International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 7; Issue 6(K); June 2018; Page No. 13806-13811
DOI: http://dx.doi.org/10.24327/ijcar.2018.13811.2480

Research Article

ELECTROLYTE IMBALANCES IN CANCER PATIENTS DURING CHEMOTHERAPY, A TERTIARY CARE CENTER EXPERIENCE FROM PAKISTAN

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A R T I C L E I N F O

Article History:

Received 12th March, 2018
Received in revised form 24th April, 2018 Accepted 5th May, 2018
Published online 28th June, 2018

Key words:

Hyponatremia, hypokalemia, hypochloremia, hypomagnesaemia, chemotherapy, cancer

A B S T R A C T

Introduction: During chemotherapy for treatment of cancer lead to some degree of electrolyte derangement, but exact frequency and type of electrolyte imbalances has not been well documented. Therefore we wanted to conduct this study.
Objective: To see frequency of electrolyte imbalances among cancer patients during Chemotherapy.
Material and methods: This is a cross sectional observational study which was conducted from 1st April 2016 to 30 Mar 2017inthe Department of Oncology, Jinnah Postgraduate Medical Centre, Karachi after obtaining approval from institutional ethical review committee. 256 cancer patients, age range 18-70 years who received single or combination chemotherapy were included.
Results: In the total of 256 cancer patients divided into 12 groups depending upon chemotherapeutic regimen, the overall incidence of hyponatremia was 52.7%, for hypokalemia was 42.2%, for hypochloremia was 14.8% and for hypomagnesaemia was 10.2%. The mean age in all groups ranged from 27.42±8.92 years to 49.50±11.71 years. (P-value=0.001). The mean weight in all groups ranged from 50.10±18.57 kg to 64.58±13.95 kg. (P-value=0.03). The mean chemotherapy days in all groups ranged from 4.97±1.44 days to 8.52±3.70 days. (P-value=0.001).
Conclusion: Our study showed that electrolyte imbalances common during chemotherapy and medical oncologist should monitor their levels while on chemotherapy.

INTRODUCTION

Electrolyte disorders are commonly encountered in the patient with cancer. In most cases, these disorders are associated with etiologies seen in all types of patients and are not specifically linked to the malignancy or its therapy (for example, diuretic-induced hyponatremia or hypokalemia).(1) In other cases, electrolyte disorders are due to paraneoplastic syndromes or are specifically associated with chemotherapeutic regimens. (2) When these malignancy-specific electrolyte disorders are manifested, they can lead to life-threatening complications that require emergent therapy.

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Thus, proper recognition and treatment of these disorders is important in the overall care of the patient with cancer.(3) Hyponatremia is the most common electrolyte disorder encountered in patients with malignancies. Approximately 14% of hyponatremia encountered medical inpatients is due to an underlying malignancy-related condition.(4) It is important to note that nearly half of these cases represented hospital-acquired hyponatremia, suggesting that management of these patients with intravenous fluids significantly contributes to the development of hyponatremia.(5) Hyperkalemia in the patient with cancer is often attributable to acute kidney injury, rhabdomyolysis, or tumor lysis syndrome. (6) Less common causesinclude adrenalinsufficiency associated with metastatic disease or drugs such as ketoconazole, metapyrone, calcineurin inhibitors in stem cell transplant patients, nonsteroidal anti-inflammatory agents, trimethoprim, and heparin.(7) Hypokalemia is the second most common electrolyte disorder

encountered in the patient with cancer. (8) In most cases, the etiology of hypokalemia is multifactorial and includes medicationsuch as cisplatin, ifosfamide, amphotericin B, and aminoglycoside antibiotics that can cause tubular damage as well as gastrointestinal and kidney losses of potassium. (9) Hypokalemia is also commonly seen in conjunction with other electrolyte disorders such as hyponatremia and hypomagnesemia and reflects the underlying etiologies such as diuretic use. Patients with calcium levels greater than 11 mg/dl may also develop hypokalemia due to the effect of using diuretics.(10) Although rare, and described primarily in case reports, some malignancies are associated with decreased calcium.(11) The tumors are usually metastatic to bone and have osteoblastic activity. Hypomagnesemia can be associated in patients with cancer, although this disturbance is generally the result of therapy rather than being due to the underlying disease state. (12)

Electrolyte abnormalities are common and complicate the care of cancer patients. These abnormalities often have known etiologies and can be anticipated and managed when diagnosed early and accurately. By effectively managing electrolyte disturbances, consultants will hopefully be able to impart a more consistent and effective therapeutic regimen to cancer patients. The Objective of our study was to compare the effect of different chemotherapeutic drugs on the electrolytes among cancer patients undergoing chemotherapy in Oncology Department of Jinnah Postgraduate Medical Centre, Karachi.

METHODOLOGY

This is an observational study and samples were collected using non-probability convenient sampling technique in which a total of 256 patients who received chemotherapy in the department of oncology the Jinnah Postgraduate Medical Centre, Karachiwere included. Study was approved by Hospital's Ethical Review Committee. This study was conducted from 1st April 2016 to 30 March 2017**.** Patients required to have histological diagnosis of cancer and must be receiving chemotherapy. Patients age ranged between 17 to 70 years, having adequate renal, liver, cardiacfunction and normal electrolytes as baseline value, and patients with baseline electrolyte imbalances were first corrected before enrolling into the study while patients with significant neurological, hepatic, renal and cardiac abnormalities were excluded. Those patients who were not candidate of chemotherapy due to poor performance status and patients on total parenteral nutrition also excluded.

Data were collected from all eligible patients through proforma and followed them till 3 weeks after completion of a complete chemotherapy regimen. Independent variables included age, weight, height, gender and body surface area. The variables included type of cancer, chemotherapy protocol, and number of days of chemotherapy, sodium, potassium, magnesium and chloride.A total of 12 groups were made based on the chemotherapy protocol. Group 1 included patients on taxotere, cisplatin and fluorouracil (TPF). Group 2 included patients on concurrent chemoradiotherapy (CCRT) with cisplatin.Group 3 included patients on concurrent chemoradiotherapy (CCRT) with cisplatin and flurouracil. Group 4 included patients on oxaliplatin, leucovorin, fluorouracil (FOLFOX). Group 5 included patients on adriamycin and cyclophosphamide (AC). Group 6 included patients on cisplatin and gemcitabine. Group 7 included patients on Carboplatin plus Paclitaxel. Group 8 included patients on cisplatin and etoposide. Group 9 included patients on daunorubicin, vincristine, prednisone, L-asparaginase (DVPL). Group 10 included patients on daunorubicin and cytarabine(3+7). Group 11 included patients on cyclophosphamide, hydroxydaunorubicin, oncovin and prednisone (CHOP). Group 12 included patients on adriamycin, bleomycin, vinblastine and dacarbazine (ABVD). Data was analysed using SPSS version 20. Descriptive statistics of demographic variables were presented as mean, standard deviation and frequency in percentages. The variables like age, height, weight, body surface area were recorded. Independent variables included sodium, potassium, chloride, magnesium. P-value of less than 0.05 was considered as significant.

RESULTS

In a total of 256 patients on chemotherapy, divided into 12 groups, the highest mean age was reported in group 8 i.e. 49.62 ± 14.83 years and lowest mean age was found in group 9 i.e. 27.42 ± 8.92 years.(p-value 0.001) The highest mean weight was recorded in group 12, i.e. 64.58 ± 13.95 kg and lowest mean weight in group 10 to be 50.10 ± 18.57 kg (p-value 0.03) Highest mean height was present in group 4, 162.41 ± 11.10 cmand lowest mean height in group 7, 152.65 ± 18.46 cm(p-value 0.19) Highest mean body surface area was found in group 12, 1.67 ± 0.18$m^2$and lowest mean body surface area in group 1.51 ± 0.16 m^2 .(p-value 0.17) The highest mean chemotherapy days was present in group 9, 8.52 ± 3.70 days and lowest mean chemotherapy days in 4.97 ± 1.44 days.(p-value 0.001) (Table:-1)

Table 1 Basic demographic variables associated with each group

Variables	Groups	n	Mean	Standard Deviation	P-Value
Age (Years)	Group 1	39	42.43	10.54	<0.001
	Group 2	40	49.50	11.71	
	Group 3	24	46.25	13.95	
	Group 4	12	42.83	8.73	
	Group 5	27	42.14	8.34	
	Group 6	10	44.30	11.92	
	Group 7	29	47.00	13.20	
	Group 8	16	49.62	14.83	
	Group 9	19	27.42	8.92	
	Group 10	10	29.70	10.44	
	Group 11	18	40.66	12.59	
	Group 12	12	43.08	10.84	
Weight (kg)	Group 1	39	54.23	12.49	0.028
	Group 2	40	54.80	6.71	
	Group 3	24	54.25	11.49	
	Group 4	12	57.91	13.50	
	Group 5	27	60.14	6.23	
	Group 6	10	61.40	5.71	
	Group 7	29	54.51	10.08	
	Group 8	16	59.25	10.68	
	Group 9	19	54.39	12.22	
	Group 10	10	50.10	18.57	
	Group 11	18	53.50	13.47	
	Group 12	12	64.58	13.95	
Height (cm)	Group 1	39	160.15	13.04	0.191
	Group 2	40	159.87	6.48	
	Group 3	24	156.87	7.4	
	Group 4	12	162.41	11.10	
	Group 5	27	155.37	5.97	
	Group 6	10	161.00	9.11	
	Group 7	29	153.65	18.46	
	Group 8	16	159.50	8.57	
	Group 9	19	157.94	9.41	
	Group 10	10	156.60	6.75	
	Group 11	18	159.38	8.54	
	Group 12	12	161.91	6.43	

Variables	Groups	n	Mean	Standard Deviation	P-Value
Body Surface Area (m^2)	Group 1	39	1.53	0.20	0.172
	Group 2	40	1.54	0.11	
	Group 3	24	1.51	0.16	
	Group 4	12	1.63	0.19	
	Group 5	27	1.59	0.08	
	Group 6	10	1.61	0.09	
	Group 7	29	1.52	0.17	
	Group 8	16	1.58	0.20	
	Group 9	19	1.55	0.19	
	Group 10	10	1.50	0.21	
	Group 11	18	1.55	0.20	
	Group 12	12	1.67	0.18	
Chemotherapy (Days)	Group 1	39	6.02	2.14	<0.001
	Group 2	40	4.97	1.44	
	Group 3	24	5.29	1.92	
	Group 4	12	5.83	1.26	
	Group 5	27	5.85	1.19	
	Group 6	10	6.00	1.33	
	Group 7	29	5.41	2.07	
	Group 8	16	6.31	2.72	
	Group 9	19	8.52	3.70	
	Group 10	10	7.70	2.45	
	Group 11	18	6.61	3.72	
	Group 12	12	5.58	1.50	

Frequency and percentage of Sodium (Na) in all groups was normal in majority of patients before chemotherapy. While after chemotherapy, with respect to each group, group 1 had 33 (84.6%) patients with reduced Na. In group 2, 28 (70%) patients had reduced Na. In group 3, 19 (97.2%) patients had reduced Na. In group 4, 06 (50%) patients had reduced Na. In group 5, 01 (3.7%) patients had reduced Na. In group 6, 07 (70%) patients had reduced Na. In group 7, 07 (24.1%) patients had reduced Na. In group 8, 05 (31.3%) patients had reduced Na. In group 9, 12 (63.2%) patients had reduced Na. In group 10, 06 (60%) patients had reduced Na. In group 11, 05 (27.8%) patients had reduced Na. In group 12, 06 (50%) patients had reduced Na. (Table:-2)

Table 2 Frequency of Sodium level variations before and after start of chemotherapy

			Sodium			
			Before		After	
			n	%	n	%
Group 1 (n=39)	Reduced	<135	0	0	33	84.6
	Normal	135-145	39	100	6	15.4
	Increased	>145	0	0	0	0
Group 2 (n=40)	Reduced	<135	0	0	28	70
	Normal	135-145	39	97.5	12	30
	Increased	>145	1	2.5	0	0
Group 3 (n=24)	Reduced	<135	1	4.2	19	97.2
	Normal	135-145	23	95.8	5	20.8
	Increased	>145	0	0	0	0
Group 4 (n=12)	Reduced	<135	0	0	6	50
	Normal	135-145	12	100	6	50
	Increased	>145	0	0	0	0
Group 5 (n=27)	Reduced	<135	0	0	1	3.7
	Normal	135-145	27	100	26	96.3
	Increased	>145	0	0	0	0
Group 6 (n=10)	Reduced	<135	0	0	7	70
	Normal	135-145	10	100	3	30
	Increased	>145	0	0	0	0
Group 7 (n=29)	Reduced	<135	0	0	7	24.1
	Normal	135-145	29	100	22	75.9
	Increased	>145	0	0	0	0
Group 8 (n=16)	Reduced	<135	0	0	5	31.3
	Normal	135-145	16	100	11	68.8
	Increased	>145	0	0	0	0
Group 9 (n=19)	Reduced	<135	0	0	12	63.2
	Normal	135-145	19	100	6	31.6
	Increased	>145	0	0	1	5.3
Group 10 (n=10)	Reduced	<135	1	10	6	60
	Normal	135-145	9	90	4	40
	Increased	>145	0	0	0	0
Group 11 (n=18)	Reduced	<135	0	0	5	27.8
	Normal	135-145	18	100	13	72.2
	Increased	>145	0	0	0	0
Group 12 (n=12)	Reduced	<135	0	0	6	50
	Normal	135-145	12	100	6	50
	Increased	>145	0	0	0	0

Frequency and percentage of Potassium (K) in all groups was in majority of patients, normal before chemotherapy. While after chemotherapy, in group 1, 29 (74.4%) patients had reduced K. In group 2, 20 (50%) patients had reduced K. In group 3, 20 (83.3%) patients had reduced K. In group 4, 02 (16.7%) patients had reduced K. In group 5, all patients had normal K. In group 6, 06 (60%) patients had reduced K. In group 7, 08 (27.6%) patients had reduced K. In group 8, 03 (18.8%) patients had reduced K. In group 9, 11 (57.9%) patients had reduced K. In group 10, 05 (50%) patients had reduced K. In group 11, 04 (22.2%) patients had reduced K while 10 (55.6%) had normal K and 04 (22.2%) had increase K. In group 12, 11 (91.7%) patients had normal K while only 01 (8.3%) had increased K.(Table:-3)

Table 3 Frequency of Potassium level variations before and after start of chemotherapy

			Potassium			
			Before		After	
			n	%	n	%
Group 1 (n=39)	Reduced	<3.5	1	2.6	29	74.4
	Normal	3.5-5.0	38	97.4	10	25.6
	Increased	>5	0	0	0	0
Group 2 (n=40)	Reduced	<3.5	1	2.5	20	50
	Normal	3.5-5.0	39	97.5	20	50
	Increased	>5	0	0	0	0
Group 3 (n=24)	Reduced	<3.5	0	0	20	83.3
	Normal	3.5-5.0	24	100	4	16.7
	Increased	>5	0	0	0	0
Group 4 (n=12)	Reduced	<3.5	0	0	2	16.7
	Normal	3.5-5.0	12	100	10	83.3
	Increased	>5	0	0	0	0
Group 5 (n=27)	Reduced	<3.5	0	0	0	0
	Normal	3.5-5.0	27	100	27	100
	Increased	>5	0	0	0	0
Group 6 (n=10)	Reduced	<3.5	0	0	6	60
	Normal	3.5-5.0	10	100	4	40
	Increased	>5	0	0	0	0
Group 7 (n=29)	Reduced	<3.5	0	0	8	27.6
	Normal	3.5-5.0	29	0	21	72.4
	Increased	>5	0	0	0	0
Group 8 (n=16)	Reduced	<3.5	0	0	3	18.8
	Normal	3.5-5.0	16	100	13	81.3
	Increased	>5	0	0	0	0
Group 9 (n=19)	Reduced	<3.5	0	0	11	57.9
	Normal	3.5-5.0	19	100	7	36.8
	Increased	>5	0	0	1	5.3
Group 10 (n=10)	Reduced	<3.5	0	0	5	50
	Normal	3.5-5.0	10	100	4	40
	Increased	>5	0	0	1	10
Group 11 (n=18)	Reduced	<3.5	0	0	4	22.2
	Normal	3.5-5.0	17	94.4	10	55.6
	Increased	>5	1	5.6	4	22.2
Group 12 (n=12)	Reduced	<3.5	0	0	0	0
	Normal	3.5-5.0	12	100	11	91.7
	Increased	>5	0	0	1	8.3

Frequency and percentage of (Cl) in all groups was in majority of patients, normal before chemotherapy. While after chemotherapy, in group 1, 10 (25.6%) patients had reduced Cl while 29 (74.7%) had normal Cl. In group 2, 09 (22.5%) patients had reduced Cl. In group 3, 04 (16.7%) patients had reduced Cl. In group 4, 01 (8.3%) patients had reduced Cl. In group 5, 26 patients (96.3%) had normal Cl except 01 (3.7%)

had increased Cl In group 6, 01 (10%) patient had reduced Cl. In group 7, 02 (6.9%) patients had reduced Cl. In group 8, 02 (12.5%) patients had reduced Cl. In group 9, 06 (31.6%) patients had reduced Cl. In group 10, 02 (20%) patients had reduced Cl l. In group 11, 01 (5.6%) patients had reduced Cl. In group 12, 11 (91.7%) patients had normal Cl while only 01 (8.3%) had increased Cl.(Table:-4)

Table 4 Frequency of Chloride level variations before and after start of chemotherapy

			Chloride			
			Before		After	
			n	%	n	%
Group 1 (n=39)	Reduced	<97	0	0	10	25.6
	Normal	97-107	38	97.4	29	74.4
	Increased	>107	1	2.6	0	0
Group 2 (n=40)	Reduced	<97	0	0	9	22.5
	Normal	97-107	40	100	31	77.5
	Increased	>107	0	0	0	0
Group 3 (n=24)	Reduced	<97	0	0	4	16.7
	Normal	97-107	23	95.8	20	83.3
	Increased	>107	1	4.2	0	0
Group 4 (n=12)	Reduced	<97	0	0	1	8.3
	Normal	97-107	12	100	11	91.7
	Increased	>107	0	0	0	0
Group 5 (n=27)	Reduced	<97	0	0	0	0
	Normal	97-107	27	100	26	96.3
	Increased	>107	0	0	1	3.7
Group 6 (n=10)	Reduced	<97	0	0	1	10
	Normal	97-107	10	100	9	90
	Increased	>107	0	0	0	0
Group 7 (n=29)	Reduced	<97	0	0	2	6.9
	Normal	97-107	29	100	27	93.1
	Increased	>107	0	0	0	0
Group 8 (n=16)	Reduced	<97	0	0	2	12.5
	Normal	97-107	16	100	14	87.5
	Increased	>107	0	0	0	0
Group 9 (n=19)	Reduced	<97	0	0	6	31.6
	Normal	97-107	19	100	13	68.4
	Increased	>107	0	0	0	0
Group 10 (n=10)	Reduced	<97	0	0	2	20
	Normal	97-107	10	100	8	80
	Increased	>107	0	0	0	0
Group 11 (n=18)	Reduced	<97	0	0	1	5.6
	Normal	97-107	18	100	17	94.4
	Increased	>107	0	0	0	0
Group 12 (n=12)	Reduced	<97	0	0	0	0
	Normal	97-107	12	100	11	91.7
	Increased	>107	0	0	1	8.3

Frequency and percentage of (Mg) in all groups was in majority of patients, normal before chemotherapy. While after chemotherapy, in group 1, 12 (30.8%) patients had reduced Mg. In group 2, 04 (10%) patients had reduced Mg. In group 3, 06 (25%) patients had reduced Mg. In group 6, 01 (10%) patient had reduced Mg. In group 7, 01 (3.4%) patients had reduced Mg. In group 8, 01 (6.3%) patients had reduced Mg. In group 9, 16 (84.2%) patients had reduced Mg. In group 11, 01 (5.6%) patients had reduced Mg and 04 (22.2%) had increased Mg. In group 4, 5, 10 and 12, all patients had normal Mg. (Table:-5)

Table 5 Frequency of Magnesium level variations before and after start of chemotherapy

			Magnesium			
			Before		After	
			n	%	n	%
Group 1 (n=39)	Reduced	<1.5	0	0	12	30.8
	Normal	1.5-2.5	38	97.4	27	69.2
	Increased	>2.5	1	2.6	0	0
Group 2 (n=40)	Reduced	<1.5	0	0	4	10
	Normal	1.5-2.5	40	100	36	90
	Increased	>2.5	0	0	0	0
Group 3 (n=24)	Reduced	<1.5	0	0	6	25
	Normal	1.5-2.5	24	100	18	75
	Increased	>2.5	0	0	0	0
Group 4 (n=12)	Reduced	<1.5	0	0	0	0
	Normal	1.5-2.5	12	100	12	100
	Increased	>2.5	0	0	0	0
Group 5 (n=27)	Reduced	<1.5	0	0	0	0
	Normal	1.5-2.5	27	100	27	100
	Increased	>2.5	0	0	0	0
Group 6 (n=10)	Reduced	<1.5	0	0	1	10
	Normal	1.5-2.5	10	100	9	90
	Increased	>2.5	0	0	0	0
Group 7 (n=29)	Reduced	<1.5	0	0	1	3.4
	Normal	1.5-2.5	29	100	28	96.6
	Increased	>2.5	0	0	0	0
Group 8 (n=16)	Reduced	<1.5	0	0	1	6.3
	Normal	1.5-2.5	16	100	15	93.8
	Increased	>2.5	0	0	0	0
Group 9 (n=19)	Reduced	<1.5	0	0	16	84.2
	Normal	1.5-2.5	19	100	3	15.8
	Increased	>2.5	0	0	0	0
Group 10 (n=10)	Reduced	<1.5	0	0	0	0
	Normal	1.5-2.5	10	100	10	100
	Increased	>2.5	0	0	0	0
Group 11 (n=18)	Reduced	<1.5	0	0	1	5.6
	Normal	1.5-2.5	18	100	13	72.2
	Increased	>2.5	0	0	4	22.2
Group 12 (n=12)	Reduced	<1.5	0	0	0	0
	Normal	1.5-2.5	12	100	12	100
	Increased	>2.5	0	0	0	0

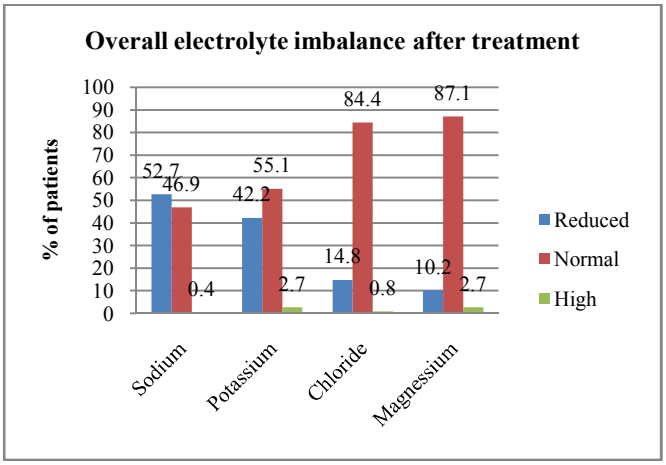

Figure 1 Overall percentage of electrolyte imbalance after treatment with chemotherapeutic drugs.

DISCUSSION

In our study of 256 cancer patients on chemotherapy divided into 12 groups depending upon the chemotherapeutic drugs used. The overall incidence of hyponatremia in our study prior to the start of chemotherapy was 8%. While after chemotherapy, 52.7% of patients were reported to have hyponatremia. The overall incidence of hypokalemia in our study prior to the start of chemotherapy was 8%. While after chemotherapy, 42.2% of patients developed hypokalemia.All patients in our study before the start of chemotherapy had

normal chloride and magnesium levels However after chemotherapy, 14.8% and 10.2% of patients developed hypochloremia and hypomagnesaemia respectively.

The incidence of hyponatremia has stretched from as low as 4 % to about 47 %. (13, 14)In a study by Verbalis JG *et al* is proportionate to the hyponatremia prevalence rates of 15%–30% reported for general medicine admissions. (15)In another study by Hutchison FN *et al* is a common etiology for hyponatremia in the hospitalized patient, accountingfor 14% of cases (16). A study by Castillo JJ *et al*., reported that hyponatremia was significantly associated with metabolic derangements as it ranged between 46-54% (17) Our study falls in line with the above studies showing an overall similar percentage of hyponatremia, i.e. 52.7%. In a study by Gill G *et al*., in which Cisplatin, a antineoplastic agent was linked to hyponatremia through a mechanism that involved salt wasting at the loop of Henle. 10% of these patients on cisplatin therapy developed hyponatremia with a high urine sodium concentration but with profound volume depletion.(18) On the contrary in our study , hyponatremia with use of cisplatin in group 1 , 10 and 11 of our study showed higher rate of hyponatremias, 84%, 60% and 28% respectively. Reason for this might be the use of cisplatin in combination with other chemotherapeutic drugs in our study. The prevalence of hypokalemiahas been reported by Filippatos TD *et al*., to range between 43% and 64% (19). In accordance with this, our study showed a similar percentage of hypokalemia, i.e. 42.2%. In a study by Alexandraki KI*et al*., cancer-specific causes of hypokalemiawere reported to betumorswhich secrete ectopic adrenocorticotropin hormone(ACTH) such as SCLC, thymus or bronchial carcinoid, thyroid medullary carcinoma, or neuroendocrine tumors.Although uncommon, these tumors stimulate renal potassium wasting via excessive cortisol release that activates the mineralo-corticoid pathway. The potassium losses in these cases may be profound and require aggressive replacement. (20) The choices for replacement are the same as those utilized for hypokalemia in the non-cancer patient, but it should be noted that given the difficulty cancer patients may have with oral intake due to nausea, mucositis, etc., intravenous dosing is often necessary.(21) Hypokalemia treatment is also ineffective if hypomagnesemia remains uncorrected, due to unchecked potassium losses via the renal outer medullary K1 channel (ROMK) channel in distal nephron tubular cells (22). Hypomagnesemia in cancer patient may be due to decreased intake or from renal magnesium wasting. Renal losses of magnesium are principally due to chemotherapy-mediated injury to the distal nephron, the site of active magnesium reabsorption in the nephron (23) In a study by Shaikh AJ*et al* reported the electrolyte imbalances of hypokalemia, on an overall scale whether be it any grade of cancer or type of chemotherapeutic drugs used to be present in 48% of patients.Hyponatremia was documented in 67.9% patients and hypomagnesaemia was recorded in 54.3% patient. (27) In relation to this in our study, we had found that 52.7% cancer patients had hyponatremia, 42.2% had hypokalemia and 10.2% were reported to have hypomagnesemia after chemotherapy.

The overall findings in the studies mentioned above clearly state a wide range of electrolyte imbalance in different chemotherapeutic combinations which are consistent with findings in our study.

The qualitative and quantitative approach of our study has assured that we have assessed the extensive range of electrolyte imbalances in cancer patients. However, the study might not be immune from selection and observer bias. Considering the views of our observations and to what extent they are consistent with the different chemotherapeutic regimens would be revealing to discover more facts about the electrolyte imbalances in patients receiving chemotherapy.

CONCLUSION

Our study shows that in significant number of patients during chemotherapy develop electrolyte imbalances mainly sodium and potassium followed by magnesium and chloride. This is the first study of its kind in our center addressing importance of monitoring electrolyte during chemotherapy to avoid serious consequences.

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How to cite this article:

Reena Kumari *et al* (2018) 'Electrolyte Imbalances in Cancer Patients During Chemotherapy, A Tertiary Care Center Experience From Pakistan', *International Journal of Current Advanced Research,* 07(6), pp. 13806-13811.
DOI: http://dx.doi.org/10.24327/ijcar.2018.13811.2480

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