

East African Medical Journal Vol. 91 No. 10 October 2014

THE DETERMINANTS OF HEALTH RELATED QUALITY OF LIFE OF PATIENTS ON MAINTENANCE HAEMODIALYSIS AT KENYATTA NATIONAL HOSPITAL, KENYA

E. Kamau, MBChB, MMed, J. Kayima, MBChB, MMed, Associate Professor and C. F. Otieno, MBChB, MMed, Associate Professor, Department of Clinical Medicine and Therapeutics, College of Health Sciences, University of Nairobi, P. O. Box 19676-00202, Nairobi, Kenya

THE DETERMINANTS OF HEALTH RELATED QUALITY OF LIFE OF PATIENTS ON MAINTENANCE HAEMODIALYSIS AT KENYATTA NATIONAL HOSPITAL, KENYA

E. KAMAU, J. KAYIMA and C. F. OTIENO

ABSTRACT

Background: Health related quality of life (HRQOL) is increasingly being recognised as a primary outcome measure in the treatment of end stage renal disease. In addition to being an important surrogate marker of quality of care in patients on maintenance haemodialysis, HRQOL measures have been shown to be robust predictors of mortality and morbidity.

Objective: To determine the health related quality of life and its determinants in patients on maintenance haemodialysis at the Kenyatta National Hospital.

Design: A cross-sectional descriptive study.

Setting: Renal unit, Kenyatta National Hospital

Subjects: Adult patients with end stage renal disease on maintenance haemodialysis.

Results: The mean physical composite summary and mental composite summary scores were 39.09 ± 9.49 and 41.87 ± 10.56 respectively. The burden of kidney disease sub-scale, symptom and problems sub-scale and effect of kidney disease on daily life sub-scale scores were 16.15 ± 21.83 , 73.46 ± 18.06 and 67.63 ± 23.45 respectively. No significant correlations were found between the health-related quality of life scores, socio-demographic and clinical factors assessed.

Conclusion: The health-related quality of life of patients on maintenance haemodialysis is reduced. The physical quality of life is more affected than the mental quality of life. No independent determinants of health-related quality of life were identified.

INTRODUCTION

Patients with End Stage Renal Disease (ESRD) on maintenance Haemodialysis (HD) have significantly lower health related quality of life (HRQOL) than age matched general population, with physical health particularly more affected than the mental health (1-6). Within the physical composite score (PCS) the health domain most affected is the role-functioning physical which limits ability to participate in normal daily roles and activities (1). Patients on haemodialysis have lower scores than renal transplant patients in multiple studies (3, 7).

Over the last decade, multiple advances have been made in treatment of anaemia, adequacy of dialysis and use of erythropoietin and Vitamin D in patients on haemodialysis. However, this has not translated to an improvement of HRQOL.

Several factors are associated with HRQOL outcomes in patients on maintenance haemodialysis.

Gender is a powerful predictor of HRQOL scores in multiple studies, with females manifesting lower scores in multiple domains especially physical health (1, 8, 9).

Increasing age has been shown to correlate negatively with quality of life (9). Older patients have lower physical health scores whereas younger patients have lower mental health scores (10).

High socio-economic status as evidenced by increased income and level of education correlates positively with quality of life (11).

Anaemia is associated with reduced quality of life, and haemoglobin levels predict both physical and mental domains on the SF-36 (4, 8, 9, 12).

Nutritional biomarkers have moderate to large predictive power of HRQOL. These include Serum albumin, Creatinine and Body mass index (BMI) (13). Low creatinine levels and low body mass index are significantly associated with lower quality of life scores (13).

Co-morbidities, particularly cardio-vascular diseases and risk factors are associated with lower HRQOL scores (4, 14, 15). Diabetic patients on dialysis have lower self-rated physical health compared to non-diabetics on dialysis (15). Patients with hypertension, especially if poorly controlled, have lower quality of life than patients with normal blood pressure (16).

Although adequacy of dialysis is a strong predictor of survival, its relationship with HRQOL is inconsistent (6, 13).

Patients with ESRD on dialysis bear a heavy symptom burden of fatigue, cognitive difficulty, sleep disturbance, sexual dysfunction, pain and depression which negatively affect HRQOL (17, 19, 20).

HRQOL scores serve as a useful and relatively convenient screening instrument for the risk of death and hospitalisation. Assessment of HRQOL may identify patients with undiagnosed or inappropriately treated depression who may benefit from standard interventions. An MCS score of less than 42 is highly sensitive and specific for depression (9).

Several interventions improve HRQOL scores among patients with ESRD on haemodialysis. These include treatment of anaemia, management of pain and sleep disturbances, exercise programmes, renal transplantation, improved bone mineral metabolism, treatment of restless leg syndrome with Gabapentin, and treatment of sexual dysfunction. Short daily and long nocturnal haemodialysis improves HRQOL scores. In addition, counselling in response to individual patient's issues and cognitive behavioural therapy can be helpful (21).

MATERIALS AND METHODS

The study was conducted at the Kenyatta National Hospital renal unit after obtaining ethical approval from the ethical and research committee. Patients with ESRD aged 18 years and above on maintenance haemodialysis were considered eligible. Patients who had been on dialysis for less than three months, patients hospitalised in the last four weeks and patients with cognitive impairment, psychosis and dementia, were excluded from the study.

Demographic and socio-economic history was obtained through direct questioning of the patient and recorded in the study proforma. Primary diagnosis, co-morbidities and treatment history were derived from patients' medical record. Physical examination was carried out and co-morbidities and their associated complications noted. Height and weight were measured for each patient and body mass index calculated. Adequacy of dialysis was calculated using Kt/v .

Laboratory methods: Albumin was analysed using the Technicon RA-1000 machine. Haematocrit levels were analyzed using the microhaematocrit centrifuge. The

readings were done using a microhematocrit reader. For patients who had albumin and haematocrit levels measured over the last three months, an average of the results was recorded.

HRQOL was measured by the KDQOL-36 questionnaire. The KDQOL-36 questionnaire is a validated instrument, used in multiple studies and recommended by the National Kidney Foundation (22, 23).

The first 12 items of the KDQOL-36 are the Medical Outcomes Survey (MOS) SF-12 survey, which measures patients' perceptions of their own physical and mental functioning. In addition, there are 24 kidney-disease specific questions. The five scores derived from the KDQOL-36 are:

1. Physical component summary (PCS) (items 1-12)—an overall measure of physical functioning that assesses physical limitations, energy level and general health.
2. Mental component summary (MCS) (items 1-12)—an overall measure of mental functioning that assesses tasks, depression, anxiety and social activities.
3. Burden of kidney disease sub-scale (items 13-16)—how much kidney disease interferes with daily life, takes up time, causes frustration, or makes the respondent feel like a burden.
4. Symptoms and problems sub-scale (items 17-28b)—how bothered a respondent feels by sore muscles, chest pain, cramps, itchy or dry skin, shortness of breath, faintness/dizziness, lack of appetite, feeling washed out or drained, numbness in the hands or feet, nausea, or problems with dialysis access.
5. Effects of kidney disease on daily life sub-scale (items 29-36)—how bothered the respondent feels by fluid limits, diet restrictions, ability to work around the house or travel, feeling dependent on doctors and other medical staff, stress or worries, sex life, and personal appearance.

The questionnaire was in English language and was interviewer administered. For patients who did not understand English the principal investigator translated the questions to a language they best understood or used a translator. A mark was put against the patient's response. Those questions that the patient did not answer were left blank.

Data analysis: The data collected were entered into EXCEL and password protected.

Survey scoring: An Excel scoring spreadsheet with an example and instructions was obtained from the UCLA website at www.gim.med.ucla.edu/kdqol.

Each question had a maximum of 100 points with a higher score indicating better health. The scales had a maximum of 100 points with higher scores indicating better health. Scale scores were computed if at least

one item in the scale was answered. The scores were computed as the average of the answered items.

Continuous variables were summarised into means and standard deviations. Categorical data were summarised into proportions. Relationships between HRQOL Scores and the continuous variables were analyzed by Pearson correlation or Spearman rank correlation. Relationships between HRQOL scores and categorical variables were analysed using the

student T test / ANOVA. Significant level was set at a $P < 0.05$.

RESULTS

A total of 130 out of the 144 patients on maintenance haemodialysis were screened. Ninety six patients (66.7%) met the inclusion criteria and were included in the study. The baseline characteristics of the study participants. Table 1.

Table 1
Baseline characteristics of the study participants

Characteristic	Population
Male: female ratio	1.91:1
Age, mean (SD) yrs.	44 (± 13.98)
Employment status (%)	
Employed	25
Retired	27.1
Unemployed	47.9
Education level (%)	
Uneducated	0
Primary	21.9
Secondary	45
Tertiary	31.3
Duration of dialysis (range) months	3-156
Primary renal disease (%)	
Hypertension	53.1
Diabetes mellitus	30.2
Chronic glomerulonephritis	7
Polycystic kidney disease	3.1
Bladder outlet obstruction	5.26
Co-morbidity (%)	
None	0
Hypertension	26
Hepatitis B	4.2
Osteoarthritis	2
Hypertensive heart disease	2
Diabetes mellitus	2
BPH	2.1
HIV	1
Hypothyroidism	1
PUD	3
Body Mass Index, mean (SD) kg/m ²	22.75(± 3.94)
Adequacy of Dialysis, mean (SD) kt/v	2.05(± 0.43)
Haematocrit level, mean (SD)	26.35(± 7.17)
Albumin levels, mean (SD) g/l	38.56(± 9.32)

HRQOL: The mean physical composite summary and mental composite summary scores were 39.09±9.49 and 41.87±10.56 respectively. The population norms for the PCS and MCS scores are 50±10.

The burden of kidney disease sub-scale, symptom and problems sub-scale and effect of kidney

disease on daily life sub-scale scores were 16.15±21.83, 73.46±18.061 and 67.63±23.45 respectively. The sub-scale scores range from 0-100 with higher scores indicating better health. Pearson's and Spearman's rank correlation between clinical indicators and PCS & MCS scores. Table 2.

Table 2
Correlation between composite scores and the continuous variables

	PCS	MCS
AGE	-0.152	-0.016
p-value	0.138	0.877
*DURATION OF DIALYSIS	0.049	0.017
p-value	0.638	0.869
COMORBIDITY NO.	-0.184	-0.127
p-value	0.073	0.221
BODY MASS INDEX	0.023	0.124
P-value	0.823	0.233
KT/V	0.072	0.068
P-value	0.486	0.515
HEMATOCRIT	0.133	0.055
P-value	0.197	0.594
ALBUMIN	0.015	0.085
P-value	0.885	0.410

*spearman's rank correlation was done for dialysis duration

Student T Test and Analysis of Variance (ANOVA) were conducted for categorical variables as shown in the Table 3.

Table 3
Assessment of correlation between composite scores and the categorical variables

	PCS	MCS
MALE	39.54	42.18
FEMALE	38.23	41.26
P value	0.525	0.691
EMPLOYED	42.04	41.35
UNEMPLOYED	38.87	40.89
RETIRED	36.75	44.04
P value	0.142	0.468
PRIMARY	38.49	40.07
SECONDARY	38.29	43.84
TERTIARY	40.81	39.98
P value	0.512	0.212
DM	37.32	39.92
NON-DM	39.86	42.72
P value	0.231	0.235

There were no significant associations between the composite scores and socio-demographic and clinical variables.

Sub-scale scores were not significantly associated with socio-demographic and clinical variables.

DISCUSSION

The socio-demographic and clinical characteristics found in this study were similar to those of similar populations in previous studies done at the KNH renal unit.

In this study, the mean PCS Score was 39.09 \pm 9.49 and the mean MCS Score was 41.87 \pm 10.57. This finding is consistent with multiple studies that have found the HRQOL of life of patients on maintenance haemodialysis to be reduced (5, 8, 21, 24, 25, 26).

The symptoms and problem sub-scale score was 73.46 \pm 18.06. The effect of kidney disease on daily life sub-scale score was 67.63 \pm 23.45. The burden of kidney disease sub-scale score was 16.15 \pm 21.83. A similar trend of very low scores in the burden of kidney disease sub-scale and relatively good scores in the effect of kidney disease on daily life sub-scale and symptoms and problem sub-scale have been noted in studies conducted in centres offering conventional three times a week dialysis (27).

Though multiple studies have shown significant correlation between age, gender, duration of dialysis, employment status and education level, this study failed to identify any statistically significant correlation between socio-demographic factors and HRQOL scores (2, 4, 10, 14, 21).

Yamana *et al* (studied 44 Japanese patients) and Bokhle *et al* (among 140 South Brazilian patients) found no correlation between age, gender, social-economic status and the HRQOL scores which they attributed to small sample sizes and homogenous results (24,27).

Though no significant associations were noted between the HRQOL and the socio-demographic factors assessed, some trends were identified.

Females had lower scores than males, even though females were significantly younger than their male counterparts; yet increasing age has been shown to negatively affect HRQOL (2, 8, 9, 11). Multiple studies that have shown females to have lower scores (2, 8, 9, 11). The exact cause for lower HRQOL in females with ESRD is not clear, but women tend to be more apprehensive about their bodily image and appearance which are impacted negatively by dialysis through fluid overload and insertion of vascular access (11). Additionally, as women in Kenya are less socio-economically empowered than men, they may feel more burdened to their families (11). Women have numerous domestic tasks and responsibilities that they may not be able to circumvent despite illness and which impact negatively on their quality of life

(9).

The MCS score in this study was 42.19 in patients less than 44 years old and 41.59 in patients aged 44 or older ($p=0.784$). Other studies have found older patients to have higher MCS indicating better emotional coping with chronic diseases (6, 9). The elderly patients in the present study were likely to have more emotional problems owing to the huge financial implications of dialysis particularly as most are unemployed. In contrast, in developed countries where renal replacement therapy is provided for by the state, the elderly cope better with dialysis.

Though socio-economic status as assessed by education level and employment status did not significantly correlate with the HRQOL scores, the PCS scores tended to be higher among those in employment ($p=0.079$). The MCS was found to be lower in those in employment ($p=0.78$). Increased socio-economic status has been shown to correlate positively with quality of life (4, 8, 9, 11). Those in employment scored better in the PCS as they were likely to be more physically fit to sustain employment. Having a job is an important predictor of better mental quality of life. Holding a job certainly has a positive influence on the perception that an individual has on his or her role in society and contributes towards improved self-esteem. In this study, though not statistically significant, those in employment scored lower. This could relate to the inconvenient dialysis schedule and colossal amount of time spent dealing with their diseases both of which constantly puts them at risk of being declared redundant at their workplaces.

None of the clinical variables assessed in this study correlated significantly with the HRQOL scores. Though numerous studies have shown hematocrit and albumin to be important predictors of HRQOL, this study did not identify any significant association possibly because albumin and hematocrit levels were relatively homogenous with results distributed within a narrow range (4, 8, 9, 11). The study may also have been under-powered to detect such an association. Studies showing similar results include Yamana *et al* in a study done among 44 Japanese haemodialysis patients, Bokhle *et al* among 140 Brazilian patients and Mingardi *et al* among 304 Italian patients (24, 27, 28). Mingardi *et al* attributed their lack of correlation to the limited variability of the hematocrit values due to routine use of erythropoietin (28).

Although adequacy of dialysis is a strong predictor of survival, studies on its relationship with HRQOL have had inconsistent outcomes. Merkus *et al* and Mingardi *et al* failed to identify an association between Kt/v and HRQOL (14, 28). Cleary and De Ore did not find an association between Kt/v and physical functioning, but found a small statistically significant association between MCS and kt/v (9, 29). In this study though not statistically significant,

the HRQOL scores were consistently higher in the patients with adequate dialysis. This underscores the importance of interventions aimed at improving adequacy of dialysis in our patients.

Though dialysis duration, co-morbidity and primary renal disease have been shown to correlate with HRQOL of haemodialysis patients, this study did not identify a significant correlation (6, 25, 30). However a trend was noted in this study where DM was associated with reduced scores in all sub-scales. This is in keeping with numerous studies that have shown DM to be associated with reduced quality of life especially physical functioning (8, 14). The reduced quality of life in diabetic dialysis patients is probably related to higher co-morbidity burden (30).

The failure of this study to identify any significant association between all variables assessed and the HRQOL scores could be as a result of the short dialysis duration and probably the impact of dialysis on QOL takes a longer time to be detected.

Other factors not assessed such as role of social support and spirituality may be important determinants of quality of life in our population. Plantinga *et al* found greater life satisfaction at one year on dialysis among patients with higher overall social support compared to those with lower support (Odds ratio 2.47) (31). HD patients who are more religious have also been shown to have higher quality of life than those who are less religious (32).

This study has important implications as our patients had markedly reduced HRQOL. However modifiable interventions shown to improve HRQOL of HD patients such as anaemia, albumin and adequacy of dialysis were found not to be independent determinants. For instance, this means that in our study population correction of anaemia would not necessarily result in an improvement of HRQOL.

As such efforts to improve HRQOL in our setting should extend beyond strictly nephrological care. Other factors that could influence HRQOL such as social and family support, individual psychological factors and physical, psychological and occupational rehabilitation need to be evaluated in more details in our setting.

CONCLUSION

The HRQOL of haemodialysis patients at the KNH renal unit is reduced with the physical health more affected than the mental aspect. Among the sub-scales, the burden of kidney disease sub-scale is the most affected.

Age, gender, socio-economic status, primary renal disease, co-morbidities, albumin, haematocrit, body mass index and adequacy of dialysis did not correlate significantly with HRQOL.

COMPETING INTERESTS

The authors declare that they have no competing interests.

ACKNOWLEDGEMENTS

To the renal unit laboratory for conducting the lab tests.

REFERENCES

1. Evans RL, Manninen DL, Garrison LP, Hart LG, Blagg CR, Gutman RA, Hull AR, Lowrie EG: Quality of life of patients with End Stage Renal Disease. *New Engl. Med. J.* 1985, **312**:563-589.
2. Merkus MP, Jagger KJ, Dekker FW, Boeschoten EW, Stevens P, Krediet RT, The NECOSAD study group: Quality of Life in Patients on Chronic Dialysis: Self-Assessment 3 Months After the Start of Treatment. *Amer. J. Kidney Diseases* 1997, **29**: 584-592
3. Sathvik BS, Parthasarathi G, Narahari MG, Gurudev KC: An assessment of the quality of life in haemodialysis patients using the WHOQOL-BREF questionnaire. *Indian J. Nephrol.* 2008, **18**:141-149
4. Moreno F, Lopez-Gomez JM, Sanz-Guajardo D, Jofre R, Valderrabano F: Quality of life in dialysis patients. A Spanish multicentre study. *Nephrol. Dial. Transpl.* 1996, Suppl 2:125-129
5. Becker C, Katz I, Heever E: An investigation into the Quality Of Life Chronic Haemodialysis Patients Managed with Outcome Driven Protocols. *Cardio. J. Afric.* 2010. **3**:11
6. Cleary J, Drennan J: Quality of Life of Patients on Haemodialysis for End Stage Renal Disease. *J. Adv. Nurs.* 2005, **51**: 577-586
7. Jofre R, Gomez J, Moreno F, Sanz-Guajardo P, Valderrabano F: Changes in Quality of Life after Renal Transplantation. *Amer. J. Kidney Diseases* 1998, **32**:93-100
8. Mittal SK, Ahern L, Flaster E, Maesaka JK, Fishbane S: Self Assessed Physical and Mental Health of Haemodialysis Patients. *Nephrol. dial. transplant.* 2001, **16**: 1387-1394
9. Seica A, Segall C, Verzan C, Gomez J, Vaduva N, Maqdinca M, Rusoiu S, Cristea S, Stefan M, Serbanesanu D, Morosanu P, Gradjenca L, Andronache R, Nechita M, Dragos D, Gusbeth P, Mircescu G, Covic A, Drorica A: Factors affecting the quality of life of haemodialysis patients from Romania: a multicentre study. *Nephrol. Dial. Transplant.* 2009, **10**:1-4.
10. Mujais M, Story K, Broiuiette J, Takano T, Soroka S, Franek C, Mendelsohn D, Finkelstein FO: Health-related Quality of Life in CKD Patients: Correlates and Evolution over Time. *Clin. J. Ameri. Soc. Nephrol.* 2009, **4**: 1293-1301.
11. Rocco MV, Gassman JJ, Wang S, Kaplan R, the modification in renal diet study group: Cross sectional study on the symptoms and quality of life in chronic renal disease: The modification of diet in renal disease study. *Ameri. J. kidney diseases* 1997, **29**: 888-896.

12. Perlman RL, Finkelstein FO, Liu L, Roys E, Kiser M, Eisele G, Burrows-Hudson S, Messana JM, Levin N, Rajagopalan S, Port FK, Wolfe RA, Saran R: Quality of Life in Chronic Kidney Disease: A Cross-sectional analysis in the renal research institute-CKD Study. *Ameri. J. Kidney Disease* 2005, **45**:658-666
13. Spiegel BMR, Melmed G, Robbins S, Esrailian E: Biomarkers and Health Related Quality of Life in End Stage Renal Disease: A Systematic Review. *Clinic. J. Ameri. Soc. Nephrol.* 2008, **3**:1759-1768
14. Merkus MP, Jager KJ, Dekker FW, De Haan RJ, Boeschoten EW, Krediet RT: Quality of life over time in dialysis: The Netherlands Cooperative Study on the Adequacy of Dialysis. *Kidney International* 1999, **56**: 720-728
15. Soresen VR, Mathiesen ER, Watt T, Bjorner JB, Andersen MV, Feldt-Rasmussen: Diabetics treated with Dialysis: Complications and Quality of Life. *Diabetologica* 2007, **50**: 2254-2262.
16. Soni RK, Weisbord SD, Unruh ML: Health-related quality of life outcomes in chronic kidney disease. *Cur. Opin. Nephrol. Hypert.* 2010, **19**:153-159
17. Leinau L, Murphy TE, Bradley E, Fried T: Relationship between Conditions Addressed by Haemodialysis Guidelines and Non-ESRD-Specific Conditions Affecting Quality of Life ESRD. *Clinic. J. Ameri. Soc. Nephrol.* 2009, **4**: 572-578
18. Abdel-kader K, Unruh M, Weisbord S: Symptom Burden, Depression, and Quality of Life in Chronic and End-Stage Kidney Disease. *Clinic. J. Ameri. Soc. Nephrol.* 2009, **4**: 1057-1064.
19. Wiesbord SD, Fried LF, Arnold RM, Fine MJ, Levenson DJ, Peterson RA, Switzer GE: Prevalence, Severity, and Importance of Physical and Emotional Symptoms in Chronic Haemodialysis Patients. *J. Ameri. Soc. Nephrol.* 2005, **16**: 2487-2494.
20. Sesso R, Yoshihiro M: Time of diagnosis of chronic renal failure and assessment of quality of life in haemodialysis patients. *Nephrol. Dial. Transplant.* 1997, **12**: 2111-2116
21. Finkelstein FO, Wuerth D, Finkelstein SH: Health related quality of life and the CKD patient: challenges for the nephrology community. *Kidney International* 2009, **76**:946-952
22. National Kidney Foundation: Kidney Disease Outcome Quality Initiative clinical practice guidelines for chronic kidney disease: Evaluation, Classification and Stratification. *Ameri. J. Kidney Diseases* 2002, **39**: 1-226
23. Lacson E, Xu J, Lin S, Dean SG, Lazarus JM, Hakim R: A Comparison of SF-36 and SF-12 Composite Scores and Subsequent Hospitalization and Mortality Risks in Long- Term Dialysis Patients. *Clinic. J. Ameri. Soc. Nephrol.* 2010, **5**:252-260
24. Bohlke M, Nunes DL, Marini SS, Kitamura C, Andrade M, Von-Gysel MP: Predictors of Quality of Life among Patients on Dialysis in Southern Brazil. *Sau Paulo Med. J.* 2008, **126**: 252-256
25. Vasilieva IA: Quality of life in Chronic Haemodialysis Patients in Russia. *Haemodialysis International* 2006, **10**: 274-278
26. Chiang CK, Peng Y, Chiang S, Yang C, He Y, Hung K, Wu K, Wu M, Fang C, Tsai T, Chen W. Health Related Quality of Life of Haemodialysis Patients in Taiwan: A Multicenter Study. *Blood Purification* 2004, **22**:490-498
27. Yamana E. The Relationship of Clinical Laboratory Parameters and patient attributes to the Quality of Life of patients on Haemodialysis. *Jap. J. Nurs. Scien.* 2009, **6**: 9-20
28. Mingardi G, Cornalba L, Cortinovia E, Ruggiata R, Mosconi P, Apolone G: Health Related Quality of Life in Dialysis Patients. A report from an Italian Study using the SF-36 Health Survey. *Nephrol. Dial. Transplant* 1999, **14**:1503-1510
29. De Oreo PB: Haemodialysis Patient-Assessed Functional Health Status Predicts Continued Survival, Hospitalization and Dialysis Attendance Compliance. *Ameri. J. Kidney Disease* 1997, **30**: 204-212.
30. Nissenson A, Fine R: Mortality Risk Factors for Patients Treated with Dialysis. *Clinical Dialysis* 2005, **102**: 1169
31. Plantiga LR, Fink NE, Harrington-Levey R, Finkelstein FO, Hebah N, Powe NR, Jaar BG: Association of Social Support with Outcomes in Incident Dialysis Patients. *Clinic. J. Ameri. Soc. Nephrol.* 2010, **5**: 1480-1488.
32. Berman E, Merz JF, Rudnick M, Snyder RW, Rogers KK, Lee J, Johnson D, Mosenkis A, Israni A, Wolpe PR, Lipschutz JH: Religiosity in a Haemodialysis population and its Relationship to Satisfaction with medical care, Satisfaction with life and Adherence. *Ameri. J. Kidney Diseases* 2004, **44**: 488-497