

Quality of life in patients on hemodialysis: A quasi-experiment with review of literature

Kavita J Rawat, Kavita S Joshi, Rahul D Arora

Department of Medicine, Seth G S Medical College and KEM Hospital, Mumbai, Maharashtra, India

Correspondence to: Kavita S Joshi, E-mail: kavitajoshi@kem.edu

Received: October 28, 2016; Accepted: December 06, 2016

ABSTRACT

Background: In patients who have a chronic kidney disease (CKD) for which cure is not a realistic goal. Maximizing functioning, well-being and improving quality of life (QOL) should be primary objectives of care. **Objectives:** Aim of this study was to assess the influence of end-stage renal disease (ESRD) on patient's QOL and to compare the QOL in ESRD patients who were dialyzed and correction of anemia was done. **Materials and Methods:** A prospective observational study was conducted in tertiary care center, KEM Hospital, Parel, Mumbai, over 1 year. All newly diagnosed CKD patients >18 years of age who were first time initiated on dialysis were recruited for the study. Pregnant patients, patients on dialysis or known ischemic heart disease were excluded from the study. Patient's QOL was evaluated using short form-36 (SF-36) questionnaires at initiation of hemodialysis and at the end of 1 year after standard line of care. Statistical analysis was performed with descriptive statistics with paired *t*-test. **Results:** SF-36 score at baseline and at 1 year was 50.01 ± 11.36 and 53.18 ± 12.51 with $P < 0.0001$. Hemoglobin (Hb) baseline and average Hb at 1 year 7.65 ± 1.52 and 8.61 ± 1.06 $P < 0.0001$. **Conclusion:** QOL declines as the CKD progresses, least at stage 5. Diabetic CKD patients tend to have poorer QOL as compared to other etiologies of CKD. Correction of anemia tremendously improves QOL.


KEY WORDS: Chronic Kidney Disease; Anemia; Hemodialysis; Quality of Life

INTRODUCTION

Chronic kidney disease (CKD) is an increasing medical and socioeconomic concern in India as well as the world. Its treatment is multifactorial. Last decade, across the spectrum of renal diseases in India, CKD was the most common, seen in 58.1% followed by acute KD 29.2% and retroperitoneal fibrosis in 12.7% patients.^[1] The current prevalence of CKD in India is 17.2% with ~6% have CKD stage three or worse.^[2] Diabetic nephropathy was the most common cause of CKD, seen in 58.4%.^[2] Mean estimated glomerular filtration rate

(eGFR) in Indian population is 87.84 ± 21 mL/min/1.73 m².^[3] In healthy looking population, the prevalence of hypertension is 26.85% and diabetes in 9.79% seems like the population is sitting on the fence to develop CKD.^[3] The natural course of CKD leads to final outcome of end-stage renal disease (ESRD), according to eGFR the CKD is been divided into five stages as shown in Table 1.

As the prevalence of diabetes, hypertension and resulting CKD is on the rise, so is the burden of non-communicable diseases on the health-care system. The availability of renal replacement therapy and the cost involved in it is staggering especially in developing country like India, where we are struggling with management of communicable diseases and its periodic outbreaks. Patients with CKD are suffering due to disease and have very poor quality of life (QOL). According to WHO definition, Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.^[4] Medical effectiveness is

Access this article online	
Website: http://www.ijmsph.com	Quick Response code
DOI: 10.5455/ijmsph.2017.1061306122016	

International Journal of Medical Science and Public Health Online 2016. © 2016 Kavita S Joshi et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material for any purpose, even commercially, provided the original work is properly cited and states its license.

Table 1: CKD stages, NKF KDOQI guidelines

Stage	Description	GFR (mL/min/1.73 m ²)
1	Kidney damage with normal or ↑GFR	≥90
2	Kidney damage with mild ↓GFR	60-89
3	Moderate ↓GFR	30-59
4	Severe ↓GFR	15-29
5	Kidney failure	<15 (or dialysis)

Chronic kidney disease is defined as either kidney damage or GFR < 60 mL/min/1.73 m² for ≥ 3 months. Kidney damage is defined as pathologic abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies.

CKD: Chronic kidney disease, GFR: Glomerular filtration rate

increasingly viewed from multiple prospective that include more than patients survival rates and clinical outcome. Patients' functional status, well-being and satisfaction along with treatment costs also determine the effectiveness of care.^[5] All these factors need to be clearly understood by the hospital staff to enable them to support the patient in individualized way.^[6] In patients who have a chronic disease such as ESRD for which cure is not a realistic goal maximizing functioning and well-being should be primary objectives of care. The importance of measuring the QOL of ESRD patients in relation to health-care lies in not only providing the absolute survival but also the quality of that survival.^[7] Sociodemographic and clinical characteristics seem to influence the QOL in hemodialysis patients.^[8] If we can measure the QOL and evaluate it after the intervention then we can take the necessary treatment options to achieve a better QOL in these patients.

The short form-36 (SF-36) health survey is a survey of patient health status and is commonly used in health economics as a variable in the quality-adjusted life year calculation to determine the cost-effectiveness of a health treatment. The original SF-36 came out from the medical outcome study done by the RAND corporation. Since then a group of researchers from the original study released a commercial version of SF-36 while the original SF-36 is available in public domain license free from RAND.^[9,10] The SF-36 is used as a tool to study QOL in various chronic illnesses.^[11-16]

The aim of this study was to assess the influence of end-stage renal failure on patient's life and to compare QOL in ESRD patients who were dialyzed and correction of anemia was done.

MATERIALS AND METHODS

A prospective observational study was conducted in tertiary care center, Seth G S Medical College, KEM Hospital, Parel, Mumbai over a period of 1-year. Local Institutional review board approval was obtained. All newly diagnosed CKD patients >18 years of age who were

first time initiated on dialysis were recruited for the study from outpatient and indoor department. The patients who pregnant, patients already on dialysis and known ischemic heart disease were excluded from the study. Human immunodeficiency virus, hepatitis B and C positive patients were also excluded from the study. The indication for dialysis was a determined by to standard line of care and was done by artificial kidney unit.

Study Procedure

The patients willing for the study were recruited after informed written consent. History and detailed examination was recorded. Detailed demographic data were also recorded.

QOL of these patients was assessed using SF-36 questionnaires at the base line, i.e., at the time of diagnosis and at the end of 1 year of standard line of care. No intervention done for the study purpose. The treatment was given by nephrology as well as Department of Internal Medicine. The questionnaires were available in three different languages, i.e., Marathi, Hindi, and English. They were given to the patients as per the choice of the patient's language.

SF-36

It is a set of generic, coherent, and easily administered QOL measures. These measures rely on patient self-reporting and are now widely utilized by managed care organizations and by Medicare for routine monitoring and assessment of care outcomes in adult patients.

The authors of SF-36 aimed to develop a short, generic measure of subjective health status that was psychometrically sound, and that could be applied in a wide range of settings. SF-36 comprises eight dimensions: Physical functioning (10 items), social functioning (2 items), role limitations due to physical problems (4 items), role limitations due to emotional problems (3 items), mental health (5 items), energy/vitality (4 items), pain (2 items), general health perception (5 items), and perception of health change over last 12 months (1 item): Each parameter is scored from 0 to 100. Managed care 36-Item Short Form Functional and Perceived Health Status Survey. A questionnaire which measures health status; the SF-36 also includes a list of 18 self-reported chronic conditions. The content validity of the SF-36 has been favorably compared to that of other widely used generic health surveys. Systematic comparisons indicate that the SF-36 includes eight of the most frequently measured health concepts.^[17,18]

Statistical Analysis

The data were analyzed using descriptive statistics. Results are expressed as percentage. Paired *t*-test was used.

RESULTS

A total 139 patients were recruited for the study. Out of 139, eight died during next 1 year. 22 were not in the stable condition to answer the questionnaire at the end of 1 year and seven refused to participate in the study after 1 year. Therefore, 102 patients were analyzed. This study dealt with spectrum of CKD in adults so patients with age <18 years were excluded from the study, mean age was 49 years. Figure 1 is showing the age and sex distribution of patients. Figure 2 is showing the number of patients in different stages of CKD. Figure 3 is showing the etiology of CKD in different patients. Table 2 is showing average hemoglobin (Hb) in various stages of CKD.

QOL is showing progressive decline in scores as the stages of CKD advances (Figure 4). Statistical significance values are for the trend across the three CKD stages (Stage III with Stage IV and Stage IV with stage V). Table 3 is showing

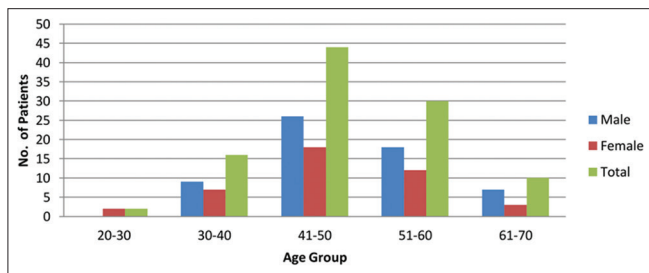


Figure 1: Age and sex distribution of patients

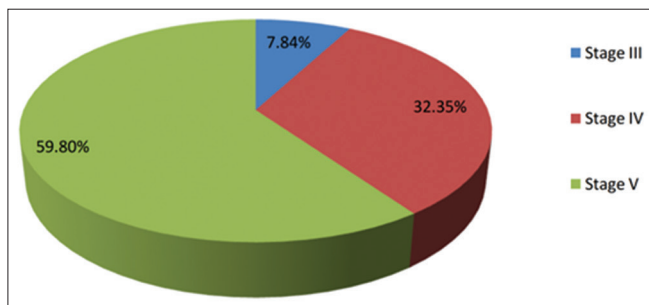


Figure 2: Number of patients in different stages

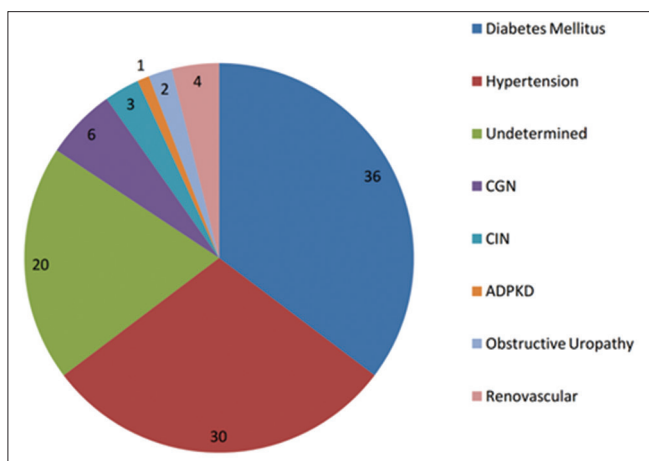


Figure 3: Etiology of chronic kidney disease

QOL in different stages of CKD. Diabetics (Figure 5) had worse QOL compared with their respective counterparts (hypertension and others).

There was a significant increase in Hb associated with which there was a significant improvement in physical, mental and overall SF 36 score of patients with CKD Table 4 (Figure 6) is showing QOL in after correction of anemia.

DISCUSSION

In our study, QOL showing progressive decline in scores as the stages of CKD advances. In the study conducted by Pagels et al.^[19] found that all health-related QOL (HRQL) dimensions deteriorated significantly with CKD stages with the lowest scores in CKD Stage 5. The largest differences between the patient groups were seen in physical functioning. The largest differences between the patient groups were seen in “physical functioning,” “role physical,” “general health,” and in physical summary scores (PCS).

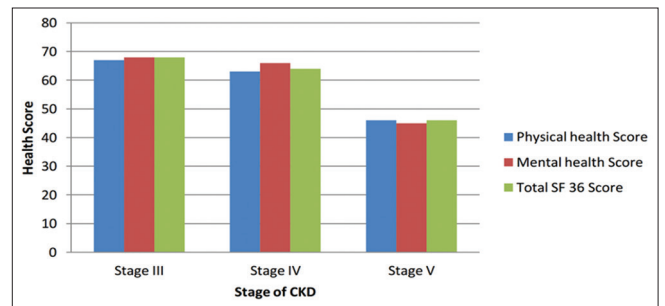


Figure 4: Quality of life in patients with various stages of chronic kidney disease

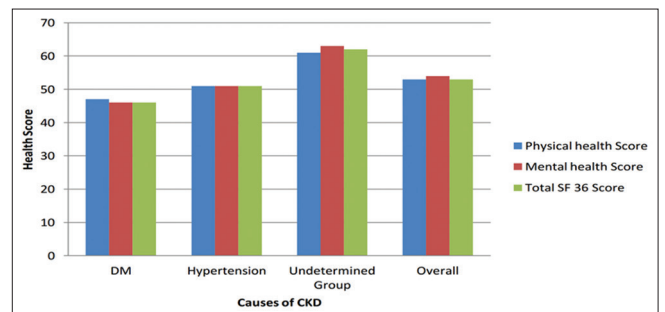


Figure 5: Quality of life in patients with etiologies of chronic kidney disease

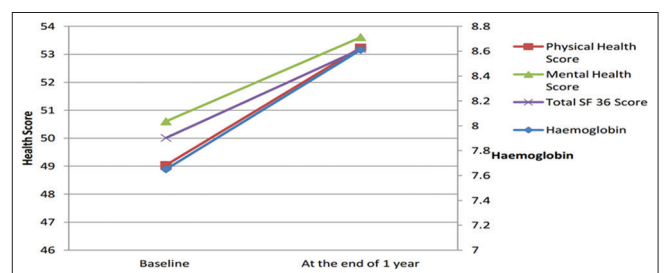


Figure 6: Quality of life with correction of anemia after 1 year

Table 2: Average hemoglobin in various stages of CKD

Stage of CKD	Number of patients	Average Hb in g% at baseline	Average Hb in g% at 1 year
3	8	9.81	9.85
4	33	8.0	9.16
5	61	7.16	8.28

CKD: Chronic kidney disease, Hb: Hemoglobin

Table 3: QOL in different stages of CKD

Stages of CKD	Physical health score	Mental health score	Total SF-36	P value
Stage III	67	68	68	
Stage IV	63	66	64	0.02
Stage V	46	45	46	<0.001

CKD: Chronic kidney disease, SF-36: Short form-36, QOL: Quality of life

Table 4: QOL in after correction of anemia

Parameter	Average	P value
Hemoglobin baseline	7.65±1.52	<0.0001
Average hemoglobin at 1 year	8.61±1.06	
Physical health score	49.4±10.19	<0.0001
Physical health score at 1 year	53.24±11.37	
Mental health score	50.6±12.7	<0.0001
Mental health score at 1 year	53.61±13.94	
SF-36 score at baseline	50.01±11.36	<0.0001
SF-36 score at 1 year	53.18±12.51	

SF-36: Short form-36, QOL: Quality of life

The smallest disparities were seen in mental health and pain patients in CDK Stage 4 demonstrated deteriorated scores with a large magnitude in “physical function,” “general health” and PCS compared to the patients in CKD Stages 2-3. The patients in CKD Stage 5 demonstrated deteriorated scores with a medium sized magnitude in “role emotional” and mental summary scores compared to the patients in CKD 4. Results were consistent with our study.

In the study conducted by Mujais et al.,^[20] HRQL in patients with CKD is reduced by a magnitude that is considered clinically significant. HRQL scores are significantly influenced by the severity grade of CKD.

In our study, we found that the QOL scores were the lower in patients with a history of diabetes mellitus than nondiabetics. In the study conducted by Pagels et al.^[19] concluded that those with diabetes, physical composite score, and “vitality” scores were significantly lower compared to those without diabetes. In the study conducted by Mujais et al.,^[20] diabetic patients with a history of congestive heart failure had worse PCS compared with their respective counterparts. This was also true for all components of the PCS examined individually except for role physical in patients with a history of myocardial infarction. Although the results were similar

with results of our study, this study took an account of heart failure history in diabetic patients to find the score of QOL.

The QOL in our study improved with improvement in Hb. There was improvement in physical health score as well as mental health score. Revicki et al.^[21] studied HRQL associated with recombinant human erythropoietin (r-HuEPO) therapy for predialysis chronic renal disease patients. The investigators evaluated the impact of r-HuEPO therapy on HRQL in predialysis chronic renal disease patients with anemia. Hematocrit levels were measured at baseline and monthly. HRQL was assessed at baseline and at weeks 16, 32, and 48. Significant improvements in hematocrit levels were observed in the r-HuEPO-treated group ($P < 0.0001$), and no changes were seen in the untreated group. Correction of anemia (hematocrit ≥ 36) occurred in 79% of r-RHuEPO-treated patients and 0% of control patients. Significant improvements in assessments of energy ($P < 0.05$), physical function ($P < 0.05$), home management ($P < 0.05$), social activity ($P < 0.05$), and cognitive function ($P < 0.05$) were found for the r-HuEPO-treated group. In patients receiving r-HuEPO, significant improvements were seen in hematocrit levels, and these increases resulted in improvements in HRQL. The study results were consistent with our studies.

McMahon et al.^[22] studied the effects of Hb normalization on QOL and cardiovascular parameters in end-stage renal failure. QOL was significantly improved at Hb (14) compared with Hb (10) for both total score (6.5±1.7 vs. 13.4±3.0, $P = 0.01$) and psychosocial dimension score (5.4±1.9 vs. 15.4±4.0, $P < 0.01$). The maintenance weekly dose of epoetin required was 80% higher at Hb (14) compared with Hb (10) ($P < 0.001$). Results were similar with our study.

Alexander^[23] studied the association of anemia correction with HRQL in the patients not on dialysis and found that compared to baseline values, mean HRQL subscales were significantly improved in the treatment group at 16 weeks ($P < 0.05$ for SF-36 physical function; $P < 0.001$ (for SF-36 vitality, Functional Assessment of Cancer Therapy [FACT] anemia and FACT fatigue scales). At week 16, the SF-36 mean increase for 48 treatment patients in the vitality subscale score was 14.9 (standard deviation [SD] 3.2) and the mean increase in the KD QOL Burden of KD subscale was 5.5 (SD 3.3). Multivariate regression analysis demonstrated a statistically significant association ($P < 0.05$) between Hb levels and higher HRQL scores on several physical function, energy and fatigue scales. Results were consistent with our study.

Moreno et al.^[24] studied increasing the hematocrit has a beneficial effect on QOL and is safe in selected hemodialysis patients in Spain. In the study, the mean hematocrit increased from 30.9% to 38.4% and Hb from 10.2 to 12.5 g/dl during the study. Health indicator scores improved significantly:

Mean physical dimension (sickness impact profile [SIP]) from 5.38 to 4.1 ($P < 0.005$); mean psychosocial dimension from 9.2 to 7 ($P < 0.001$); mean global SIP from 8.9 to 7.25 ($P < 0.001$); mean Karnofsky scale score from 75.6 to 78.4 ($P < 0.01$). Therefore, functional status and QOL improved with increased hematocrit. Results were consistent with our study.

Canadian Erythropoietin Study Group^[25] assessed the correlation between the change in Hb concentration and the change in QOL and exercise capacity at 6 months. The mean (SD) Hb concentration at 6 months was 74 (12) g/L in patients given placebo, 102 (10) g/L in those in the low erythropoietin group, and 117 (17) g/L in those in the high erythropoietin group. Compared with the placebo group, patients treated with erythropoietin had a significant improvement in their scores for fatigue, physical symptoms, relationships, and depression on the KD questionnaire and in the global and physical scores on the SIP. The distance walked in the stress test increased in the group treated with erythropoietin, but there was no improvement in the 6 min walk test, psychosocial scores on the SIP, or time trade-off scores. There was no significant difference in the improvement in QOL or exercise capacity between the two groups taking erythropoietin.

Ibrahim *et al.* studied QOL in patients on hemodialysis having uremic pruritus (UP). 25 they found physical domain for those with UP on hemodialysis was significantly impaired in comparison to the control subjects on hemodialysis with no UP ($P < 0.05$) with the exception to the daily energy and work capacity satisfaction modules. Socially, impairment was significant with regards to the patient personal relationships and friend support ($P < 0.05$), while sex life satisfaction showed no significant impairment. Psychologically, there was a much significant impairment regarding all modules of the questionnaire ($P < 0.05$). Environmentally, all modules of the questionnaires showed impairment of statistical significance ($P < 0.05$) with the exception to the money needs and living place satisfaction.^[26]

Makkar *et al.* concluded that continuous ambulatory peritoneal dialysis patients have significantly better QOL in physical as well as psychological aspects, when compared with hemodialysis patients.^[27]

CONCLUSION

QOL declines as the CKD progresses, least at stage 5. Diabetic CKD patients tend to have poorer QOL as compared to other etiologies of CKD. Correction of anemia tremendously improves QOL in patients on maintenance hemodialysis. Even partial anemia correction has been shown to lead to improvements in QOL of these patients. There is a need for mass enlightenment campaigns to educate the population on prevention of CKD with its associated problems.

REFERENCES

1. Kohli HS, Bhat A, Aravindan, Sud K, Jha V, Gupta KL, *et al.* Spectrum of renal failure in elderly patients. *Int Urol Nephrol.* 2006;38(3-4):759-65.
2. Singh AK, Farag YM, Mittal BV, Subramanian KK, Reddy SR, Acharya VN, *et al.* Epidemiology and risk factors of chronic kidney disease in India - Results from the SEEK (Screening and Early Evaluation of Kidney Disease) study. *BMC Nephrol.* 2013;14:114.
3. Trivedi H, Vanikar A, Patel H, Kanodia K, Kute V, Nigam L, *et al.* High prevalence of chronic kidney disease in a semi-urban population of Western India. *Clin Kidney J.* 2016;9(3):438-43.
4. Preamble to the Constitution of the World Health Organization as Adopted by the International Health Conference, New York, and 19-22 June, 1946; Signed on 22 July 1946 by the Representatives of 61 States (Official Records of the World Health Organization, No. 2. and Entered into Force on 7 April; 1948. p. 100.
5. Kutner NG. Assessing end-stage renal disease patients' functioning and well-being: Measurement approaches and implications for clinical practice. *Am J Kidney Dis.* 1994;24(2):321-33.
6. Klang B, Björvell H, Clyne N. Quality of life in predialytic uremic patients. *Qual Life Res.* 1996;5(1):109-16.
7. Gokal R. Quality of life. In: *The Textbook of Peritoneal Dialysis.* New York: Kluwer Academic Publishers; 1994. p. 679-98.
8. Gerasimoula K, Lefkothea L, Maria L, Victoria A, Paraskevi T, Maria P. Quality of life in hemodialysis patients. *Mater Sociomed.* 2015;27(5):305-9.
9. Ramakant P, Verma AK, Chand G, Mishra A, Agarwal G, Agarwal A, *et al.* Salutary effect of parathyroidectomy on neuropsychiatric symptoms in patients with primary hyperparathyroidism: Evaluation using PAS and SF-36v2 scoring systems. *J Postgrad Med.* 2011;57(2):96-101.
10. Available from: http://www.alswh.org.au/images/content/pdf/infodata/data_dictionary_supplement/ddsection2sf36.pdf. 2016 [Last accessed on 2016 Oct 17].
11. Su CT, Ng HS, Yang AL, Lin CY. Psychometric evaluation of the short form 36 health survey (SF-36) and the World Health Organization Quality of Life Scale Brief Version (WHOQOL-BREF) for patients with schizophrenia. *Psychol Assess.* 2014;26(3):980-9.
12. Castillo-Carandang NT, Sison OT, Grefal ML, Sy RG, Alix OC, Llanes EJ, *et al.* A community-based validation study of the short-form 36 version 2 Philippines (Tagalog) in two cities in the Philippines. *PLoS One.* 2013;8(12):e83794.
13. Zhou K, Zhuang G, Zhang H, Liang P, Yin J, Kou L, *et al.* Psychometrics of the short form 36 Health Survey version 2 (SF-36v2) and the Quality of Life Scale for Drug Addicts (QOL-DAv2.0) in Chinese mainland patients with methadone maintenance treatment. *PLoS One.* 2013;8(11):e79828.
14. Ten Klooster PM, Vonkeman HE, Taal E, Siemons L, Hendriks L, de Jong AJ, *et al.* Performance of the Dutch SF-36 version 2 as a measure of health-related quality of life in patients with rheumatoid arthritis. *Health Qual Life Outcomes.* 2013;11:77.
15. Thumboo J, Wu Y, Tai ES, Gandek B, Lee J, Ma S, *et al.* Reliability and validity of the English (Singapore) and Chinese (Singapore) versions of the short-form 36 version 2 in a

- multi-ethnic urban Asian population in Singapore. *Qual Life Res.* 2013;22(9):2501-8.
16. Zhang Y, Qu B, Lun SS, Guo Y, Liu J. The 36-item short form health survey: Reliability and validity in Chinese medical students. *Int J Med Sci.* 2012;9(7):521-6.
 17. Brazier JE, Harper R, Jones NM, O’Cathain A, Thomas KJ, Usherwood T, et al. Validating the SF-36 health survey questionnaire: New outcome measure for primary care. *BMJ.* 1992;305(6846):160-4.
 18. Ware JE, Kosinski M, Gandek B. *SF-36 Health Survey Manual and Interpretation Guide.* Boston, MA: Institute NEMCTH; 1993.
 19. Pagels AA, Soderkvist BK, Medin C, Hylander B, Heiwe S. Health-related quality of life in different stages of chronic kidney disease and at initiation of dialysis treatment. *Health Qual Life Outcomes.* 2012;10:71.
 20. Mujais SK, Story K, Brouillette J, Takano T, Soroka S, Franek C, et al. Health-related quality of life in CKD Patients: Correlates and evolution over time. *Clin J Am Soc Nephrol.* 2009;4(8):1293-301.
 21. Revicki DA, Brown RE, Feeny DH, Henry D, Teehan BP, Rudnick MR, et al. Health-related quality of life associated with recombinant human erythropoietin therapy for predialysis chronic renal disease patients. *Am J Kidney Dis.* 1995;25(4):548-54.
 22. McMahon LP, Mason K, Skinner SL, Burge CM, Grigg LE, Becker GJ. Effects of haemoglobin normalization on quality of life and cardiovascular parameters in end-stage renal failure. *Nephrol Dial Transplant.* 2000;15(9):1425-30.
 23. Alexander M, Kewalramani R, Agodoa I, Globe D. Association of anemia correction with health related quality of life in patients not on dialysis. *Curr Med Res Opin.* 2007;23(12):2997-3008.
 24. Moreno F, Sanz-Guajardo D, López-Gómez JM, Jofre R, Valderrábano F. Increasing the hematocrit has a beneficial effect on quality of life and is safe in selected hemodialysis patients. Spanish Cooperative Renal Patients Quality of Life Study Group of the Spanish Society of Nephrology. *J Am Soc Nephrol.* 2000;11(2):335-42.
 25. Canadian Erythropoietin Study Group. Association between recombinant human erythropoietin and quality of life and exercise capacity of patients receiving haemodialysis. *BMJ.* 1990;300(6724):573-8.
 26. Ibrahim MK, Elshahid AR, El Baz TZ, Elazab RM, Elhoseiny SA, Elsaie ML. Impact of uraemic pruritus on quality of life among end stage renal disease patients on dialysis. *J Clin Diagn Res.* 2016;10(3):WC01-5.
 27. Makkar V, Kumar M, Mahajan R, Khaira NS. Comparison of outcomes and quality of life between hemodialysis and peritoneal dialysis patients in Indian ESRD population. *J Clin Diagn Res.* 2015;9(3):OC28-31.

How to cite this article: Rawat KJ, Joshi KS, Arora RD. Quality of life in patients on hemodialysis: A quasi-experiment with review of literature. *Int J Med Sci Public Health* 2017;6(4):786-791.

Source of Support: Nil, **Conflict of Interest:** None declared.