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INTRA-DIALYTIC COMPLICATIONS IN HEMODIALYSIS PATIENTS

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KEYWORDS :

INTRODUCTION:

Chronic kidney disease is becoming a rising health problem worldwide including India [1,2]End-stage renal disease (ESRD) has reached epidemic proportion with well over one million worldwide[3]. This staggering number represents only the tip of the iceberg, as the incidence of chronic kidney disease (CKD) is at least 30-fold higher than that of ESRD[4].In the context of CKD, India has emerged as a 'hotspot' that is probably representative of the burden of CKD that exists in South Asia.[5] Majority of patients of chronic kidney disease require haemodialysis, usually of 9 to 12 hours per week divided into sessions for their survival. Despite the advances made in haemodialysis equipment, dialysate water purification and dialyzers, still haemodialysis is associated with various complications though the clinical spectrum have change over decades.[6]The various complications observed during haemodialysis may be attributed to various technical problems often combined with patient's comorbidities.[7]ESRD patients in the subcontinent are younger as compared to their western counterparts. The median age of patients entering ESRD programs is 44 years in India, as compared to 52–63 years in developed countries.[11]

Acute complications of haemodialysis are defined as clinical signs and symptoms appearing during a haemodialysis session or within 24 hours after dialysis.[8] hence, the patient and the dialysis apparatus should be under supervision of nurses consistently, so that different potential complications can be detected.[21]

Based on some studies, the recorded complications of haemodialysis include Hypotension (70-80%), Muscle Cramps (60-80%), and Disequilibrium Syndrome (50-60%) Nausea and Vomiting (50%) Headache (50-60%) Chest Pain (45-50%) Itching (50%), Fever and Chills (40%).[9] However, these statistics vary in different setups.[10]

The objective of this study was to determine frequency of complications during haemodialysis, so that necessary measures could be taken to avoid subsequently. This study will supplement existing data from our country and will help contrast changing aspects of our own population as compared to other regions of the world.

MATERIAL AND METHODS:

Type of Study: - Descriptive cross-sectional study
Place of Study: - Department of General Medicine, Meenakshi Medical College Hospital & Research Institute (MMCH & RI), Enathur, Kanchipuram.

Period of Study: - Oct 2017 till Nov 2018
Sampling Method: - Non-Probability Purposive sampling
Sample Size: - 50 patients were followed up to 3350 haemodialysis sessions

INCLUSION CRITERIA:

1) All patients aged more than 18 years who underwent haemodialysis at MMC during the study period were included in the study.
2) All patients underwent conventional intermittent HD with standard low-flux membranes and a bicarbonate bath.
3) Informed consent was taken from participants of the study.

EXCLUSION CRITERIA

1) Dialysis Sessions prematurely terminated for technical reasons were excluded
2) Patients requiring emergency HD sessions having high risk for complications e.g. patients on ventilator, hemodynamic instability were not included in the study, though HD was performed.

METHOD:

A standard Questionnaire in apre-designed proformawas prepared, which to be filled by dialysis staff each time a patient showed signs / symptoms of any complication. Patient's symptoms, nurses records and physicians interventions were recorded in the proforma and analysed to sort out possible complications. Individual information recorded included age, gender, etiological factors of CKD. Vital signs were checked at the start and then hourly or whenever patient complained of being unwell. ECG was performed whenever patient complained of palpitations or heart sinking or any abnormality detected during pulse /BP examination.Patients (or accompanying family members) were advised to report all complications occurring during the 24 hours after dialysis according to a form they were provided with. Occurrence of various complications during HD i.e. fever, chest pain, muscle cramps, rigors, vomiting, itching, headache, arrhythmias, seizures, hypoglycaemic episodes (BSR <60mg/dL on glucometer) were recorded.

DEFINITIONS:

We defined hypotension as any recorded blood pressure fall equal or more than 20 mm of Hg in systolic BP from the

baseline or systolic blood pressure during the dialysis session of <90 mm Hg with or with-out symptoms[12]. Intra-dialytic hypertension was defined as an increase in mean arterial blood pressure (MAP) ≥15 mmHg during or immediately after HD or an increase in systolic BP (SBP) >10 mmHg from pre to post-dialysis systolic blood pressure[13].

ANALYSIS:

Done by using Microsoft Excel and SPSS version 21. Quantitative variables were described by using descriptive statistics while Qualitative variables were described using frequency and percentage

RESULTS:

A total of 3350 sessions were performed in 50 patients over 12 months and observed for complications. Male patients were 35 (70%) while 15 (30%) were female patients (fig-1). Age ranged from 18 years till 76 years with mean of 44.72 SD ± 14.11 (fig-2). On an average each patient received two dialysis sessions per week and each session was of 2-4 hours of duration. All patients received bicarbonate based dialysis. The mean blood flow, dialysate flow and ultrafiltration rates were 300 ml/minute, 600 mL/minute and 500ml/hour respectively. The most common complication observed was hypotension (28.65%) followed by fever (16.11%), hypertension (14.03%), nausea (9.85%), muscle cramps (6.87%), headache (5.67%), itching (5.07%), hypoglycaemia (4.78%), vomiting (4.37%), chest pain (3.88%), seizures (0.298%), and arrhythmias (0.597%) (Table-I).

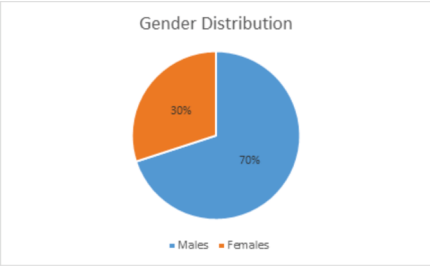

Figure 1: Gender Distribution

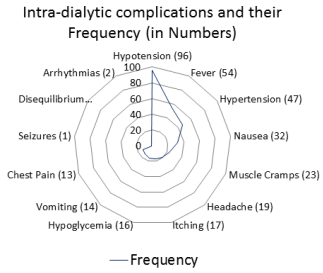

Figure 2: Intra - dialytic complications and their Frequency

Table-I: Intra-dialytic complications and their frequency.

Complication	Frequency	Percentage %
Hypotension	960	28.65
Fever	540	16.11
Hypertension	470	14.03
Nausea	320	9.85
Muscle Cramps	230	6.87
Headache	190	5.67
Itching	170	5.07
Hypoglycemia	160	4.78
Vomiting	140	4.37
Chest Pain	130	3.88
Seizures	10	0.298
Disequilibrium Syndrome	10	0.298
Arrhythmias	20	0.597
Total	3350	

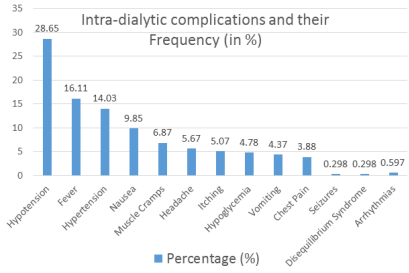

Figure 3: Intra - dialytic complications and their Frequency (in %)

DISCUSSION:

The commonest complication seen in our study was intra-dialytic hypotension (28.65%). There is a wide variation in its prevalence in different studies; however our study showed slightly less prevalence as compared to both Indian[9] and international literature[9,14,15]. This is consistent with findings in a recent study which identified intradialytic hypotension less prevalent as quoted in other studies[14].

Causes for hypotension during Haemodialysis procedure is due to removing excess of weight more than the body ideal weight, anaemia, haemorrhage, taking antihypertensive pills before dialysis, anaphylaxis, and air embolism.It is also favoured by the feeding less than 2 hours before dialysis, the higher ultrafiltration rate more than 1000 mL/hour and diabetes. Feeding less than 2 hours or during dialysis leads to blood sequestration in splanchnic vein with reduce effective blood volume and can be linked to the reduction of systemic vascular resistance[16]. Meanwhile, higher ultrafiltration generates hypovolemia, which should be normally compensated by refilling rate; the occurrence of hypotension is favoured by the inadequately refilling in these patients. The plasma refilling rate often increases in correlation with the ultrafiltration rate, depending on the hydration status to counteract intravascular volume depletion[17].Intradialytic hypotension can be managed by properly assessing dry weight of patient and accordingly adjusting ultra-filtration rate, by decreasing dialysate temperature and giving intravenous normal saline.

Fever was an important complication during haemodialysis in our setup. Mostly seen in patients having dialysis catheters. These catheters are foreign body in immune-depressed uremic patients and constitute a source of infections and are considered as well-known cause of bacteremia[18]. People with lower education may not understand the importance of infection control and poor hygiene results in an increased prevalence of infections. The most important measure to prevent catheter infection is meticulous handling of the catheter at all times. Early formation of AV fistula is another manoeuvre that can help prevent this complication.

Hypertension during dialysis is associated with high blood volume which is adjusted by daily sodium intake, amount of urine and removing excess fluid through ultrafiltration, changing to non-dialyzable antihypertensive medications which inhibit RAAS or lower Endothelin, considering switching from intravenous to subcutaneous ESA, and altering the dialysis prescription.

Painful muscles spasms are seen usually in lower extremities are associated with removal of large amounts of fluid (rapid volume contraction), getting below your dry weight, imbalances in electrolytes level (Low concentration of sodium in dialyzer may lead to increase in removal of sodium from body and may cause cramping.[19])

Headache and Itching were next common complications

encountered.Although the pathophysiology of headache is not known but it might be associated with hypo- hypertension, serum electrolyte disturbances, pre and post dialytic BUN values and decreased serum osmolarity. Itching or pruritis may be associated to sensitivity to vascular access disinfecting solutions and needles,dry skin, uraemia with elevated blood urea nitrogenor it can be simply due to patient being immobilized for several hours during the session and becoming more aware.

Intradialytic hypoglycaemia is another complications found in our study. Hypoglycaemic episode during dialysis are more common in diabetic patients, Blood glucose level fluctuates more in diabetic patients with end stage renal disease and on dialysis. Due to this fluctuation therapeutic insulin excess occur in these patients. Oral anti-hyperglycaemic agents cause less risk of hypoglycaemic episodes than patients on insulin.[20]

While nausea and vomiting can be part of dialysisrelated complications such as disequilibrium syndrome, hypotension, allergic reactions and electrolytic imbalance, they may also accompany acute coronary syndrome, cerebrovascular events and infections.

LIMITATION OF STUDY:

The main limitation of the present study relates primarily to the size of the sample this limitation arises from the fact that only few patients and chronic hemodialysis maintenance treatment in the dialysis unit at MMCH & RI, fulfilled the study criteria.

A study carried out in longer period of time would allow the inclusion of more people and so, it would perhaps make statistically significant some trends shown in the study.

CONCLUSION:

Complications are quite common during dialysis and some of the most frequent ones aren't life threatening and can be avoided with better systems in place for early detection. And many minor complications can be managed at an early stage with regular and persistent monitoring of the patient during dialysis. Also proper steps should be taken to clean the vascular access area and to strictly maintain microbe free surroundings. Even awareness among the patient about the complications and possible self-care may decrease their occurrences.

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