SHORT COMMUNICATION

Effect of haemodialysis practice guideline on dialysis indicators and haemodynamic complications among patients undergoing haemodialysis

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Abstract

To assess the effect of haemodialysis practice guidelines on dialysis indicators and haemodynamic complications, the comparative study was conducted at the dialysis unit of Sheikh Zayed Hospital, Lahore, Pakistan, and comprised patients undergoing haemodialysis who were divided into intervention group A in which updated haemodialysis practice guidelines were used, and control group B in which routine base dialysis was given. Data was collected using a self-structured tool. Data was analysed using McNemar test and Mann-Whitney U-test with $p<0.05$. Compared to baseline, there was a significant improvement in post-intervention ratio of effective removal of clearance (K) resulting from the treatment characterised by time (t) in the patient with a specific volume of distribution (V), or Kt/V, median & IQR 0.83(0.355) vs 1.21(0.11) and percentage of urea reduction ratio with median & IQR 49(12) vs. 66.5(18.65) ($p<0.05$). Intradialytic hypotension was found in 17(56.6%) subjects in group B and in 4(13.4%) in group A ($p=0.002$). Intradialytic hypertension was found in 8(25.6%) patients in group B and 1(3.4%) in group A ($p=0.039$). It is recommended that dialysis be performed in accordance with the most recent clinical guidelines in order to improve practices and to increase haemodialysis effectiveness.

Keywords: Haemodialysis, Dialysis indicators, Dialysis complications.

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Introduction

Chronic kidney disease (CKD) is a global health issue and its prevalence rate is increasing abruptly. The burden of CKD worldwide has increased by 87%, and the mortality by 98%Xie, Bowe, Mokdad, Xian, Yan, Li, Maddukuri, Tsai, Floyd and Al-Aly.[1] Highest CKD prevalence (21.2%) has been reported from Pakistan, while the lowest (10.2%) has been reported from India. Prevalence from countries, like Bangladesh, Nepal and India is in line with global data (13.4%).[2] In terms of ethnic groups in Pakistan, the prevalence is highest among men and women (9.5%, 10.3%), respectively, among Sindhis, followed by Muhajirs (2%, 4.7%), Balochis (2.4%, 4.2%) and Pakhtoons (2.5%, 1.2%).[3]

When kidney functions decline to 10-15%, then alternative methods, such as dialysis and kidney transplantation, are needed.[4] Haemodialysis (HD) is the most common renal replacement therapy (RRT) in Pakistan and around the world, with over 2 million people worldwide undergoing HD.[5] Inadequate HD can increase illness complications, length of stay, and patient costs.[6] A single HD session costs 3,000 to 8,000 Pakistani rupees (PKR), which means an average cost of PKR550,000 to PKR700,000 per year in Pakistan.[7] High mortality rate of the end-stage renal disease (ESRD) in HD cases was 40.6% in Pakistan, especially in Punjab.[8] HD care-givers spend a lot of time during dialysis session with a patient to help managing dialysis-induced complications, with increasing patient disability and mortality.[9] Developing countries, including Pakistan, are facing a silent epidemic of ESRD , which is a critical component within the global burden of CKD.[10] There are only a few centres that offer kidney transplantation to the massively increasing cases of ESRD.[11] As a result, HD remains the most common alternative treatment option. The majority of healthcare facilities in Pakistan are unable to provide adequate dialysis and patient management in accordance with the recommended guidelines due to limited resources. Therefore, implementing standard clinical HD guidelines is needed to improve practices regarding HD complications, with the aim of increasing HD effectiveness.

The current study was planned to determine the effect of HD practice guideline on dialysis indicators and complications. The alternate hypothesis was that adherence to practice guidelines will have a positive impact on dialysis indicators and complications among patients undergoing HD.

Methods and Results

The comparative study was conducted at the dialysis unit of Sheikh Zayed Hospital, Lahore, Pakistan, from May 3 to September 25, 2022. A total of 60 sample size was calculated using the OpenEpi software[12] and simple

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random sampling technique was used to recruit the study participants. Those enrolled were divided into two groups; intervention group A in which updated HD practice guidelines[12] were used, and control group B in which routine base dialysis was given. The study included adult patients (18-60 years old), of both genders, undergoing center-based haemodialysis (HD) with a glomerular filtration rate (GFR) <15ml/min, having hypertension (HTN) as a co-morbidity, and a permanent vascular access. Excluded were patients awaiting renal transplant, those with Glasgow Coma Scale (GCS) <11, and those who died during the study period.

Data collection was conducted following approval from the ethical committee of Sheikh Zayed Hospital under reference number admin/22/117/1527 and the University of Lahore under reference number LSN/letter/3242-22. The study participants provided consent, followed by the administration of a self-structured questionnaire for data collection. The questionnaire's validation involved five experts in Nephrology, each with over five years of experience and holding Fellowships of the College of Physicians and Surgeons (FCPS). The Content Validity Index (CVI) was 0.91, and Cronbach's alpha coefficient was 0.724.

Data was analysed using Mann-Whitney tests, while McNemar test was used to compare the HD complications. Data normality was checked using Shapiro-Wilk and. P<0.05 was considered statistically significant.

Present study showed that out of the total 60 patients, half (30) were allocated to each of the two groups. In total, there were 36 (60%) males and 24 (40%) females, with 26 (43.3%) patients falling within the 50-60 age. The majority of 42 (70%) patients resided in urban areas, while 18 (30%) were from rural areas. These gender proportions were consistent with those reported in a previous study, which found 60.4% males and 39.6% females.[5] The mean age in the current study was 52.80±13.82 years, which was higher than 43.35±9.45 years reported earlier.[6]

Intradialytic hypotension was found in 17(56.6%) patients in group B and 4(13.4%) in group A (p=0.002). Intradialytic HTN was found in 8(25.6%) patients in group B and 1(3.4%) in group A (p=0.039) (Table 1).

The findings were in agreement with those of a study)[15] reporting 75% hypotension at baseline compared to 17.5% post-intervention (p=0.001). Similarly, a study by Hamid et al showed that 26.6% and 16.6% subjects, respectively, had HTN (p<0.05).[10]

The present study examined the comparison between the groups regarding the Kt/V ratio and the percentage of urea reduction ratio (URR%). In group B, 22 patients (73.3%) had a Kt/V <1.2, while 8 (26.7%) patients had a Kt/V >1.2, with a median of 0.83 and an interquartile range (IQR) of 0.355. Conversely, in group A, 14 (46.7%) patients had a Kt/V <1.2, and 16 (53.3%) patients had a Kt/V >1.2, with a median of 1.21 and an IQR of 0.11 (p=0.046), as illustrated in table 2.

Table-1: Intergroup comparison of intradialytic haemodynamic complications.

Complications			Control	Interventional	
	No	Yes	n (%)	n (%)	*p*-value
Hypotension					
No	11	2	13 (43.4)	26 (86.6)	0.002
Yes	15	2	17 (56.6)	4 (13.4)	
Hypertension					
No	21	1	22 (73.4)	29 (96.6)	0.039
Yes	8	0	8 (25.6)	1 (3.4)	

McNemar test with p<0.05 was considered significant.

Table-2: Intergroup comparison of urea clearance rate (Kt/V) and urea reduction ratio (URR).

Haemodialysis	Control			Interventional			
Indicators	n (%)	M	IQR	n (%)	M	IQR	*p*-value
Kt/V < 1.2	22 (73.3)	0.83	0.355	14 (46.7)	1.21	0.11	0.046
Kt/V > 1.2	8 (26.7)			16 (53.3)			
URR < 55 %	22 (73.3)			8 (26.7)			
URR 55 - 64	7 (23.3)	49	12	1 (3.3)	66.5	18.65	0.000
URR > 65%	1 (3.3)			21 (70)			

Mann-Whitney U-test with p<0.05 was considered significant.

However another study reported that Kt/V differences were 2.32 and 0.18, respectively, before and after the intervention (p<0.05).[13] In the same context a study reported that post-intervention Kt/V was greater compared to the baseline (p<0.05).[14] Further supported by the study of Afzal and colleagues.[15]

In the current study, the median and Interquartile Range URR in group B was (49mg/dl, 12) compared to (66.5mg/dl, 18.65) in group A (p<0.05) as shown in table 2. According to a study by Hasan and Winarsih, URR was 64% pre-intervention and 71% post-intervention (p<0.05).[16] Another study reported that the URR improved from 72.8% to 75.2% (p<0.01).[17]

The current study has its limitations, as the power was limited, and the sample was not randomised. Also, the study was limited to HD patients with permanent vascular access and no co-morbidities other than CKD and HTN. As such, the findings cannot be generalised.

In view of the findings, however, it is recommended that the standard of HD procedures must be improved, enabling all patients undergoing HD to get complete nursing care in order to reduce intradialytic complications.

Conclusion

Following guideline base practice improved patients' dialysis indicators and reduced dialysis-related complications. Based on clinical evidence, HD practice guideline was effective in using cool dialysate, reassessing the dry weight, maintain Trendelenburg position, lowering ultrafiltration rate, managing HD-induced complications, drawing blood sample, and ensuring blood transfusion during dialysis.

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Conflict of Interest: None.

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Author Contribution:

AA: Introduction, methodology, result analysis and discussion.

AY: Review introduction, methodology, result analysis, discussion and helped in conclusion.