revealed the prevalence of CKD to be 0.76%.³ A study in a rural population in Shivamogga showed a prevalence of 6.3%.⁴ CKD is characterized by progressive and irreversible loss

of kidney function and can lead to End stage renal disease(ESRD).⁵ Dialysis and kidney transplantation are the modalities of management of ESRD.Hemodialysis is most often used modality worldwide.⁶ The adequacy of dialysis for most Nephrologists refers to the biochemical outcome measures. Patients on maintenance hemodialysis suffer from many physical and psychological disabilities like fatigue,myalgia,sexual dysfunction, and depression.⁷ Studies have shown that from the patients perspective adequate dialysis is one that enables them to have a good quality time in their life⁸ Unfortunately we give little attention to these aspects of care. The World Health Organization (WHO) defines health as not merely the absence of disease or infirmity, but a state of complete physical, mental and social wellbeing.⁹ The concept of health related quality of life as an outcome measure in

* Corresponding author.

E-mail address: ashokbhatdoc@gmail.com (A. Bhat).

chronic disease has emerged over the past few decades. According to WHO quality of life (QoL) is defined as individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.¹⁰ In patients with a chronic disease such as ESRD for which cure is not a realistic goal, maximizing functioning and well-being should be a primary objective of care. Quality of life has been shown to be less in all stages of CKD, however no association was detected between the stage of CKD and quality of life.¹¹ There are plenty of studies on quality of life in patients on dialysis in western literature; however, there is no clear evidence regarding comparison of the same and its determinants in patients with advanced chronic kidney disease at stage 4 and 5.¹² The culture and value systems among Indians is different from the west. Twice a week Hemodialysis is followed in most centers.¹³ Hence the western data is not applicable to the Indian scenario. Therefore we decided to conduct a study to assess and compare the quality of life between patients with CKD stage 4 (pre dialysis) and patients on maintenance hemodialysis and also to see if there is any correlation between sociodemographic, clinical and biochemical parameters with perceived quality of life.

2. Materials and methods

This was a comparative cross-sectional study conducted at the dialysis and outpatient unit of our institute from January to December 2021. Patients were selected by convenience sampling method. The selected patients were divided into two groups: namely Pre dialysis (CKD stage 4) and Dialysis group. Stage of CKD was defined as per NKF-DOQI guidelines.¹⁴ Glomerular filtration rate (GFR) was assessed using the MDRD formula.¹⁵ Patients were included if they were more than 18 years old. Those included in the pre dialysis group had eGFR of 15–29 mL/min/1.73 m² BSA (MDRD). Patients on maintenance hemodialysis for more than 3 months were included in the Dialysis group. Patients with major psychiatric disorders, drug/alcohol addiction, active malignancy, cirrhosis of liver, severe congestive heart failure (NYHA 4), and those hospitalized for treatment of any intercurrent illness were excluded.

Total of 100 each of pre dialysis and dialysis patients were enrolled. Written informed consent was obtained from each participant. The study was carried out in accordance with the standards of the Declaration of Helsinki. Ethical clearance was obtained from hospital ethics committee. Patients were evaluated by detailed history and physical examination including socio-demographic data, presence of Diabetes mellitus, use of erythropoietin, frequency and duration of dialysis. Hemoglobin, serum creatinine, serum albumin, calcium, phosphorus and body mass index were collected from patient medical records.

All the patients were provided with the SF-36 questionnaire (Short form). The patients completed the answers to the questions on their own. For those who could not do the same due to inability to read or write, the dialysis nurse / duty doctor would assist them by reading out the questions and documenting the answers.

SF-36 is a multi-purpose, short-form health survey with 36 questions. This instrument evaluates patients' perceptions of their health-related quality of life. It involves eight domains of health: namely physical function, physical role, bodily pain, general health, vitality, social functioning, emotional role and mental health. These domains are divided into two component summaries: physical (physical functioning, physical role and bodily pain) and mental (social functioning, emotional role and mental health). The domains of general health and vitality are considered to belong to both component summaries. Scoring is by Likert method. Raw scores are linearly transformed to 0–100 scales. Higher scores indicate better health.¹⁶

2.1. Statistical analysis

Chi square test for discrete variables and student t test for continuous variables were used for univariate analysis. ANOVA test was used to compare the means when there were more than two groups. The predictive ability of the factors which emerged after univariate analysis was confirmed by using logistic regression. All values were expressed as Mean $\pm$ SD and p value of <0.05 was considered significant.

3. Results

Assessment of baseline characteristics (Table 1) showed that the pre dialysis group had a significantly older population, and a higher number of patients with type 2 diabetes. The hemoglobin level in the dialysis group was significantly lesser than the pre dialysis group. All the other parameters were not significantly different between the two groups.

Perceived quality of life was worse for dialysis patients compared to pre dialysis patients for the dimensions of physical functioning, body pain, vitality, social functioning, role emotional and mental health. The overall physical component summary score and mental component summary score of dialysis patients was also worse than the pre dialysis group. Similarly, the total score was significantly lesser in the dialysis group. (Table 2)

Among the patients in the dialysis group, age, sex, level of education, income, presence of type 2 diabetes and body mass index did not correlate with perceived quality of life. Use of erythropoietin, higher Hemoglobin, and higher Albumin levels, more frequent dialysis correlated with better physical component score, mental component summary score and total score. Total duration of dialysis, calcium and phosphorus levels had no impact on quality of

Table 1: Baseline characteristics of pre dialysis and dialysis group

	Pre dialysis (N=100)	Dialysis (N=100)
Age(yrs.)	57.93 ±12.77 (Mean±SD)	54.3500 ± 11.51 * (Mean±SD)
Sex		
Male	71	67
Female	29	33
Educational status		
Up to 12 th std	18	25
Graduate	38	35
Postgraduate	44	40
Income		
<20000Rs/month	27	24
>20000Rs/month	73	76
Type 2 Diabetes		
Present	51	37 +
Absent	49	63
BMI(Kg/m ²)	22.2 ± 2.86 (Mean±SD)	21.61 ± 3.77 (Mean±SD)
<18.5	13	18
18.5-25	74	65
> 25	13	17
Hb(gm/dl)	10.54±2.7 (Mean±SD)	9.81±7.79 (Mean±SD) *
<10	36	70
10-12	41	26
>12	23	4
Albumin(gm/dl)	3.66 ±0.68 (Mean±SD)	3.51±0.57 (Mean±SD)
<2.5	10	7
2.5-3.5	32	45
>3.5	58	44 ++
Calcium(mg/dl)	8.34 ±0.85 (Mean±SD)	8.56 ±0.23 (Mean±SD)
<8.9	86	68
8.9-10.7	13	23
>10.7	1	9
Phosphorus(mg/dl)	4.96±1.66 (Mean±SD)	5.49±3.33 (Mean±SD)
<2.5	5	3
2.5-4.5	40	40
>4.5	55	57
Erythropoietin use		
Yes	19	20
No	81	80
Frequency of Dialysis		
Once/week	—	11
Twice/week		56
Thrice/week		33
Duration of dialysis		
< 1 year		44
1-2 years		23
3-4 years	—	28
>4 years		5

*t test p<0.05, +Chi square test p<0.05, ++Albumin value not available for 4 patients

Table 2: Comparison of quality of life(QoL) between pre dialysis and dialysis patients

	Group	N	Mean±SD	t test
Physical function	Pre dialysis	100	64.30±12.81	p=0.008
	Dialysis	100	58.3±18.16	
Role Physical	Pre ialysis	100	67±42.62	p=0.236
	Dialysis	100	60±40.66	
Body pain	Pre dialysis	100	66.92±15.86	p=0.008
	Dialysis	100	60.52±17.67	
General health	Pre dialysis	100	45.69±13.41	p=0.592
Vitality	Dialysis	100	44.72±12.12	p=0.008
	Dialysis	100	50.85±9.13	
Social functioning	Pre dialysis	100	47.35±9.35	p=0.024
	Dialysis	100	73.75±15.53	
Role emotional	Pre dialysis	100	68.58±16.52	p=0.003
	Dialysis	100	91.66±22.90	
Mental health	Pre dialysis	100	79.04±34.38	p=0.018
	Dialysis	100	59.16±12.26	
PCS	Pre dialysis	100	55.44±9.56	p=0.018
	Dialysis	100	58.99±14.94	
MCS	Pre dialysis	100	54.01±14.55	p=0.001
	Dialysis	100	64.11±10.87	
Total	Pre dialysis	100	58.99±11.48	p=0.004
	Dialysis	100	64.93±13.05	
			59.55±13.29	

PCS- Physical component summary MCS-Mental component summary

Table 3: Correlation of sociodemo graphic factors, Diabetes & BMI with QoL in dialysis group

Patient characteristics	PCS score	MCS score	Total score
Age			
<65 yrs (N=88)	53.85±14.88	58.88±11.51	59.52±13.33
>65yrs (N=12)	55.16±12.30	59.75±11.74	59.75±13.53
t test p value	0.77	0.80	0.95
Sex			
Male (N=67)	55.17 ±13.62	59.49 ±10.51	60.58 ±12.14
Female(N=33)	51.63 ±16.23	57.96 ±13.36	57.45 ±15.35
t test p value	0.25	0.53	0.27
Educational status			
Up to 12 th standard (N=35)	53.05±16.50	58.34±13.26	58.42±15.20
Graduate (N=40)	56.42±13.98	60.27±10.67	61.95±12.42
Postgraduate (N=25)	51.48±12.33	57.84±10.24	57.28±11.55
ANOVA p value	0.37	0.65	0.32
Income (monthly)			
<20000 Rs (N=24)	54.50 ±17.65	60.29±10.90	61.33 ±14.85
>20000 Rs (N=76)	55.30 ±13.08	56.57±13.52	61.30 ±11.93
t test p value	0.81	0.22	0.99
Type 2 diabetes			
Present (N=37)	52.13±13.14	58.67±10.08	58.02±11.68
Absent (N=63)	55.39±15.41	59.75±11.97	60.90±14.03
t test p value	0.28	0.64	0.29
BMI(Kg/M²)			
<18.5 (N=18)	57.11±12.09	58.16±11.12	60.77±11.48
18.5-25 (N=65)	53.24±15.54	59.46±11.94	59.53±14.07
>25 (N=17)	53.64±13.21	58.05±10.56	58.29±12.53
ANOVA p value	0.609	0.857	0.861

BMI-Body mass index PCS-physical component summary MCS-Mental component summary

Table 4: Correlation of erythropoietinuse, lab parameters, frequency of dialysis and duration of dialysis with quality of life in dialysis group

Patient characteristics	PCS score	MCS score	Total score
Erythropoietin use			
Yes (N=20)	64.05±13.51	65.15±11.07	69.30±11.17
No (N=80)	51.65±13.77	57.75±10.85	57.37±12.55
t test p value	<0.001	0.008	<0.001
Hemoglobin(g/dl)			
<10 (N=70)	52.34±14.33	56.77±12.13	57.24±13.75
10-12 (N=26)	57.92±15.07	64.07±8.19	65.03±10.85
>12 (N=4)	57.75±12.28	64.75±5.25	64.25±9.17
ANOVA p value	0.21	0.01	0.02
Serum Albumin(g/dl)			
<2.5 (N=7)	37.0±17.77	43.57±15.64	40.42±16.37
2.5-2.5 (N=45)	49.48±12.77	57.68±11.24	56.77±11.66
>3.5 (N=44)	62.25±11.10	64.0±7.15	66.68±9.16
ANOVA p value	<0.001	<0.001	<0.001
Calcium(mg/dl)			
<8.9(N=68)	52.50±14.91	58.77±11.77	58.69±13.63
8.9-10.7 (N=23)	57.21±13.38	59.39±11.21	61.47±12.35
>10.7 (N=9)	57.22±14.31	59.55±11.18	61.11±13.79
ANOVA p value	0.32	0.96	0.64
Phosphorus(mg/dl)			
<2.5 (N=3)	53.33±9.50	65.0±9.81	61.33±9.63
2.5-4.5 (N=40)	56.50±13.44	61.07±11.11	61.60±12.79
>4.5 (N=57)	52.29±15.47	57.21±11.69	58.01±13.81
ANOVA p value	0.37	0.17	0.41
Frequency of dialysis			
Once/week (N=11)	34.90±8.05	49.72±10.10	46.72±11.00
Twice/week (N=56)	55.76±12.07	58.89±10.32	60.23±11.57
Thrice/week (N=33)	57.39±15.54	62.24±12.36	62.66±14.52
ANOVA p value	<0.001	0.006	0.002
Duration of dialysis			
<1 year (N=44)	53.65±16.45	58.63±13.22	59.70±14.85
1-2 years (N=23)	52.65±14.61	57.91±10.38	57.91±12.81
3-4 years (N=28)	54.32±11.18	60.10±10.25	59.75±11.52
>4 years (N=5)	61.60±15.07	60.80±7.94	64.60±12.38
ANOVA p value	0.66	0.89	0.78

Table 5: Predictors of quality of lifein patients on Hemodialysis (logistic regression analysis)

Physical component summary SF 36			
	p	Odds ratio	95% confidence interval
Erythropoietin use	0.01	0.17	0.04-0.73
Albumin	<0.001	4.49	1.92-10.48
Frequency of dialysis	0.03	0.03	1.04-5.48
Mental component summary SF36			
Erythropoietin use	0.008	0.15	0.03-0.61
Albumin	0.01	2.90	1.28-6.54
Frequency of dialysis	0.04	2.36	1.02-5.44
Hemoglobin	0.27	1.60	0.68-3.74
Total score SF 36			
Erythropoietin use	<0.001	0.08	0.21-0.31
Albumin	0.003	4.71	1.69-13.14
Frequency of dialysis	0.67	1.21	0.49-3.03
Hemoglobin	0.24	1.68	0.69-4.11

SF 36-Short form 36

life (Tables 3 and 4)

Logistic regression analysis was done with the factors which showed significant correlation with quality of life on univariate analysis. The independent predictors of higher Physical component summary scores and mental component summary scores in Dialysis group were Use of Erythropoietin, Higher albumin and more frequent dialysis. The independent predictors of higher Total SF36 scores were use of erythropoietin and higher albumin level (Table 5)

4. Discussion

This study showed that the perceived quality of life was worse for patients on hemodialysis when compared to pre dialysis patients in both the domains of physical and mental health. Poor quality of life has been associated with poor adherence to dialysis,¹⁷ mortality and hospitalization.¹⁸ Tracking the quality of life of these patients should help the clinicians to provide an individualized care and can have the potential to improve outcomes. A recent study shows that exercise therapy improves physical function in CKD and has physiological and psychological impact.¹⁹ The correlation between stage of CKD and quality of life is controversial. One previous study failed to find any correlation. However this study shows a clear decline of quality of life from pre dialysis to dialysis stage. Aggarwal et al²⁰ also showed a clear progressive deterioration of quality of life with progression of CKD.

Mere knowledge of quality of life scores alone is not sufficient. We need to know the factors associated with it so that corrective measures are taken. We attempted to do the same by exploring the correlation between quality of life and sociodemographic, clinical, and biochemical parameters. Univariate analysis showed significant association between use of erythropoietin, higher Hemoglobin, higher Albumin levels and more frequent dialysis with better quality of life. However Logistic regression analysis showed that use of erythropoietin, higher albumin levels and more frequent dialysis were the independent predictors of better PCS and MCS scores. Dialysis patients treated with erythropoietin show improved exercise tolerance and physical function.²¹ This explains the higher PCS and MCS scores. Higher hemoglobin emerged as significant factor on univariate analysis but failed to emerge as significant on logistic regression suggesting that higher hemoglobin values were dependent on erythropoietin use. The major limitation for use of erythropoietin in developing countries is cost. A reduction of cost of these medications should make them more easily accessible to patients. Albumin is a marker of nutritional status and a lower level of the same suggests malnutrition. Our finding of low albumin being associated with poor quality of life is in concordance with studies in the past.²² Increased inter dialytic interval leads to fluid overload causing shortness

of breath, pulmonary edema, gastrointestinal edema and loss of appetite.²³ This necessitates large volume removal by ultrafiltration causing symptomatic hypotensive episodes with nausea, cramps and vomiting. Prolonged inter dialytic interval can also result in dialysis disequilibrium syndrome with headache, confusion, seizure and dizziness.²⁴ More frequent dialysis means shorter inter dialytic interval thereby can alleviate these complications. This is possibly the cause of improved quality of life we observed in patients who underwent more frequent hemodialysis (twice and thrice weekly). Studies in the past have shown that increased age is associated with poor quality of life on hemodialysis.²⁵ However we failed to find such an association. Older adult's expectations of physical strength may be lesser when compared to younger population. They may have unique life experiences and spirituality which may alter their expectations. These could be the possible reasons why we did not observe any decline in quality of life in older patients. Gender did not affect the quality of life in our study. Previous studies have shown that men had better QoL than women,²⁶ females had better²⁵ or equal.²⁷ Unlike previous studies²⁵ we did not observe any correlation between education level or socioeconomic status with QoL. A number of patients undergoing hemodialysis at our center had their dialysis cost borne by Employee state insurance which can explain the finding. Similar to some previous studies²⁵ we did not find any correlation of quality of life with diabetes mellitus. High and low serum phosphorus and high calcium have been shown to be associated with a poor quality of life.^{28,29} The mean calcium and phosphorus levels of our patients were well within the recommended levels³⁰ thereby resulting in our observation of no correlation between these parameters and QoL.

Cross sectional studies capture QoL at a given point of time and fail to document changes over a period of time. This is a limitation of this study. Since patients included were from only one center our findings may not be generalizable. Follow up and repeated assessments and multicenter studies are required to obtain better information

5. Conclusion

Perceived quality of life was worse for patients on hemodialysis patients when compared to pre dialysis patients. Use of erythropoietin, higher albumin levels, and more frequent dialysis were independent predictors of better quality of life.

6. Conflict of Interest

The author declares that he has no conflict of interest

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Author biography

Ashok Bhat, Associate Professor  <https://orcid.org/0000-0001-6226-0930>

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