academicJournals

Vol. 5(2), pp. 9-18, February, 2014
DOI: 10.5897/JDE2013.0068
ISSN 2141-2685

http://www.academicjournals.org/JDE

Journal of Diabetes and Endocrinology

Full Length Research Paper

Quality of life in diabetic and non diabetic patients on hemodialysis therapy

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Received 8 August, 2013; Accepted 2 January, 2014

Chronic kidney disease is a worldwide public health problem and a chronic disease that deteriorates the quality of life (QOL). Diabetes is recognized as co-morbidity in patients of end stage renal disease (ESRD). This study evaluated QOL in diabetic and non-diabetic patients on maintenance dialysis therapy. A cross-sectional study was conducted on ESRD with or without diabetes on hemodialysis therapy for at least three months at Kidney Center, Sheikh Zayed Medical Complex, Lahore Pakistan. QOL was assessed using WHOQOL-BREF questionnaire by World Health Organization. One hundred and thirty seven (n=137) hemodialysis patients were observed. 59 (41.8%) were with diabetes mellitus (DM) and 78 (55%) were without DM. 81 (54%) were on hemodialysis for more than 2 years. There was no statistically significant (p≥0.066) difference in QOL scores of hemodialysis patients with or without diabetes; however, a significant (p≤0.025) difference was observed in responses of 'meaningfulness' and "ability to concentrate" by patients of both groups. The scores were divided in two categories of '≤50' and '>50'; a significant (p≤0.047) difference between two groups was observed in physical domain only. The current study on diabetic and non-diabetic hemodialysis patients showed no statistical difference in their QOL except for "meaningfulness of life" and "ability to concentrate".

Key words: End stage renal disease (ESRD), diabetes mellitus (DM), quality of life (QOL), hemodialysis.

INTRODUCTION

Chronic kidney disease (CKD) is the progressive decrease in normal function of kidneys over time (Jayatilake et al., 2013) and is also defined as kidney damage with decreased function (glomerular filtration rate <60 ml/min/1.73 m^2 for 3 months or more. When kidneys lose 85 to 90% function, dialysis therapy becomes essential to remove uremic toxins. When kidneys are in state of renal failure, hemodialysis is done for removal of electrolytes and excessive water is also removed. CKD changes the serum levels of albumin, potassium, calcium, phosphorus, sodium, cholesterol and electrolytes (Craig, 2008). Hemodialysis keeps a safe level of potassium, sodium and bicarbonate in blood (Choi and Ha, 2013).

CKD is a worldwide public health problem generally associated with aging, diabetes (diabetic nephropathy), hypertension, obesity and cardiovascular disease. Hypertension, high cholesterol, tobacco smoking, obesity, poor diet, excessive alcohol intake and physical inactivity are well-established risk factors for CKD (McClellan et al., 2004). Diabetes mellitus (DM) and hypertension are leading causes of end-stage renal disease (ESRD) and their prevalence is high in Pakistani population (Zafar et al., 2011). Previous studies have shown a high prevalence of CKD (Anees et al., 2011; Jafar et al., 2005) and there

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are estimated 150 patients of ESRD/million/annum in Pakistan. Cost of dialysis is approximately US $1500.00 to 2000.00/patient/annum (Naqvi, 2009). According to a report by dialysis registry of Pakistan, there are 6000 patients of dialysis in Pakistan and only 40% of them have access to dialysis therapy. These patients are also underdialyzed due to lack of facilities which affect their survival as well as QOL (Lopes et al., 2007).

Quality of life (QOL) is an important indicator of a person's health and well-being as well as a parameter to calculate person's illness and survival (Yang et al., 2005). Chronic diseases impact the physical health, financial status, social life and capacity to perform routine activities and ultimately deteriorated QOL (Sathvik et al., 2008). In chronic diseases, success of therapy is evaluated by disease free period and physical well-being of the patient (Issa and Baiyewu, 2006). ESRD is one of the chronic diseases which have been reported to significantly impair the QOL as they have to undergo dialysis therapy regularly (Weisbord et al., 2003). Hemodialysis therapy is expensive, time consuming and patient is required to strictly follow diet restrictions.

DM is a major cause of ESRD and is recognized as a co-morbidity in patients of ESRD, the situation gets worse because of the fact that DM has its own complications which affect a person's QOL. A study from Poland showed significant low scores in physical health of dialysis patients with DM as compared to dialysis patients without DM (Gumprecht et al., 2010). Researchers from Denmark noted that QOL of dialysis patients with DM was lower than dialysis patients without DM (Sorensen et al., 2007). In a study carried out in India, researchers found significant difference in QOL of dialysis patients, renal transplant patients and normal healthy populations (Sathvik et al., 2008). Therefore, the aim of this study was to evaluate the QOL of hemodialysis patients with respect to DM.

METHODOLOGY

Study design and setting

Cross sectional study based on a standard questionnaire (WHOQOL-BREF, 1997) was carried out from 1st May to 30th July, 2012. Patients were enrolled from Dialysis Unit of National Institute of Kidney Disease (NIKD), Shaikh Zayed Medical Complex, Lahore, Pakistan. The study was approved by Institutional Review Board (IRB) of Shaikh Zayed Medical Complex, Lahore.

Study participants

All consecutive ESRD patients attending the hospital for dialysis were requested for participation in the study. The eligibility criteria for enrollment of patients was: (1) ESRD patients aged 18 or above of either gender; (2) on dialysis therapy for at least three months or more; (3) able to understand the local language (Urdu and Punjabi) and (4) able to give informed consent for enrollment in the study. Patients who had malignancies or any major surgery in previous six months were excluded from the study. All patients who fulfilled the inclusion criteria were recruited. Patients' demographic and medical data was recorded from patients' files and participants were identified as diabetic or non-diabetic on the basis of established diagnosis by medical officer.

Assessment tool for QOL

WHOQOL-BREF questionnaire by World Health Organization (WHO, 1997) was used to assess QOL in ESRD patients. It was developed by WHOQOL group after modification of original WHOQOL questionnaire which had 100 questions. WHOQOL group modified it to make it applicable on most of the situations. The modified and clinically applicable form was named WHOQOL-BREF (WHO, 1997). Initially it was formulated in English and then according to the need, it was translated to different local languages. It was translated into Urdu and exercised on 18 patients for its validation. After evaluation of their answers, it was applied on all the study participants. It contains 26 questions which were categorized in four domains; physical health, psychological health, social relationship and environment. All patients were not interviewed by principal investigator (AW) who is neither part of dialysis unit staff nor had any previous contact with study participants. This was done to avoid any study bias. WHOQOL-BREF questionnaire score were transformed to a scale of 0 to 100 (WHO, 1997). Higher scores of domains reflect better QOL.

QOL domains

These are combination of different answers in WHO-QOLBREF questionnaire which represent a specific dimension of QOL.

Physical

Physical is the combination of questions 3, 4, 10, 15, 16, 17 and 18 and it represents the physical well-being of person.

Psychological

Psychological is the combination of questions 5, 6, 7, 11, 19 and 26 and it represents the psychological well-being of person.

Social

Social is the combination of questions 20, 21 and 22 and it represents the social well-being and interaction of person with society.

Environmental

Environment is the combination of questions 8, 9, 12, 13, 14, 23, 24 and 25 and it represents the quality of environment of a person and its effects on his/her QOL.

Statistical analysis

Age, gender, education, employment status and marital status were calculated in frequencies. Chi-square test was applied to observe any difference between patients with DM and without DM for the study variables. Level of significance was set at $p<0.05$ with a

confidence level of 95%. Regression analysis was done to observe association of DM with QOL domains. Data was entered and analyzed in SPSS software (version 17.0; SPSS Inc., Chicago, IL, USA).

RESULTS

Demographic and medical parameters

One hundred and thirty seven (n=137) hemodialysis patients were enrolled for the study. 59 (43%) were with diabetes and 78 (57%) were without diabetes. Age was recorded in three categories of <30, 30 to 60 and >60 years; participants comprised of 24 (17%), 86 (63%) and 27 (20%) in the respective categories. 78 (57%) were males, 99 (72%) married, 41 (30%) illiterate, 124 (90%) have monthly income below US$ 500, 107(78%) were unemployed, 78 (57%) were with hypertensive, 51 (37%) patients had both hypertension and diabetes, and 81 (59%) were on hemodialysis (HD) for more than 2 years (Table 1).

Demographic and medical parameters of both groups were matched at base line and no statistically significant difference was observed in them except for age. Among patients having age <30 years, 22 participants were in the group without diabetes whereas only 2 participants in diabetic group.

QOL scores

There was no statistically significant difference in QOL scores of HD patients with DM and without DM; however, a significant difference was observed in questions 7 and 8 of the questionnaire. Question 7 was about the 'meaningfulness' of patient's life: 15 (25%) patients with DM answered 'Not at all' option as compared to only 3 (4%) patients without DM. Majority of the patients 34 (58%) were with DM and 65 (84%) patients were without DM had moderate feelings about meaningful life.

In question 8, response of patients about "ability to concentrate" showed that 10(17%) patients with DM answered "Not at all'' as compared to 6 (8%) patients without DM, whereas patients' response "very much'' was higher in patients without DM. In all other questions, there was no significant difference between QOL in HD patients with DM and without DM (Table 2).

Domain scores were divided in two categories of **"**≤50**"** and **"**>50" and significant difference between two groups of patients was observed in physical domain of WHOQOL-BREF. 43 (72.9%) patients with DM showed scores up to 50, while 15 (25.4%) showed scores above 50. In patients without DM, 45 (57.7%) scored up to 50 and 33 (42.3%) scored above 50. This difference was found to be statistically significant (p=0.047). However, there was no significant difference in the other three domains which were psychological, social and environmental (Figure 1).

This difference in age groups was associated with two questions ''ability to concentrate'' and ''meaningfulness of life'' where statistical p values were $p<0.01$ and $p<0.014$, respectively. In this study, duration of dialysis does not have any significant association with QOL. Regression analysis showed significant association of 'meaningfulness of life' ($p=0.024$) and 'ability to concentrate' and the 'physical domain' ($p=0.017$) with non-diabetic ESRD patients. Duration of dialysis showed significant association ($p\leq0.008$) with information needed, ability to get around, support of friends, transport satisfaction. Longer duration of dialysis was statistically associated with low education ($p=0.022$), low income ($p=0.037$), and unemployment ($p=0.032$). Increasing age ($p=0.025$) and co-morbidity were associated with physical pain ($p=0.047$) and presence of DM ($p<0.001$) independent of other variables.

DISCUSSION

Non communicable diseases (NCDs) like DM and CKD affect various aspects of human life (Fortin et al., 2006). Long duration of treatment, financial support and special care are required to deal with such diseases. It is not possible for all patients to meet these requirements and consequently their life starts to deteriorate. In ESRD patients, main goal of hemodialysis therapy is to improve patient's QOL which is usually measured in terms of physical, psychological, environmental and social well-being of the patient (WHO, 1997).

This study compared QOL of two groups of hemodialysis (HD) patients, one with DM and other without DM and observed any additional effect of DM on QOL of HD patients. In addition to hypertension, DM with its various complications on other systems of human body is a major contributing factor in ESRD (Li et al., 2013). It affects multiple organs of the body and cause vision impairment, cardiac problems, kidney diseases and peripheral vascular diseases. The prevalence of DM in subcontinent is two times high as compared to western countries. DM affects physical abilities of patient leaving a comparatively low score of QOL (Anees et al., 2011).

While comparing QOL of HD patients with DM and without DM, baseline parameters like age, gender, education, marital status, employment status, monthly income and duration of dialysis of both groups were matched in this study. The only variable that showed statistical difference was age as patients were enrolled without any limitations of age. The group of patients with DM showed low scores of QOL in physical domain as compared to the group without DM. In remaining three domains which were psychological, social and environmental, there was no statistically significant difference

Table 1. Demographic and medical parameters of participants.

Study parameter	Group A [n= 59 (43%)]	Group B [n=78 (57%)]	Total (137)	p values
Age groups (years)				
<30	2 (3)	22 (28)	24 (17)	<0.01#
30 - 60	40 (68)	46 (59)	86 (63)	
>60	17 (29)	10 (13)	27 (20)	
Gender				
Male	32 (54)	46 (59)	78 (57)	0.967#
Female	27 (46)	32 (41)	59 (43)	
Education				
Illiterate	18 (30)	23 (29)	41 (30)	0.761#
Up to 12th/ Diploma	30 (51)	42 (54)	72 (52)	
Degree	11 (19)	13 (17)	34 (25)	
Marital Status				
Married	46 (78)	53 (68)	99 (72)	0.992#
Bachelor/Widower	13 (22)	25 (32)	38 (28)	
Family Income per month (US$)				
<500	53 (90)	71 (91)	124 (90)	0.281#
500-1000	6 (10)	5 (6)	11 (8)	
1000-2000	0 (0)	2 (3)	2 (1)	
Employment Status				
Working	11 (19)	19 (24)	30 (22)	0.234#
Not Working	48 (81)	59 (76)	107 (78)	
Duration of Dialysis				
<1 year	11 (19)	20 (26)	31 (23)	0.632#
1 - 2 years	13 (22)	12 (15)	25 (18)	
>2 years	35 (59)	46 (59)	81 (59)	
Urea(g/dl)	47.1 ± 12.9	46.6 ±14.1	46.8 ± 13.5	0.840*
Hemoglobin(g/dl)	11.1 ± 1.9	10.6 ± 1.8	10.8 ± 2.7	0.575*
Creatinine(mg/dl)	10.2 ± 2.7	11.1 ± 2.8	10.6 ± 2.7	0.575*
Albumin(g/dl)	3.6 ± 0.5	3.7 ± 0.4	3.6 ± 0.4	0.465*

Group A = Participants with DM, Group B = Participants without DM. **t*-test, #Chi- Sq test.

between two groups. It is in accordance with the observation that DM brings changes to a person's life (Kazemi-Galougahi et al., 2012). Insulin or oral anti-diabetic therapy, regular monitoring of blood glucose and restricted diet affects QOL of patient (Apostolou et al., 2007). There was no reported impact of difference in treatment modalities on QOL of patients with DM.

In a study from Denmark by Sorensen et al. (2007), self-reported QOL scores of patients with DM were low as compared to patients without DM. In another study (Anees et al., 2011), researchers observed low QOL scores of patients with diabetes. There was no statistically significant difference in QOL of HD patients as compared to other chronic diseases like DM and asthma. These diseases affect QOL but extent of impact is different in different circumstances (Juenger et al., 2002).

Duration of dialysis has no significant effect on QOL score as reported in a previous study (Hallinen et al., 2009), as observed in the current study. Patients having

Table 2. Response of participants (n=137) to WHOQOL-BREF.

QOL response status	Group A [n=59(43%)]	Group B [n=78(57%)]	p values
1. How satisfied are you with your sleep?			
Very dissatisfied	4 (7)	1 (1)	0.338
Dissatisfied	17 (29)	27 (35)	
Neither dissatisfied nor satisfied	15 (25)	14 (18)	
Satisfied	22 (37)	33 (42)	
Very satisfied	1 (2)	3 (4)	
2. How would you rate your quality of life?			
Very poor	0 (0)	1 (1)	0.706
poor	20 (34)	22 (28)	
Neither poor nor good	23 (39)	42 (54)	
good	15 (25)	10 (13)	
Very good	1 (2)	3 (4)	
3. How satisfied are you with your health?			
Very dissatisfied	0 (0)	2 (2)	0.434
Dissatisfied	26 (44)	21 (27)	
Neither dissatisfied nor satisfied	16 (27)	35 (45)	
Satisfied	17 (29)	18 (23)	
Very satisfied	0 (0)	2 (3)	
4. To what extent physical pain prevents you from doing what you need to do?			
Extreme	4 (7)	1 (1)	0.518
Very much	38 (64)	51 (66)	
Moderate	9 (15)	18 (23)	
A little	6 (10)	3 (4)	
Not at all	2 (3)	5 (6)	
5. How much do you need medical treatment to function in your daily life?			
Extreme	4 (7)	1 (1)	0.121
Very much	49 (83)	65 (83)	
Moderate	6 (10)	12 (16)	
A little	0 (0)	0 (0)	
Not at all	0 (0)	0 (0)	
6. How much do you enjoy life?			
Extreme	1 (1.6)	0 (0)	0.296
Very much	5 (8.4)	14 (18)	
Moderate	14 (24)	9 (12)	
A little	24 (41)	47 (60)	
Not at all	15 (25)	8 (10)	
7. To what extent do you feel your life to be meaningful?			
Extreme	0 (0)	0 (0)	0.017
Very much	5 (8.4)	5 (6)	
Moderate	34 (58)	65 (84)	
Very much	5 (8.4)	5 (6)	
Not at all	15 (25)	3 (4)	

8. How well are you able to concentrate?			
Extreme	0 (0)	0 (0)	0.025
Very much	7 (12)	18 (23)	
Moderate	15 (25)	23 (29)	
A little	27 (46)	31 (40)	
Not at all	10 (17)	6 (8)	
9. How safe do you feel in your daily life?			
Extreme	0 (0)	1 (1)	0.066
Very much	7 (12)	9 (11)	
Moderate	17 (29)	35 (45)	
A little	30 (51)	31 (40)	
Not at all	5 (8)	2 (3)	
10. How healthy is your physical environment?			
Extreme	0 (0)	0 (0)	0.199
Very much	13 (22)	19 (24)	
Moderate	22 (37)	41 (53)	
A little	21 (36)	13 (17)	
Not at all	3 (5)	5 (6)	
11. Do you have enough energy for everyday life?			
Completely	0 (0)	2 (3)	0.256
Mostly	7 (12)	9 (12)	
Moderate	9 (15)	18 (23)	
A little	35 (59)	42 (53)	
Not at all	8 (14)	7 (9)	
12. Are you able to accept your bodily appearance?			
Completely	0 (0)	1 (1)	0.356
Mostly	4 (7)	4 (5)	
Moderate	12 (20)	21 (27)	
A little	40 (68)	50 (64)	
Not at all	3 (5)	2 (3)	
13. Have you enough money to meet your needs?			
Completely	3 (5)	2 (3)	0.299
Mostly	11 (19)	23 (29)	
Moderate	23 (39)	29 (37)	
A little	18 (30)	22 (28)	
Not at all	4 (7)	2 (3)	
14. How available to you is the information needed?			
Completely	1 (2)	0 (0)	0.070
Mostly	22 (37)	42 (54)	
Moderate	21 (35)	28 (36)	
A little	14 (24)	5 (6)	
Not at all	1 (2)	3 (4)	
15. Opportunity for leisure activities?			
Completely	2 (4)	0 (0)	0.974
Mostly	4 (7)	6 (8)	

Moderate	6 (10)	9 (12)	
A little	32 (54)	47 (60)	
Not at all	15 (25)	16 (20)	
16. How well are you be able to get around?			
Very good	1 (2)	1 (1)	
Good	7 (12)	13 (18)	0.544
Neither poor nor good	28 (47)	44 (56)	
Poor	21 (36)	19 (25)	
Very poor	2 (3)	1 (1)	
17. How satisfied are you with your abilities to perform daily activities?			
Very satisfied	1 (2)	1 (1)	
Satisfied	11 (19)	13 (17)	0.863
Neither dissatisfied nor satisfied	12 (20)	19 (25)	
Dissatisfied	34 (57)	43 (55)	
Very dissatisfied	1 (2)	1 (1)	
18. How satisfied are you with your capacity for work?			
Very satisfied	0 (0)	1 (1)	
Satisfied	10 (17)	13 (17)	
Neither dissatisfied nor satisfied	6 (10)	20 (26)	0.112
Dissatisfied	43 (73)	43 (55)	
Very dissatisfied	0 (0)	1 (1)	
19. How satisfied are you with yourself?			
Very satisfied	1 (2)	4 (5)	
Satisfied	13 (22)	18 (23)	0.436
Neither dissatisfied nor satisfied	13 (22)	22 (28)	
Dissatisfied	32 (54)	34 (44)	
Very dissatisfied	0 (0)	0 (0)	
20. How satisfied are you with your personal relationship?			
Very satisfied	9 (15)	11 (14)	
Satisfied	25 (42)	36 (46)	0.596
Neither dissatisfied nor satisfied	18 (31)	20 (26)	
Dissatisfied	7 (12)	8 (10)	
Very dissatisfied	0 (0)	3 (4)	
21. How satisfied are you with your sex life?			
Very satisfied	3 (5)	1 (1)	
Satisfied	16 (27)	22 (28)	0.562
Neither dissatisfied nor satisfied	28 (47)	44 (57)	
Dissatisfied	11 (19)	10 (13)	
Very dissatisfied	1 (2)	1 (1)	
22. How satisfied are you with support from friends?			
Very satisfied	1 (2)	1 (1)	
Satisfied	14 (24)	16 (21)	0.117
Neither dissatisfied nor satisfied	11 (19)	30 (38)	
Dissatisfied	31 (52)	27 (35)	
Very dissatisfied	2 (3)	4 (5)	

23. How much satisfied are you with living place condition?			
Very satisfied	2 (3)	1 (1)	0.689
Satisfied	27 (46)	31 (40)	
Neither dissatisfied nor satisfied	19 (32)	31 (40)	
Dissatisfied	11 (19)	14 (18)	
Very dissatisfied	0 (0)	1 (1)	
24. How satisfied are you with access to health care facilities?			
Very satisfied	3 (5)	2 (3)	0.331
Satisfied	37 (63)	59 (75)	
Neither dissatisfied nor satisfied	13 (22)	13 (17)	
Dissatisfied	6 (10)	3 (4)	
Very dissatisfied	0 (0)	1 (1)	
25. How satisfied are you with your transport?			
Very satisfied	1 (2)	0 (0)	0.179
Satisfied	23 (39)	41 (52)	
Neither dissatisfied nor satisfied	14 (24)	20 (26)	
Dissatisfied	21 (35)	16 (21)	
Very dissatisfied	0 (0)	1 (1)	
26. How often do you have negative feelings?			
Never	6 (11)	10 (13)	0.467
Seldom	15 (25)	29 (37)	
Quite often	21 (36)	25 (32)	
Very often	15 (25)	12 (15)	
Always	2 (3)	2 (3)	

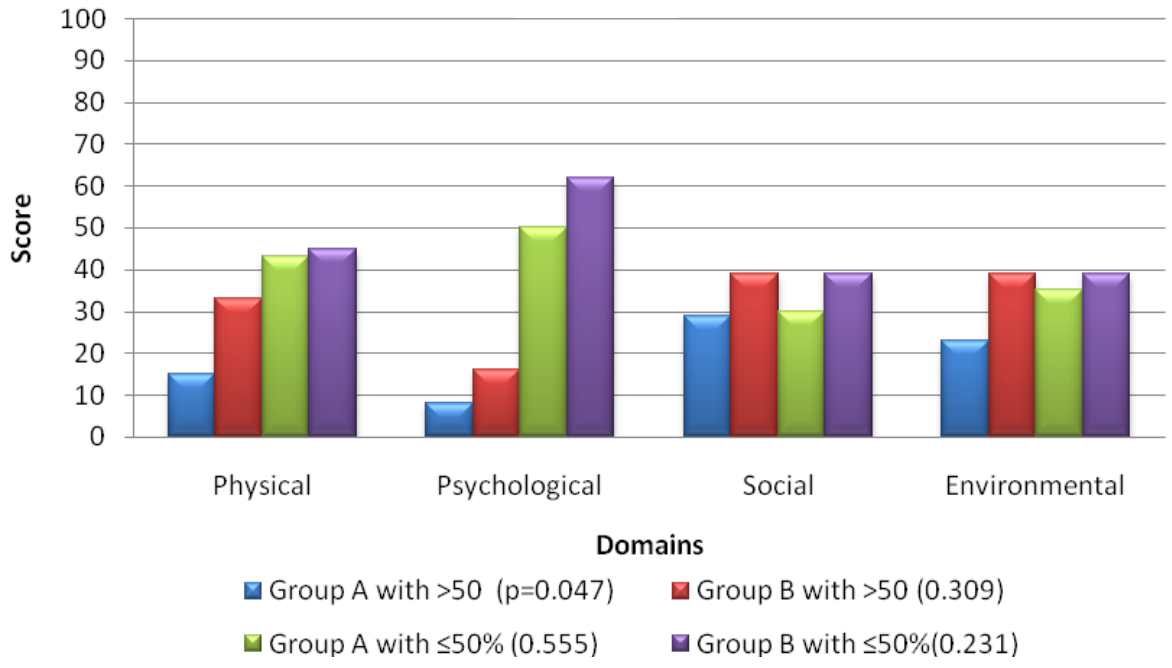

Figure 1. Domainwise participant's distribution in study groups.

dialysis from different durations did not show any significant difference in QOL. However, one investigator have reported significant effect of duration of dialysis on QOL (Vasilieva, 2006).

Patients without DM were of younger age as compared to patients with DM. In patients below 30 years, only 2 patients were with DM, while 22 were without DM. As most of the complications of DM like diabetic neuropathy and nephropathy occur with increasing age (Apostolou et al., 2007), therefore QOL score is comparatively better in younger patients. Age is also significantly associated with "ability to concentrate" and "meaningfulness of life". In younger age patient's, ability to concentrate is better than old age and they also feel their life is more meaningful as compared to old age patients. This may be a limitation to our study, but at the time of enrolment of patients there were no strict matching criteria between groups. Regarding biochemical parameters like urea, hemoglobin, creatinine and albumin levels, there was no significant difference between two groups.

Reports of previous studies showing some association between education, marital status, employment status and duration of dialysis might be due to the fact that in those studies, they did not match baseline characteristics (Anees et al., 2011), while the present study matched baseline parameters and observed the difference between patients with DM and without DM. The current study tried to control all potential confounding factors. Age difference in two groups was due to the fact that DM usually affects patients in older age and enrolled patients regardless of age. Secondly, most of these studies are from developed countries where health care system, family trends and income levels are very different from developed countries. So the result in this study cannot actually be compared with developed countries.

Limitations of study

According to international guidelines, patients must undergo dialysis treatment thrice a week, but due to lack of funds and medical facilities in the local settings, only a few persons get dialysis thrice a week (Anees et al., 2011). Others get it twice a week or once a week. This may limit the QOL score of HD patients; so it is difficult to compare this study to other studies conducted in developed countries with all required facilities available.

In this study, only patients who were on therapy in dialysis unit were interviewed. They might feel a little safer than other patients who were not able to get treatment. Due to friendly behavior of dialysis unit staff, they might have reported positively to questions about medical facilities available to them. It was an interview based questionnaire, so it greatly depends on patient's mood, interest and attention at the time of interview.

Situation at that specific time may cause difference in answers of patients about financial needs as well as social interaction and psychological well-being.

Conclusion

This study on diabetic and non-diabetic ESRD hemodialysis patients showed a statistically significant difference in their QOL scores of "meaningfulness of life" and "ability to concentrate". Physical domain was also significantly associated with the presence of DM.

Conflict of Interests

The author(s) have not declared any conflict of interests.

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