



FREQUENCY OF ADEQUATE HAEMODIALYSIS AT HAEMODIALYSIS UNIT NISHTAR HOSPITAL MULTAN.

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ABSTRACT... This adequacy of HD is judged by formulas like Urea Reduction Ratio (URR) and Kt/V. Adequate hemodialysis is vital for restoration of body homeostasis towards normal and to avoid potential complications. The aim of the current study was to determine the frequency of adequate hemodialysis at hemodialysis center at Nishtar Hospital Multan. **Objectives:** The objective of this study was to determine the frequency of adequate hemodialysis at hemodialysis unit Nishtar Hospital Multan. **Study Design:** Cross-sectional Study. **Setting:** Department of Medicine, Medical Unit-IV, Nishtar Hospital, Multan. **Duration:** Six months from 18/01/2018 to 17/07/2018. **Material and Methods:** This study involved 174 patients undergoing hemodialysis at least 3 sessions in a week for the previous 6 months at hemodialysis center Nishtar Hospital Multan. A formal written consent was taken from every patient. Patient's demographic details along with duration of disease, calculated Kt/V and adequacy of hemodialysis ($Kt/V \geq 1.2$) were recorded in the attached proforma. Data obtained during study were analyzed by using SPSS version 24. Mean and standard deviation were estimated for numerical variables; age, duration of disease, Kt/V values. Frequency and percentage were calculated for categorical variable i-e gender, diabetes mellitus, hypertension, adequate hemodialysis. Stratification was done for parameters like age, gender, diabetes, hypertension and duration of disease. After stratification was done t-test was applied and value $\leq .05$ was considered as significant. **Results:** The age range of our study population was 40-70 years having a mean of 54.24 ± 8.39 years. It included 113 (64.9%) male and 61 (35.1%) female suffers of ESRD. 75 (43.1%) patients were diabetic while 116 (66.7%) patients were hypertensive. The time lapse from diagnosis to dialysis ranged from 6-18 months with a mean of 12.11 ± 3.55 months. The Kt/V value ranged from .80 to 1.90 with a mean of $1.45 \pm .27$. Taking a cut-off value of $Kt/V \geq 1.2$ for adequate hemodialysis, the frequency of adequate hemodialysis was found to be 85.1% (n=148). **Conclusion:** The frequency of adequate hemodialysis was found to be 85.1% among ESRD patients undergoing hemodialysis at least 3 times a week for the past 6 months at hemodialysis center Nishtar Hospital Multan. It indicates that Dialysis centre in Nishtar hospital is working effectively.

Key words: End Stage Renal Disease, Hemodialysis, Hemodialysis Adequacy.

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INTRODUCTION

End Stage Renal Disease (ESRD) is a distressing socioeconomic and health related problem not only for sufferers but also their dependents and family members in Pakistan. According to an estimate Pakistan has 150 End Stage Renal Disease patients/annum/million.¹ ESRD is widely distributed throughout the world and the new cases of ESRD are enormously increasing in various countries.^{2,3,4}

Haemodialysis (HD) is a traditional treatment for End Stage Renal Diseases. It is a 'life saving

procedure'. Because of fiscal limitations, less than 1/3rd of all patients referred to a tertiary care centre get any kind of renal replacement therapy. While most haemodialysis patients who stop treatment and die, do so because of fiscal constraints in the first three months⁵ Purpose of haemodialysis is to restore fluid and electrolyte balance of the body as much as possible to the normal one. Adequacy of dialysis is assessed in order to attain a dialysis dose that would be adequate enough for ESRD patients for the betterment of quality of their lives and would be helpful in prolonging their survival.⁶ This adequacy of HD is judged by formulas like

Kt/V and Urea Reduction Ratio.⁷

Using a cut-off value of Kt/V ≥ 1.2 for adequate haemodialysis, various studies have evaluated the adequacy of several dialysis centres across the world. Roozitalab et al.⁸ in 2013 evaluated dialysis centres at Kohgiluyeh and Boyer-Ahmad provinces Iran and documented that only 41.5% patients had adequate haemodialysis. Samakoosh et al.⁹ in 2012 determined the adequacy among haemodialysis patients at Qaemshar Razi Hospital Iran and documented that only 41.7% patients had adequate haemodialysis. Mousavi et al.¹⁰ in 2012 at Abadan (Iran) documented this rate to be 12.97%. Shasti & Babahaji¹¹ in 2011 at Tehran (Iran) documented this rate to be 50%. Mogharab et al.¹² in 2010 at Birjand (Iran) documented this rate to be only 10%. Hussain et al.¹³ in 2013 evaluated dialysis centre at Sheikh Zayed Hospital, Rahim Yar Khan Pakistan and documented that 87% of patients had adequate haemodialysis.

Adequate haemodialysis is vital for restoration of body homeostasis towards normal and to avoid potential complications. Also it is important to reduce cost of un-necessary haemodialysis and thus to reduce dropout rates.⁵ Assessment of adequacy of dialysis in various centres is helpful in judgement of effective functioning of that dialysis centre. It also stresses upon the need of calculating the individual's dialysis dose rather than putting the patient on dialysis in conventional way i.e 4 hours 3 times a week. By using formula of Kt/V one is able to increase or decrease the time of dialysis or dialyser flow rate to meet adequate need of dialysis. Dialysis centre at Nishtar hospital Multan is a busy unit with haemodialysis of more than 90 patients per day. However, the haemodialysis adequacy of these patients has not been evaluated previously which necessitates this study to identify the percentage of patients receiving adequate haemodialysis. This study will bring base line data and will provide ground for future studies to identify factors attributable for inadequate haemodialysis and measures to improve this rate.

OBJECTIVE

The objective of our study was to find out the frequency of adequate hemodialysis at hemodialysis unit Nishtar Hospital Multan.

OPERATIONAL DEFINITION

End Stage Renal Disease (ESRD)

ESRD was labeled on the basis of serum creatinine >6.5 mg/dl, ultrasound finding of renal damage and glomerular filtration rate (GFR) < 10 ml/min/1.73m² for three months.

Adequate Hemodialysis

Adequacy of hemodialysis was measured in terms of post-dialysis Kt/V and a cut-off value of ≥ 1.2 was used for adequate hemodialysis.

Kt/V

K denotes dialyzer clearance, t notifies time for dialysis, Kt is product of clearance and time, V is water content of body. **Example:** If K is 250 mL/min and t is 200 minutes (3 hours and 20 minutes), Kt will be 50000 mL, or 50 liters. Water content of 60 kg person is 36(60%) liters. So Kt/V for this patient would be 1.67.

Duration of Disease

It was measured in months from the date of diagnosis of ESRD (clinical record) till the enrolment in the current study.

MATERIALS AND METHODS

Research was conducted at Department of Nephrology and Medical Unit-IV, Nishtar Hospital, Multan. Duration of study was 6 months from 18th January 2018 to 17th July 2018. One hundred and seventy four patients were selected by Non-Probability, Consecutive Sampling. Individuals with either gender between 40-70 years of age suffering from ESRD undergoing regular hemodialysis at least 3 times a week (according to log of dialysis center) for the past 6 months. However, patients shifted from continuous ambulatory peritoneal dialysis therapy as per history and clinical record of the patient

and patients who received acute (unplanned emergent) dialysis during last 3 months on more than one occasion according to review of medical record of the patient were excluded. After acquisition of approval of ethical review committee, 174 patients undergoing hemodialysis at least 3 sessions in a week for the previous 6 months at hemodialysis center Nishtar Hospital Multan were enrolled. A formal written consent was taken from every patient. Patient's demographic details along with duration of disease were recorded in the attached proforma. Kt/V and adequacy of hemodialysis ($Kt/V \geq 1.2$) these patients after dialysis on Fresenius 4008S dialysis machine was recorded. All the patients received hemodialysis on the same machine and by the same operator to eliminate bias. Data obtained during study were analyzed by using SPSS version 24. Mean and standard deviation were estimated for numerical variables; age, duration of disease, Kt/V values. Frequency and percentage were calculated for categorical variable i-e gender, diabetes mellitus, hypertension, adequate hemodialysis. Stratification was done for parameters like age, gender, diabetes, hypertension and duration of disease. After stratification was done t-test was applied and value ≤ 0.05 was considered as significant.

RESULTS

This study involved 174 patients undergoing hemodialysis at least 3 times a week for the past 6 months at hemodialysis center Nishtar Hospital Multan. The age range of our study population was 40-70 years having a mean of 54.24 ± 8.39 years. It included 113 (64.9%) male and 61 (35.1%) female suffers of ESRD. Seventy five (43.1%) patients were diabetic while 116 (66.7%) patients were hypertensive. The duration of disease ranged from 6 months to 18 months with a mean of 12.11 ± 3.55 months.

The Kt/V value ranged from 0.80 to 1.90 with a mean of $1.45 \pm .27$. Taking a cut-off value of $Kt/V \geq 1.2$ for adequate hemodialysis, the frequency of adequate hemodialysis was found to be 85.1% ($n=148$).

When stratified, the frequency of adequate

hemodialysis was un-affected by patient age; 40-50 years vs. 51-60 years vs. 61-70 years (85.0% vs. 85.7% vs. 83.8%; $p=.964$), gender; male vs. female (85.8% vs. 83.6%; $p=.693$), diabetes status; diabetics vs. non-diabetics (82.7% vs. 86.9%; $p=.441$), hypertensive status; hypertensive vs. normotensive (82.8% vs. 89.7%; $p=.229$) and duration of disease; 6-9 months vs. 10-12 months vs. 13-15 months vs. 16-18 months (84.3% vs. 87.1% vs. 83.6% vs. 87.1%; $p=.955$).

Age	Hemodialysis Adequacy		P-Value
	Adequate (n = 148)	Inadequate (n = 26)	
40 – 50 Years	51	09	0.962
51 – 60 Years	66	11	
61 – 70 Years	31	06	

Table-I. Age wise distribution of hemodialysis Adequacy. (n = 174)

Gender	Hemodialysis Adequacy		P-Value
	Adequate (n = 148)	Inadequate (n = 26)	
Male	97	16	0.693
Female	51	10	

Table-II. Gender wise distribution of hemodialysis Adequacy. (n = 174)

Diabetes	Hemodialysis Adequacy		P-Value
	Adequate (n = 148)	Inadequate (n = 26)	
Yes	62	13	0.441
No	86	13	

Table-III. Distribution of hemodialysis adequacy with regards to diabetes. (n = 174)

Hypertension	Hemodialysis Adequacy		P-Value
	Adequate (n = 148)	Inadequate (n = 26)	
Yes	96	20	0.229
No	52	06	

Table-IV. Distribution of hemodialysis Adequacy with regards to hypertension. (n = 174)

Duration	Hemodialysis Adequacy		P-Value
	Adequate (n = 148)	Inadequate (n = 26)	
6 – 9 months	43	08	0.955
10 – 12 Months	27	04	
13 – 15 Months	51	10	
16 – 18 months	27	04	

Table-V. Distribution of hemodialysis Adequacy with regards to duration of disease. (n = 174)

Author	Year	Dialysis Center	Country	Adequacy
Roozitalab et al. ⁸	2013	Kohgiluyeh and Boyer-Ahmad	Iran	41.5%
Samakoosh et al. ⁹	2012	Qaemshar Razi Hospital	Iran	41.7%
Mousavi et al. ¹⁰	2012	Abadan	Iran	12.97%
Shasti & Babahaji ¹¹	2011	Tehran	Iran	50%
Mogharab et al. ¹²	2010	Birjand	Iran	10%
Manandhar et al. ¹⁴	2009	Nepal Medical College and Teaching Hospital	Nepal	17%
Hussain et al. ¹³	2013	Sheikh Zayed Hospital, Rahim Yar Khan	Pakistan	87%
Current Study	2015	Nishtar Hospital, Multan	Pakistan	85.1%

Review of Frequency of Adequate Hemodialysis at Various Centers across the World

DISCUSSION

The End Stage Renal Disease (ESRD) is a distressing medical, social, and economic problem not only for patients but also for their families.¹ Haemodialysis (HD) is a traditional treatment for End Stage Renal Diseases and is a lifesaving procedure.⁵ Haemodialysis is aimed at returning the body's fluid and electrolyte status as close to normal as possible. This adequacy of HD is judged by formulas like Kt/V and Urea Reduction Ratio.⁷ Adequate haemodialysis is vital for restoration of body homeostasis towards normal and to avoid potential complications also it is important to reduce cost of un-necessary hemodialysis and thus to reduce dropout rates. Using a cut-off value of Kt/V ≥ 1.2 for adequate hemodialysis, various studies have evaluated the adequacy of several dialysis centers across the world. A summary of these studies and their reported frequency of adequate hemodialysis have been given in table below.

According to an estimate, Pakistan has 150 ESRD patients/annum/million¹. Dialysis center at Nishtar hospital Multan is a busy unit with haemodialysis of more than 90 patients per day. The purpose of the current study was to determine the frequency of adequate hemodialysis at hemodialysis center Nishtar Hospital Multan.

This study involved 174 patients undergoing hemodialysis at least 3 times a week for the past 6 months at hemodialysis center Nishtar Hospital Multan. The age of the patients ranged from 40 years to 70 years with a mean of 54.24 ± 8.39 years. There were 113 (64.9%) male and 61 (35.1%) female patients in the study sample. Lu et al¹⁵ from USA has also reported very high

frequency of male patient with 98 %, higher than our results while mean age was 66.2 ± 11.3 years, showing similar trends to our results. Another study by Sumida et al¹⁶ from USA also reported 98 % male gender predominance while mean age of the study cases was 68.1 ± 11.4 years, similar to our trends.

Seventy Five (43.1%) patients were diabetic while 116 (66.7%) patients were hypertensive. Hussain et al¹³ observed a similar frequency of diabetes (55%) but comparatively very low frequency of hypertension (17%) among ESRD patients at hemodialysis center Sheikh Zayed Hospital, Rahim Yar Khan Pakistan. Lu et al¹⁵ from USA has also reported ESRD patients having 47 % diabetes while 46 % hypertension, similar to that of our study results. Another study by Sumida et al¹⁶ from USA reported 71.2 % diabetes and 96 % hypertension which were much higher than our study results. The reason may be higher mean age of these patients as compared to our results as we only included patients up to 70 years of age, while age is considered to be an independent risk factor for diabetes and hypertension.

The duration of disease ranged from 6 months to 18 months with a mean of 12.11 ± 3.55 months. The Kt/V value ranged from 0.80 to 1.90 with a mean of $1.45 \pm .27$ while Hussain et al¹³ observed mean Kt/V to be 1.22 ± 0.04 .

Taking a cut-off value of Kt/V ≥ 1.2 for adequate hemodialysis, the frequency of adequate hemodialysis was found to be 85.1% (n=148). Our results match with those of Hussain et al¹³ in 2013 who evaluated dialysis center at Sheikh Zayed Hospital, Rahim Yar Khan Pakistan and

documented that 87% of patients had adequate hemodialysis.

When stratified, the frequency of adequate hemodialysis was un-affected by patient age; 40-50 years vs. 51-60 years vs. 61-70 years (85.0% vs. 85.7% vs. 83.8%; $p=.964$), gender; male vs. female (85.8% vs. 83.6%; $p=.693$), diabetes status; diabetics vs. non-diabetics (82.7% vs. 86.9%; $p=.441$), hypertensive status; hypertensive vs. normotensive (82.8% vs. 89.7%; $p=.229$) and duration of disease; 6-9 months vs. 10-12 months vs. 13-15 months vs. 16-18 months (84.3% vs. 87.1% vs. 83.6% vs. 87.1%; $p=0.955$).

Thus frequency of adequate hemodialysis was found to be 85.1% among ESRD patients undergoing hemodialysis at least 3 times a week for the past 6 months at hemodialysis center Nishtar Hospital Multan and this frequency was not affected by patient age, gender, diabetes, hypertension and duration of disease. This frequency is quite high as compared to that reported in literature for other dialysis centers across the world as shown above. This is encouraging and highlights the success of dialysis center at Nishtar Hospital, Multan.

A very important limitation to our study was lack of long term follow-up to determine dropout rates and mortality as a number of previous studies have reported association between low mean Kt/V value and patient's mortality.¹⁷ Therefore future studies with long term follow-up to evaluate frequency of mortality among ESRD patients undergoing hemodialysis at Hemodialysis Center, Nishtar Hospital Multan are recommended.

CONCLUSION

Adequacy of dialysis is assessed in order to attain a dialysis dose that would be adequate enough for ESRD patients for the betterment of quality of their lives and would be helpful in prolonging their survival. Assessment of adequacy of dialysis in various centres is helpful in judgement of effective functioning of that dialysis centre. It also stresses upon the need of calculating the individual's dialysis dose rather than putting the patient on

dialysis in conventional way i.e. 4 hours 3 times a week. By using formula of Kt/V one is able to increase or decrease the duration or dialyser flow rate to meet adequate need of dialysis

The frequency of adequate hemodialysis was found to be 85.1% among ESRD patients undergoing hemodialysis at least 3 times a week for the past 6 months at hemodialysis center Nishtar Hospital Multan. It indicates that Dialysis center in Nishtar hospital is working effectively.


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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author's Signature
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2	Ghulam Abbas	Data collection & Analysis.	