*ejpmr, 2021,8(3), 116-121*

SJIF Impact Factor 6.222

**EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH**

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

# FACTORS RELATED TO HEMODIALYSIS PRACTICE- PATTERNS IN PATIENTS WITH MAINTENANCE HEMODIALYSIS

**Md. Mamunur Rashid*[1], Pradip Kumar Dutta[2], Md. Nurul Huda[3], Biplob Kumar Barua[4] and Dr. Mohammad Abdul Kader[5]**

[1]MD (Nephrology), Registrar, Nephrology, Evercare Hospital, Dhaka, Bangladesh.
[2]Professor and Ex Head, Department of Nephrology, Chittagong Medical College Hospital, Chittagong, Bangladesh.
[3]Professor, Head of the Department, Chittagong Medical College Hospital, Chittagong, Bangladesh.
[4]Registrar of Nephrology, Chittagong Medical College Hospital, Chittagong, Bangladesh.
[5]Assistant Registrar of Nephrology, Chittagong Medical College Hospital, Chittagong, Bangladesh.

***Corresponding Author: Md. Mamunur Rashid**

MD (Nephrology), Registrar, Nephrology, Evercare Hospital, Dhaka, Bangladesh.

**Article Received on 08/01/2021** **Article Revised on 28/01/2021** **Article Accepted on 18/02/2021**

## ABSTRACT

**Introduction:** Chronic kidney disease (CKD) refers to an irreversible and usually a progressive, deterioration of kidney function caused by a wide variety of disease. A large proportion of patients with CKD develop end stage renal disease (ESRD) with the need for dialysis or kidney transplantation. Mortality rates are high among dialysis patients and dialysis outcomes vary across facilities and countries. **Objectives:** The aim of this study was to assess factors related to hemodialysis practice-patterns in patients with MHD. **Methods:** A prospective observational study was designed in 160 patients who were on maintenance hemodialysis twice and thrice weekly in different dialysis centers, Chittagong. At baseline information were collected & patients were followed up until their death or upto 1 year. **Results:** Of 160 patients studied mean age was 50.11±13.21 years, 66.25% were male, 35.00% were diabetic. Temporary dialysis catheters were the most common initial vascular access. The prevalence of positive hepatitis B virus surface antigen & anti hepatitis C virus surface antibody were 15.625% & 15.00% respectively. 38 patients died & mortality rate was 23.75%. Sepsis & IHD were the most common causes of death. **Conclusion:** Despite the continuous improvement of dialysis technology and pharmacological treatment, mortality rates for dialysis patients are still high. Most common causes of CKD were diabetic nephropathy and chronic glomerulonephritis.

**KEYWORDS:** ESRD, twice weekly hemodialysis, thrice weekly hemodialysis, mortality.

## INTRODUCTION

Chronic kidney disease (CKD) is an emerging health problem in Bangladesh. It is a devastating disease with profound physical morbidity associated with financial, social and emotional stress on the individual. The definition of CKD is based on the presence of kidney damage (i.e., albuminuria) or decreased kidney function (i.e., glomerular filtration rate <60 ml/min/1.73m$^2$) for 3 months or more. The term "end-stage renal disease" (ESRD) generally refers to CKD treated with either dialysis or transplantation. There are approximately two million patients world-wide who regularly receive renal replacement therapy (RRT) in the form of dialysis. Of them, more than 80% are on hemodialysis (HD) and 15% are on peritoneal dialysis (PD), mostly from developed nations. On the other hand more than 1.5 million people die every year simply because they don't have access to any form of RRT and these patients are mostly from developing nations. The cost of RRT is enormous, even highly developed nations cannot cope with it.[1,2]

Hemodialysis is the mainstay therapy which is offered for ESRD patients who cannot undergo renal transplantation. The main purpose of hemodialysis is the provision of sufficient and late patient treatment, which contributes to better physical condition of the patient and it prevents further problems and complications that are due to uremia.

Dialysis therapy ameliorates many of clinical manifestations of end-stage renal disease (ESRD) and postpones imminent death. However, the hemodialysis patients have higher morbidity and mortality, multiple hospitalizations, unique treatment complications, such as vascular access failure, considerable expenses, and lower quality of life than the general population. The dialysis outcomes and practice patterns studies (DOPPS) which included patients from several countries (Japan, Australia, France, Germany, Italy, Spain, and the UK, the United States, Belgium, Canada and Sweden) with large populations of dialysis patients showed that dialysis

practice varies widely among countries.[3,4,5] There are limited data regarding hemodialysis practice patterns from Bangladesh. We did this study to document the clinical profile of patients on maintenance hemodialysis (MHD) with special emphasis on various aspects of chronic kidney disease (CKD) stage 5D, such as anemia, mineral bone disease, vaccination, hypertension in various dialysis units of Chittagong.

## OBJECTIVE

### General objective

To assess factors related to hemodialysis practice-patterns in patients with MHD.

### Specific objective

- To find out demographic and socioeconomic profiles of ESRD patients.
- To assess biochemical parameters among patients on MHD.
- To determine associated factors (Vaccination, Vascular access, frequency of dialysis) related to dialysis practice.
-

## METHODOLOGY

| | |
|---|---|
| Type of study | Observational prospective study |
| Place of study | Different dialysis centers, Chittagong |
| Study period | 1 Year from approval of protocol by the ethical committee |
| Study population | Patients of ESRD on MHD |
| Sampling technique | Convenience sampling |
| Study sample | MHD Patients in different dialysis centers of Chittagong |

### Selection Criteria

Inclusion criteria

Patients of end stage renal disease (ESRD) received twice or thrice weekly hemodialysis for last 1 month from the beginning of study.

### Exclusion criteria

1. Patients less than 18 years old.
2. Pregnant women.
3. Patients who did not provide written consent to be enrolled in study.

### Procedure of Study

This observational study was conducted at different dialysis centers in Chittagong district. Sample was collected by convenience sampling. Patients aged under 18 years, acute kidney injury (AKI) getting hemodialysis, pregnant women, those who dropped out or who switched over to other forms of renal replacement therapy like continuous ambulatory peritoneal dialysis (CAPD) and renal transplantation after inclusion into the study and patients who did not provide written consent to participate in this study were excluded. Selected patients with ESRD on maintenance hemodialysis were enrolled prospectively within 1 month and followed up over a period of 1 year. The study was started after approval by the institutional ethical committee and an informed consent was obtained from all the patients. Both the patient and his/her relatives were subsequently interviewed and data was collected into standard data collection form.

**Data collection Methods:** All data from interview, physical examination, laboratory parameter were collected in clinical record form.

### Data Processing and Analysis

Mean ± standard deviation (SD) and percentages were used for summarizing the data. Continuous variables were studied using the Student's *t*-test (two tailed, independent). Categorical variables were analyzed using the Chi-square and 2 × 2, 2 × 4 Fisher's exact tests. The primary endpoint of the analysis was death. Patients were followed-up and censored at the time of death or at the end of 1-year study period. The confidence interval (CI) 95% and a $P < 0.05$ was used for statistical significance. All statistical analyses were performed with SPSS version 20.

## RESULT

**Table I: Distribution of the socio-demographic characteristics of study population in alive and dead groups (n = 160).**

| Feature | Alive | | Dead | | Total | |
|---|---|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage | Frequency | Percentage |
| **1. Age:** | | | | | | |
| **i. <30 years** | 14 | 11.48 | 3 | 7.89 | 17 | 10.63 |
| **ii. 30-45 years** | 31 | 25.41 | 8 | 21.05 | 39 | 24.38 |
| **iii. 46-60 years** | 53 | 43.44 | 15 | 39.47 | 68 | 42.50 |
| **iv. >60 years** | 24 | 19.67 | 12 | 31.58 | 36 | 22.50 |
| **2. Sex:** | | | | | | |
| **i. Male** | 78 | 63.93 | 28 | 73.68 | 106 | 66.25 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **ii. Female** | 44 | 36.07 | 10 | 26.32 | 54 | 33.75 |
| **3. Economic dependency:** | | | | | | |
| **i. Independent** | 29 | 23.77 | 14 | 36.84 | 43 | 26.87 |
| **ii. Dependant** | 93 | 76.23 | 24 | 63.16 | 117 | 73.13 |
| **4.SES:** | | | | | | |
| **i. Lower** | 10 | 8.20 | 3 | 7.89 | 13 | 8.13 |
| **ii. Lower middle** | 42 | 34.43 | 7 | 18.42 | 49 | 30.63 |
| **iii. Upper middle** | 42 | 34.43 | 17 | 44.74 | 59 | 36.88 |
| **iv. Upper** | 28 | 22.95 | 11 | 28.95 | 39 | 24.38 |
| **5.Locality:** | | | | | | |
| **i. Rural** | 47 | 38.52 | 20 | 52.63 | 67 | 41.88 |
| **ii. Urban** | 75 | 61.48 | 18 | 47.37 | 93 | 58.13 |
| **6. Vaccination: (HBV)** | | | | | | |
| **i. Vaccinated** | 79 | 64.75 | 15 | 39.47 | 94 | 58.75 |
| **ii. Not vaccinated** | 43 | 35.25 | 23 | 60.53 | 66 | 41.25 |
| **7. BMI: (kg/m$^2$)** | | | | | | |
| **i. <18.5** | 3 | 2.46 | 7 | 18.42 | 10 | 6.33 |
| **ii. 18.5- 24.9** | 82 | 67.21 | 23 | 60.53 | 105 | 66.46 |
| **iii. 25.0- 29.9** | 27 | 22.13 | 6 | 15.79 | 33 | 20.89 |
| **iv. >= 30.0** | 10 | 8.20 | 2 | 5.26 | 12 | 6.33 |
| **8. Correction of anaemia** | | | | | | |
| **i. Erythropoietin** | 33 | 27.05 | 7 | 18.42 | 40 | 25 |
| **ii. Blood transfusion** | 77 | 63.12 | 29 | 76.32 | 106 | 66.25 |
| **iii. Both** | 12 | 9.83 | 2 | 5.26 | 14 | 8.75 |

SES= Socio-economic status; HBV= Hepatitis B Virus

Table I shows distribution of the socio-demographic characteristics of study population in alive and dead groups. 183 patients were recruited, 23 dropped out and 160 patients were included in the study. It was observed that more than one third (43.44%) patients belonged to age 46-60 years in alive, 15(39.47%) in dead and 68(42.50%) in total. Almost two third (63.93%) patients were male in alive, 28(73.68%) in dead and 106(66.25%) in total. Three fourth (76.23%) patients were dependant in alive, 24(63.16%) in dead and 117(73.13%) in total. More than one third (34.43%) patients were upper middle in alive, 17(44.74%) in dead and 59 (36.88%) in total. Almost two third (61.48%) patients come in urban area in alive, 18(47.37%) in dead and 93(58.13%) in total. Almost two third (64.75%) patients had vaccination against hepatitis B virus in alive, 15 (39.47%) in dead and 94(58.75%) in total. More than two third (67.21%) patients belonged to BMI 18.5- 24.9 kg/m$^2$ in alive, 23(60.53%) in dead and 105(66.46%) in total. Two third patients (66.25%) received blood transfusion for correction of anaemia, 40 (25%) received erythropoietin and 14 (8.75%) received both.

**Table II: Comparison between alive and dead study population on basis of Age & BMI (n=160).**

| Variables | Alive | | Dead | | Total | | p value |
|---|---|---|---|---|---|---|---|
| | Mean | ±SD | Mean | ±SD | Mean | ±SD | |
| **Age:** | | | | | | | |
| **i. Male** | 49.41 | ±12.39 | 53.07 | ±13.07 | 50.37 | ±12.61 | 0.092 |
| **ii. Female** | 48.63 | ±15.07 | 53.8 | ±10.68 | 49.59 | ±14.42 | |
| **iii. Total** | 49.13 | ±13.36 | 53.26 | ±12.35 | 50.11 | ±13.21 | |
| **BMI:** | | | | | | | |
| **i. Male** | 23.71 | ±4.27 | 21.84 | ±2.98 | 23.22 | ±4.04 | 0.008* |
| **ii. Female** | 23.49 | ±3.82 | 21.25 | ±3.95 | 23.08 | ±3.90 | |
| **iii. Total** | 23.63 | ±4.10 | 21.68 | ±3.21 | 23.17 | ±3.99 | |

p values calculated by t-test
BMI= Body mass index

Table II shows comparison between alive and dead study population on basis of Age & BMI (Body mass index). Male patients the mean age was 49.41±12.39 years in alive, 53.07±13.07 years in dead and 50.37±12.61 years in Total. The difference of BMI was statistically significant ($p<0.05$) between two groups.

**Table III: Comparison of co-morbidities between alive and dead population (n=160).**

| Variables | Alive | | Dead | | Total | | p value |
|---|---|---|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage | Frequency | Percentage | |
| **DM** | 50 | 40.98 | 24 | 63.16 | 74 | 46.25 | 0.017* |
| **HTN** | 111 | 90.98 | 37 | 97.37 | 148 | 92.50 | 0.192 |
| **IHD** | 44 | 36.07 | 22 | 57.89 | 66 | 41.25 | 0.017* |
| **HBV** | 19 | 15.57 | 06 | 15.79 | 25 | 15.625 | 0.974 |
| **HCV** | 21 | 17.21 | 03 | 7.89 | 24 | 15.00 | 0.160 |

p values calculated by chi square and Fisher's exact test

DM=Diabetes mellitus; HTN=Hypertension; IHD=Ischaemic heart disease; HBV=Hepatitis B virus infection; HCV=Hepatitis C virus Infection

Table III shows that more than one third (40.98) patients had DM in alive, 24(63.16%) in dead and 74(46.25%) in total. (90.98). Majority (90.98%) patients had HTN in alive, 37(97.37%) in dead and 148(92.50%) in total. The difference of DM and IHD were statistically significant ($p<0.05$) between two groups.

**Table IV: Dialysis related factors in different groups (n=160).**

| Variables | Alive | | Dead | | Total | |
|---|---|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage | Frequency | Percentage |
| **Dialysis Frequency:** | | | | | | |
| **i. Twice weekly** | 105 | 86.07 | 29 | 76.32 | 134 | 83.75 |
| **ii. Thrice weekly** | 17 | 13.93 | 09 | 23.68 | 26 | 16.25 |
| **Duration of dialysis** | | | | | | |
| **i. <2 years** | 68 | 55.74 | 24 | 63.16 | 92 | 57.50 |
| **ii. >2 years** | 54 | 44.26 | 14 | 36.84 | 68 | 42.50 |
| **Initial vascular access** | | | | | | |
| **i. F/C** | 56 | 45.90 | 23 | 60.53 | 79 | 49.38 |
| **ii. J/C** | 34 | 27.87 | 09 | 23.68 | 43 | 26.88 |
| **iii. P/C** | 06 | 4.92 | 00 | 0.00 | 06 | 3.75 |
| **iv. AVF** | 26 | 21.31 | 06 | 15.79 | 32 | 20.00 |

F/C= Femoral catheter
J/C= Jugular catheter
P/C= Permanent central venous catheter
AVF= Arterio-venous fistula

Table V shows that dialysis frequency twice weekly found 105(86.07%) in alive and 29(76.32%) in dead. Duration of dialysis <2 years found 68(55.74%) in alive and 24(63.16%) in dead. Initial vascular access F/C was found 56(45.90%) in alive and 23(60.53%) in dead.

**Table V: Etiology of CKD (n=160).**

| Variables | Alive | | Dead | | Total | |
|---|---|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage | Frequency | Percentage |
| **1. DM** | 33 | 27.05 | 23 | 60.53 | 56 | 35.00 |
| **2. GN** | 46 | 37.70 | 10 | 26.32 | 56 | 35.00 |
| **3. OU** | 08 | 6.56 | 00 | 0.00 | 08 | 5.00 |
| **4. ADPKD** | 06 | 4.92 | 00 | 0.00 | 06 | 3.75 |
| **5. HTN** | 03 | 2.46 | 00 | 0.00 | 03 | 1.88 |
| **6. CPN** | 10 | 8.20 | 02 | 5.23 | 12 | 7.50 |
| **7. UK** | 13 | 10.66 | 3 | 7.89 | 16 | 10.00 |
| **8. CIN** | 3 | 2.46 | 0 | 0.00 | 3 | 1.87 |

DM= Diabetes mellitus; GN= Glomerulonephritis; OU=Obstructive uropathy; ADPKD= Autosomal dominant polycystic kidney disease; CPN=Chronic pyelonephritis; UK= unknown cause; CIN=Chronic interstitial nephritis.

Table V shows etiology of CKD in different groups and frequency DM and GN were more common etiology of CKD. DM found 33(27.05%) in alive and 23(60.53%) in dead respectively. GN found 46(37.7%) in alive and 10(26.32%) in dead. Others are depicted in the above table.

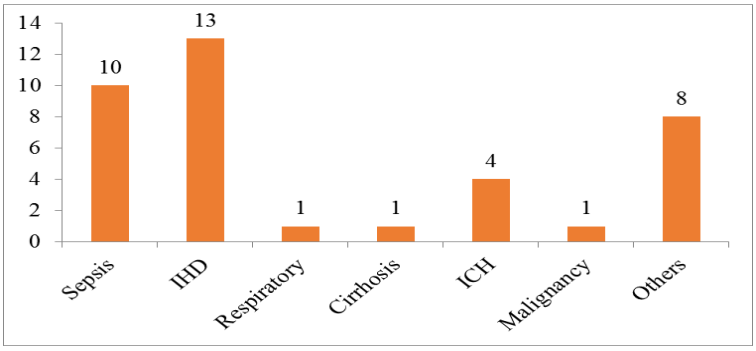


**Figure 1: Causes of mortality (n=38).**

Infection and IHD were the most common causes of death in other study together leading to 63.12% of overall deaths consistent with other studies.100 About 36.8% of the deaths occurred due to sepsis alone, mostly as a result of vascular access related infections like an abscess of the AVF and catheter related bacteraemia. IHD contributed to 26.3% of the deaths. The mean age of those dying due to IHD was 62.8 years and majorities (60%) of them were diabetics. Congestive cardiac failure occurred in 40% of those cases and many had moderate left ventricular systolic dysfunction (mean ejection fraction 54%). Intractable pulmonary edema as a consequence of inadequate dialysis in poorly compliant patients accounted for 15.8% of the mortality. Though there is a decline in the cardiovascular deaths in the general population presently, a similar trend has not been observed in dialysis patients owing to the fact that most dialysis patients are diabetic and many have underlying cardiac disease at the initiation of dialysis therapy itself. Sepsis and ischemic heart disease (IHD) were the most common causes of death both accounting for nearly 60% of the overall mortality. A significant number of those deaths occurred in the first 6 months of starting dialysis therapy. The cause of death was not known in 10.5% cases. Among the infections, vascular access related infections accounted for 23.5% and the remaining were mostly due to urinary tract infection, pneumonia and cellulitis, more so in diabetics. We could not stratify sepsis as because deficiency of culture proven organisms and lack of culture facilities however urinary tract infection and pneumonia were assumed to be the common causes in most cases.

## DISCUSSION

The present study also revealed that out of 160 patients, 106(66.25%) were male and 54(33.75%) were female in both alive and dead groups. In accordance with our findings, males outnumbered females among those on MHD with M: F ratio of ~2:1 pattern consistent with DOPPS[6] and Indian studies in terms of age and sex ratios by Swarnalatha et al and Chandrashekar et al.[7,8] Moreover, majority of the patients were above 40 years (age 49.74 ± 14.55) and males outnumbered females in a ratio of 3:1. The majority of hemodialysis patients in a study were men, congruent with studies in Europe. It has been suggested that men with glomerular disease may have worse prognosis, but there is no conclusive evidence that sex is a determining factor in CKD progression demonstrated by Kjellstrand, C.M.[9] A prospective study of 127 ESRD patients initiated on HD was done. The study included 101 males and 26 females, with a mean age of 50.05 ± 13.80 years which strongly correlates with our study.

Three fourth (76.23%) patients were dependant in alive, 24(63.16%) in dead and 117(73.13%) in total. More than one third (34.43%) patients were upper middle in alive 17(44.74%) in dead and 59 (36.88%) in total. Almost two third (61.48%) patients come in urban area in alive 18(47.37%) in dead and 93(58.13%) in total. Patients initiated on HD in rural area often present late with poor predialysis care leading to high morbidity.

The non-urban and rural patients face challenges when initiating dialysis, including healthcare access. Previous studies have shown little association of nonurban residence with dialysis outcomes but have not examined the association of dialysis modality with residence location.[10]

Comparison of co-morbidities between alive and dead population, it was observed that more than one third (40.98%) patients had DM in Alive, 24(63.16%) in dead and 74(46.25%) in total. Majority (90.98%) patients had HTN in Alive, 37(97.37%) in dead and 148(92.50%) in total. More than one third (36.07%) patients had IHD in Alive, 22(57.89%) in dead and 66(41.25%) in total, 19(15.57%) patients had HBV in Alive, 6(15.79%) in dead and 25(15.625%) in total, 21(17.21%) patients had HCV in Alive, 3(7.89%) in dead and 24(15.00%) in total. The difference of DM and IHD were statistically significant ($p<0.05$) between two groups in our study. Presence of HTN did not affect mortality statistically in our study also ($p = 0.192$).

Regarding dialysis related factors between alive and dead population, it was observed that dialysis frequency twice weekly found as 105(86.07%) in alive and 29(76.32%) in dead. Duration of dialysis <2 years found as 68(55.74%) in alive and 24(63.16%) in dead. Initial vascular access F/C was found 56(45.90%) in alive and 23(60.53%) in dead. Regarding dialysis frequency, total patients both alive and dead, 134 patients (83.75%) undergone twice weekly dialysis and 26(16.25%) had dialysis thrice

weekly. The duration of dialysis was <2 years in 92(57.50%) and the duration was >2 years in 68 (42.50%).

## CONCLUSION

Our findings indicated that mortality in patients on maintenance hemodialysis was disproportionately high. The most common causes of death were sepsis and IHD. Most common cause of CKD was Diabetic nephropathy and chronic glomerulonephritis (CGN). Temporary femoral venous catheter was most common vascular access.

## REFERENCE

1. Scheppati A, Peirco N, Remuzza G. Preventing end stage renal disease: the potential impact of screening and intervention in developing countries. Nephrol Dial Transplant, 2003; 18: 858-9.
2. US Renal Data System. USRDS 2012. Annual data report. Atlas of chronic kidney disease and end stage renal disease in the United States. Bethesda, MD: National Institute Health, National Institute of Diabetes and Digestive and Kidney Disease, 2012.
3. Hecking M, Bieber BA, Ethier J, Kautzky-Willer A, Sunder-Plassmann G, Säemann MD, et al. Sex-specific differences in hemodialysis prevalence and practices and the male-to-female mortality rate: The dialysis outcomes and practice patterns study (DOPPS) PLoS Med, 2014; 11: e1001750.
4. Port FK. Practice-based versus patient-level outcomes research in hemodialysis: The DOPPS (Dialysis Outcomes and Practice Patterns Study) experience. Am J Kidney Dis., 2014; 64: 969–77.
5. Lopes AA, Bragg-Gresham JL, Elder SJ, Ginsberg N, Goodkin DA, Pifer T, et al. Independent and joint associations of nutritional status indicators with mortality risk among chronic hemodialysis patients in the dialysis outcomes and practice patterns study (DOPPS) J Ren Nutr, 2010; 20: 224–34.
6. Hecking, M., Bieber, B.A., Ethier, J., Kautzky-Willer, A., Sunder-Plassmann, G., Säemann, M.D., Ramirez, S.P., Gillespie, B.W., Pisoni, R.L., Robinson, B.M. and Port, F.K., Sex-specific differences in hemodialysis prevalence and practices and the male-to-female mortality rate: the Dialysis Outcomes and Practice Patterns Study (DOPPS). PLoS medicine, 2014; 11(10): e1001750.
7. Swarnalatha, G., Ram, R., Prasad, N. and Dakshinamurty, K.V., End-stage renal disease patients on hemodialysis: A study from a tertiary care center in a developing country. Hemodialysis International, 2011; 15(3): 312-319.
8. Chandrashekar, A., Ramakrishnan, S. and Rangarajan, D., Survival analysis of patients on maintenance hemodialysis. Indian journal of nephrology, 2014; 24(4): 206.
9. Kjellstrand, C.M., Blagg, C.R., Twardowski, Z.J. and Bower, J., Blood access and daily hemodialysis: clinical experience and review of the literature. ASAIO journal, 2003; 49(6): 645-649.
10. Saugar, M., Arbogast, P.T., Ikizler, P. and Kerri L. Cavanaugh Rural and Micropolitan Residence and Mortality in Patients on Dialysis. Clin J Am Soc Nephrol, 2012; 7(7): 1121–1129.