

Serum Electrolytes Levels in Patients with Alcohol Dependence Syndrome

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ABSTRACT

Introduction: Alcohol is one of the factors that can affect renal functions directly or indirectly as a consequence of liver diseases. Impairment of renal tubular functions can contribute to variations in serum electrolytes. The aim of this study is to evaluate frequency of serum electrolytes levels in inpatients with alcohol dependence syndrome and to study the relationship of serum electrolytes with the clinical variables of alcohol dependence.

Material and Methods: This is an observational, descriptive, cross sectional clinical study conducted on one hundred consecutive patients with ICD10 diagnosis of Alcohol Dependence Syndrome admitted to the deaddiction centre, Department of Psychiatry, Father Muller Medical College Mangalore. Laboratory investigations were done for all inpatients to assess for renal parameters and serum electrolytes levels. Medical diagnoses were based on clinical findings and examination. The data of 100 patients were analyzed using chi-square test, Fischer's Exact Test and Karl Pearson co-relation co-efficient.

Results: Of the 100 patients with alcohol dependence syndrome 4% of individuals have increased serum urea levels and 14% have increased serum creatinine levels. Hyponatraemia is noted in 46% of individuals and hypochloremia is noted in 24% of individuals with alcohol dependence syndrome. Hypokalemia is noted in 67% of subjects with alcohol dependence syndrome. Statistically significance difference is noted in association of hypokalemia with amount of alcohol consumption. ($P=0.03$)

Conclusion: Variations in serum electrolyte levels are observed in individuals with alcohol dependence syndrome. Serum electrolyte abnormalities when undetected play a significant role on mortality and morbidity. Early recognition of the serum electrolyte abnormalities is of paramount importance for their appropriate management. Our findings indicate the need for assessment of renal functions and serum electrolytes in individuals with alcohol dependence syndrome.

Keywords: Alcohol Dependence Syndrome, Serum Electrolytes, Renal functions.

INTRODUCTION

Alcohol related changes are observed in the structure and functions of the kidneys and impairment in their ability to regulate the volume and composition of fluid and electrolytes in the body. Individuals with alcohol dependence may experience low blood concentrations of electrolytes as well as potentially severe alterations in the body's acid-base balance.¹ Chronic alcohol use decreases the renal tubular reabsorption and reduces renal functions. Multiple functional abnormalities of renal tubules may be associated with alcohol induced changes in membrane composition and lipid peroxidation.² The effects of alcohol on electrolytes are biphasic. Alcohol induced water diuresis is short lived and followed by a period of fluid retention. When the metabolic and hormonal alterations perturb homeostatic mechanisms, the effects become clinically

manifested.³

In a longitudinal prospective cohort study of 11,023 alcohol dependent men who were followed up after 14 years, the main outcome measures were elevated creatinine levels and reduced estimated glomerular filtration rates. After 14 years, 473 men (4.3%) had elevated creatinine levels and 1296 (11.8%) had reduced glomerular filtration rates.⁴ Researchers have observed increased serum urea and serum creatinine values in individuals with alcohol dependence syndrome.⁵ In a study comparing 50 subjects with alcohol dependence syndrome with 50 healthy controls observed no statistically significant difference in the serum urea and serum creatinine values between the two groups.⁶ Several researchers have observed no significant increase in serum urea and serum creatinine level although estimated glomerular filtration rate was reduced in individuals with alcohol dependence syndrome.⁷⁻¹⁰ Researchers have reported that the subjects with alcohol dependence had significantly higher levels of serum uric acid, serum creatinine and eGFR values than non-alcoholics. Chronic alcohol consumption was significantly associated with a higher level of serum creatinine and eGFR.^{11,12}

A study on metabolic parameters of blood and renal functions before and after four weeks of abstinence in 61 patients with alcohol dependence syndrome found that on admission 30% of subjects had hypophosphatemia and hypomagnesemia, 21% had hypocalcemia and 13% had hypokalemia. The metabolic abnormalities and renal tubular functions improved after four weeks of abstinence. It was observed that the transient defects in renal tubular functions were common in patients with alcohol dependence syndrome and may contribute to their abnormalities of serum electrolytes and blood acid-base profiles.¹³ Research on metabolic abnormalities assessed in 33 patients admitted with alcohol dependence withdrawal state uncomplicated reported that the phosphaturia which was rapidly reversible after alcohol withdrawal and inversely correlated with albuminemia, hyponatremia, elevated CPK level and hyperuricemia with rapid normalization.¹⁴ It was also observed that the hypokalemia and hyponatremia were common electrolytes derangement and may occur subsequent to several mechanisms mediated by alcohol

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toxicity.¹⁵

In a cross-sectional study conducted on 90 patients with alcohol dependence compared with 90 normal healthy controls, the mean values of serum sodium and potassium was lower in cases (133.58 ± 7.8 , sodium and 3.64 ± 0.65 , potassium) as compared to controls (139.43 ± 3.85 , sodium and 4.15 ± 0.43 , potassium) with the significant correlation in both groups. It was noted that hyponatremia and hypokalemia was the most common electrolyte abnormalities observed in patients with alcohol dependence syndrome.¹⁶ Researchers observed that in individuals with alcohol dependence syndrome electrolytes abnormalities was noted during the withdrawal state and the levels of serum potassium was frequently low, cardiac arrhythmias and alterations in the ST segment, T and U waves in the electrocardiograms was also common.¹⁷ A study conducted on 30 patients with alcohol dependence syndrome found variations in serum electrolytes levels; 60% of the serum magnesium levels, 30 % of the serum potassium levels and 20% of the serum calcium levels was below the normal range. It was also noted that approximately one-third of the patients had hypernatremia and hyperchloremia.¹⁸ Researchers have observed that subjects with alcohol dependence without liver damage showed significant sodium retention than alcohol dependence with liver damage. Blood and plasma volume was significantly higher in the alcohol withdrawal group. Reduced serum potassium and systemic alkalosis was noted in individuals with alcohol dependence syndrome in withdrawal state.¹⁹ A comparative study conducted on 45 individuals with alcohol dependence syndrome with withdrawal convulsions and 25 controls without withdrawal seizure found that in the seizure group significantly lower magnesium, potassium and calcium levels than non seizure controls.²⁰

Several studies have reported hyponatraemia was common in patients with alcohol dependence syndrome. In a cohort of 127 patients with alcohol dependence syndrome hyponatraemia (serum sodium <134 mmol/l) was found in 17.3% of patients. The most common cause of hyponatraemia was hypovolaemia.²¹ In a study conducted researchers concluded that the renal tubular defects contribute to the abnormalities of serum electrolytes in individuals with alcohol dependence syndrome. Serum magnesium levels were decreased, serum sodium levels was increased, serum potassium levels decreased whereas serum chloride levels were not significantly altered in patients with alcohol dependence syndrome. Hypokalemia was relatively a common electrolyte abnormality observed in patients with alcohol dependence.²² Researchers reported that serum potassium levels was significantly lower in alcohol dependence syndrome patients compared to the control population (3.8 ± 1.1 mmol/l vs. 4.6 ± 0.9 mmol/l).²³ Study conducted found that the most frequent electrolyte disturbance in patients with alcohol dependence withdrawal state was hyponatremia(72.8%), hypomagnesemia(29.8%) and hypokalemia(28.9%). It was also observed that patients with delirium tremens most frequently had hypokalemia.²⁴

Study aimed to evaluate frequency of serum electrolytes in patients with alcohol dependence syndrome and to study the relationship of serum electrolytes with clinical variables of alcohol dependence syndrome.

MATERIAL AND METHODS

The clinical study was conducted in the deaddiction centre, Department of Psychiatry, Father Muller Medical College, Mangalore. All patients admitted in the deaddiction centre from July 2012 to December 2012 constituted the population for the investigation. One hundred consecutive inpatients who satisfied the inclusion and exclusion criteria were selected as the sample for the study. The inclusion criteria were inpatients with ICD DCR-10 diagnosis of Alcohol Dependence Syndrome, age group between 20 to 60 years, male patients. Patients with substance dependence other than nicotine, presence of comorbid psychiatric disorders, patients with medical comorbidity and pre existing renal and metabolic abnormalities were excluded from the study. For the present study, specially designed proforma was used to collect and document the sociodemographic and clinical data of alcohol dependence. The Socio Economic Status Schedule [SESS - Sodhi and Sharma 1986] was used to assess the socioeconomic status of the patients. Laboratory investigations of serum urea, serum creatinine was assessed to screen for renal functions. Assessment for serum electrolyte levels in patients admitted with alcohol dependence syndrome included the laboratory investigations of serum sodium, serum potassium and serum chloride level estimation.

Procedure

The present investigation is an observational, descriptive, cross sectional clinical study. This study was cleared by the institutional ethical committee. The design and nature of the clinical study was explained to the patients and to significant relatives of patients. A written informed consent was obtained from all the subjects. All the patients (n=100) were subjected to a thorough clinical examination which included physical and Mental Status Examination. When indicated extended neurological examination was carried out to rule out neurobehavioral disorders. The sociodemographic data was collected and recorded in the specially designed proforma. The socioeconomic class was assessed using the Socio Economic Status Schedule. Venous blood samples for laboratory investigations were sent on the day one of inpatient care. This included venous blood samples for serum urea, serum creatinine, serum sodium, serum potassium and serum chloride levels estimation. The diagnosis of renal diseases and metabolic abnormalities was confirmed by consultants from nephrology and general medicine.

STATISTICAL ANALYSIS

Statistical analysis was performed with SPSS Version 23.0 statistic software package. Collected data were analyzed by frequency, percentage, mean, standard deviations. The data was further analyzed using chi-square test, Fischer's Exact Test and Karl Pearson co-relation co-efficient.

RESULTS

Of the 100 patients assessed with alcohol dependence syndrome, 16% belong to age group between 20 to 30 years, 40% to 31 - 40 years, 30% to 41- 50 years and 15% belong to age group between 51 to 60 years respectively. 61% of individuals are married, 27% are single and 12% are separated/divorced. 64% of individuals belong to Hindu community, 5% to Muslim and 31% belong to Christian community respectively. 54% of the study sample resides in rural area and 46% in urban area. 26%

of individuals are educated upto primary level, 38% upto high school, 17% upto PUC and 19% of individuals are graduates. 12% of individual are unemployed, 38% are unskilled and 25% skilled labourers, 14% have clerical jobs and 11% are professionals. 13% of study sample belong to SESS class II, 47% to SESS class III and 40% belong to SESS class IV respectively.

Of the 100 inpatients with alcohol dependence syndrome 4% of individuals have increased serum urea levels and 14% have increased serum creatinine levels. Hyponatraemia is noted in 46% of individuals with alcohol dependence syndrome. Hypokalemia is noted in 67% of subjects and hypochloremia is noted in 24% of individuals with alcohol dependence syndrome. 4.8% of individuals with alcohol dependence syndrome in withdrawal state and 2.7% of individuals with alcohol dependence syndrome in delirium have increased serum urea levels respectively. In the present study 96% of individuals with alcohol dependence syndrome have serum urea levels within the normal range. However no statistically significant differences are noted with total duration of alcohol use, duration of dependence, amount of alcohol consumption, age of onset, past history of withdrawal seizures and withdrawal delirium.

11.1% of individuals with alcohol dependence syndrome in withdrawal state and 18.9% of individuals with alcohol dependence syndrome in delirium have serum creatinine level more than 1.2 mg/dl. Increased serum creatinine levels are noted with increased duration of alcohol use and duration of dependence. Individuals who consume more than 12 IU of alcohol per day have increased serum creatinine levels. Increased serum creatinine levels are noted in individuals with early onset of alcohol use. 21.1% of individuals with past history of seizures and 16.1% of individual with past history of delirium have increased serum creatinine levels. However, no statistically significant difference is noted. [Table 1]

50.8% of individuals with alcohol dependence syndrome

in withdrawal state and 37.8% of individuals with alcohol dependence syndrome in delirium have serum sodium levels less than 136 mEq/L. Hyponatremia is noted with increased duration of alcohol use and duration of dependence. Early onset of alcohol use is noted to be associated with hyponatremia. 31.6% of individuals with past history of seizures and 38.7% of individuals with past history of delirium have reduced serum sodium levels. However no statistically significant differences are noted with clinical variables. [Table 2]

73% of individuals with alcohol dependence syndrome in withdrawal state and 56.8% of individuals with alcohol dependence syndrome in delirium have serum potassium level less than 3.5mEq/L. Hypokalemia are noted with increased duration of alcohol use and duration of dependence. However, no statistically significance difference is noted. Hypokalemia is noted in 80% individual who consume 6 to 12 IU of alcohol per day, 53.7% who consume 12 to 18 IU of alcohol per day and 75.8 % of individuals who consume more than 18 IU of alcohol per day. Statistically significance difference is noted in association with amount of alcohol consumption ($P= 0.03$). 64.5% of individuals with early onset alcohol use have hypokalemia. 57.9% of individuals with past history of seizure and 54.8% of individual with past history of delirium have reduced serum potassium levels. [Table 3]

27% of individuals with alcohol dependence syndrome in withdrawal state and 18.9% of individuals with alcohol dependence syndrome in delirium have reduced serum chloride levels. Reduced serum chloride levels are noted in individual who consume more than 12 IU of alcohol per day. 26.3% of individuals with past history of seizure and 22.6% of individual with past history of delirium have reduced serum chloride levels. However, no statistically significance difference is noted with clinical variables. [Table 4]

DISCUSSION

The present investigation is conducted in Father Muller Medical

		0.6 – 1.2 mg/dl	> 1.2 mg/dl	Total	P value
Psychiatric Diagnosis	F 10.30	56(88.9%)	7(11.1%)	63(100%)	0.277
	F10.40	30(81.1%)	7(18.9%)	37(100%)	NS
Total duration of alcohol use	0-5 years	7(87.5%)	1(12.5%)	8(100%)	0.782
	5-10 years	24(92.3%)	2(7.7%)	26(100%)	NS
	10-15 years	20(83.3%)	4(16.7%)	24(100%)	
	15 – 20 years	28(84.8%)	5(15.2%)	33(100%)	
	>20 years	7(77.8%)	2(22.2%)	9(100%)	
Duration of dependence	0-5 years	26(89.7%)	3(10.3%)	29(100%)	0.811
	5-10 years	28(84.8%)	5(15.2%)	33(100%)	NS
	10-15 Years	24(85.7%)	4(14.3%)	28(100%)	
	>15 years	8(80%)	2(20%)	10(100%)	
Amount of alcohol	< 6 IU	1(100%)	0	1(100%)	0.793
	6 IU– 12 IU	22(88%)	3(12%)	25(100%)	NS
	12 IU– 18 IU	36(87.8%)	5(12.2%)	41(100%)	
	>18 IU	27(81.8%)	6(18.2%)	33(100%)	
Age of onset	Early	52(83.9%)	10(16.1%)	62(100%)	0.319
	Late	34(89.5%)	4(10.5%)	38(100%)	NS
Past Withdrawal seizures	Absent	71(87.7%)	10(12.3%)	81(100%)	0.258
	Present	15(78.9%)	4(21.1%)	19(100%)	NS
Past Withdrawal delirium	Absent	60(87%)	9(13%)	69(100%)	0.449
	Present	26(83.9%)	5(16.1%)	31(100%)	NS

Table-1: Association of Serum Creatinine and Clinical Variables

		136 – 145 mEq/L	< 136 mEq/L	Total	P value
Psychiatric Diagnosis	F 10.30	31(49.2%)	32(50.8%)	63(100%)	0.209
	F10.40	239(62.2%)	14(37.8%)	37(100%)	NS
Total duration of alcohol use	0-5 years	5(62.5%)	3 (37.5%)	8(100%)	0.903
	5-10 years	12(46.2%)	14(53.8%)	26(100%)	NS
	10-15 years	14(53.8%)	10(41.7%)	24(100%)	
	15-20 years	18(54.5%)	15(45.5%)	33(100%)	
	>20 years	5(55.6%)	4(44.4%)	9(100%)	
Duration of dependence	0-5 years	13(44.8%)	16(55.2%)	29(100%)	0.276
	5-10 years	21(63.6%)	12(36.4%)	33(100%)	NS
	10-15 Years	13(46.4%)	15(53.6%)	28(100%)	
	>15 years	7(70%)	3(30%)	10(100%)	
Amount of Alcohol	< 6 IU	0	1(100%)	1(100%)	0.150
	6 IU - 12 IU	11(44%)	14(56%)	25(100%)	NS
	12 IU- 18 IU	27(65.9%)	14(34.1%)	41(100%)	
	>18 IU	16(48.5%)	17(51.5%)	33(100%)	
Age of Onset	Early	36(58.1%)	26(41.9%)	62(100%)	0.298
	Late	18(47.4%)	20(52.6%)	38(100%)	NS
Past Withdrawal seizures	Absent	41(50.6%)	40(49.4%)	81(100%)	0.161
	Present	13(68.4%)	6(31.6%)	19(100%)	NS
Past Withdrawal delirium	Absent	35(50.7%)	34(49.3%)	69(100%)	0.327
	Present	19(61.3%)	12(38.7%)	31(100%)	NS

Table-2: Association of Serum Sodium and Clinical variables

		3.5 - 5.1 mEq/L	< 3.5 mEq/L	Total	P value
Psychiatric Diagnosis	F 10.30	17(27%)	46(73%)	63(100%)	0.095
	F10.40	16(43.2%)	21(56.8%)	37(100%)	NS
Total duration of alcohol use	0-5 years	4(50%)	4(50%)	8(100%)	0.420
	5 - 10 years	7(26.9%)	19(73.1%)	26(100%)	NS
	10 - 15 years	8(33.3%)	16(66.7%)	24(100%)	
	15 - 20 years	13(39.4%)	20(60.6%)	33(100%)	
	>20 years	1(11.1%)	8(88.9%)	9(100%)	
Duration of dependence	0 - 5 years	9(31%)	20(69%)	29(100%)	0.286
	5 - 10 years	14(42.4%)	19(57.6%)	33(100%)	NS
	10 - 15 Years	9(32.1%)	19(67.9%)	28(100%)	
	>15 years	1(10%)	9(90%)	10(100%)	
Amount of alcohol	< 6 IU	1(100%)	0	1(100%)	0.030
	6 IU - 12 IU	5(20%)	20(80%)	25(100%)	S
	12 IU - 18 IU	19(46.3%)	22(53.7%)	41(100%)	
	>18 IU	8(24.2%)	25(75.8%)	33(100%)	
Age of onset	Early	22(35.3%)	40(64.5%)	62(100%)	0.500
	Late	11(28.9%)	27(71.1%)	38(100%)	NS
Past Withdrawal seizures	Absent	25(30.9%)	56(69.1%)	81(100%)	0.348
	Present	8(42.1%)	11(57.9%)	19(100%)	NS
Past Withdrawal delirium	Absent	19(27.5%)	50(72.5%)	69(100%)	0.830
	Present	14(45.2%)	17(54.8%)	31(100%)	NS

Table-3: Association of Serum Potassium and Clinical Variables

College Hospital which is a multispecialty general teaching hospital in Mangalore. The results of the present investigation indicate that the serum electrolytes levels are altered in individuals with alcohol dependence syndrome. In the present study, of the 100 inpatients with alcohol dependence syndrome 4% of individuals have increased serum urea levels and 14% have increased serum creatinine levels. Hyponatraemia is noted in 46% of individuals with alcohol dependence syndrome. Hypokalemia is noted in 67% of subjects and hypochloremia is noted in 24% of individuals with alcohol dependence syndrome. In the present study 4.8% of individuals with alcohol dependence syndrome in withdrawal state and 2.7% of individuals with

alcohol dependence syndrome in delirium have increased serum urea levels respectively. However 96% of subjects with alcohol dependence syndrome have serum urea level within normal limits. The results of the present study are in concordance with that of the earlier studies.⁶

Previous researchers have reported increased serum creatinine levels in patients with alcohol dependence syndrome.^{4,5,12} In the present investigation 11.1% of individuals with alcohol dependence syndrome in withdrawal state and 18.9% of individuals with alcohol dependence syndrome in delirium have serum creatinine level more than 1.2 mg/dl. It is observed that 21.1% of individuals with past history of seizure and 16.1% of

		98 - 107 mEq/L	<98 mEq/L	Total	P value
Psychiatric Diagnosis	F 10.30	46(73%)	17(27%)	63(100%)	0.362
	F10.40	30(81.1%)	7(18.9%)	37(100%)	NS
Total duration of alcohol use	0-5 years	6(75%)	2 (25%)	8(100%)	0.914
	5-10 years	19(73.1%)	7(26.9%)	26(100%)	NS
	10-15 years	20(83.3%)	4(16.7%)	24(100%)	
	15 – 20 years	24(72.7%)	9(27.3%)	33(100%)	
	>20 years	7(77.8%)	2(22.2%)	9(100%)	
Duration of dependence	0-5 years	24(82.8%)	5(17.2%)	29(100%)	0.559
	5-10 years	26(78.8%)	7(21.2%)	33(100%)	NS
	10-15 Years	19(67.9%)	9(32.1%)	28(100%)	
	>15 years	7(70%)	3(30%)	10(100%)	
Amount of alcohol	< 6 IU	1(100%)	0	1(100%)	0.464
	6 IU - 12 IU	21(84%)	4(16%)	25(100%)	NS
	12 IU - 18 IU	32(78%)	9(22%)	41(100%)	
	>18 IU	22(66.7%)	11(33.3%)	33(100%)	
Age of onset	Early	47(75.8%)	15(24.2%)	62(100%)	0.954
	Late	29(76.3%)	9(23.7%)	38(100%)	NS
Past Withdrawal seizures	Absent	62(76.5%)	19(23.5%)	81(100%)	0.501
	Present	14(73.7%)	5(26.3%)	19(100%)	NS
Past Withdrawal delirium	Absent	52(75.4%)	17(24.6%)	69(100%)	0.824
	Present	24(77.4%)	7(22.6%)	31(100%)	NS

Table-4: Association of Serum Chloride And Clinical Variables

individuals with past history of delirium have increased serum creatinine levels. However in the present study, no statistically significant difference is noted in serum urea and creatinine levels. The results of the present study are in concordance with that of the earlier studies.⁶⁻¹⁰

Functions of kidneys are to regulate both the volume and the composition of body fluid such as sodium, potassium, and chloride ions. However, alcohol's ability to increase urine volume alters the body's fluid level and produces disturbances in electrolyte concentrations. These effects vary depending on factors such as the amount of alcohol and duration of drinking, the presence of other diseases and nutritional status of individuals. It is observed that transient defects in renal tubular function are common in patients with chronic alcoholism and may contribute to their abnormalities of serum electrolyte and blood acid-base profiles.¹² The results of the present study indicates 50.8% of individuals with alcohol dependence syndrome in withdrawal state and 37.8% of individuals with alcohol dependence syndrome in delirium have serum sodium levels less than 136 mEq/L. It is observed that Hyponatremia is associated with increased duration of alcohol use and duration of dependence of alcohol and also early onset of alcohol use. In the current study 31.6% of individuals with past history of seizure and 38.7% of individuals with past history of delirium have reduced serum sodium levels. The results of the present study are in concordance with that of the earlier studies.^{13-19,21,24} The results of the present study indicates 73% of individuals with alcohol dependence syndrome in withdrawal state and 56.8% of individual with alcohol dependence syndrome in delirium have serum potassium level less than 3.5 mEq/L. It is observed that hypokalemia are associated with increase duration of alcohol use and duration of dependence. In the current study hypokalemia is noted in 80% of individuals who consume 6 to 12 IU of alcohol per day, 53.7% who consume 12 to 18 IU of alcohol per day and 75.8% of individual who consume

more than 18 IU of alcohol per day. Statistically significance difference is noted in association with amount of alcohol consumption ($P=0.03$). It is observed that 64.5% of individuals with early onset of alcohol use have reduced serum potassium levels and 57.9% of individuals with past history of seizure and 54.8% of individuals with past history of delirium have hypokalemia. Previous studies have reported that hypokalaemia is commonly found among the electrolytes abnormalities in individuals with alcohol dependence syndrome.^{13,15,17,19-24} The results of the present study indicates 27% of individuals with alcohol dependence syndrome in withdrawal state and 18.9% of individual with alcohol dependence syndrome in delirium have reduced serum chloride levels. It is observed that reduced serum chloride levels are associated in individuals who consume more than 12 IU of alcohol per day. The results of the present study are in concordance with that of the earlier studies.^{13,16,18} Previous studies have reported that approximately one-third of the patients with alcohol dependence have hypernatremia^{18,23} and hyperchloremia.¹⁸ In the present investigation none of the patients have increase in serum sodium, potassium and chloride levels.

The present investigation is an observational, descriptive, cross sectional clinical study. The present study has certain merits and limitations. Selection bias is avoided. The sample size is inadequate. The out patients are not investigated. The sample is not representative of the general population of such patients as the study was done in tertiary care hospital. A much larger representative sample with multiple centre approach would be suggested. In the present study serum urea and creatinine was considered to screen renal functions. Current investigation is a cross sectional analysis. Longitudinal follow up study matched with control group and also correlation with blood pressure, renal ultrasonograph and other metabolic parameters may provide larger scope for interpretation. Future studies are required to draw definite conclusions.

CONCLUSION

Variations in serum electrolyte levels are observed in individuals with alcohol dependence syndrome. Serum electrolyte abnormalities when undetected play a significant role on mortality and morbidity. Early recognition of the serum electrolyte abnormalities is of paramount importance for their appropriate management. Our findings indicate the need for assessment of renal functions and serum electrolytes in individuals with alcohol dependence syndrome.

REFERENCES

1. Epstein M. Alcohol's Impact on Kidney Function. *Alcohol Health and Research World*. 1997;21:84-93.
2. Kumar SB, Vasudevan DM. Alcohol induced effects on kidney. *Indian Journal of Clinical Biochemistry*. 2008; 23:4-9.
3. Eiser AR. The Effects of Alcohol on Renal Function and Excretion. *Alcoholism Clinical and Experimental Research*. 1987;11:127-138.
4. Schaeffner ES, Kurth T, Jong PE, et al. Alcohol consumption and the risk of renal dysfunction in apparently healthy men. *Arch Intern Med*. 2005;165:1048-1053.
5. Keso L, Salaspuro M. Serum creatinine values and changes in alcohol consumption among alcohol dependent patients. *Alcohol Alcohol Suppl*. 1987;1:611-613.
6. Mohamed YS, Ahmed SA, Mohamed SB, Abdrabo AA. Evaluation of alcoholic consumption on serum uric acid, urea, and creatinine levels. *European Journal of Pharmaceutical and Medical Research*. 2016;3:577-579.
7. Kim HN, Kim SH, Song SW. Is Alcohol Drinking Associated with Renal Impairment in the General Population of South Korea? *Kidney Blood Press Res*. 2014;39:40-49.
8. Reynolds K, Gu D, Chen J, Tang X, et al. Alcohol consumption and the risk of end-stage renal disease among Chinese men. *Kidney International*. 2008;73:870-876.
9. Buja A, Scafato E, Baggio B, Sergi G. Renal impairment and moderate alcohol consumption in the elderly. Results from the Italian Longitudinal Study on Aging (ILSA). *Public Health Nutrition*. 2011;14:1907-1918.
10. Majumdar SK, Shaw GK, O'Gorman P, Thomson AD. Plasma urea and creatinine status in chronic alcoholics. *Drug and Alcohol Dependence*. 1982;9:97-100.
11. Cecchin E, De March S. Alcohol misuse and renal damage. *Addiction Biology*. 1996;1:7-17.
12. Chung FM, Yang YH, Shieh TY, Shin SJ, et al. Effect of alcohol consumption on estimated glomerular filtration rate and creatinine clearance rate. *Nephrology Dial Transplant*. 2005;20:1610-1616.
13. Marchi SD, Cecchin E, Basile A, Bertotti A, Nardini R, Bartoli E. Renal tubular dysfunction in chronic alcohol abuse -- effects of abstinence. *New England Journal of Medicine*. 1993;329:1927-1934.
14. Vandemergel X, Simon F. Evolution of metabolic abnormalities in alcoholic patients during withdrawal. *Journal of Addiction*. 2015;2015:1-4.
15. Elisaf M, Kalaitzidis R. Metabolic abnormalities in alcoholic patients: focus on acid base and electrolyte disorders. *Journal of Alcoholism and Drug Dependence*. 2015;3:185-191.
16. Raut M, Ghimire S, Regmi P, Raut SK, Jha B. Level of Serum Electrolytes in Chronic Alcoholic Patients. *Annals of Clinical Chemistry and Laboratory Medicine*. 2015;1: 31-34.
17. Vetter WR, Cohn LH, Reichgott M. Hypokalemia and electrocardiographic abnormalities during acute alcohol withdrawal. *Archives of Internal Medicine*. 1967;120:536-541.
18. Martin HE, Mccuskey C, Tupikova N. Electrolyte disturbance in acute alcoholism with particular reference to magnesium. *The American Journal of Nutrition*. 1959; 7:191-196.
19. Sereny G, Rapoport A, Husdan H. The effect of alcohol withdrawal on electrolyte and acid-base balance. *Metabolism*. 1966;15:896-904.
20. Meyer, JG, Urban K. Electrolyte changes and acid base balance after alcohol withdrawal. *Journal of Neurology*. 1977;215:135-140.
21. Liamis GL, Milionis HJ, Rizos EC, Kostas C. et al. Mechanisms of hyponatraemia in alcohol patients. *Alcohol Alcohol*. 2000;35:612-616.
22. Ashalata K, Kumari PK, Vijaya BPVSS, Nagamani M, Lakshmi KK. Serum magnesium and other electrolyte levels in chronic alcoholic patients in a tertiary mental care centre in north coastal Andhra Pradesh India. *Journal of Dental and Medical Science*. 2015;14:35-37.
23. Elisaf M, Liberopoulos E, Bairaktari E, Siamopoulos K. Hypokalaemia in alcoholic patients. *Drug and Alcohol Review*. 2002;21:73-76.
24. Stasiukyniene V. Blood plasma potassium, sodium and magnesium level in chronic alcoholic patients during alcohol withdrawal. *Medicina*. 2002;38:892-895.

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