

**Original Article**

**DIALYSIS PRACTICE PATTERN IN PATIENTS UNDERGOING HEMODIALYSIS IN A TERTIARY AND A PRIVATE HOSPITAL**

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**ABSTRACT**

**Objective:** To evaluate the dialysis practice pattern in chronic kidney disease patients undergoing hemodialysis in a tertiary and a private hospital

**Methods:** A prospective observational study of six months duration was carried out in 158 CKD patients on hemodialysis for a minimum period of one month. Data such as socio-demographic, clinical characteristics and dialysis practice details were captured from the patient's medical records into the pre-designed Patient Proforma. The collected data were analysed.

**Results:** Majority of respondents were male (67.09%), more than 60 y of age (32.28 %), married (89.24%). Hypertension (26.51%, 17.33%) was found to be the leading cause of CKD in a tertiary and private hospital. In the tertiary hospital, 78.31% of patients were undergoing twice-weekly hemodialysis, whereas in the private hospital thrice weekly (50.67%) hemodialysis was common. About 51.81% of patients in the tertiary and 58.67% in the private hospital was undergoing hemodialysis for 1-5 y with Arterio-Venous Fistula (59.04%, 94.67%) as the permanent vascular access ( $P < 0.001$ ).

**Conclusion:** This study shows that hypertension was the leading cause of CKD in both hospitals. In the tertiary hospital twice weekly hemodialysis with arteriovenous fistula (AVF) and Permanent Catheter (IJV), were both preferred as the permanent vascular access. Whereas in the private hospital majority were undergoing thrice weekly hemodialysis and AVF was highly preferred.

**Keywords:** Dialysis practice pattern, Chronic Kidney Disease, Hemodialysis

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**INTRODUCTION**

Chronic kidney disease (CKD) has become a public health problem worldwide. The global prevalence of CKD Stages 1 to 5 was 13.4% [1]. Whereas the prevalence in India was 17.2% [2]. The global prevalence of end stage renal disease patients on dialysis was 215/million population [3].

Dialysis practice pattern is a prospective observational study of hemodialysis practices based on the collection of data from a random sample of patients across various dialysis facilities. These samples help us to obtain a better understanding of the variation in practice patterns across different facilities. Studies have shown improved patient survival with higher dialysis dose and different dialysis membrane, thereby concluding that dialysis outcome can be modified by changes in dialysis practice [4]. Therefore, our study focuses on the dialysis practice pattern in patients undergoing hemodialysis in a tertiary and a private hospital.

**MATERIALS AND METHODS**

A prospective observational study was carried out from August 2017 to April 2018 in a tertiary hospital and private hospital. Patients having CKD and on maintenance haemodialysis, for at least >1 mo was included in our study. Pregnant women on dialysis, age less than 18 y, patients who are being dialysed for Acute Kidney Injury and patients who are being evaluated for renal transplantation were excluded. Ethical approval was obtained for the study from the institutional ethics committee (BVDUMC/IEC/84) and the patient's informed consent was taken prior to the study. The details like age, gender, educational and employment status, social history, comorbid conditions, frequency of dialysis, duration of dialysis, pre-and post-dialysis weight, blood pressure, vascular access, and laboratory values

were noted in the self-pre-designed Patient Proforma. mean±standard deviation and percentages was used for summarizing the data, other relevant statistical tests Chi-square test was used for quantitative data and comparison of proportions. The  $P$  value < 0.05 was considered as statistical significant.

**RESULTS**

A total of 158 patients from two hospitals in Pune were included. Out of which, 83 and 75 patients were from a tertiary and a private hospital respectively, satisfying the inclusion criteria. The mean age of the patients undergoing hemodialysis in these two hospitals were 49.53±15.09 y and 51.52±14.53 y, out of which majority were greater than 46 y (63.29%). The highest number of patients undergoing hemodialysis in both the hospitals was males (73.49%, 60%). Majority of the patients in the private hospital were from the middle socioeconomic class (80%) whereas, in the tertiary hospital subjects belong to lower-middle socioeconomic class (100%) which was found to be statistically significant ( $P = < 0.001$ ). Highest number of patients were unemployed (50.60%, 36%), married (90.36%, 88%) and obtained high school education (62.65%, 45.33%) ( $P = < 0.001$ ). About 78 (93.98%) patients were covered with insurance or health scheme in the tertiary hospital and only 39 (52%) were insured in the private hospital [table 1].

Hypertension was the common comorbidity among hemodialysis patients in both the hospitals [table 2]. Mean pre and post dialysis blood pressure (systolic and diastolic) were similar in the tertiary hospital (154.30±24.12 and 89.41±13.96 mm Hg) whereas in the private hospital the pre-dialysis systolic and diastolic blood pressure were 151.82±28.01 and 78.78±14.06 mm Hg and the post dialysis systolic and diastolic blood pressure were 149.4±27.77 and 80.63±13.43 mm Hg, respectively.

Table 1: Socio-demographic characteristics of chronic kidney disease patients undergo hemodialysis

Characteristics	Number of patients (%)		Total (n=158)
	Tertiary hospital (n=83)	Private hospital (n=75)	
<b>Gender</b>			
Male	61 (73.49)	45 (60)	106 (67.09)
Female	22 (26.51)	30 (40)	52 (32.91)
<b>Age (years)</b>			
18-31	11 (13.25)	7 (9.33)	18 (11.39)
32-45	22 (26.51)	18 (24)	40 (25.32)
46-59	25 (30.12)	24 (32)	49 (31.01)
≥ 60	25 (30.12)	26 (34.67)	51 (32.28)
<b>Socioeconomic class (based on monthly income)</b>			
Lower	30 (36.14)	5 (6.67)	35 (22.15)
Lower middle	7 (8.43)	8 (10.67)	15 (9.49)
Middle	46 (55.42)	60 (80)	106 (67.09)
Upper middle	0 (0)	1 (1.33)	1 (0.63)
Higher	0 (0)	1 (1.33)	1 (0.63)
<b>Educational status</b>			
Illiterate	14 (16.87)	2 (2.67)	16 (10.13)
Primary School	3 (3.61)	4 (5.33)	7 (4.43)
High School	52 (62.65)	34 (45.33)	86 (54.43)
Graduate	14 (16.87)	29 (38.67)	43 (27.22)
Post Graduate	0 (0)	6 (8)	6 (3.80)
<b>Employment Status</b>			
Employed	24 (28.92)	24 (32)	48 (30.38)
Unemployed/Retired	59 (71.08)	51 (68)	110 (69.62)
<b>Marital Status</b>			
Married	75 (90.36)	66 (88)	141 (89.24)
Unmarried	8 (9.64)	9 (12)	17 (10.76)
<b>Medical Insurance/Health scheme</b>			
Insured/Health scheme	78 (93.98)	39 (52)	117 (74.05)
Non-Insured	5 (6.02)	36 (48)	41 (25.95)

Hypertension was found to be the leading cause of chronic kidney disease in the tertiary (26.51%) and the private hospital (17.33%) [fig. 1].

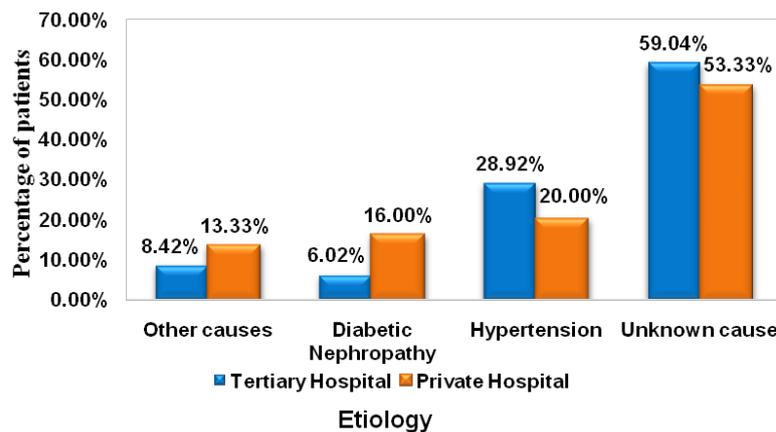


Fig. 1: Etiology of chronic kidney disease patients undergoing hemodialysis in a tertiary and a private hospital

Table 2: Co-morbidities of chronic kidney disease patients undergoing hemodialysis

Characteristics	Number of patients (%)		Chi-square	P value
	Tertiary hospital (n = 80)	Private hospital (n = 64)		
Co-morbid Condition				
Present	80	64	0.909	0.340
Absent	3	6		
Hypertension	46 (57.5)	35 (54.69)	81 (56.25)	
Diabetes+Hypertension	28 (35)	20 (31.25)	48 (33.33)	
Diabetes Mellitus	0 (0)	5 (7.81)	5 (3.47)	
Hypothyroidism/Hyperthyroidism	0 (0)	2 (3.13)	2 (1.39)	
Hypertension+Hypothyroidism	3 (3.75)	0 (0)	3 (2.08)	
Hypertension+Diabetes+Coronary artery disease+Hypothyroidism	1 (1.25)	0 (0)	1 (0.69)	
Hypertension+Diabetes+Coronary artery disease	1 (1.25)	0 (0)	1 (0.69)	
Hypertension+Coronary artery disease	1 (1.25)	1 (1.56)	2 (1.39)	
Hypertension+Diabetes+COPD	0 (0)	1 (1.56)	1 (0.69)	

Table 3 shows that the Internal Jugular Vein (IJV) catheter was the initial vascular access in both the hospitals. In both the groups, Arterio-Venous Fistula (AVF) was the permanent vascular access in the majority of the patients (59.04%, 94.67%). 78.31% of the

patients in the tertiary hospital were undergoing twice-weekly hemodialysis, whereas in the private hospital there were an equal number of patients undergoing twice (48.00%) and thrice (50.67%) weekly hemodialysis.

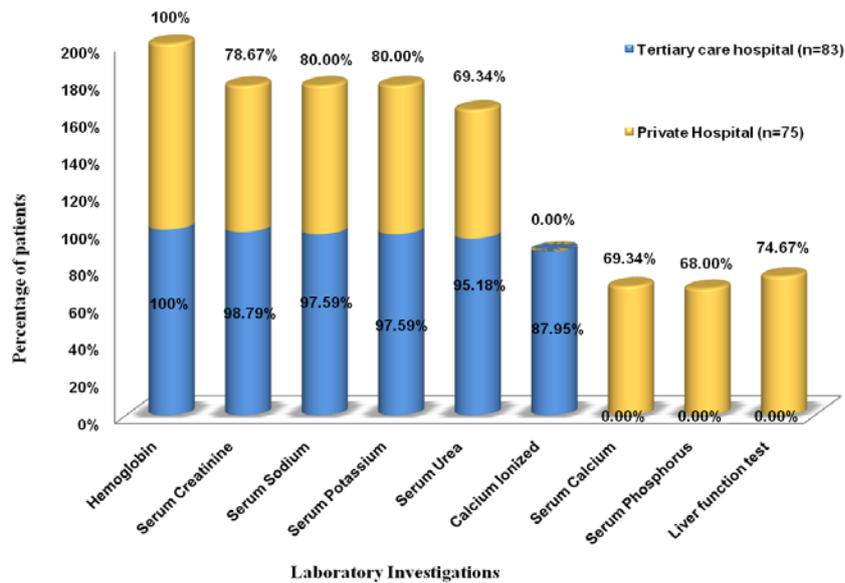
**Table 3: Vascular access patterns of chronic kidney disease patients undergoing hemodialysis**

Characteristics	Number of patients (%)		Total (n=158)	Chi-square value	P value
	Tertiary hospital (n=83)	Private hospital (n=75)			
<b>Vascular access</b>					
Access at the initiation of MHD					
Internal Jugular vein Catheter	83 (100)	75 (100)	158 (100)		
Access while on MHD					
Arterio-Venous Fistula	49 (59.04)	71 (94.67)	120 (75.95)	27.38	<0.001*
Permanent Catheter (IJV)	34 (40.96)	4 (5.33)	38 (24.05)		

Chi-square test, \*P<0.05 is considered to be statistically significant

The average duration of hemodialysis in both the centers was 4 h. About 51.81% of patients in the tertiary and 58.67% in the private hospital was undergoing hemodialysis for 1-5 y [table 4]. Nearly all

the patients were vaccinated for Hepatitis B virus (HBV). About 7 (9.33%) patients had Hepatitis C virus infection in the private hospital.



**Fig. 2: Laboratory tests performed in chronic kidney disease patients undergoing hemodialysis in a tertiary and a private hospital**

**Table 4: Dialysis-related characteristics of chronic kidney disease patients undergoing hemodialysis**

Characteristics	Number of patients (%)		Total (n=158)	Chi-square value	P-value
	Tertiary hospital (n=83)	Private hospital (n=75)			
<b>Duration of dialysis per session (hrs)</b>					
4 h					
<b>Frequency of dialysis session per week</b>					
Once	6 (7.23)	1 (1.33)	7 (4.43)	25.07	<0.001*
Twice	65 (78.31)	36 (48)	101 (63.92)		
Thrice	12 (14.46)	38 (50.67)	50 (31.65)		
<b>Characteristics</b>	<b>Number of patients (%)</b>		<b>Total (n=158)</b>	<b>Chi-square value</b>	<b>P-value</b>
<b>Duration on Dialysis</b>					
Less than 1 y	30 (36.14)	19 (25.33)	49 (31.01)	2.89	0.408
1-5 y	43 (51.81)	44 (58.67)	87 (55.06)		
6-10 y	8 (9.64)	11 (14.67)	19 (12.03)		
More than 10 y	2 (2.41)	1 (1.33)	3 (1.90)		
<b>Interdialytic Weight Gain</b>					
Less than 1 kg	12 (14.46)	8 (10.67)	20 (12.66)	1.10	0.894
1-2 kg	18 (21.69)	19 (25.33)	37 (23.42)		
2-3 kg	25 (30.12)	25 (33.33)	50 (31.65)		
3-4 kg	15 (18.07)	18 (24)	33 (20.89)		
≥ 4 kg	5 (6.02)	5 (6.67)	10 (6.33)		
Nil	8 (9.64)	0 (0)	8 (5.06)		
Mean Ultrafiltration volume (ml)	2405.31±1268.85	2964.48±982.85			

Chi-square test, \*P<0.05 is considered to be statistically significant

Hematological, serum creatinine and biochemistry tests were performed in both the hospitals, whereas serum calcium, serum phosphorus, and liver function tests were performed only in the private hospital. The mean hemoglobin value was found to be  $9.47 \pm 1.35$  for tertiary hospital and  $10.21 \pm 1.36$  for a private hospital. The mean of serum creatinine in the tertiary and private hospital were  $6.75 \pm 2.12$  and  $9.33 \pm 2.29$  respectively whereas the mean for serum sodium and serum potassium for both the hospitals were  $133.69 \pm 4.01$ ,  $4.83 \pm 0.81$  and  $136.04 \pm 6.63$ ,  $5.29 \pm 0.62$  respectively [fig. 2]

## DISCUSSION

Chronic kidney disease refers to an irreversible loss of renal function that develops due to a multi-factorial etiology. Chronic kidney disease often goes unrecognized until its terminal complication, the end-stage renal disease develops for which patients receive any form of renal replacement therapy. Renal replacement therapy options and practice varies worldwide and is influenced by patient's choice, nephrologists practice pattern, insurance policies, and socioeconomic factors.

Majority of the patients undergoing hemodialysis were males (67.09%) which are a consistent pattern when compared to Lakshminarayan *et al.* [5], Sanjay K. Agarwal *et al.* [6], and Manfred Hecking *et al.* [7], who reported similar results. Males demonstrate higher risk factors such as overweight, having a higher waist circumference, and a higher blood pressure which makes them more vulnerable to develop chronic kidney disease over a period of time [8]. On the contrary Idan Goldberg *et al.* [8], and Lori L. Pounds *et al.* [9] in their report state that the prevalence of CKD tends to be higher in women, whereas the disease progression in men is more severe. Mean age reported in the tertiary care hospital ( $49.53 \pm 15.09$  y) and the private hospital ( $51.52 \pm 14.53$  y) was found to be similar. Bernard Canaud *et al.* [10], in his study states that elderly patients account for an increasing fraction of patients on renal replacement therapy worldwide due to aging and underlying co-morbidities (25%–30%). Thus, justifying the higher number of our study subject belonging to the age group of greater than 46 y.

In India, hemodialysis is the dominant renal replacement therapy option and is largely influenced by the socioeconomics of the area of practice and limited insurance schemes [11, 12]. In this study patients in the private hospital were on thrice weekly hemodialysis (50.67%), whereas in the tertiary care hospital majority were on twice weekly hemodialysis (78.31%) considering that majority of them belonged to the lower-middle socioeconomic class, were unemployed and economically depended on their family or insurance coverage for dialysis and drug expenditure. Similar result was published by Brian Bieber *et al.* which justify our findings [13]. Seyed Abbas Tavallai *et al.* [14] in his report stated that marital adjustment is considered as a part of social wellbeing, disturbed marital relationship adversely affects physical health, mental health, the quality of life, and even economic status of individuals which can be concurrent with our study that reported 90.36% in the tertiary care hospital and 88.00% in private hospital were married. Patients undergoing hemodialysis were independent of their social habits (smoking, alcohol consumption and tobacco chewing).

Hypertension can be a cause or a consequence of chronic kidney disease. It has been reported to occur in 85% to 95% of patients with chronic kidney disease (stages 3-5) in the U. S. [15]. Decline in kidney function is typically associated with elevated blood pressure, and sustained elevations in blood pressure thus hasten the progression of kidney failure. About 56.33% of our study population had unknown etiology as the leading cause of hypertension (22.15%) as the second leading cause of end stage renal disease. An earlier report published by MJ Kulkarni *et al.* also proposed unknown etiology as the leading cause and diabetic nephropathy as the second leading cause of end-stage renal disease [4]. Late diagnosis of renal failure is a worldwide phenomenon, more so in developing countries like India (65%) [16]. Delay in early signs for detection and management, low education status and knowledge regarding conditions can be considered as major factor. Hypertension was also the major co-morbid condition among our study subjects (95.14%) a portion of our study subject also suffered from diabetes along with hypertension (33.33%). This study result is in good agreement with that reported by Winkelmayer WC. *et al.* [17, 18].

No difference was found between the pre and post dialysis blood pressure in both the groups. This study reported that all the patients undergoing hemodialysis were using catheter as their initial vascular access for a period of two to three months due to late referral or poor awareness and about 59.04% of tertiary care hospital and 94.67% of private hospital had arterio-venous fistula as their permanent vascular access which is similar to the result reported by Dinesh Bansal *et al.* [19]. Arterio-venous fistulas is generally preferred owing to its durability and the fewer associated complications [20]. Permanent Catheter was also considered as a permanent vascular access in 40.96 % and 5.33% of the patients in the tertiary care hospital and the private hospital respectively. The increase in the number of patients choosing permanent catheter as the vascular access in the tertiary care hospital can depend on a lack of patient education and cost of surgery.

Hepatitis B and/or C infection while on dialysis is another major problem in the country. Availability of reasonably effective vaccination against hepatitis B has helped to reduce the rate of hepatitis B virus infection but there is no such vaccination to prevent hepatitis C. The prevalence is widely variable, from <5% to 75% [15]. Very few patients from the private hospital (9.33%) were hepatitis C positive and few developed HCV infection during their course in the hospital.

The lab tests performed in both the hospitals were haemoglobin, serum creatinine, serum sodium, serum potassium, serum urea and calcium ionized. The hemoglobin is levels are low in patients with CKD because the kidneys no longer make the hormone erythropoietin that stimulates the bones to make red blood cells (RBCs). Creatinine and other electrolytes are checked since kidneys no longer filter them properly. In addition to this, the elevated levels of toxins in the blood cause the RBCs to have a shortened life span. According to Kidney Disease: Improving Global Outcomes (KDIGO) guidelines, monitoring in CKD includes serum calcium and phosphorous for every 1-3 mo and PTH every 3-6 mo [21].

## CONCLUSION

This study illustrates the present day scenario of dialysis in tertiary care and private hospital. In the tertiary hospital, the majority of the patients belonged to lower-middle socioeconomic class and were covered under insurance or health scheme. Twice weekly hemodialysis was more preferred over thrice weekly hemodialysis with AVF and Permanent Catheter (IJV), both preferred as the permanent vascular access in the tertiary hospital. Whereas, in the private hospital majority of them were from middle class undergoing thrice weekly hemodialysis and AVF was highly preferred. Hypertension was the most common cause of CKD and also the highest co-morbidity reported.

## LIMITATIONS OF THE STUDY

Limitations of our study include small sample size and six months duration which provided limited data of study population. Due to prospective observational study, data was collected only once and further follow-up was not done. Information on the status of the patient's health was not available.

## AUTHORS CONTRIBUTIONS

All the author have contributed equally for the designing, preparation and review of the study.

## CONFLICT OF INTERESTS

Declared none

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