

Hemoglobin Level, Associated Co-Morbidities and Quality of Life among Patients Undergoing Hemodialysis at One of the University Hospitals in Cairo Governorate

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Abstract: Quality of life (QoL) is important as an outcome measurement, especially for long-term diseases. Patients with end stage renal disease have several co-morbidities which may have significant adverse effects. Moreover, the patients are prone to non-compliance and all these significantly affect their QoL. This study was conducted to assess the QoL exhibited by patients undergoing hemodialysis and its relationship with their hemoglobin level and associated co-morbidities in the renal insufficiency unit and nephrology and dialysis center at one of the university hospitals in Cairo governorate. A descriptive exploratory design was utilized. A total of 100 adult male and female patients undergoing hemodialysis were studied. QoL of patients undergoing hemodialysis was significantly impaired; there was a significant correlation between hemoglobin level and KDCS scores. Diabetic patients had a statistical significant difference with PCS, & MCS scores. On the other hand, cardiac patients had a statistical significant difference in relation to PCS, KDCS, & QoL total scores. Patients with arthritis had only a statistical significant difference in PCS scores. Hypertension had no impact to any dimension of QoL. It was observed that there were significant differences between hemoglobin level and co-morbid conditions in relation to one or more dimensions of QoL except hypertension.

Key words: End Stage Renal Disease • Renal Dialysis • Co-Morbidities • Hemoglobin Level • QoL

INTRODUCTION

Chronic kidney disease (CKD) requiring dialysis is one of the chronic diseases that impact quality of life (QoL). Patients with CKD are in need for changing diet and habits, following a strict therapeutic regimen, coping with an incurable disease, depending on a machine, in addition to having negative effect on energy and vitality levels, sometimes reducing or limiting the social interactions, affecting psychological health [1] and interferes profoundly in patients' well-being [2-4].

Kidney disease was the ninth leading cause of death in the United States. The number of patients being treated for end stage renal disease (ESRD) globally was estimated to be 2,786,000 with a 6 -7% growth rate continues to increase at a significantly higher rate than the world population. Hemodialysis remained the most common treatment modality, with approximately 1,929,000 patients

undergoing hemodialysis (89% of all dialysis patients) [5]. In Egypt; ESRD is growing by 100% annually; the estimated annual incidence of ESRD is around 74 per million and the total prevalence of patients on dialysis is 264 per million, also there are 90,000 patient die each year because of kidney failure [6].

QoL is important as an outcome measurement, especially for long-term diseases such as chronic renal failure (CRF) [7]. Although advances in dialysis treatment have contributed to improved survival of patients with ESRD, QoL is much lower for those patients than for the general population [8]. There are mainly three types of variables which might affect the QoL of dialysis patients: socio-demographic variables (age, gender, socioeconomic status and educational level), clinical variables (hemoglobin, co-morbid conditions and dialysis duration) and psychological variable (patients' representation of illness) [9].

ESRD patients have several co-morbidities such as anemia, diabetes mellitus, hypertension, cardiovascular diseases and arthritis, which require taking different medications, with significant adverse effects and may be associated with drug interactions. Moreover, the patients are prone to non-compliance; all of these significantly affect the QoL of these patients [10, 11]. Also, an increase in the number of co-morbidities may worsen the QoL of patients due to physical, psychological and emotional reasons [12].

Anemia is an almost constant complication of CRF that significantly contributes to the symptoms and complications of the disease. It is caused by failure of renal excretory and endocrine functions. It occurs primarily because of lower production of erythropoietin by the decreased mass of functioning renal tubular cells [13]. Anemia results in fatigue, reduced exercise capacity, decreased cognition and impaired immunity, thus, decreases QoL. In addition, increased workload on the heart as a result of anemia can lead to left ventricular hypertrophy and maladaptive cardiomyopathy. These conditions increase the risk of death from heart failure or ischemic heart disease [14]. Erythropoiesis-stimulating agents (ESAs) is a cornerstone of therapy for patients undergoing dialysis to maintain hemoglobin levels over 11 g/dL [15], with an acceptable target of 11 to 12 g/dL [16]. Because ESAs increase hemoglobin levels, thus, results in a reduction in blood-transfusion rates and enhancing QoL [17].

ESRD patients are at much higher risk of cardiovascular disease than the general population. Cardiovascular disease is by far the leading cause of morbidity and mortality in dialysis patients, accounting for almost 40% of hospitalizations and 50% of deaths [18]. There are certain uremia-associated risk factors that are unique in this population which include anemia, hyperparathyroidism, dyslipidemia, high lipoprotein, prothrombotic factors, hypoalbuminemia and chronic inflammation [19]. The presence and severity of diabetes and co-morbid conditions in general and cardiovascular diseases in particular predict impaired QoL [20].

The prevalence of hypertension remains high in hemodialysis patients, leading to a considerable morbimortality and an unsatisfactory QoL [21]; its prevalence is about 86%. Although many patients receive antihypertensive drugs, only 30% have well controlled BP [22]. Hypertension is the single most important factor for the development of cardio and cerebrovascular complications. Hypertension in the hemodialysis patients is multifactorial, but, the most important risk factors are

anemia, hypoalbuminemia, chronic inflammation, prothrombotic factors, hyperhomocysteinemia, vascular calcification and the traditional factors for cardiovascular risk [18]. Hypertension has an impact on patients' physical, psychological and social functioning which can alter their QoL [23].

ESRD is a common co-morbidity of diabetes mellitus (DM) that necessitates dialysis which in turn impacts QoL. Diabetic dialysis patients have poorer QoL than non diabetic dialysis patients. DM affects multiple organs in the body; it causes vision problem, cardiac problem, kidney failure, cerebrovascular events and peripheral vascular disease, leading to amputation and impaired physical health. All these problems lead to limited daily activities and work capacity, dependence on antidiabetic drugs for many years and disturbed sleep due to pain affecting physical health [24].

Musculoskeletal problems remain among the main limitations of the QoL of the patients with hemodialysis [25]. Arthritis is the leading cause of disability. Thus, it limits daily activities such as walking, climbing stairs, bathing and dressing. In patients with arthritis there is a significantly higher risk of developing depressive symptoms 2-4 years after diagnosis. Depression has been indicated to be related to reduced health status, as well as higher pain and fatigue levels and reduced QoL. Pain and disability inevitably affect patient's psychological status and general feeling of well-being [26].

QoL is often evaluated to determine the effectiveness of healthcare and treatment, as well as resource distribution and health policy development. Moreover, identifying the QoL of hemodialysis patients and its determinant factors are a fundamental aspect to evaluate with a view to effective interventions is a main aspect in nursing [27]. Therefore, this study was conducted to assess the QoL exhibited by patients undergoing hemodialysis and its relationship with their hemoglobin level and associated co-morbidities.

MATERIALS AND METHODS

This descriptive exploratory study was conducted on the renal insufficiency unit and nephrology and dialysis center at one of the university hospitals in Cairo governorate over a period of 6 months starting on June, 2012 to December, 2012. A Purposive sample of 100 adult male and female patients was studied. The inclusion criteria for the study were; male & female patients aged 20-65 years old, diagnosed with ESRD and receiving maintenance hemodialysis for = 3 months. Patients with

recognized mental health difficulties were excluded. Data pertinent to the study variables were collected by means of the following tools:

Socio-Demographic and Medical Profile Data Tool:

It was designed by the researchers, divided into two parts; the first part was related to the socio-demographic variables as the patient's age, gender, occupation, level of education, marital status, place of residence, income, family size and family breadwinner. The second part was concerned with the medical profile that included patient's co-morbidities, duration of dialysis, number of hemodialysis sessions/week and hemoglobin level.

Kidney Disease Quality of Life Short Form (KDQoL-SF™) Version 1.3:

It was developed and validated by Hays *et al.* [28] to measure QoL and the burden of disease for patients with ESRD; it was adopted after translation into Arabic. Each item (or question) was scored and then converted into a 0 to 100 scale, where 0 indicates the worst QoL and 100 the best QoL. Content validity of the translated and back translated tools was reviewed by a panel of five experts' professors in medical surgical nursing specialty. Internal consistency reliability for the KDQoL-SF™ was done using cronbach α coefficients; 0.893, this means that Arabic version of this questionnaire is a valid and reliable tool for use in Egyptian patients with CKD. It consists of three main items:

ESRD-Targeted Areas: It includes eleven scales (43 items) that relate to the kidney diseases which are: symptom/problem list (12 item), effects of kidney disease (8 items), burden of kidney disease (4 items), work status (2 items), cognitive function (3 items), quality of social interaction (3 items), sexual function (2 items), sleep (4 items), social support (2 items), dialysis staff encouragement (2 items) and patient satisfaction (1 item). These 11 subscales (items) make kidney disease component summary (KDCS).

36-Item Health Survey (SF-36): it includes eight scales which are physical functioning, role-physical, pain, general health, role-emotional, social function, vitality (energy/fatigue) and mental health (emotional well-being). These 8 subscales (items) make two components "physical component summary (PCS) and mental component summary (MCS)".

Overall Health Rating Item: Asks patients to rate their health on a 0-10 response scale ranging from "worst possible health" to "best possible health".

An Individual session was conducted with each patient met the inclusion criteria. Patients who agreed to participate in the study were interviewed once by the researchers when they were on dialysis machine or after dialysis to fill out the socio-demographic & medical profile data tool and kidney disease quality of life short form tool in about 30-45 minutes with the patient. He/she asked all the questions of all dimensions and let him/her to answer freely. Finally gave the patient the chance to express his/her fears, questions and problems about ESRD and hemodialysis. Statistical analysis was utilized to test for differences and correlations between the variables, using the SPSS program. A probability level of 0.05 has been adopted as the level of significance.

RESULTS

According to study results, approximately two thirds (60%) of the studied sample were female and more than one third (40%) was male, also, the majority (72%) of them were married and about more than one third (38%) aged from 50-65 years old with a mean age (45.27 ± 12.21 years). One third (31%) of them were illiterate. Nearly half (47%) of them were unemployed and about (65%) lived in urban areas. More than one third (41%) of them had low income and depended financially on a family relative and community services as shown in Table (1). one quarter (25%) of the studied sample undergone maintenance hemodialysis from 5-10 years. Also, the majority of them had three sessions/week and dialyzed 4 hours/session with the percentage of (96%) & (90%) respectively. Most of the studied sample (90%) reported that they complained from muscle cramps, as well two third of them complained from HCV & chest/back pain with the percentage of (71%) & (66%) respectively. Also, they had co-morbidities such as hypertension, arthritis, cardiovascular disease and diabetes in percentages of (78%, 45, 31% and 18%) respectively as shown in Table (2).

The QoL of ESRD patients undergoing hemodialysis was significantly impaired and there was a significant correlation among PCS, MCS, KDCS and QoL_tot, as indicated in Table 3. Also, the majority (98%) of studied sample experienced low hemoglobin level (anemia) and there was a significant correlation between hemoglobin

Table 1: Distribution of socio-demographic characteristics among the studied sample (n=100).

Variables	N	%
Age / Yrs:		
20<30	13	13
30<40	24	24
40<50	25	25
50 - 65	38	38
Mean ± SD	45.27 ± 12.21	
Gender:		
Male	40	40
Female	60	60
Residence:		
Urban	65	65
Rural	35	35
Marital status:		
Single	13	13
Married	72	72
Widowed	7	7
Divorced	8	8
Level of education:		
Illiterate	31	31
Read and write	28	28
Primary school	4	4
Secondary	26	26
Technical institute	5	5
Bachelor	6	6
Current occupation:		
Working full-time	1	1
Working part-time	5	5
Unemployed	47	47
Retired	8	8
Housewife	39	39
Income/month:		
150 < 500	37	37
500 < 1000	41	41
1000 < 2000	18	18
2000 - 3000	4	4

Table 2: Distribution of medical data among the studied sample (n=100)

Variables	N	%
Duration of hemodialysis / years		
Less than 1 year	16	16
1 < 3	21	
3 < 5	20	20
5 < 10	25	25
10 < 15	15	15
15 years and more	3	3
Frequency of hemodialysis		
Two sessions/wk	4	4
Three sessions/wk	96	96
Duration of hemodialysis session		
3:30 hours	10	10
4:00 hours	90	90
Hemodialysis complications:		
- intradialytic complications:		
Chest/back pain	90	90
Muscle cramps	13	13
Hypotension	48	48
Pruritis Vomiting	5	5
- vascular access complications:		
Bleeding	20	20
Local infection	22	22
Aneurysm	4	4
Clotting	17	17
Access dysfunction	17	17
- HCV	71	71

Table 3: Mean, standard deviation and Pearson correlation between quality of life total score and its components among the studied sample (n=100)

Variables	Mean ± SD	PCS		MCS		KDCS	
		r	p	r	p	r	P
PCS	29.10±12.14	-	-	-	-	-	-
MCS	26.47±12.63	0.613**	0	-	-	-	-
KDCS	40.67±14.17	0.595**	0	0.667**	0	-	-
QoL_tot	32.08±11.25	0.839**	0	0.875**	0	0.883**	0

Physical component summary (PCS), mental component summary (MCS), kidney disease component summary (KDCS) and the quality of life total score (QoL_tot)

* Correlation is significant at the 0.05 level.

** Correlation is significant at the 0.01 level.

Table 4: Pearson correlation between hemoglobin level and physical component summary (PCS), mental component summary (MCS), kidney disease component summary (KDCS) and quality of life total score QoL_tot among the studied subjects (n=100).

Variables	r	p-value
PCS	-0.028	0.780
MCS	0.118	0.241
KDCS	0.215	0.032*
QoL_tot	0.124	0.218

* Correlation is significant at the 0.05 level.

Table 5: Comparison between co-morbid conditions and physical component summary (PCS), mental component summary (MCS), kidney disease component summary (KDCS) and quality of life total score QoL_tot among the studied subjects (n=100).

Variables	Yes Mean ± SD	No Mean ± SD	T	P-value
PCS				
- Diabetes	22.97±7.13	30.44±12.63	-2.422	0.001
- Hypertension	30.20±12.85	25.18±8.34	1.731	0.087
- Cardiovascular	23.30±9.50	31.70±12.36	-3.709	0
- Arthritis	26.50±9.82	31.22±13.48	-2.022	0.046
MCS				
- Diabetes	22.31±7.04	27.38±13.41	-1.554	0.027
- Hypertension	27.09±13.16	24.27±10.51	1.048	0.301
- Cardiovascular	23.04±9.44	28.01±13.61	-1.839	0.069
- Arthritis	25.31±10.83	27.42±13.96	-0.85	0.397
KDCS				
- Diabetes	37.85±11.02	41.29±14.75	-1.122	0.27
- Hypertension	41.09±14.92	39.19±11.26	0.644	0.523
- Cardiovascular	35.76±12.92	42.88±14.23	-2.464	0.016
- Arthritis	40.76±11.41	40.60±16.18	0.055	0.956
QoL_tot				
- Diabetes	27.71±6.60	33.04±11.85	-1.842	0.069
- Hypertension	32.79±11.90	29.55±8.29	1.461	0.151
- Cardiovascular	27.37±8.92	34.20±11.60	-3.21	0.002
- Arthritis	30.86±8.91	33.08±12.85	-0.983	0.328

* Correlation is significant at the 0.05 level.

** Correlation is significant at the 0.01 level.

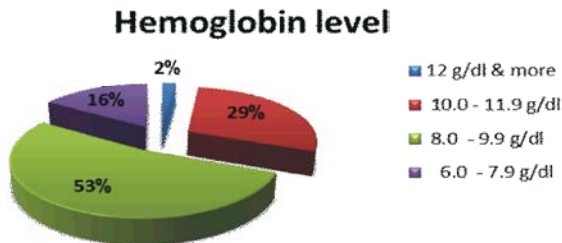


Fig. 1: Distribution of hemoglobin level among the studied subjects (n=100).

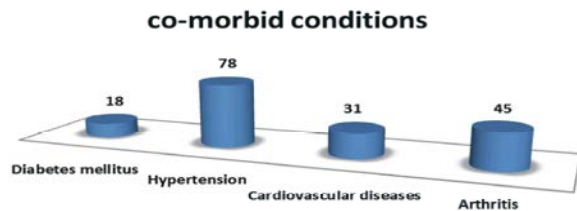


Fig. 2: Distribution of co-morbid conditions among the studied sample (n=100).

level and KDCS as shown in Table 4. there was a statistical significant difference between diabetic patients in relation to PCS, & MCS, on the other hand, there was no statistical significant differences between hypertensive patients in relation to PCS, MCS, KDCS, & QoL_tot. However, there was a statistical significant difference between cardiac patients in relation to PCS, KDCS, &

QoL_tot. Also, there was a statistical significant difference between patients with arthritis in relation to PCS as shown in Table 5.

DISCUSSION

The current study indicates that majority of patients are female and married, also aged from 50-65 years old. One third of them were illiterate. Nearly half of them were unemployed and lived in urban areas. More than one third of them had low income and depended financially on a family relative and community services. In this respect, the incidence and prevalence of CKD is growing most rapidly in people ages 60 and older [5] and the mean age of CKD is 49.8 ± 19 years [29]. Also, the number of male patients with ESRD is higher than the female patients. This may be because of smoking and alcoholic habits of men, which might aggravate the renal failure [10, 30].

As evident from the current study that the QoL of ESRD patients undergoing hemodialysis was significantly impaired and there was significant correlation among PCS, MCS, KDCS and QoL_tot. Thus, any change in one QoL dimension can impact other dimensions. In this respect, QoL of ESRD patients undergoing hemodialysis was impaired; physical functioning and psychological status are the domains most probably affected by the disease and its treatments [31, 32].

This study shows that the majority of the studied sample suffered from anemia (low hemoglobin level). Also, it was found that there was a significant correlation between hemoglobin level and KDCS. While there were no significant correlation among PCS, MCS and QoL_tot in relation to hemoglobin level. The results of the current study were not in congruence with the results of Clement *et al.* [33], who concluded that hemoglobin levels in excess of 12 g/dl lead to small and not clinically meaningful improvements in QoL. In this regards, Santos [34] mentioned that no differences of QoL according to hemoglobin levels and suggests that higher levels of hemoglobin (greater than 13 g/dl) may cause serious adverse effects, including hypertension and death. Also, hemoglobin levels correlated with higher physical component summary values (PCS) [35].

The current study revealed that diabetes was experienced by a minority of studied sample and there was a statistical significant difference between these patients in relation to PCS, & MCS, on the other hand, there was no statistical significant difference between diabetic patients in relation to KDCS, & QoL_tot. In this respect, physical health was significantly worse in diabetic dialysis patients as compared with nondiabetic dialysis patients [36]. Also, Foley, Curtis, and Parfrey [14] reported that, diabetes had an independent and negative impact on sexual function and physical functioning, but was associated with improvement in scores for burden of kidney disease and emotional well being. Moreover, diabetes as a co-morbid condition had negative effects on QoL [37].

As cleared from the present study, the majority of the studied sample had hypertension and there were no statistical significant differences between hypertensive patients in relation to PCS, MCS, KDCS, & QoL_tot. In this regards, hypertension reduced QoL and cardiovascular co-morbidities exacerbate reductions [23]. Also, QoL of people with hypertension can be adversely affected by hypertension itself and side-effects of treatment [38, 39]. Thus, hypertension may have an impact on patients' physical, psychological and social functioning that altered their QoL. Therefore, Malliara [22] suggests that hypertension should be controlled in hemodialysis patients, because systolic blood pressure > 180mm Hg was associated with poor outcomes. Also, Mercieca, Azzopardi, & Serracino-Inglott [40] found that the blood pressure was adequately controlled in dialysis patients, with no significant differences over a period of 6 months.

In the current study, one third of the studied sample experienced cardiovascular diseases and there was a statistical significant difference between cardiac patients in relation to PCS, KDCS, & QoL_tot except MCS. Results of this study were consistent with the findings of De Gusmao *et al.* [41] who showed that cardiovascular co-morbidities affected most of the domains in QoL negatively; it has an impact on both physical and mental domains. Similarly, results of Baune and Aljeesh [42] showed that cardiovascular diseases can cause physical disability and psychological stress, thus, affect the QoL assessment. Also, this finding of this study was consistent with the findings of studies on hypertensive patients with angina, myocardial infarction and stroke which reported lower physical and psychological well-being [43].

The present study illustrated that, nearly half of the studied sample had arthritis and there was a significant statistical difference between patients with arthritis in relation to PCS, while there were no statistical significant differences between patients with arthritis in relation to MCS, KDCS, & QoL_tot. In this respect, lower physiological function and QoL scores in dialysis patients are related to musculo-skeletal disorder as co-morbidity [37].

Based on study findings, it was concluded that QoL of hemodialysis was poor and there were significant differences between hemoglobin level and co-morbid conditions in relation to one or more dimensions of QoL except hypertension. Therefore, it is important to recognize, assess and manage co-morbid conditions accurately among patients undergoing hemodialysis.

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