



HEMODIALYSIS; ACUTE INTRADIALYTIC COMPLICATIONS FOUND ON MAINTENANCE HEMODIALYSIS IN PATIENTS AT A PUBLIC HOSPITAL LAHORE.

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ABSTRACT... Introduction: Hemodialysis is the most common method - used to remove waste and toxic substances from the body, hence it is used to treat patients of different types of renal failure. Upto 1960s, attempts were made to reduce the side/adverse effects associated with hemodialysis and to make hemodialysis an effective therapy. Now-a-days many advanced and sophisticated dialysis machines have been designed which make dialysis therapy more convenient and promising. Hemodialysis therapy requires complete coordination between the health care team which includes nephrologists, dietitian, nurse, technician and social worker. Patient and his/her family also coordinate the procedure to make hemodialysis more effective. But even with the use of modern and effective dialysis machines for therapy patients may still suffer from different types of complications. **Objective:** The purpose of this study was to observe those complications and also their management during and after dialysis. **Place and conducted year:** Data was collected by convenience sampling technique in local hospital of Lahore in December, 2016. **Study design:** Retrospective approach was used and notices the case history of 100 patients. **Methods:** Retrospective approach was used and the case history of 100 patients (from morning and evening shifts) who had hemodialysis over a 1-5 year period was noted. Demographic and clinical data of patients who died during dialysis were compared to the control group comprised of the survivors of hemodialysis. Data was analyzed using SPSS IBM version 16. **Result:** In this study it was observed that patients may suffer from various complications. 38% patients suffered from hypotension, 13% patients suffered from cramps, Itching was observed in 15% of patients, Vomiting was observed in 18% of the patients and in 5% patients dialysis reaction was observed. In order to manage these complications normal saline and 5% dextrose were administered to the patients. Hydrocortisone Sodium Succinate was administered intravenously in order to manage dialyzer reaction and session was postponed. Although hemodialysis is beneficial but it poses certain risks as well. **Conclusion:** Hemodialysis is associated with various life threatening complications however these complications occur in low frequency and these can be managed and prevented by various protective therapies by health care team and medical staff.

Key words: Intradialytic, Cramp, Frequency, Complications.

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INTRODUCTION

Hemodialysis is a method by which toxic/metabolic waste substances like impurities are removed from the body when the kidneys are unable to perform their normal function.¹ The word dialysis is derived from the Greek word “dialysis” which means dissolution, “dia” meaning through, and “luisis” mean loosening.²

Various vital functions are performed by normal healthy kidneys. Kidneys play an important role in homeostasis as they maintain the normal

environment of the body. The waste products produced in various metabolic activities are excreted through kidneys. Water and electrolyte balance in the body is also maintained by the healthy kidneys. Kidneys secrete various hormones like erythropoietin, renin, thrombopoietin, prostaglandins etc. These hormones regulate the blood pressure and calcium level in the body. In case of any renal disease, kidneys are unable to perform these normal functions and would result in water and sodium retention in the body. Also kidney failure may lead to accumulation

of harmful/ toxic waste substances in the body. These may result in increased blood pressure and decreased RBCs production by the bone marrow due to inhibition of erythropoietin release by diseased kidney. Thus pathology of the kidney would require appropriate treatment.

Hemodialysis is a technique which uses a special filter or semi-permeable membrane that allows the blood to pass through it. The filter then removes the extra water, body waste and toxic products from the blood. This procedure thus cleans the blood, maintains the homeostatic environment of the body and regulates the normal BP through maintaining the proper fluid and electrolyte balance.

Hemodialysis therapy requires dedication as patients must go to the dialysis centre every alternate days and each session requires several hours. However flexibility may be offered to the patient by the medical staff in selecting the shift amongst morning, afternoon or evening hours. The shift selection may depend upon the availability of patient or health care team and also upon capacity at the dialysis unit.

Hemodialysis a procedure which actually removes all the waste products of metabolic reaction, electrolytes³ and extra water from the blood when the kidney does not perform its normal function e.g. in renal failure.

Hemodialysis replaces the filtration function of kidney in case of renal dysfunction.⁴ Accumulation of different waste substances from the body is toxic in renal disease and serious abnormalities and even death may occur.⁴ Although hemodialysis does not monitor normal body functions as it is not a constant process⁵, it still maintain the homeostatic environment of the body.

The principle behind hemodialysis is simple diffusion through a semi-permeable membrane.⁶ Counter current flow mechanism allows the blood and dialysate to flow in opposite directions through which concentration gradient is established and efficiency of dialysis is increased.⁶

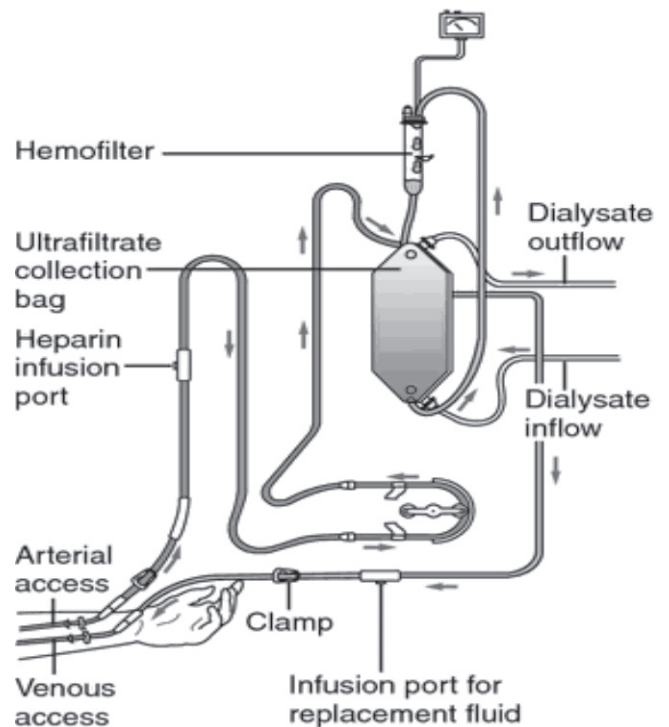


Figure-1. Model of dialysis

PATIENTS AND METHOD

This study was conducted in a government tertiary care hospital Lahore. The sample size was calculated using the World Health Organization (WHO) sample size. Informed consent was taken from the hospitals and participants.

Sampling Technique

Technique of “convenience sampling” was used for sample size evaluation. In this technique easily accessible records of subjects were selected who visited the dialysis centre regularly.

Statistical Analysis

In order to analyze the data SPSS version 16 was used. Frequency distributions and cross tabulations of all variables were done. Mean and standard deviation of each variable was then calculated.

Course of Dialysis

There were total 108 hemodialysis session which received by 100 patients (almost 1-10 sessions/patient). Most of the patients (57%) received only ≤ 3 sessions. 53% patients received dialysis through subclavian vein, 39% through femoral and

3% via internal jugular vein. 1% patient received both femoral and subclavian lines but at different times of the session. Synthetic polysulfone low flux dialyzers of 3-7 sizes were used. Dialyzer size, blood lines size, venous pressure and blood flow magnitude varied according to the patient's size. During dialysis heparin and bicarbonate dialysate were administered. Patients were not allowed to eat anything. Duration of session was of 3 hours however duration decreased to 1 hour or increased to 5 hours depending upon the patients' severity of disease and dialysis tolerant abilities.

RESULTS

Intradialytic complications were observed in patients at hemodialysis centre of local Hospital Lahore. Forty patients were selected randomly that were on regular hemodialysis with frequency of two to three times a week and their case history were studied.

Hemodialysis is a procedure of 4-5 hour. During the study period, hemodialysis session of each patient was observed and complications were noted. During hemodialysis patients suffered from nausea, hypotension, increase body temperature, Cramps, Chills, emesis, hypersensitivity and dialyzer reaction. Almost all these side effects were treated locally in the hospital.

Hypotension was the major complication (38%) during hemodialysis procedure and it was because imbalance of minerals (like Na⁺, Cl⁻, Ca⁺) and fluid loss. It was managed by pausing the ultra-filtration or by reducing the flow rate. Normal Saline and 5% Dextrose Solution were administered and the patient was placed in a trendelenburg position.

Out of all these complications, 13% were observed as cramps and it was facilitated by suggesting

stretching exercises to the patients. In this study we noted fever during dialysis about 6%, chills in 8 % while 18% patient suffered from nausea and vomiting and thus antiemetic (Domperidone inj IV) was given to them. Antihistamines were administered to 15% patients who suffered from allergy and hypersensitivity reactions. The patients were managed according to the severity of reactions. In cases of Anaphylactic shock The procedure was stopped immediately and corticosteroids were given IV. When the symptoms disappeared the procedure was resumed again. The patients who suffered from acute and chronic renal failure was 63% and 37% respectively. In this study it was revealed that minimum duration of hemodialysis was ≥ 2 years while maximum duration 5 years.

More complications were observed in patients who received few hemodialysis sessions as compared to patients with multiple hemodialysis sessions and thus they were found to be more stable. Interestingly weight gain of up to 3.5 kg and increased rate of other complications was observed in patients with high intake of water or other liquids during dialysis procedure.

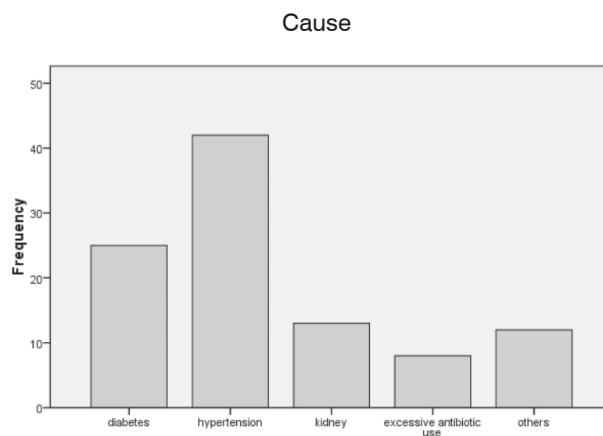


Figure-2. Graphical presentations of causes of renal failure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	diabetes	25	25.0	25.0	25.0
	hypertension	42	42.0	42.0	67.0
	kidney	13	13.0	13.0	80.0
	excessive antibiotic use	8	8.0	8.0	88.0
	others	12	12.0	12.0	100.0
	Total	100	100.0	100.0	

Table-I. Causes of renal failure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 yr or less	25	25.0	25.0	25.0
	up to 3 yrs	62	62.0	62.0	87.0
	up to 5 yrs	13	13.0	13.0	100.0
	Total	100	100.0	100.0	

Table-II. Duration of hemodialysis

		Frequency	Percent	Valid Percent	Cumulative Percent
	acute	63	63.0	63.0	63.0
	chronic	37	37.0	37.0	100.0
	Total	100	100.0	100.0	

Table-III. Types of renal failure

		Frequency	Percent	Valid Percent	Cumulative Percent
	bicarbonate	98	98.0	98.0	98.0
	Acetate	2	2.0	2.0	100.0
	Total	100	100.0	100.0	

Table-IV. Mode of hemodialysis

		Frequency	Percent	Valid Percent	Cumulative Percent
	2 times a week	95	95.0	95.0	95.0
	3 times a week	5	5.0	5.0	100.0
	Total	100	100.0	100.0	

Table-V. Frequency of hemodialysis

		Frequency	Percent	Valid Percent	Cumulative Percent
	No	62	62.0	62.0	62.0
	Yes	38	38.0	38.0	100.0
	Total	100	100.0	100.0	

Table-VI. Hypotension during hemodialysis

		Frequency	Percent	Valid Percent	Cumulative Percent
	No	85	85.0	85.0	85.0
	Yes	15	15.0	15.0	100.0
	Total	100	100.0	100.0	

Table-VII. Itching during hemodialysis

		Frequency	Percent	Valid Percent	Cumulative Percent
	No	92	92.0	92.0	92.0
	Yes	8	8.0	8.0	100.0
	Total	100	100.0	100.0	

Table-VIII. Chills during hemodialysis

		Frequency	Percent	Valid Percent	Cumulative Percent
	No	82	82.0	82.0	82.0
	Yes	18	18.0	18.0	100.0
	Total	100	100.0	100.0	

Table-IX. Nausea and vomiting during hemodialysis

		Frequency	Percent	Valid Percent	Cumulative Percent
	No	87	87.0	87.0	87.0
	Yes	13	13.0	13.0	100.0
	Total	100	100.0	100.0	

Table-X. Cramps

	Frequency	Percent	Valid Percent	Cumulative Percent
No	94	94.0	94.0	94.0
Yes	6	6.0	6.0	100.0
Total	100	100.0	100.0	

Table-XI. Fever

	Frequency	Percent	Valid Percent	Cumulative Percent
No	95	95.0	95.0	95.0
Yes	5	5.0	5.0	100.0
Total	100	100.0	100.0	

Table-XII. Dialyzer reaction

	Frequency	Percent	Valid Percent	Cumulative Percent
No	25	25.0	25.0	25.0
Yes	75	75.0	75.0	100.0
Total	100	100.0	100.0	

Table-XIII. Dietary supplement intake

DISCUSSION

Incidence of intradialytic complications is 20 to 30% and it continues to be a leading problem causing discomfort. The individuals that are at high risk of intradialytic complications are those suffering from diastolic dysfunction, hyperglycemia, left ventricular hypertrophy, myocardial infarction, cardiovascular abnormalities, coronary heart disease and those individuals with weight gain during hemodialysis procedure (>3% of body weight); and also anephric patients. Hypotension during hemodialysis procedure is fatal and its incidence ratio is 20 to 30% which increases mortality rate and also discomfort. Age and co morbidity increases risk for intradialytic complication of hypotension. The principle behind the hemodialysis is simple diffusion through a semi-permeable membrane.⁶ Counter current mechanism establishes concentration gradient through semipermeable membrane; between blood and dialysate; and increases the efficiency of dialysis technique.⁶

Complications	Frequency	% Total
hypotension	38	38
chill	8	8
cramps	13	13
vomiting	18	18
fever	6	6
itching	15	15

Table-XIV. Complications occurring during dialysis

Average safe zone of patients in united states that were started on HD was approximate UF of 1.8 to 2.3 kg/treatment. It was measured according to mean baseline weight of all age group individuals and thus it was that observed there was increased risk of IDH complications when patients show increased interdialytic weight gain pattern higher than the accepted safe zone. In this study; the common cause (33%) of intradialytic complications was incorrect assessment of ideal body weight followed by excess removal of UF. The episodes or intensity of IDH may vary from person to person and also these complications may resolve within the dialysis centre; in the unit; or these may persist even after patient leave the dialysis centre. Persistent hypotension within or after completion of dialysis procedure may require an explanation for patient because otherwise it may cause serious risks to patients and even death may occur at home. There should proper communication with the patient if he/she is hypertensive as after hemodialysis procedure. antihypersensitive drug administration may further worsen the condition and that may also increase the risk for an ischemic attack. 11% of IDH complications were because of irrational use of antihypertensive medications. Two important points were discussed after detailed hemodynamic analysis of IDH (1) just before a hypotensive episode there is no sudden decrease in extracellular fluid volume. (2) Reduced cardiac filling and thus decreased cardiac output may

lead to IDH. About 3 L of plasma volume resides in the veins, and in veins of skin and splanchnic area, that change their capacity.

Patient also experienced backache during dialysis because they were unable to move for many hours as they were restricted in a dialysis chair.

Most of the patients undergoing hemodialysis (HD) were in poor condition and thus risk of complications and also morbidity and mortality rate was increased thus some dialysis sessions may be terminated. The common complications observed were chill, decrease BP, emesis, cramps, fever and convulsions. Hypertension, not hypotension was reported unlike the other studies. It may be because of the reason that large number of patients was children having acute kidney failure and fluid overload contributes to the development of IDHHTN.

CONCLUSION

Complications were seen quite common in normal dialysis patients. Having a long history of attaining dialysis, more frequency of dialysis per week and longer time spent in a single session of dialysis were other factors associated more with side effects. It is associated with multiple complications which can be resolved and prevented by



keeping in view patient compliance, by using careful measures and skilled staff. Hemodialysis procedure requires four hours. During the study hemodialysis session of each patient was observed. The common complications which were observed during sessions were decrease in blood pressure, increase in temperature, cramps, chills, emesis, nausea, allergy and dialyzer reaction. However health care team managed the patients and complications effectively and efficiently.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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1	Yasir Mehmood	Theme, Methodology, Discussion.	
2	Umair Ashraf	Methodology & statistics analysis.	
3	Imran Ali	Statistic analysis & discussion.	