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ORIGINAL ARTICLE

Frequency of intradialytic hypotension in patients with chronic kidney disease.

Izhar Ali Bangash[1], Irfan Mirza[2], Syed Hassan Mustafa[3], Farah Iqbal[4]

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ABSTRACT… Objective: To find the frequency of intradialytic hypotension in chronic kidney disease. **Study Design:** Cross Sectional Descriptive study. **Setting:** Hemodialysis Unit of Ayub Teaching Hospital Abbottabad. **Period:** March 2019 to June 2019. **Material & Methods:** A total of 95 patients, fulfilling the inclusion criteria were enrolled in the study. After taking consent, relevant history was taken along with physical examination performed. The medical record including various investigations was reviewed. Blood pressure was recorded at regular intervals during the ongoing hemodialysis session of selected patients by the staff of hemodialysis unit, using bedside mercury manometer. **Results:** Out of 95, 47 patients (49%) developed intradialytic hypotension in the middle of their hemodialysis sessions. There was no significant difference in the frequencies of intradialytic hypotension with respect to gender and age. **Conclusion:** Hemodialysis is a life saving treatment modality. Despite advances in technology it carries a number of complications. Intradialytic hypotension is one of its frequent complications with a fact that it has no consensus definition. Its frequency in chronic kidney disease patients visiting hemodialysis unit of Ayub Teaching Hospital Abbottabad is high. The high frequency necessitates various interventions for its prevention and further research is required in this regard.

Key words: Complications, Hemodialysis, Hypotension.

INTRODUCTION

Hemodynamic instability during hemodialysis is a significant issue that has usually been overlooked. One of the most common and grave issue among hemodynamic instability is the intradialytic hypotension (IDH).[1] Though different studies have used different cut off values for defining IDH, most have agreed upon defining IDH as a drop in systolic blood pressure of ≥ 20 mm Hg after the initiation of dialysis or a drop of > 10mm Hg in mean arterial pressure during dialysis. Based on these the cut off values, its frequency was observed as 68%.[2,3]

Numerous factors have been considered to have led to the development of IDH. Some of the risk factors described in literature include pre – existing coronary heart disease, arrhythmias, sepsis, air embolism, pericardial diseases, blood loss and anaphylactic reactions to the dialyzer.[4,5] Even in the absence of aforementioned conditions, IDH can still develop when fluid from the body is rapidly removed leading to hypovolemia.[6] Though this may activate the compensatory pathways which include the rise in heart rate, plasma refilling and peripheral vasoconstriction, these compensatory mechanisms may not always compensate for the fluid loss leading to IDH.[7]

The management principles of IDH include looking for the aforementioned conditions, cautiously and slowly removing the fluid to prevent hypotension and stopping the hemodialysis session all together when IDH develops.[8] Other measures include changing the patient position and administering oral and intravenous fluids. Some of the most common fluids used for this purpose include the normal saline, hypertonic saline, dextrose saline and albumin infusions. Once the blood pressure has been stabilized, the event should be documented and every effort should be made to find out the exact cause.

1. MBBS, Lecturer Physiology, Ayub Medical College Abbottabad.
2. MBBS, FCPS (Nephrology), Assistant Professor Nephrology, Rehman Medical Institute Peshawar.
3. MBBS, FCPS (Med), FCPS (Rheum), Consultant Physician, Ayub Teaching Hospital Abbottabad.
4. MBBS, Trainee Medical Officer Dermatology, Lady Reading Hospital, Peshawer.

Correspondence Address:
Dr. Syed Hassan Mustafa
Ayub Teaching Hospital Abbottabad
syedhassanmustafa@yahoo.com

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When hemodynamic instability persists, patient should be hospitalized and detailed evaluation of the patient should be done to ascertain the cause and prevent such measures in the future.[9,10]

Since IDH is associated with significant mortality and there was no local data available regarding its frequency among patients with chronic kidney disease (CKD), therefore this study was designed to determine the aforementioned objective.

MATERIAL & METHODS

This cross sectional study was conducted from April 2019 to July 2019 in the Hemodialysis unit of Ayub Teaching Hospital (ATH), Abbottabad. A total of 95 patients were included in the study, with sampling done through non-probability consecutive sampling. Our inclusion criteria included; age 18 – 60, patients with impaired kidney functions for 6 months and on regular hemodialysis. The following conditions were excluded from the study; septic shock, cardiogenic shock, massive hemorrhage due to any cause, patients with recent history of severe diarrhea or vomiting, patients with coronary heart diseases, valvular heart disease or cardiomyopathy.

Sample size was calculated by using WHO sample size estimation formula with the following assumptions: Prevalence of IDH in patients with CKD: 57%[7], Confidence level: 95% and Absolute Precision as 10%. Intradialytic hypotension was defined as a drop in systolic blood pressure of ≥ 20 mm Hg after the initiation of dialysis or a drop of > 10mm Hg in mean arterial pressure during dialysis.

After getting the approval of the hospital ethical committee, all patients fulfilling the inclusion criteria were included in the study. An informed consent was taken from all patients and the purpose of the study was explained to them. Detailed history was taken and complete physical examination was performed. Patient blood pressure was recorded before the initiation of hemodialysis and then blood pressure was recorded at regular interval during dialysis. All recordings were taken by the same doctor and were recorded using the same mercurt manometer. All of the information was recorded on a proforma.

All of the data were entered and analyzed by using SPSS version 22. Mean and standard deviation were calculated for quantitative variables like age, and blood pressure as systolic blood pressure and mean arterial pressure. Frequencies and percentages were calculated for categorical variables like gender and IDH. Data was stratified by age and gender with respect to outcome variable i.e. presence of IDH. Chi-square test at 5% level of significance was used.

RESULTS

There were 95 patients included in the study. Among these 49 were male patients while 46 were female patients. The youngest patient was 20 years of age while the eldest patient was of 60 years. The mean age ± SD was 42.98 ± 11.35 years. As regards systolic blood pressure (SBP), its mean value before the beginning of session was measured as 159 ± 29 mmHg while the mean arterial pressure (MAP) was 114 ± 19 mmHg. Similarly, at the mid of the session the SBP and MAP were measured as 148 ± 26 mmHg and 108 ± 17 mmHg respectively. (Table-I)

Intradialytic hypotension was observed in 47 patients (49%) in the middle of their dialysis sessions (Table-II). When IDH was stratified by age and gender, our results were statistically insignificant. (Table-II and III)

	Minimum	Maximum	Mean	Std. Deviation
Age in years	20	60	42.98	11.354
Systolic BP at start of hemodialysis	90	222	159.09	29.283
Systolic BP at mid of hemodialysis	80	205	148.53	26.209
Mean arterial pressure at start of hemodialysis	76.67	166.67	114.8561	19.96206
Mean arterial pressure at mid of hemodialysis	60.00	145.33	108.4351	17.63151

Table-I. Mean and Standard deviation for age and blood pressure of study participants (n = 95). Blood pressure measured in mmHg.

			Gender		Total
			Male	Female	
Intradialytic hypotension	Yes	Count % of Total	22 (23.2%)	25 (26.3%)	47 (49.5%)
	No	Count % of Total	27 (28.4%)	21 (22.1%)	48 (50.5%)
Total		Count % of Total	49 (51.6%)	46 (48.4%)	95 (100.0%)
Chi-square			0.848		
P-value			0.357		

Table-II. Frequency of intradialytic hypotension in study participants with respect to gender (n = 95)

			Stratification of Age		Total
			20 to 40 Years	41 to 60 Years	
Intradialytic hypotension	Yes	Count % of Total	19 (20.0%)	28 (29.5%)	47 (49.5%)
	No	Count % of Total	19 (20.0%)	29 (30.5%)	48 (50.5%)
Total		Count % of Total	38 (40.0%)	57 (60.0%)	95 (100.0%)
Chi-square			0.007		
P-value			0.933		

Table-III. Frequency of intradialytic hypotension in study participants with respect to age (n = 95)

DISCUSSION

In our study, we observed that frequency of IDH in the hemodialysis unit of Ayub Teaching Hospital Abbottabad is quite high. Given that IDH has high mortality, therefore this signifies the importance of regular blood pressure monitoring during hemodialysis session. In this study the blood pressure was measured twice during hemodialysis, with one reading taken at the beginning of dialysis while other taken when more than half of the session was done. However in one study it was observed that frequency of IDH is highest during in the initial 25% of the session, therefore the hemodialysis staff should be vigilant regarding IDH from the beginning of the session.[11,12]

We observed that IDH occurred in 49% of the patients which is in accordance with the literature. Since there have been wide differences in the definition of IDH, previous studies has recorded its frequency to be ranging from 10 – 50%.[5,13] Flytheet al.[3] in their study reported that the frequency of IDH varied widely when different definitions of IDH were used. Thus they showed that 68% of the patients developed IDH during dialysis when the cut off value of IDH was considered as a fall in systolic BP of > 20mmHg. However, only 10% of patients had they SBP levels drop to levels below 90mmHg, indicating that if this be taken as the cutoff point then the frequency of IDH is far less.

Farrukh et al.[6] reported that the frequency of IDH during dialysis is about 12% which was in contradiction to our study. Again the main reason for difference was the different operational definitions used. In another study, hypotension was observed in 57% patients undergoing hemodialysis[14] which was in line with our study.

In our study, the frequency of IDH was found similar in both genders (23.2% in males vs 26.3% in females). In literature, female sex has been mentioned as a risk factor for developing IDH which is in contradiction to our study.[15,16]

Since the frequency of numerous medical conditions that would normally increase the chances of IDH increases with age, one would expect the frequency of IDH itself to increase with advancing age.[16,17] However, in contradiction to this, we observed that the frequency of IDH is not affected by age. One reason for this may be because our sample size mean age was relatively young and one would expect IDH frequency to be high in patients over 60 years of age.

IDH is associated with significant morbidity and mortality, and therefore measures should be taken to prevent its occurrence.[18] Some of

these measures include increasing the duration of dialysis to 4 hours, drawing the blood out of the body slowly, restricting sodium intake, limiting dialysate and frequently monitoring blood pressure.[19,20]

Some of the strengths of our study include; this was the first time any such study was conducted in the province of Khyber Pukhtunkhwa. No study has so far been conducted that looked into the frequency of IDH in patients on regular dialysis. Moreover, we found that the frequency of IDH is quite high, which necessitates immediate actions to be taken by the authorities.

Our study was not without limitations. Firstly our sample size was small and we recommend larger studies with much higher sample size. Secondly we did not determine the cause of IDH. Though significant as it looks, it requires extensive evaluation which was beyond the financial ability of the authors. Finally, we did not take into account some common co – morbities like diabetes mellitus, hypertension or any drug intake that would otherwise have provided additional information.

The hemodialysis unit in which this study was conducted is over burdened with patients, therefore it was not possible to follow all of the preventive measures highlighted in the relevant literature. However, certain suggestions which can be shared with local physicians for reducing the incidence of IDH are as below:

1. Detailed history should be taken from all patients undergoing dialysis and any patient with aforementioned conditions in the introduction section should be labeled as high risk patients
2. All relevant investigations should be performed especially the full blood count and serum electrolytes, and an abnormality if found should be sorted out before starting the session
3. Advice regarding dietary sodium restriction should be made a routine
4. During dialysis, fluid should be slowly removed and ultra filtration or dialysis should be immediately stopped if patient develops any symptom of IDH

CONCLUSION

We observed that a very high percentage of patients develop IDH during hemodialysis in Ayub Teaching Hospital Hospital Abbottabad. Since dialysis is the necessity of CKD patients and since it cannot be abandoned, such a high frequency is therefore alarming.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Izhar Ali Bangash	Original idea, Data collection, Manuscript.	
2	Irfan Mirza	Proof reading, Data collection.	
3	Syed Hassan Mustafa	Manuscript writing.	
4	Farah Iqbal	Data collection.