ELECTROLYTES DISTURBANCE IN THE PATIENT OF chronic kidney disease ON HEMODIALYSIS

Supervised by : *PROF.DR.* ALI MOUSA JAAFER AL-TAMEEMI

Submitted by ; ABDULALI AHMED YOUSEF AL-TAMEEMI

ABSTRACT

Title: ELECTROLYTES DISTURBANCE IN THE PATIENT OF chronic kidney disease ON HEMODIALYSIS
Background: Electrolytes are ionized materials found naturally in the body that help to regulate nerve and muscle function, fluid levels and help maintain proper acid or pH levels in the body. Common electrolytes include sodium, potassium, calcium, magnesium and chloride, which also help to regulate the function of many bodily systems. Imbalanced electrolyte levels may develop as a result of impaired kidney function and causing troubling symptoms.

Methods: 100 cases has been collected from hemodialysis center in general baqubah hospital, and according to their lab data and history we evaluate the electrolyte disturbance in them.
results;
increase level of potassium
decrease level of sodium
increase level of phosphate
decrease level of calcium
decrease level of magnesium some patient
increase level of magnesium in some patient
metabolic acidosis
fluid over load
conclusions;
hyperkalemia, hyponatremia, hyperphosphotemia, hypocalcaemia, hypermagnesemia, hypomagnesaemia and acidosis are commonly seen in chronic hemodialysis patients and they can lead to life-threatening complications. It is important for clinicians to monitor K,NA,PH,CA,MG , and ABG in patients with CKD on hemodialysis and resolve the complications that results from them.
Recommendations; life style modification, and regular monitoring of electrolytes and manage the complications.

INTRODUCTION

Chronic Kidney Disease (CKD) is a progressive condition characterized by the gradual loss of kidney function over time. CKD is classified based on the eGFR to different stages as detailed below:

Stages of CKD of all types		
Stage	**Qualitative Description**	**GFR (mL/min/1.73 m²)**
1	Kidney damage – normal GFR	> 90*
2	Kidney damage – mild ↓ GFR	60-89*
3a	Moderate ↓ GFR	45-59
3b	Moderate ↓ GFR	30-44
4	Severe ↓ GFR	15-29
5	End-stage renal disease	<15

*A GFR >60 mL/min/1.73 m² in isolation is not CKD, unless other evidence of kidney damage is present

CKD, chronic kidney disease; *GFR*, glomerular filtration rate

In the end stage of CKD, when kidney function is severely impaired, patients often require renal replacement therapy, such as hemodialysis, to manage
Electrolyte disturbances are common in patients with end-stage chronic kidney disease (CKD) who are undergoing hemodialysis. Hemodialysis is a renal replacement therapy that removes waste products, excess fluids, and electrolytes from the blood, but despite this, maintaining proper electrolyte balance can be challenging due to different complications that result from them. Here's an overview of electrolyte disturbances commonly encountered in end-stage CKD patients undergoing hemodialysis

AIM OF STUDY

This research aims to explore the effects of ESRD of CKD on the electrolytes of the patients on hemodialysis.

Material and method

I Initiated the research by reaching out to the professor supervising the project, seeking permission from Dayala University of Medical Sciences to commence the study.
Dayala University issued a letter to the hemodialysis center, granting approval for a qualitative exploratory study within an interpretive framework.
The observational study, centered on patients suffering from End-Stage Renal Disease (ESRD), was conducted from September 2023 to March 2024. Throughout this period, a total of 103 samples were gathered from Chronic Kidney Disease (CKD) patients undergoing hemodialysis. The data, collected based on laboratory results and patient histories, underwent multiple discussions with the supervising professor to ensure the research's success

Statics.

The statistical analysis procedure performed according to chi-square test for independence using SPSS software version 26

RESULTS:

hundred patients with CKD on hemodialysis were included and the results of electrolytes has been compared between each other, and most of CKD patient were male (n=62;62%) ,while 38 of them were female 38%.
16 (16%) of them
in teenage range of age (9-18) , 37 ,37%of them are in Young Adult aged (18-25) ,19 (19%) are in the adult age (26-60) and 26

(26%) in old adult (61 and above) , for women's (18% of them were housewives, 5% of them were teachers , 6% of them were cleaner, 6% retired from their work and 3% students. For males 28 % were solders and retired from services, 6% students , 3% are college athletics, 9% taxi driver, 3% were Grocer, 2% were Butcher, 2% are oil seller 2% are clothes seller 7% teachers.

73% of them from urban area, 37% from rural areas.

28% of patient were have uncontrolled blood pressure that lead to CKD , 33% of patient were having un control diabetic and HTN that lead CKD , 1%have polycystic kidney, 10% had kidney atrophy since birth , 7% of patients their cause was taken too much pain killer(NSAID), 9% unknown causes of CKD , 5% of patient had chemotherapy cause, 4% of patient had scleroderma cause and 5% had SLE cause

According to 100 samples that has been collected ,we have;

Age in years	Number Of cases	Number of pt with K↑	Number of pt with NA ↓	Number of pt with ph↑	Number of pt with ca ↓	Number of pt with mg↑	Number of pt with mg ↓	Metabolic acidosis
Below 18	16	14	15	16	13	8	8	17
18-25	37	35	33	35	31	20	17	36
26-60	19	18	17	18	19	9	10	19
61	26	26	24	25	25	14	12	25

and above								
Total	100	93	89	94	88	51	49	95

Table 1 show 93% 0f cases have high potassium level , 89% of cases have low sodium level , 94%of cases have high level of phosphors, 88% of cases have low calcium level , 51% of cases have high magnesium level , 49% of cases have low magnesium level , 95% of cases have metabolic acidosis

TABILE 2 The electrolytes disturbance in CKD male patients ;

Age in years	Number Of cases	Number of pt with K↑	Number of pt with NA↓	Number of pt with ph↑	Number of pt with ca↓	Number of pt with mg↑	Number of pt with mg↓	Metabolic acidosis
Below 18	7	7	6	7	5	3	4	7
18-25	21	20	21	18	17	13	8	21
26-60	16	15	14	16	15	10	6	15
61 and above	18	18	18	16	18	12	6	18
Total	62	60	58	57	55	38	24	61

TABILE 3 The electrolytes disturbances in CKD femal patients :

Age in years	Number Of cases	Number of pt with K↑	Number of pt with NA↓	Number of pt with ph↑	Number of pt with ca↓	Number of pt with mg↑	Number of pt with mg↓	Metabolic acidosis
Below 18	4	4	3	4	4	2	2	4
18-25	9	7	8	7	9	4	5	9
26-60	12	12	11	9	12	7	5	12

61 and above	10	10	10	9	9	6	4	9
Total	38	36	32	29	37	18	20	37

Discussion;

Hyperkalemia (high potassium levels) is a significant concern in CKD patients on hemodialysis due to impaired renal potassium excretion.
Patients may experience hyperkalemia between dialysis sessions, especially if they consume potassium-rich foods or medications that affect potassium levels.
Severe hyperkalemia can lead to cardiac arrhythmias and cardiac arrest, making it a life-threatening condition that requires prompt treatment.

Hyponatremia (low sodium levels) may occur in CKD patients on hemodialysis, particularly if excessive fluid removal occurs during dialysis or if there's inappropriate fluid intake.
Conversely, hypernatremia (high sodium levels) can develop if patients consume excessive amounts of sodium or if there's inadequate fluid removal during dialysis and is much less common, occurring in ~1-4% of hospital patients and , It is almost non-existent.

CKD-mineral and bone disorder (CKD-MBD) is a common complication characterized by disturbances in calcium, phosphate, and vitamin D metabolism.
Hyperphosphatemia (high phosphate levels) often occurs due to decreased renal phosphate excretion and impaired activation of vitamin D.

Hypocalcemia (low calcium levels) can result from reduced vitamin D activation and secondary hyperparathyroidism. Elevated phosphate levels can contribute to vascular calcification, bone abnormalities, and cardiovascular complications.

Hypermagnesemia (high magnesium levels) is rare in CKD patients undergoing hemodialysis due to efficient removal of magnesium during dialysis.
However, hypomagnesemia (low magnesium levels) can occur due to poor dietary intake, magnesium loss during dialysis, or medications that affect magnesium levels.
Metabolic acidosis is common in CKD patients due to decreased renal acid excretion and impaired bicarbonate production .Hemodialysis helps correct acidosis by removing accumulated acids during dialysis sessions.
CKD patients are prone to fluid overload due to decreased urine output and impaired fluid regulation.

Hemodialysis helps remove excess fluid and maintain euvolemia; however, inadequate fluid removal can lead to volume overload and hypertension, while excessive removal can cause hypotension and intradialytic complications.

CONCLUSIONS:

Electrolyte disorders are common in CKD and patients with ckd who have a tendency to develop hypervolemia, hyperkalemia, hyperphosphatemia, hypocalcemia, and bicarbonate deficiency (metabolic acidosis). And due to that the patients have to undergo several sessions of hemodialysis and according to the information's that has been collected 98% of cases have hemodialysis sessions three times in the week and each sessions continue for around 3-4 hours in the day.

RECOMEDATIONS:

Management of electrolyte disturbances in end-stage CKD patients undergoing hemodialysis involves regular monitoring of electrolyte levels, dietary restrictions, adjustments in dialysis prescriptions, and medication management. Healthcare providers must individualize treatment approaches based on patients' clinical status, comorbidities, and dialysis parameters to prevent complications and optimize outcomes