ejpmr, 2020,7(12), 356-359

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

HYPONATREMIA IN PULMONARY TUBERCULOSIS

[1]Dr. N. Govindarajan and [2]*Dr. N.M.S. Ahamed

[1]Assistant Professor, Dept. of General Medicine Tirunelveli Medical College.
[2]Assistant Professor, Department of General Medicine Tirunelveli Medical College.

***Corresponding Author: Dr. N.M.S. Ahamed**
Assistant Professor, Department of General Medicine Tirunelveli Medical College.

Article Received on 08/10/2020 **Article Revised on 28/10/2020** **Article Accepted on 18/11/2020**

ABSTRACT

Introduction: Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis. The most common form is pulmonary tuberculosis. The disease is usually chronic with varying manifestations. Various complications have been reported along with pulmonary tuberculosis, including electrolyte imbalance particularly hyponatremia. this aim of our study is to evaluate the sodium level of patients with pulmonary tuberculosis., to find the correlation between hyponatremia and Gender, Age and anti TB medication and other comorbid conditions. Also, to find the impact of hyponatremia on patients with TB. **Methodology:** The study was carried out in patients admitted in a tertiary care teaching hospital for a period of six months. Study was done as prospective analytical study. Patients with or without constitutional symptoms of pulmonary TB with sputum positive or negative or culture positive Pulmonary TB and age above 12 yrs were included in the study. While patients with H/o renal disease, abnormal mental status, H/o TB meningitis, uncontrolled hyperglycemia, TB and HIV and extra pulmonary TB were excluded. **Results and Discussion:** In our study population we analysed the serum sodium levels between cases and controls and it was low in cases in comparison to controls and it was significant with a p value of 0.001. In our study population we analysed the relation between age and presence of hyponatremia and it was significant with a p value of 0.001. The most probable mechanism underlying for developing hyponatremia in this group is proposed as SIADH. Higher incidence of hyponatremia in older age group suggests that they should be closely monitored for electrolyte imbalance, if any symptoms occur, it should be promptly treated.

KEYWORDS: Tuberculosis, Hyponatremia.

INTRODUCTION

Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis. The most common form is pulmonary tuberculosis. The disease is usually chronic with varying manifestations. About one third of the current world population is infected with TB bacilli, of whom 5- 10% will develop clinical disease in their lifetime. In the year 2010 the number of global cases were 8.8 million which includes 3.2million in women and 1.1 million people with HIV. The number of persons dying from TB during 2010 were about 1.4 million.[1] Measuring the incidence of TB in our country is challenging. India is the highest TB burden country in the world, it accounts for one fourth of estimated global incident TB case in 2010. the estimated incidence rate is 185 cases/ 100000 population and prevalence is 256/100000 population.[2]

TB is a serious public health problem causing immense morbidity and mortality and distress to individuals, family and community. TB kills more adults in India than any other infectious disease. Various complications have been reported along with pulmonary tuberculosis, including electrolyte imbalance particularly hyponatremia. TB can induce hyponatremia via several mechanisms containing local invasion to the adrenal glands (adrenal insufficiency), local invasion to hypothalamus or pituitary gland, Tubercular meningitis and inappropriate ADH secretion via pulmonary infection. an acquired disturbance of neurohypophyseal function exists resulting in unregulated ADH release.

In one of the first reports, Weiss et al[3]., reported hyponatremia in resulting from SIADH in patients with PTB. Then it was declared that an increased ADH level in the presence of hyponatremia in PTB cases is an indicator for ectopic ADH production. Few studies demonstrated that the ADH level was not detectable following anti-TB therapy.[4]

SIADH was usually demonstrated in patients with TB and there are various causative factors for SIADH in tuberculosis. SIADH may occur following PTB, as well as tubercular meningitis. There are many reports of SIADH associated with pulmonary, miliary and central nervous system-related TB. More than 60% of the patients with tubercular meningitis may present with hyponatremia or SIADH at first presentation.[4] SIADH

must be considered in every case with hyponatremia with low serum osmolality condition, a normal acid-base state, urine osmolality over 100 mOsm/kg, and urine sodium concentration more than 40 meq/L. Also, generalized or local infections are important and unregarded causes of SIADH. Multiple infectious diseases are associated with this syndrome.[5] Based on this aim of our study is to evaluate the sodium level of patients with pulmonary tuberculosis., to find the correlation between hyponatremia and Gender, Age and anti TB medication and other comorbid conditions. Also, to find the impact of hyponatremia on patients with TB.

MATERIALS AND METHODS

The study was carried out in patients admitted in a tertiary care teaching hospital for a period of six months. All patients were evaluated by history taking, clinical examination and appropriate investigations. Study was done as prospective analytical study. The work was approved by the ethical committee. Individual written and informed consent was obtained. Patients with or without constitutional symptoms of pulmonary TB with sputum positive or negative or culture positive Pulmonary TB and age above 12 yrs were included in the study. While patients with H/o renal disease, abnormal mental status, H/o TB meningitis, uncontrolled hyperglycemia, TB and HIV and extra pulmonary TB were excluded. Collected data were analyzed, statistical data are made using SPSS software version 20.0. Student't' value was used, significance was considered if the 'p' value was below 0.05.

RESULTS AND OBSERVATIONS

In our study total number of subjects included in this study was 100, among these, 70 were cases i.e. patients with pulmonary TB and 30 were controls i.e. healthy persons or patients without any form of tuberculosis, the age of the patients in this study group ranged from 25 years to 85 years. The average age of the persons participated in this study are 51.16 years with the standard deviation of 15.56 years. Of the 100 participants Males were 57 and Females were 43. Of the cases there were 41 males and 29 females. In control group, there are 16 males and 14 females were selected.

Age distribution of patients were analysed and among 70 cases most of the patients were in 36-45 age group, Of the 30 controls selected, the age range was between 30 years to 78 years and more patients in control group were from 46-55 age group. There is no statistically significant difference between the groups in age and sex distribution.

Of the 70 cases, 58 patients were symptomatic for pulmonary tuberculosis like fever, cough with expectoration, loss of weight etc. and 12 patients were asymptomatic none of the controls were symptomatic. Of the symptomatic group of 58 patients, males constitute 33 and females 25 in number.

Of the 70 patients, 55 patients were positive for AFB in their sputum, tested by conventional Ziehl-Neelsen method. Among these 55 patients, 32 males were positive for sputum, 23 females were positive for sputum. Sputum negativity in males and females are 9 and 6 respectively.

Co morbid conditions like diabetes mellitus and hypertension are taken in to account, other comorbid conditions like obesity, renal diseases, and HIV status are not considered in this study. Of the 70 patients, only 14 patients presented with co-morbid conditions like diabetes and hypertension or both. 5 patients were diabetic 3 patients were hypertensive, and 6 patients were presented with both diabetes and hypertension.

In our study of the 70 cases studied, 33 patients presented with hyponatremia. this value constitute the percentage of 47.14%. There are no persons presented with severe hyponatremia, i.e. serum sodium levels below 115 mEq/L. There is only one person show hypernatremia, i.e. serum sodium levels above 145 mEq/L. his serum sodium level is 146 mEq/L. Among 33 patient with hyponatremia 20 were male and 13 were female. All these patients with hyponatremia does not show any symptoms related with hyponatremia.

The mean sodium level in males is: 137.3 ± 5.1 mEq/L. The mean sodium level in females is 139.15 mEq/L with the standard deviation of ± 4.25 mEq/L. But the difference between the sodium levels of males and females is statistically not significant (p=0.150). The least value of serum sodium in males is 119 mEq/L. The least value of serum sodium in females is 120 mEq/L. The prevalence of hyponatremia is more among the old age group of people.

Among the 30 persons in control group, only one person showed hyponatremia i.e. serum sodium level is 134 mEq/L. All persons are having normal serum sodium levels. The average sodium in control group are 139.166 mEq/L with the standard deviation of 2.63 mEq/L. Except one male in control group shows hyponatremia all persons in control group are having normal serum sodium levels.

In our study population we analysed the relation between age and presence of hyponatremia and it was significant with a p value of 0.001.

Table 1: Hyponatremia with Age.

HYPONATREMIA	MEAN AGE	STD. DEVIATION	P VALUE
N	43.08	13.799	0.001
Y	58.70	16.455	
TOTAL	50.44	16.928	

In our study population we analysed the serum sodium levels between cases and controls and it was low in cases in comparison to controls and it was significant with a p value of 0.001.

Table 2: TB VS Hyponatremia.

TUBERCULOSIS	MEAN NA	STD. DEVIATION	P VALUE
ABSENT	139.17	2.67	0.001
PRESENT	133.45	6.44	
TOTAL	135.15	6.16	

In our study for all the cases and controls along with the serum sodium levels, serum potassium levels are also measured and its significance was sought. Among the 70 cases the average of measured serum potassium level is 4.415 mEq/L with the standard deviation of 0.528. No persons are identified with hypokalemia or hyperkalemia. Among the 30 controls, all the persons present with the normal potassium levels, with the average of 4.44 mEq/L and the standard deviation is 0.557. This was not statistically significant.

DISCUSSION

In our study total number of subjects included in this study was 100, among these, 70 were cases i.e. patients with pulmonary TB and 30 were controls i.e. healthy persons or patients without any form of tuberculosis, the age of the patients in this study group ranged from 25 years to 85 years, A study was done by E.A.H SIMS, G.WELT[6] in 1950 in 10 patients with tuberculosis, one of them had Miliary tuberculosis and found a condition called as 'pulmonary salt wasting syndrome'. In this study they have excluded persons with renal disease. All the patients showed advanced malnutrition and hyponatremia. They also had hypoalbuminemia. These patients did not present with any evidence of hyponatremia. This was first incidence of hyponatremia demonstration in patients.

A study done by Nematollah jonaidi Jafari et al[7] showed among 200 patients the mean age was 59 ±20 years, females had higher mean age than males, but this difference is statistically not significant. The mean age in our study is 50.34 ±16.74 years Mean age for males is 50.41 ± 17.43 years Mean age for females is 50.48 ± 15.83 years. In our study the mean age for males and females are almost equal not similar to above study.

The mean sodium concentration was 134±4 mEq/L. the female's mean sodium concentration was 134±4.9 mEq/L versus the male's mean sodium concentration of 134±5 mEq/L. which is not statistically significant in study by Jafari et al. In our study the mean sodium level in males is: 137.3 mEq/L with the standard deviation of ±5.1 mEq/L. The mean sodium level in females is 139.15 mEq/L with the standard deviation of ± 4.25 mEq/L. But the difference between the sodium levels of males and females is statistically not significant (p=0.150).

In the Jafari et al study, 96 (48%) of the patients had normal serum sodium, whereas 102 (51%) patients had hyponatremia (47.1% males vs. 52.9% females) and two patients developed hypernatremia. There is no significance relationship between gender and hyponatremia (p=0.670). In our study also there is no significance relation between gender and hyponatremia.

Hypertension was the most common co-morbid condition presented in 46 patients and 42 patients had controlled diabetes mellitus. There was no significant relation between co-morbid condition and hyponatremia. (p=0.102) in a study done by Jafari et al Similarly diabetes and systemic hypertension are the common co-morbid conditions present in this study. There was no significant relation between co-morbid condition and hyponatremia. (p=0.153 and 0.156 respectively for hypertension and diabetes).

Mean age difference between hyponatremic and eunatremic group was statistically significant ('p'=0.0001).

A study conducted in 2004, by Kinjo et al[8], proved that there is definite association of hypokalemia in a group of TB patients. There are no previous studies available for correlation or significance of hypokalemia or hyperkalemia in patients with pulmonary TB. In this study also, there is no correlation is found, and all the cases are presented with normal levels of serum potassium level.

In our study there is definite relationship between presence of hyponatremia with tuberculosis with a mean sodium level of 133.45 in cases and 139.17 in controls which was statistically significant. The main cause in patients of pulmonary disease presenting with hyponatremia is prosed to SIADH. Hyponatremia is observed in patients with pulmonary, neoplastic, endocrine and central nervous system diseases. In 1969, Lam et al[9] have found that 11% of patients with active TB, pulmonary or non-pulmonary, are presented with

hyponatremia, and the main cause of hyponatremia in this cases is attributed to SIADH. Bryant et al[10] suggested the possibility of SIADH for patients with infectious pulmonary disease such as pulmonary TB.

SIADH is usually demonstrated in TB patients, and various causative factors have been proposed for SIADH in TB. SIADH may occur following pulmonary TB and also occurs in case of tubercular meningitis. More than 60% of patients with tubercular meningitis may present with SIADH following hyponatremia in first presentation.

Usually the hyponatremia present in the cases of TB are mild to moderate and most of the patients are asymptomatic. The hyponatremia in this situation is usually asymptomatic and always reversible with effective anti TB treatment. But patients who have hyponatremia are likely to have higher mortality. Lee et al[11] suggested hyponatremia as predictor of development and outcome in patients with ARDS due to tuberculosis.

CONCLUSION

The most probable mechanism underlying for developing hyponatremia in this group is proposed as SIADH. Higher incidence of hyponatremia in older age group suggests that they should be closely monitored for electrolyte imbalance, if any symptoms occur, it should be promptly treated. The present study focus only on the serum sodium levels and potassium levels, further studies are recommended with large study group to diagnose the possibility of causes of hyponatremia as this study has got some limitations due to various reasons.

BIBLIOGRAPHY

1. Jonaidi Jafari N, Izadi M, Sarra fzadeh F, Heidari A, Ranjbar R, Saburi A. Hyponatremia Due to Pulmonary Tuberculosis; Review of 200 Cases. Nephro-Urol Mon., 2013; 5(1): 687-691. DOI: 10.5812/numonthly.7091. Hyponatremia Due to Pulmonary Tuberculosis: Review of 200 Cases.
2. ASYMPTOMATIC HYPONATREMIA IN PULMONARY TUBERCULOSIS BY E. A. H. SIMS, 2 LOUIS G. WELT, 3 JACK ORLOFF, 4 AND JAMES W. NEEDHAM(From the Department of Internal Medicine, Yale University School of Medicine, NEW Haven, Conn.) (Submitted for publication June 21, 1950; accepted, August 28, 1950)
3. Weiss H, Katz S. Hyponatremia resulting from apparently inappropriate secretion of antidiuretic hormone in patients with pulmonary tuberculosis. Am Rev Respir Dis., 1965; 92(4): 609–16.
4. Hill AR, Uribarri J, Mann J, Berl T. Altered water metabolism in tuberculosis: role of vasopressin. Am J Med., 1990; 88(4): 357–64. Doi: 10.1016/0002-9343(90)90489-Z.
5. Nettles R. Hyponatremia in a Patient With AIDS. Infect Dis Clin Practice, 2002; 11(4): 238–41. Doi: 10.1097/00019048-200205000-00011
6. ASYMPTOMATIC HYPONATREMIA IN PULMONARY TUBERCULOSIS BY E. A. H. SIMS, 2 LOUIS G. WELT, 3 JACK ORLOFF,4 AND JAMES W. NEEDHAM(From the Department of Internal Medicine, Yale University School of Medicine, NEW Haven, Conn.) (Submitted for publication June 21, 1950; accepted, August 28, 1950)
7. Jonaidi Jafari N, Izadi M, Sarra fzadeh F, Heidari A, Ranjbar R, Saburi A.Hyponatremia Due to Pulmonary Tuberculosis; Review of 200 Cases. Nephro-Urol Mon., 2013; 5(1): 687-691. DOI: 10.5812/numonthly.7091. Hyponatremia Due to Pulmonary Tuberculosis: Review of 200 Cases.
8. Kinjo T, Higuchi D, Oshiro Y, Nakamatsu Y, Fujita K, Nakamoto A, et al. Addison's disease due to tuberculosis that required differentiation from SIADH. J Infect Chemother, 2009; 15(4): 239-42.
9. Lam KS, Sham MM, Tam SC, Ng MM, Ma HT. Hypopituitarism after tuberculous meningitis in childhood. Ann Intern Med., 1993; 118(9): 701-6.
10. Bryant DH. The syndrome of inappropriate secretion of antidiuretic hormone in infectious pulmonary disease. Med J, Aust. 1972; 1(25): 1285-8.
11. Lee P, Ho KK. Hyponatremia in pulmonary TB: evidence of ectopic antidiuretic hormone production. Chest., 2010; 137(1): 207-8.