BIOSCIENCES BIOTECHNOLOGY RESEARCH ASIA, June 2018. Vol. **15**(2), p. 257-264

Medication, Diet, Fluid and Treatment Adherence Behavior among Patients Subjected to Hemodialysis in Selected Hospital, India

Porkodi Arjunan[1], Judie Arulappan[2], Sreelekha Bhaskara Kurup[1], Aruna Subramaniam[3] and Munikumar Ramasamy Venkatasalu[4]

[1]Department of Medical Surgical Nursing, Faculty of Nursing,
Sri Ramachandra University, Porur, Chennai, 600 116 Tamil Nadu State, India.
[2]Department of Maternal and Child health, College of Nursing,
Sultan Qaboos University, Muscat, Sultanate of Oman.
[3]Department of Community Health Nursing, Faculty of Nursing,
Sri Ramachandra University, Porur, Chennai, Tamil Nadu State, India.
[4]PAP Rashidah Sa'adatul Bolkiah Institute of Health Sciences,
University Brunei Darussalam, Jalan Tungku Link Gadong, Negara Brunei Darussalam.

http://dx.doi.org/10.13005/bbra/2629

(Received: 11 June 2018; accepted: 25 June 2018)

The study aimed to explore adherence behavior towards medication, diet, fluid, and treatment, and determine the perception about treatment among patients subjected to hemodialysis (HD). A cross sectional descriptive research design was adopted. 100 patients subjected to hemodialysis were recruited and End stage renal disease adherence questionnaire was used to evaluate the adherence behavior and perception towards HD treatment. All (100 %) patients were adherent to dialysis treatment. 65 % of them perceived that following the fluid restrictions were important. Considerable difference was observed in adherence behavior to follow fluid and diet recommendations.

Keywords: Hemodialysis, Adherence behavior, End stage renal disease, Fluid restrictions.

Chronic renal failure is more prevalent in the world. Approximately 242 cases per one million people are diagnosed every year. And 8% are added to this number annually.[1] In India, renal replacement therapy (RRT) is required for 200,000 new patients every year and < 10% of patients receives RRT. The patients should be committed to the treatment for their underlying disease. Many of these patients face challenges with regard to their treatment adherence. [2]

In India, ESRD is one of the most common health problems. The number of patients subjected to hemodialysis (HD) is increased.[2] Patients need to undergo the hemodialysis treatment for a lifelong period. The patients with ESRD needs to restrict the fluid intake as part of the hemodialysis treatment and it is considered to be one of the most common major stressors especially in hot climate. [3, 4]

Hemodialysis and kidney transplantation are the prescribed methods of treatment for the patients with ESRD and they are required to follow a scheduled medical treatment.[5] Adherence to medication, regular attendance to hemodialysis, food and fluid management are the critical elements

*Corresponding author E-mail:

of the treatment, and mortality rate is increased among non-adherent patients.[6] The patient has to visit the hospital weekly three times to receive hemodialysis for minimum 3 hours to 4 hours as part of the treatment regimen. [7]

As the incidence of Chronic Kidney Disease (CKD) has been on the rise in India, it might pose problems to the health care and economy in near future.[8] In America, 500,000 people are affected with ESRD.[9] Hundred new cases per million people are diagnosed with ESRD every year worldwide.[10]

Since ESRD is a lifelong disease, it affects the mood, behavior, cognition and outcomes of the patient.[11] The complex dialysis schedule, dietary and fluid restrictions, and need for taking multiple prescribed medications causes stress for the patients.[12] The results of the treatment and patient's outcome largely depends on the adherence to diet and fluid restrictions. [13]

Patients with ESRD require lifelong treatment, including restrictions in many day today activities. [14] For many patients with ESRD, non-adherence to the prescribed diet, fluid, drug, and non- adherence to the treatment regimen can lead to adverse outcome. The risk of fluid volume overload increases with the increase intake of fluids. However the patient's longingness to drink is utmost common reason for non-adherence. [15]

Nonadherence is common, when patients with ESRD are given a responsibility for following prescribed treatments. Besides dialysis, patients are expected to strictly adhere to a prescribed treatment including diet and fluid restrictions and medication and dialysis treatment. [16] Providing a good quality of life (QOL) and extending life are the overall goal of the treatment for the patients with ESRD. [17] Patients need to modify their lifestyle to have a better quality of life.

Further research studies need to be conducted to emphasize on patients' quality of life, perceptions regarding health-related behaviors and address the issues related to psychosocial needs. The concept of health behaviors including non-adherence to diet and fluid and the relationship between selected individual characteristics, perception and affect were explained in health promotion model (HPM). [18]

Less number of research studies has focused completely on adherence to therapeutic medications treatment among HD patients. However, some of the interventional strategies focusing patient centered care such as identifying barriers to medication adherence and removal of barrier, client education as well as cognitive behavioral strategies will increase the adherence to treatment regimens. [19]

Patients with chronic diseases are required to have specific self-care behaviors. The essential self-care behavior needed for patients with ESRD comprises of fluid restriction, dietary modification, taking prescribed medication, self-care, effective communication with others, self-efficacy and role acceptance. [20] The prescribed treatment for the patients subjected to HD include minimum 12 hours of HD treatment per week , intake of a combination of various prescribed medications, and consuming a prescribed diet. [21]

Almost half (50%) of HD patients were able to control their daily fluid intake, and other patients, find it difficult to follow their stipulated fluid allowance. [22] Patients receiving HD have to continuously fight to resist the attraction to drink fluids. [23] Besides, many demographic and psychosocial factors responsible for self-efficacy towards adherence to fluid allowance have been identified. [24] Patients with ESRD are threatened with many potential loses and lifestyle changes such as employment, fluid, change in dietary pattern, change in family role and financial status. [25]

Intake of inappropriate diet and consumption of excessive liquid will aggravate the patient's condition. The aim of the dietary management is to reduce the amount of electrolytes such as potassium, sodium & phosphate, urea, and creatinine. An increasing amount of food and fluid intake can lead to increased morbidity and premature death by accumulation of lethal fluids and metabolic waste products in the blood. Many investigation findings have recommended the methods to improve the adherence behavior to HD treatment. [26] Adherence varies among individuals due to their dietary habits, level of knowledge, climates & living conditions, as well as attitude towards prescribed limitations. [27]

In developing countries such as India, fewer studies are conducted in this very important aspect. Thus, the authors focused on the adherence to HD attendance, medication, diet and fluid

restrictions. Also to determine the perception of their disease among patients subjected to HD.

METHODS

The cross sectional survey was conducted on patients subjected to hemodialysis in Chennai, South India. The questionnaire used for this study was End stage renal disease adherence questionnaire (ESRD-AQ) by Kim et al., (2010).[28] This is a 46 item questionnaire with five sections: general information, and items measuring adherence related to HD treatment, medications, fluid restrictions and dietary restrictions. The reliability of the tool was established using test-retest stability, with ICC's ranging from 0.83 to 1.00. The score interpretation varied with items. A score of e" 1000 indicates better adherence and d" 1000 as poor adherence. The two subscales of this questionnaire included to measure the direct adherence behavior and the other one as patients' knowledge and perceptions about treatment. The scores obtained were interpreted based on the maximum the higher the score- better the adherence. The investigators also collected the demographic and clinical variables such as age, gender, educational qualification, marital status, occupation, employment, residence and type of family. In addition, the clinical data related to causes of kidney failure, duration of ESRD and BMI were obtained.

This study was conducted in a dialysis unit of one of the territory University teaching 3500 bedded hospital at Chennai, South India. The 25 bedded dialysis unit of this hospital performs both peritoneal and hemodialysis for patients with ESRD. Everyday approximately 75 patients undergo dialysis in 3 shifts (7am, 1pm and 7pm). Duration of the dialysis was from 3 hours to 4.30 hours. Majority of the patients undergo only hemodialysis. During the study period, 250 ESRD patients were registered with this dialysis unit. They undergo daily, alternative days or 3 times weekly depend on the need for dialysis.

Participants were recruited if they were currently receiving HD for e"6 months & three times a week, both gender, aged above 21 years, able to consent and understands, reads English and/ or Tamil, a local language.

In total, 250 patients were in attendance in the center for two months period of data collection. Two researchers screened their clinical documents and identified 147 patients deemed as eligible for participation in the study. Data were collected from first 100 respondents after providing with information sheet and obtained informed consent. One researcher administered the questionnaire either by face to face (n=62) or self-completion of survey (n=38). However, when the investigators found seven incomplete self-administered questionnaire, again samples were chosen to reach 100 patients. 14 patients declined to participate due to lack of family consent and others felt the questionnaire was too long to answer.

Consent and approval from the Institutional Review Board of the University was obtained prior to the data collection.

The data collection started after obtaining ethical approval from the University Research and ethics committee and also from the respective administrative approval of the dialysis unit. An open meeting on the project brief was given to all the clinical nurses at dialysis unit during their staff meeting where the investigators requested their support to 'first approach' the eligible patients. The data were collected for 12 weeks period. During that period, researchers attended the dialysis unit every day to screen out the eligible patients. At the Centre, patients subjected to hemodialysis arrived the dialysis unit 30 minutes earlier on the scheduled time of the day (7am, 1pm and 7pm).

Eligible patients were 'first approached' by the dialysis nurses to gain initial consent. Consented patients were contacted by the researchers to explain the purpose of the study. After getting the permission from the patients, the patients were contacted again on the day of data collection, normally at their next dialysis appointment. If the patients were still interested to participate in the study, the researcher administered or handed over the self-administered the questionnaire. Respondents completed this survey during their waiting time before the start their hemodialysis at the dialysis unit.

Collected data were analyzed using the Statistical Package for the Social Sciences (SPSS, IBM, California, California State, USA) for Windows Version 20.0. The investigators used descriptive statistics to assess the adherence of advised behavior changes (medication intake, fluid restriction, dietary modification and regular

HD attendance) and patients' knowledge on their disease management. The association between adherence behavior and perception with their demographic and clinical variables was done by using ANOVA and chi square test. Pearson correlation was used to correlate between adherence behavior and perception. To study the pattern of relationship between adherence behavior and perception with background variables were analyzed using multiple linear regression analysis.

RESULTS

Of 100 samples, 32 % were in the age group between 41 to 50 years and 26.00% were in 51 to 60 years (Table 1). 82 % of patients were males whereas 12 % of patients were females and 86% of them were married. 69 % of them were home makers. 47 % of them had professional education. 83% of the study participants were from urban area. 49.00 % of the study participants were unemployed. Majority 77.00 % of the study participants were from nuclear family.

Among the samples, 58 % of the participants had renal failure due to hypertension. 40 % of them had end stage renal disease (ESRD) for 3 to 5 years period of time whereas 6 % had for more than 8 years. 78 % of study participants were having normal BMI (body mass index) whereas 15.00 % of them were overweight.

Direct hemodialysis treatment adherence behavior

The participants were asked about the elements of direct adherence behavior with HD including adherence to hemodialysis attendance, medication, fluid and diet. In terms of hemodialysis attendance, the mean value was 292.00 ± 27.266 with the score range of 0 to 300. Regarding the episode of shortening HD time, the mean score was 198.00 ± 9.847 with the score range from 0 to 100. The study participants' adherence to medication mean score was 191.00 ± 21.66 with the score range from 0 to 200. Adherence to fluid restriction mean score was 156.00 ± 46.210 with score range from 0 to 200. The study participants' adherences to dietary restriction mean score was 135.50 ± 29.555 with score range from 0 to 200 (Table 1).

Adherence behavior

In terms of treatment adherence, the mean value was 25.67 ± 3.03 with the score range from 0 to 102. Regarding adherence to medication, the mean score was 16.69 ± 2.88 with the score range from 0 to 54. The study participants' adherence to

Table 1. Mean and standard deviation of direct adherence behavior among patients subjected to hemodialysis (N=100)

Q.No.	Item	Range	Mean	SD
14.	HD attendance	0-300	292.00	27.266
17.	Episode of shortening HD time	0-200	198.00	9.847
18	Duration of shortening HD time	0-100	99.00	4.924
26.	Adherence to medication	0-200	191.00	21.766
31.	Adherence to fluid restriction	0-200	156.00	46.210
46.	Adherence to dietary restriction	0-200	135.50	29.555
	Total	0-1200	1071.5	62.05

Table 2. Mean and standard deviation of adherence behavior among the patients subjected to hemodialysis (N =100)

Item	Mean	SD
Treatment adherence(0-102)	25.67	3.03
Adherence to medication (0-54)	16.69	2.88
Adherence to fluid restriction(0-57)	17.90	2.70
Adherence to dietary restriction(0-46)	21.17	3.77

Table 3. Frequency and percentage distribution of adherence behavior among the patients subjected to hemodialysis (N=100)

Adherence behavior	No.	%
Better adherence	86	86.00
Poor adherence	14	14.0

fluid restriction mean score was 17.90 ± 2.70 with the score range from 0 to 57. Adherence to dietary restriction mean score was 21.17 ± 3.77 with score range from 0 to 46. (Table 2).

Adherence behavior

Of the samples, 86.00 % of the study participants had better adherence behavior whereas 14.00% of them had poor adherence behavior (Table 3).

Patients' knowledge on their disease management

Among the samples, 96.00 % of the study participants expressed that following the HD attendance is very important, 86.00 % of them understood the importance of HD attendance because following the dialysis schedule is important to keep their body healthy. All the study participants agreed that taking scheduled medication is very important, whereas 98.00 % of them told that medication adherence is very important because taking medicines is important to keep their body healthy. 96.00 % of the study participants said that fluid restrictions is highly important whereas only 65.00 % of them were aware that because limiting fluid intake is important to keep their body healthy and 85.00 % of the study participants had knowledge regarding the types of food that they

Table 4. Frequency and percentage distribution of perception about treatment among the patients subjected to hemodialysis (N=100)

Q.No.	Item	No.	%
11.	Perception on HD attendance	96	96.0
12.	Understanding the importance of HD attendance	86	86.0
22.	Perception on medication adherence	100	100.0
23.	Understanding importance of medication	98	98.0
32.	Perception on fluid restrictions	96	96.0
33.	Understanding the importance of fluid restrictions	65	65.0
41	Perception on diet restrictions	85	85.0
42.	Understanding the importance of diet restrictions	97	97.0

Table 5. Correlation between adherence behavior and perception among patients subjected to HD (N=100)

	Adherence Behavior	Treatment adherence	Diet	Fluid	Medication	Perception
AdherenceBehavior	1					
Treatment adherence	.369.000	1				
Diet	.332.001	.094.351	1			
Fluid	.250.012	.076.452	.826.000	1		
Medication	.328.001	.124.128	.086.395	.134.185	1	
Perception	2.280.02	.271.006	.277.005	.231.021	.220.028	1

Table 6. Regression analysis of adherence score with demographic variables among the patients subjected to HD (N=100)

Demographic variables	Beta coefficient	T value	P value	95 % of C.I. Lower	Upper
gender	-3.563	-.792	0.430	-1.389	1.536
Marital status	-9.614	-1.245	.216	-1.324	1.471
Residence	-2.232	-.267	.790	1.041	1.065
Current employment	-17.575	-1.385	.169	.911	.934

R2 value 0.057, F 1.146, p 0.342

should eat each day. Regarding the diet restriction, 97.00 % of them expressed that watching their diet is important to keep their body healthy (Table 4). The overall perception about the treatment mean score was 7.65 with the standard deviation of 1.67 in a 0 to 48 scale.

Correlation between adherence behavior and perception

There was a significant relationship between treatment adherence, diet, fluid, medication and knowledge on disease management and adherence behavior among the patients subjected to HD. The significant relationship was found between fluid restriction and dietary restriction which was statistically significant at $p < 0.000$ level. The significant relationship was found between knowledge on disease management and fluid adherence and medication which was significant at $p < 0.05$ respectively (Table 5).

Association between adherence behavior and Background variables

There was a significant association between fluid adherence and marital status which was significant statistically at $p < 0.05$. The association between treatment adherence and current employment which was statistically significant at $p < 0.05$. The association between adherence behavior and educational status was statistically significant at $p < 0.05$. (Table 6)

DISCUSSION

This is the first study that was conducted to explore adherence behavior of patients subjected to hemodialysis on medication, diet and treatment in India.

The present study findings shows that most of the study participants had better adherence behavior towards medication, diet and treatment. In contrast to the present study results, few other study findings highlighted non- adherence of patients to prescribed HD, treatment with medications, dietary and fluid restrictions from 0 to 32.3%, 1.2% to 81%, 3.4% to 74%, and 1.2% to 82.4%, respectively.[6,7,10, 14,15,16,17,22, 25,28] Kugler and colleagues conducted a study to assess the adherence pattern among patients undergoing HD. Dialysis Diet and Fluid Non – Adherence questionnaire (DDFQ) was used in the study. Unexpectedly, high level of non-adherence was reported as 74.6 % and 81.4% both in fluid and diet restrictions. [29]

In the present study, the reported adherence rate to HD was high, but the rates of adherence to fluid and diet restrictions were comparatively low. Over half of patients undergoing hemodialysis in this study reported to have difficulty in following fluid restrictions as indicated in their inter-dialytic weight gain. Our study findings corroborate with the study findings of Shailendranath, B., et al. [30] In the results, it is interesting to note that 54 % of study participants had moderate scoring to the adherence to dietary management, whereas 46% of the patients had adequate scoring.

In our study, majority of HD study participants reported that HD attendance is very important, and had knowledge regarding the importance of food type, yet some of the study participants had less understanding on importance of limiting fluid intake. These findings are alike in a study carried out by Shailendranath, B., et al [30]. It is interesting to note that patients had adequate knowledge regarding protein, sodium, potassium rich and fluid contributing food sources.

Our experiment results are in good agreement with another study findings. The study aimed to identify the relationship between perception of illness, adherence to treatment, and clinical outcomes among patients subjected to HD. The study findings reported that older patients had lower identity dimension scores than younger patients. This indicates that older patients perceived reduced physical symptoms related to ESRD. ($t= -3.24$, $p< 0.001$) [28]

In our study, the analysis of results shows that there is a significant relationship between treatment adherence, diet, fluid, medication and knowledge on disease management and adherence behavior among the patients subjected to HD. The significant relationship was found between fluid restriction and dietary restriction, and knowledge on disease management and fluid adherence and medication. This is confirmed to the study findings of Khalil et al who reported that there was a positive correlation between different items of diet and fluid dialysis questionnaires ranging from $r = 0.40- 0.75$ ($p > 0.001$). [11]

The current study findings highlight the significant relationship between fluid and dietary

restrictions and perceptions and understanding level of adherence behavior. These study findings are similar to the study findings of Manar M Nabolsi [17]. Positive relationship was found between quality of life and adherence and perceived seriousness of illness. Negative relationship was noted between depression and adherence with treatment regimen and perceived seriousness. This is consistent to the results of a study conducted by Khalil et al., on fluid adherence. [10] The results revealed that none of the independent variables explained the changes in fluid adherence.

The limitations of the study are that the Participants were recruited from one dialysis center and the Biochemical measurements were not assessed to substantiate the adherence.

The recommendations of the study includes determining the dietary behavior and factors that predict adherence to diet among patients with ESRD, assessment of the quality of life and survival of patients with CKD, assessment of the lived-in experiences of patients with CKD and assessment of the possible correlation between diet and fluid non-adherence.

CONCLUSION

The patients subjected to Hemodialysis need to understand the nature of the disease, importance to follow the prescribed treatment and nurses need to play a vital role in facilitating the patients' treatment adherence.

ACKNOWLEDGEMENT

The authors acknowledge all the participants of the study.

REFERENCES

1. Levey AS, Coresh J, Bolton K, Culleton B, Harvey KS, Ikizler TA, Johnson CA, Kausz A, Kimmel PL, Kusek J, Levin A. K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification. *American Journal of Kidney Diseases.* 2002; **39**
2. Modi GK, Jha V. The incidence of end-stage renal disease in India: a population-based study. *Kidney international.* 2006; **70**(12):2131-3.
3. Jafar T, Islam M, Poulter N. Chronic kidney disease in the developing world. *N Engl J Med.* 2006; **354**(10):998.
4. Leghari NU, Amin R, Akram B, Asadullah MA. Hemodialysis; psychosocial stressors in patients. *Professional Medical Journal.* 2015; **22**(6).
5. Cukor D, Rosenthal DS, Jindal RM, Brown CD, Kimmel PL. Depression is an important contributor to low medication adherence in hemodialyzed patients and transplant recipients. *Kidney international.* 2009; **75**(11):1223-9.
6. Kaveh K, Kimmel PL. Compliance in hemodialysis patients: multidimensional measures in search of a gold standard. American journal of kidney diseases: the official *journal of the National Kidney Foundation*. 2001; **37**(2):244-66.
7. Chilcot J, Wellsted D, Farrington K. Illness representations are associated with fluid nonadherence among hemodialysis patients. *Journal of psychosomatic research*. 2010; **68**(2):203-12.
8. Singh AK, Farag YM, Mittal BV, Subramanian KK, Reddy SR, Acharya VN, Almeida AF, Channakeshavamurthy A, Ballal HS, Gaccione P, Issacs R. Epidemiology and risk factors of chronic kidney disease in India–results from the SEEK (Screening and Early Evaluation of Kidney Disease) study. *BMC nephrology.* 2013; **14**(1):114.12
9. Collins AJ, Foley RN, Gilbertson DT, Chen SC. United States Renal Data System public health surveillance of chronic kidney disease and end-stage renal disease. *Kidney international supplements.* 2015; **5**(1):2-7.
10. Khalil AA, Darawad M, Al Gamal E, Hamdan Mansour AM, Abed MA. Predictors of dietary and fluid non adherence in Jordanian patients with end stage renal disease receiving haemodialysis: a cross sectional study. *Journal of Clinical Nursing.* 2013; **22**(1-2):127-36.
11. Khalil AA, Frazier SK. Depressive symptoms and dietary nonadherence in patients with end-stage renal disease receiving hemodialysis: a review of quantitative evidence. *Issues in Mental Health Nursing.* 2010; **31**(5):324-30.
12. Akman B, Uyar M, Afsar B, Sezer S, Nurhan Ozdemir F, Haberal M. Adherence, depression and quality of life in patients on a renal transplantation waiting list. *Transplant International.* 2007; **20**(8):682-7.
13. Kimmel PL, Peterson RA, Weihs KL, Simmens SJ, Alleyne S, Cruz I, Veis JH. Multiple measurements of depression predict mortality in a longitudinal study of chronic hemodialysis outpatients. *Kidney international*. 20001; **57**(5):2093-8.
14. Kara B, Caglar K, Kilic S. Nonadherence with diet and fluid restrictions and perceived social support

in patients receiving hemodialysis. *Journal of Nursing Scholarship.* 2007; **39**(3):243-8.

15. Kim Y, Evangelista LS. Relationship between illness perceptions, treatment adherence, and clinical outcomes in patients on maintenance hemodialysis. Nephrology nursing journal: *journal of the American Nephrology Nurses' Association.* 2010; **37**(3):271.
16. Lam LW, Twinn SF, Chan SW. Self reported adherence to a therapeutic regimen among patients undergoing continuous ambulatory peritoneal dialysis. *Journal of advanced nursing.* 2010; **66**(4):763-73.
17. Nabolsi MM, Wardam L, Al Halabi JO. Quality of life, depression, adherence to treatment and illness perception of patients on haemodialysis. *International journal of nursing practice.* 2015; **21**(1):1-0.
18. Pender NJ. Heath promotion model manual, 1996
19. Kutner NG. Improving compliance in dialysis patients: does anything work? In Seminars in Dialysis 2001 Sep 1 (Vol. 14, No. 5, pp. 324-327). Blackwell Science Inc.
20. Quinan P. Control and coping for individuals with end stage renal disease on hemodialysis: a position paper. CANNT journal= *Journal ACITN;* **17**(3):77-84 (2007).
21. Daniels G, Robinson JR, Walker C, Pennings JS, Anderson ST. Gastrointestinal symptoms among African Americans undergoing hemodialysis. *Nephrology Nursing Journal.* 2015; **42**(6):539.
22. Leggat JE. Psychosocial factors in patients with chronic kidney disease: Adherence with dialysis: a focus on mortality risk. *InSeminars in dialysis* 2005, **18**(2), pp. 137-141). Blackwell Science Inc.
23. Sinclair P.M. & Parker V. Pictures and perspectives: a unique reflection on interdialytic weight gain. *Nephrology Nursing Journal,* 2009; **36**(6), 589–596.
24. Lee S.H. & Molassiotis A. Dietary and fluid compliance in Chinese hemodialysis patients. *International Journal of Nursing Studies,* 2002; **39**(7): 695–704.
25. Denhaerynck K, Manhaeve D, Dobbels F, Garzoni D, Nolte C, De Geest S. Prevalence and consequences of nonadherence to hemodialysis regimens. *American Journal of Critical Care.* 2007; **16**(3):222-35.
26. Hekmatpou D, Anoosheh M, Alhani F. Pathology of patient education: A qualitative study. *Iran Journal of Nursing.* 2007; **20**(49):51-60.
27. Lin CC, Liang CC. The relationship between health locus of control and compliance of hemodialysis patients. *The Kaohsiung journal of medical sciences.* 1997; **13**(4):243-54.
28. Kim Y, Evangelista LS. Relationship between illness perceptions, treatment adherence, and clinical outcomes in patients on maintenance hemodialysis. Nephrology nursing journal: journal of the American Nephrology Nurses' *Association.* 2010; **37**(3):271.
29. Kugler C, Vlaminck H, Haverich A, Maes B. Nonadherence with diet and fluid restrictions among adults having hemodialysis. *Journal of Nursing Scholarship*. 2005; **37**(1):25-9.
30. Shailendranath B, Ushadevi C, Prashant G. Kedlaya. Impact of knowledge, attitude and behavior among maintenance hemodialysis patients for adherence to dietary regimen–A single centre experience. *International Journal of Humanities and Social Science.* 2014; **4**(12):257-62.