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A study on electrolyte abnormalities following consumption of poisoning compound

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ABSTRACT

Aim: To assess and evaluate the type of electrolyte abnormality in poisonings.

Methodology: After permission from ethical committee the present study was conducted in 50 adults patient, of either sex aged 14- 70 years with history of consumption of poisonous compounds between the periods of Jan 2013 to June 2014. Patient who consume the following compounds will be taken for this study are Organophosphorus poisoning, Organochlorine poisoning, Oleander poisoning, Dhatura poisoning, Aluminum and zinc phosphide poisoning. Age less than 14 years**,** Corrosive poisoning**,** Patients with pre-existing cardiac disorder, renal disorder, uncontrolled hypertension, endocrine disorders, established hematological disorder are excluded from the study.

Results: 76% of study patients were survived and 24% of the study patients were expired. Out of 24% who were expired, 16% death were due nature of poison consumed. Remaining 8% deaths were due to electrolyte abnormalities. Serumelectrolyteswerenormalinmostofthepatient.Hypokalemiafollowed by hypernatremia was most common electrolyte derangements in the study. Mortality rate was more in elderly group.

Conclusion: At admission 16% of patients had hyponatremia, 54% of patients had normal serum sodium level and 30% of patients had hypernatremia. At admission 8% of patients had Hypokalemia, 60% of patients had normal potassium and 32% of patients had hyperkalemia. Mortality rate was more in elderly group.

Key Words: Electrolyte abnormalities, hyponatremia, Poisons, Monocrotophos.

INTRODUCTION

Poisoning is a global problem and is a familiar medical emergency which is associated with high rate of mortality if not diagnosed and treated early. The most common type of toxin ingested varies geographically, being prescribed medication in the developed countries and agricultural chemicals, hydrocarbons or traditional medicines in the developing nations.

Physical examination of the patient may indicate the poison or class of poison involved. The clinical features associated with some common poisons are the combination of pin-point pupils, hyper salivation, incontinence and respiratory depression suggests poisoning with a cholinesterase inhibitor such as an organophosphorus pesticide. However, the value of this approach is limited if a number of poisons with different actions have been absorbed. Moreover, many drugs have similar effects on the body, while some clinical features may be the result of secondary effects such as anoxia. Thus, if a patient is admitted with depressed respiration and pin-point pupils, this strongly suggests poisoning with an opioid. However, if the pupils are dilated, then hypnotic drugs may be present, or cerebral damage may have occurred as a result of hypoxia secondary to respiratory depression.

Most of the poisoning agents cause severe cell damage which results in disturbed homeostasis in the extra cellular fluid and often reflected in the blood by alteration in biochemical parameters. Electrolyte imbalance is a serious but readily correctable condition. Electrolyte disturbances occur in many types of poisoning for a variety of reasons. Such disturbances are sometimes simple to monitor and to interpret, but are more often complex. The correct interpretation of serial measurements requires a detailed knowledge of the therapy administered.

AIM

To assess and evaluate the type of electrolyte abnormality in poisoning compounds.To assesses signs and symptoms following electrolyte abnormalities in poisoning.

METHODOLOGY

After permission from ethical committee the present study was conducted in 50 adults patient, of either sex aged 14- 70 years with history of consumption of poisonous compounds between the periods of Jan 2013 to June 2014.

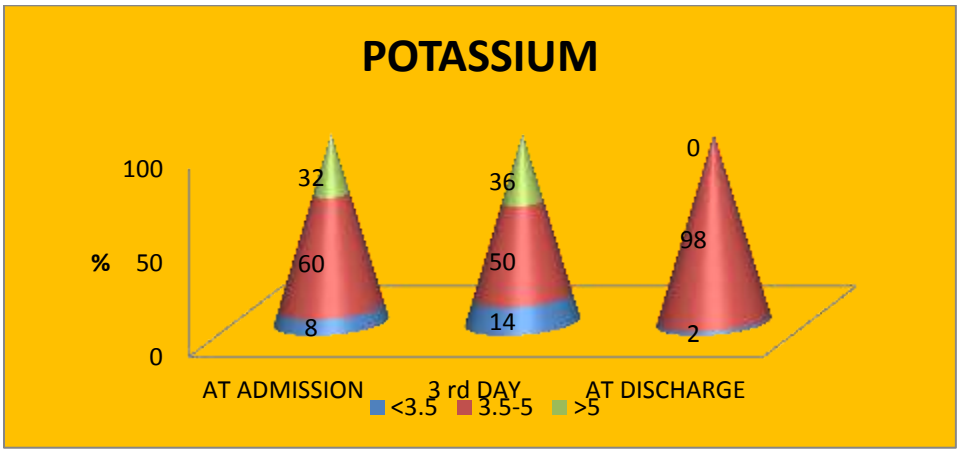
Detailed history was collected from the patients /relatives (when reliability of patient was poor) included age, sex, occupation, mode of exposure and type insecticidal agent, duration between exposure and hospitalization, patient's past history, family history, personal history. The duration of hospital stay and outcome in hospital was documented. Patient who consume the following compounds will be taken for this study are Organophosphorus poisoning, Organochlorine poisoning, Oleander poisoning, Dhatura poisoning, Aluminum and zinc phosphide poisoning. Age less than 14 years, Corrosive poisoning**,** Patients with pre-existing cardiac disorder, renal disorder, uncontrolled hypertension, endocrine disorders, established hematological disorder are excluded from the study.

Investigation which include estimation of pseudo choline esterase level in blood, standard 12 lead ECG, serum electrolytes (Na^+,K^+,Ca^{2+}) and other routine investigation. Blood sample was drawn from all those patient, for the estimation of electrolytes, who were suspected to have consumed poisoning compound before giving any treatment. Serum electrolytes (Na^+,K^+,Ca^{+2}) were taken in all patients before administering any treatment and repeated as and when indicated and at the time of discharge. Assessment of patient airway and need for endotracheal intubation was assessed during hospital stay. Patient with respiratory failure were in tubated and mechanical ventilator support was given, Psychiatric counseling was done for patient who survived.

RESULTS

It is observed that there were 30% of patients in the age category 21-30 years. There were 28% of patients in the age category 31-40 years. There were 18% of patients in the age range 51-60 years. In the above 60 years only 4% of patients were reported and in the age group 15-20 years, 8% of patients were observed. The mean age of the study patients was 36.28 +- 13.31 years.

It is inferred that 20% each consumed oleander and Dhatura compound respectively where as 12% had consumed aluminum poison. The consumption of zinc poison was 10%, whereas 8% were consumed Organochlorine compound. The maximum 30% percentage of patients was consumed organo-phosphorus compound.



It is observed that, at admission 16% of patient had sodium level less than 135 mEq/L, 54% of patients had normal serum sodium level of 135-145 mEq/L and 30% of patient had serum sodium level of more than 145 mEq/L. It is observed that, at admission 8% of patients had serum potassium level less than 3.5 mEq/L, 60% of patient had normal potassium level of 3.5-5 mEq/L and 32% of patient had increased serum potassium level of more than 5.0 mEq/L.It is observed that at admission 4% of patient had serum chloride level less than 95 mEq/L, 84% of patient had normal serum chloride level of 95-105 mEq/L and 12% of patient had chloride level of more than 105 mEq/L. It is observed that, at admission 18% of patient had serum magnesium level of less than 1.5 mEq/L,58% of patient had serum magnesium level of 1.5-2 mEq/L and 24% of patient had serum magnesium level of more than 2 mEq/L. It is observed that, at the time of admission 36% of patient had serum calcium level less than 9.5 mEq/L,66% had serum calcium level of 9.5-10.5 mEq/L and 8% of patient had serum calcium level of more than 10.5 mEq/L. It is observed that 76% patients were survived, whereas 24% of the patients were expired. Out of 24% who were expired, 16% death were due nature of poison consumed. Remaining 8% death was due to electrolyte abnormalities.

DISCUSSION

In this study maximum incidence of poisoning was among the age group of 20-40 years of age, which was comparable to the studies done by Mathur A et al and P Karki et al.

The relation between delay in institution of specific treatment and survival was found to be in significant by Karnik et al, however most other studies including the present one indicate significant relation between delay in hospitalization and increased mortality.

Among the oleander poisoning hyperkalemia observed in 80%, along with hypermagnesemia with around 70% and one death in older women and sodium level, calcium level found to be normal.In a study conducted by Zamani et al, 2010**,** in yellow oleander poisoning in 21 patients found significant higher potassium levels, more than 5.7 mEq/L in all patients and associated with cardiac arrthymias. In our study, hyperkalemia was observed in 8 of the 10 patient, who consumed yellow oleander and two death were reported due to hyperkalemia induced arrthymias, of which older women were more susceptible to hyperkalemia induced arrthymias. Along with this hypermagnesemia was observed in 7 of the 10 patients, but this has no ECG features or clinical manifestation. Thus this concludes the finding of zamani et al, that hyperkalemia is a well known

marker for serious toxicity from digoxin and other cardiac glycosides.

The seeds of yellow oleander results in significant morbidity and mortality. Variety of bradyarrhythmias and tachyarrhythmias occur following ingestion. Hypokalemia worsens toxicity due to digitalis glycosides, and hyperkalemia is life-threatening. Hence from the above observation hyperkalemia in oleander poisoning is most common electrolyte abnormalities of clinical significance and causing with signicant mortality and morbidity in older age group.

Among organo phosphorous poisoning, Monocrotophos was the most common agent (30%), followed by Dimethoate in 21%, Diazinon 5%, Parathion 2%, Melathion 2% of patients in identified group.

CONCLUSION

76% of study patients were survived and 24% of the study patients were expired. Out of 24% who were expired, 16% death were due nature of poison consumed. Remaining 8% deaths were due to electrolyte abnormalities. Mortality rate was more in elderly group.

ECG monitoring for at least 24 h is necessary to detect arrhythmias; longer monitoring is appropriate in patients with severe poisoning. Correction of dehydration with normal saline is necessary.

The major lethal consequence of phosphide ingestion, profound circulatory collapse, is secondary to factors including direct effects on cardiac myocytes, fluid loss, and adrenal gland damage. The accumulation of acetylcholine at muscarinicsites produces increase in secretions such as bronchorrhea, salivation, sweating and tearing. vomiting and an increase in the gastrointestinal motility (abdominal tightness and cramps) is also observed. This lead to alteration in electrolytes level in acute poisoning. Hypokalemia worsens toxicity due to oleander, and hyperkalemia is life-threatening. Both must be corrected.

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