Original Research

Assessment of electrolyte status in tuberculosis and normal individuals

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ABSTRACT:
Background: Tuberculosis is a major cause of morbidity, disability and death. The present study was conducted to assess electrolyte status in tuberculosis and normal individuals. **Materials & Methods:** 70 newly diagnosed cases of pulmonary tuberculosis and healthy subjects was included and serum sodium, potassium and calcium levels were estimated using electrolyte analyzer which was based on principle of ion selective electrode. **Results:** The mean sodium level in group I was 132.6 mmol/L and in group II was 138.2 mmol/L, potassium level was 3.5 mEq/L in group I and 4.0 mEq/L in group II and calcium level was 4.2 mg/dl in group I and 9.0 mg/dl in group II. The difference was significant (P< 0.05). **Conclusion:** Electrolytes were imbalance in patients with tuberculosis as compared to healthy subjects.
Key words: Sodium, Potassium, Electrolyte

INTRODUCTION

Tuberculosis is a major cause of morbidity, disability anddeath.1It accounts for 2–3 million deaths per annum, globally.[1] One third of the World population has been exposed to the TB bacterium, and new infections occur at a rate of one per second. In 2006, a total of 1.7 million people died of TB including 231,000 people with HIV.[2]

Tuberculosis typically affects all parts of the body especially lungs. The disease has become rare in developed countries, but is still a major public health problem in low- and middle-income countries.[3] For the past 40 years, treatment success in tuberculosis has been defined as the eradication of active infection whilst preventing resistance and recurrence, achieved through multidrug antimicrobial treatment.[4] In spite of newer modalities for diagnosis and treatment of TB, unfortunately, millions of people are still suffering and dying from this disease. TB remains one of the top 10 causes of death worldwide. Millions of people continue to fall sick from TB each year. India has the highest burden of both tuberculosis (TB) and multidrug-resistant (MDR) TB based on estimates reported in Global TB Report 2016. India accounts for about 24% of the global prevalence, 23% of the global incident cases, and 21% of the global.[5]

Electrolytes play a vital role in maintaining homeostasis within the body. Electrolyte imbalance can lead to impaired functions of heart, nervous system, muscular system, as well as lead to acid–base disorders. Decreased sodium electrolyte is the most common and frequent cause of electrolyte imbalance in all newly diagnosed tuberculosis patients.[6]

The present study was conducted to assess electrolyte status in tuberculosis and normal individuals.

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MATERIALS & METHODS

The present study was conducted among 70 newly diagnosed cases of pulmonary tuberculosis of both genders (Group I). Equal number of healthy subjects was included in group II. All were informed regarding the study and were involved after they agreed to participate.

Data such as name, age, gender etc. was recorded. All underwent clinical examination along with sputum smear examination by Z-N staining technique and chest X ray. Under aseptic conditions, 10 ml of venous blood samples of patients were collected and serum sodium, potassium and calcium levels were estimated using electrolyte analyzer which was based on principle of ion selective electrode. Sodium concentration less than 136 mmol/L was termed as hyponatremia and less than 115 mmol/L as severe hyponatremia. Hypokalemia was defined as serum potassium levels <3.5 mEq/L. Hypocalcaemia was defined as serum calcium level < 4.5 mg/dl using flame emission spectrophotometry. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of subjects

| Groups	Group I	Group II
Status	Tuberculosis	Healthy
M:F	40:30	40:30

Table I shows distribution of subjects in 2 groups.

Table II Assessment of electrolytes

Electrolytes	Group I	Group II	P value
Sodium	132.6	138.2	0.05
Potassium	3.5	4.0	0.05
Calcium	4.2	9.0	0.01

Table II, graph I shows that mean sodium level in group I was 132.6 mmol/L and in group II was 138.2 mmol/L, potassium level was 3.5 mEq/L in group I and 4.0 mEq/L in group II and calcium level was 4.2 mg/dl in group I and 9.0 mg/dl in group II. The difference was significant (P< 0.05).

Graph I Assessment of electrolytes
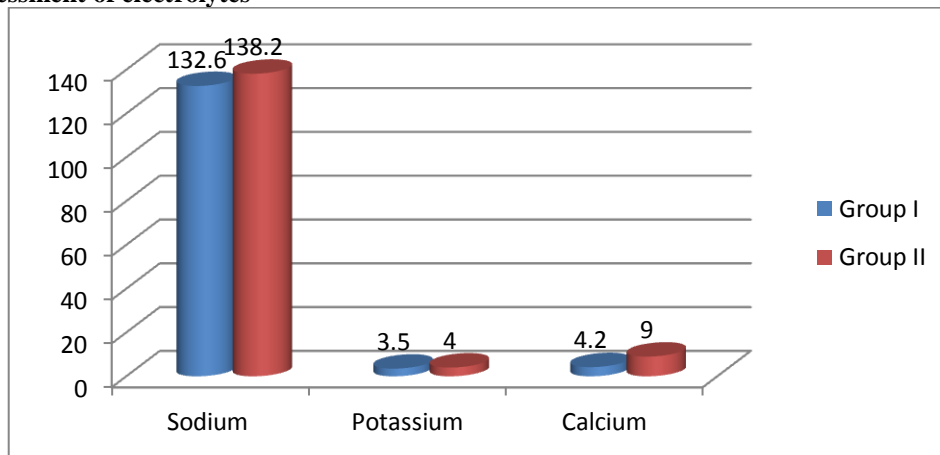
DISCUSSION

Factors contributing to the resurgence of tuberculosis in developing countries include co-infection with HIV; emergence of multiple resistant tuberculosis, inadequate treatment, poverty, malnutrition, overcrowding, armed conflict and increasing numbers of displaced persons. diarrhea, vomiting, and excessive sweating, are common features of HIV/AIDS and tuberculosis infections and have been described as possible cause of loss of water and electrolyte.[7] However, reports showed that the frequency and nature of renal and electrolyte

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abnormalities in HIV patients vary considerably from centre to centre.6Fluid-electrolyte and acid-base derangements frequently encountered in AIDS and TB, have been found to be major factors for the development of acute renal failure.[8]

In adults, tuberculosis is the second leading cause of death due to an infectious disease (after AIDS), with 95% of deaths occurring in low-income countries. The lungs are the major site for Mycobacterium tuberculosis primary infection and tuberculosis (TB) disease. Clinical manifestations of TB include primary TB, reactivation TB, laryngeal TB, endobronchial TB, lower lung field TB infection, and tuberculoma.[9] Pulmonary complications of TB can include hemoptysis, pneumothorax, bronchiectasis, extensive pulmonary destruction, malignancy, and chronic pulmonary aspergillosis. Electrolytes play a vital role in maintaining homeostasis within the body. Electrolyte imbalance can lead to impaired functions of heart, nervous system, muscular system, as well as lead to acid–base disorders. Decreased sodium electrolyte is the most common and frequent cause of electrolyte imbalance in all newly diagnosed tuberculosis patients.[10] The present study was conducted to assess electrolyte status in tuberculosis and normal individuals.

In present study, mean sodium level in group I was 132.6 mmol/L and in group II was 138.2 mmol/L, potassium level was 3.5 mEq/L in group I and 4.0 mEq/L in group II and calcium level was 4.2 mg/dl in group I and 9.0 mg/dl in group II. A study by SS Warke et al, conducted on patients in India evaluated the effect of treatment of antitubercular drugs on blood pH, electrolytes and osmolality, found mean value of serum Na+ concentration found to be 134 mmol/L which was increased after treatment and reached to 143 mmol/L. similarly Chloride level was increased 4 month post treatment suggesting the decrease in reabsorptive capacity of uriniferous tubules towards chloride ions in tuberculosis.[11]

Olalekan et al[12] evaluated the effects of treatments on the imbalance of some electrolytes among patients infected with Mycobacterium tuberculosis. A total of one hundred and ten patients participated in this study. They were divided into four groups as follows: group 1 contains 50 normal patients without TB or HIV infection, group 2 20 new positive cases of TB patients without HIV infection (M = 13; F = 07), group 3 20 new positive cases of tuberculosis co-infected with HIV infection (M = 10; F = 10), and group 4 20 positive cases of TB patients on anti tuberculous drugs (M = 11; F = 09). Levels of sodium in TB patients on drugs (TBD) were significantly lowered compared to new case tuberculosis (NCT) patients (134.80 ± 5.83 mmol/L vs 142.10 ± 6.68 mmol/L) while potassium levels were significantly elevated in TB patients on drugs compared with their new case counterparts (3.75 ± 0.15 mmol/L vs 3.07 ± 0.42 mmol/L) $P < 0.05$ respectively. Chloride levels were significantly decreased in TB patients on treatment compared to new case tuberculosis NCT (99.26 ± 6.85 mmol/L vs 108.76 ± 8.42 mmol/L) while serum bicarbonate levels were significantly elevated in TB patients on drug (TBD) compared to their NCT counterparts (24.00 ± 1.81 mmol/L vs 21.00 ± 2.05 mmol/L, $P < 0.05$, respectively).

CONCLUSION
Authors found that electrolytes were imbalanced in patients with tuberculosis as compared to healthy subjects. Thus, early diagnosis and prompt management of these abnormalities are critical.

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