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Original Research Article

Prevalence of hyponatremia in pulmonary tuberculosis

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ABSTRACT

Background: Tuberculosis is one of the most common infection in India and is associated with high mortality. India ranks 14th out of top 22 countries who are burdened with TB infections.
Methods: It is a prospective study after getting the ethical committee clearance from the institute. The patients admitted to Chest and TB, Medicine Department of SLN medical college and Hospital, Koraput, Odisha from Jan 2019 to December 2019 with pulmonary tuberculosis were included in the study.
Results: A total of 65 adult patients with active PTB were included in this study with age ranging from 15 to 69 years. The mean age of patients was 38.80 + 15.03 years. The total mean serum sodium levels among the subjects was 135.5+7.23. Among 65 patients, 26 (40%) patients had low sodium levels which was less than 135mmol/l out of which 21 (42%) were males and 5 (33%) were females. In all the groups of hyponatremias, majority were found to be males when compared to the females in their respective groups.
Conclusions: Hence patients with PTB have to be evaluated for hyponatremia as early detection and treatment of underlying electrolyte abnormality can potentially reduce mortality and morbidity associated with tuberculosis and also can shorten the duration of hospitalization.

Keywords: Electrolytes, Hyponatremia, Pulmonary, Tuberculosis

INTRODUCTION

Worldwide TB is one of the top ten causes of death and the leading cause from a single infectious agent. Globally, 10.0 million people developed TB disease in 2017: 5.8 million men, 3.2 million women and 1.0 million children.[1] Tuberculosis is one of the most common infection in India and is associated with high mortality. India ranks 14th out of top 22 countries who are burdened with TB infections.[2] As per the Global TB report 2017 the estimated incidence of TB in India was approximately 28, 00,000 accounting major part of the world's TB cases. Hyponatremia is one of the most common and important electrolyte abnormalities in clinical practice, so it must be considered in all seriously ill hospitalized patients.[3] Hyponatremia, is defined as serum sodium less than 135 mmol/litre.[4]

Mild, moderate and severe hyponatremia is defined as serum sodium concentration between 130 and 135 mmol/L, between 125 and 129 mmol/L and less than 125 mmol/L respectively. Hyponatremia is observed in 15-20% of emergency patient admissions and it occurs in up to 20% of critically ill patients.[5] Hyponatremia is important to identify because of its potential morbidity and also it can be a marker of the underlying disease.[6]

The syndrome of inappropriate secretion of antidiuretic hormone (SIADH) is the most common cause of hyponatremia and is characterized by hyponatremia,

inappropriately elevated urine osmolality, excessive urine sodium and decreased serum osmolality in a euvolemic patient without edema.[7] SIADH can be associated with malignancy, pulmonary disorders, and neurosurgical conditions, cardiac, liver, and renal failure.[2] PTB has been strongly associated with SIADH besides other infections.[8] TB can induce hyponatremia by various mechanisms like local invasion to the adrenal glands, local invasion to hypothalamus or pituitary gland, meningitis and inappropriate ADH secretion due to pulmonary infection TB can affect adrenal glands directly.[9-14] The present study was done to study and analyze the prevalence of hyponatremia in adult patients with PTB in Atertiary medical college of southern Odisha, India.

METHODS

It is a prospective study after getting the ethical committee clearance from the institute. The patients admitted to Chest and TB, Medicine Department of SLN medical college and Hospital, Koraput, Odisha from Jan 2019 to December 2019 with pulmonary tuberculosis were included in the study. PTB was diagnosed as per the institutional protocol, i.e., on clinical presentation of the patient, microscopic examination suggestive of acid-fast bacilli (AFB) and sputum CBNAAT. Demographic characteristics and laboratory data of the patients were recorded and analyzed.

Inclusion criteria

Adult patients aged 15 years and above diagnosed with active PTB were taken into the study.

Exclusion criteria

Patients with less than 15 years/O old PTB, kidney disease, malignancies, patients seropositive, patients on diuretics, medications related to SIADH and pregnant ladies were excluded. Serum sodium concentration less than 135mmol/L were considered as hyponatremia. Patients were divided into three groups: mild, moderate and severe hyponatremia with serum sodium concentration between 130 and 134 mmol/L, 125 and 129 mmol/L and <125 mmol/L respectively. The microbiological tests were done in the RNTCP lab of hospital.

Statistical analysis

In this study, all the statistical analysis has been done in N, frequency, mean and standard deviation by using statistical software SPSS (version 20).

RESULTS

A total of 65 adult patients with active PTB were included in this study with age ranging from 15 to 69 years. The mean age of patients was 38.80+15.03 years.

Figure 1 shows 50 (76.92%) were male and 15 (23.08%) were females.

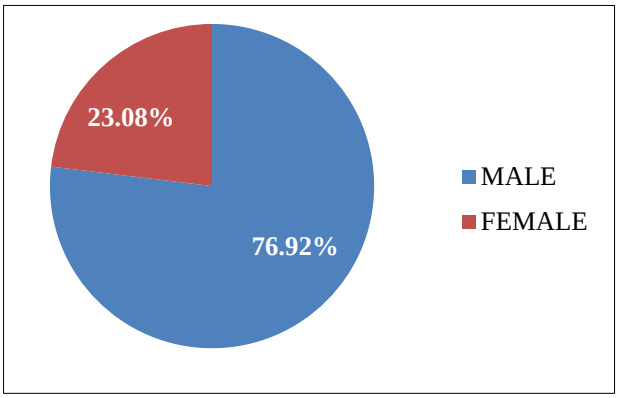

Figure 1: Sex distribution.

Table 1 shows the total mean serum sodium levels among the subjects was 135.5+7.23. The table shows males had mean serum sodium levels (135.54+6.73) and females had mean serum sodium levels (135.4+8.97).

Table 1: Gender wise mean serum sodium level.

Mean serum sodium levels	
Male	135.54±6.73
Female	135.4±8.97
Total	135.5±7.23

The age distribution and mean serum sodium levels are shown in (Table 2). As shown in Table 2 38.46% of the patients were in the age group of 20-40years and 36.92% in 40-60 years.

Table 2: Age distribution and mean serum sodium level.

Age (Years)	Cases (N)	(%)	Mean serum sodium (mmol/l)
<20	8	12.31	139.58±3.71
20-40	25	38.46	135.5±6.72
40-60	24	36.92	133.4±7.49
>60	8	12.31	137.75±5.7
Total	65	100	135.5±7.23

Among 65 patients, 26 (40%) patients had low sodium levels which was less than 135mmol/l out of which 21 (42%) were males and 5 (33%) were females shown in (Table 3).

Table 3 shows most of the patients i.e., 13 (20%) patients had mild hyponatremia; 9(13.85%) had moderate hyponatremia and 4 (6.15%) had severe hyponatremia. In all the groups of hyponatremias, majority were found to be males when compared to the females in their respective groups. In the study it was found that

18(27.69%) cases were found to be smear negative, but CBNAAT positive as shown in (Table 4).

Table 3: Serum sodium level and gender wise distribution.

Serum sodium (mmol/l)	Male		Female		Total	
	N	%	N	%	N	%
>135	29	58	10	66.67	39	60
130-134	11	22	2	13.33	13	20.00
125-129	7	14	2	13.33	9	13.85
<125	3	6	1	6.67	4	6.15
Total	50	100	15	100	65	100
Serum sodium (mmol/l) <135 was found in 26 (40%) cases of PTB patients						
Serum sodium (mmol/l) <135 was found in 21 (42%) male cases of PTB patients						
Serum sodium (mmol/l) <135 was found in 5 (33%) female cases of PTB patients						

Table 4: Serum sodium levels in relation to smear AFB status.

Serum sodium (mmol/l)	Smear positive		Smear negative, CBNAAT positive	
	N	%	N	%
>135	29	74.36	10	25.64
130-134	8	61.54	5	38.46
125-129	6	66.67	3	33.33
<125	4	100.00	0	0.00

Figure 2 shows, 8 (61.54%) out of 13 patients in mild hyponatremia, 6 (66.67%) out of 9 in moderate hyponatremia and 4(100%) out of 4 in severe hyponatremia were smear AFB positive. It shows smear positive pulmonary tuberculosis cases are much more commonly associated with hyponatremia and all the severe hyponatremia cases were found in smear positive cases only.

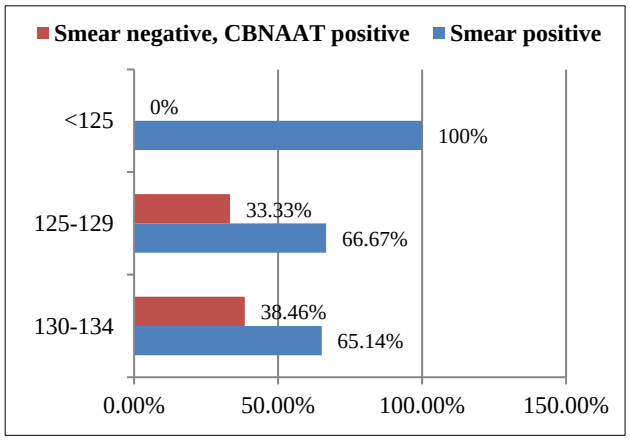

Figure 2: Hyponatremia with respect to sputum smear AFB status.

DISCUSSION

A total number of 65 patients with PTB were included in this study with an age group of 15 to 69 years and mean age being 38.80±15.03 and many were in the age group of 20-60 years. A previous study done by Bokam et al, showed the mean age of sodium was 44.4±13.81 years ranging from 18 to 80 years.[2] Jafari et al, in their study reported the mean age as 59±20 years in range of 13-102 years and Khan et al, in their study showed the mean age of all the patients to be 51.57±16.3.[8,15]

Study showed male preponderance i.e., 50(76.92%) out of 65 were males and 15 (23.08%) were females. This observation was similar to that of studies done by Bokam et al, with majority 72.2% being males, Khan et al, with 65.6% males; and Mukherjee et al, with 69.3% males with a male female ratio of 3.3:1.[2,8] The higher male prevalence was also found in the Revised National Tuberculosis Programme (RNTCP).[16] However study by Jafari et al, has shown TB was less in males (45.5%) as compared to females.[15]

Out of 65 patients 26 (40%) had hyponatremia i.e., with serum sodium levels <135 mmol/l with 42% males and 33% females. A study done by Bokam et al, observed hyponatremia in 61% of patients with PTB in accordance to this study.[2] Majority of the patients had mild hyponatremia (20%) and very few with severe hyponatremia (6.15%). During clinical practice various electrolyte imbalances cases are encountered but among them hyponatremia is the most common with a prevalence up to 15% in a general hospital population. Syndrome of inappropriate anti diuretic hormone secretion (SIADH) is the most commonly encountered form of hyponatremia.[7]

The total mean serum sodium levels among the subjects were 135.5±7.23. The mean serum sodium levels in males was 135.54±6.73 and 135.4±8.97 in females implying that males had lower sodium levels than that of females. Bokam et al, in their study also showed that mean serum sodium levels were lower in males (132.9±5.8 mmol/L) when compared to females (133.3±5.6 mmol/L) which was similar to authors results.[2] Unlike this study Khan et al, observed higher levels of mean serum sodium in males 136.03 ± 6.5 than in females 135.00±6.5.[8]

Most of the patients i.e., 20% had mild hyponatremia (serum sodium 130-134mmol/l), 13.85% had moderate hyponatremia (serum sodium 125-129mmol/l) and nearly 6.15% had severe hyponatremia (serum sodium <125 mmol/l).

Out of 26 patients with hyponatremia 18(69.23%) were sputum smear AFB positive, 61.54% of the patients in mild hyponatremia, 66.67% in moderate hyponatremia (serum sodium 125-129 mmol/l) and 100% in severe hyponatremia group (<125 mmol/l) were sputum smear

AFB positive. Studies showed that patients with chronic hyponatremia are often asymptomatic irrespective of the degree of hyponatremia. Symptoms may only occur if there is acute exacerbation of hyponatremia.[17] In this study there was one patient presented with convulsion with severe hyponatremia.

CONCLUSION

Hyponatremia is important to recognize because of its potential morbidity and also it can be a marker of the underlying disease. Hence patients with PTB have to be evaluated for hyponatremia as early detection and treatment of underlying electrolyte abnormality can potentially reduce mortality and morbidity associated with tuberculosis and also can shorten the duration of hospitalization.

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REFERENCES

1. Global Tuberculosis Report 2018. Available at: https://www.who.int/tb/publications/global_report/en. Accessed 1 March 2019.
2. Bokam BR, Badikillaya VU. Prevalence of hyponatremia in pulmonary tuberculosis--a pilot study from a tertiary care center in south India. Inter J Med Sci Public Health. 2017 Jan 1;6(1):75-80.
3. Upadhyay A, JaberBl, Madias NE. Incidence and prevalence of hyponatremia. Am J Med. 2006 Jul;119(7 Suppl 1):S30-5.
4. Saeed BO, Beaumont D, Handley GH, Weaver JU. Severe hyponatraemia: investigation and management in a district general hospital. J Clini Pathol. 2002 Dec 1;55(12):893-6.
5. Spasovski G, Vanholder R, Allolio B, Annane D, Ball S, Bichet D, et al. Clinical practice guideline on diagnosis and treatment of hyponatraemia. Nephrol Dialy Transplanta. 2014 Apr 1;29(suppl_2):i1-39.
6. Ellison DH, Berl T. The syndrome of inappropriate antidiuresis. N Engl J Med. 2007 May 17;356(20):2064-72.
7. Huda MS, Boyd A, Skagen K, Wile D, Van Heyningen C, Watson I, et al. Investigation and management of severe hyponatraemia in a hospital setting. Postgrad Med J. 2006 Mar 1;82(965):216-9.
8. Khan K, Rasool N, Mustafa F, Tariq R. Hyponatremia Due to Pulmonary Tuberculosis in Indian Population. Infect. 2017 Aug 1;16:18.
9. Jacobi J, Schnellhardt S, Kulschewski A, Amann KU, Kuefner MA, Eckardt KU, et al. An unusual case of hyponatremia. Nephrol Dial Transplant. 2010;25(3):998-1001.
10. 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 Aug 1;15(4):239-42.
11. Nagotkar L, Shanbag P, Dasarwar N. Cerebral salt wasting syndrome following neurosurgical intervention in tuberculous meningitis. Indian Pediatr. 2008;45(7):598-601.
12. Anderson NE, Somaratne J, Mason DF, Holland D, Thomas MG. Neurological and systemic complications of tuberculous meningitis and its treatment at Auckland City Hospital, New Zealand. J Clini Neurosci. 2010 Sep 1;17(9):1114-8.
13. Lee P, Ho KK. Hyponatremia in pulmonary TB: evidence of ectopic antidiuretic hormone production. Chest. 2010 Jan 1;137(1):207-8.
14. Vorherr H, Massry SG, Fallet R, Kaplan L, Kleeman CR. Antidiuretic principle in tuberculous lung tissue of a patient with pulmonary tuberculosis and hyponatremia. Annals Int Med. 1970 Mar 1;72(3):383-7.
15. Jafari NJ, Izadi M, Sarrafzadeh F, Heidari A, Ranjbar R, Saburi A. Hyponatremia due to pulmonary tuberculosis: review of 200 cases. Nephro-Urol Monthly. 2013;5(1):687-91.
16. Directorate General of Health Services. Ministry of Health and Family Welfare. New Delhi, India. Revised National Tuberculosis Control Programme. Technical Guidelines for Tuberculosis Control, October 2005. Available at: https://www.tbonline.info/technical_and_operational_guidelines_for_tuberculosis_control_. Last accessed 2019 on December 5.
17. Biswas M, Davies JS. Hyponatraemia in clinical practice. Postgrad Med J. 2007 Jun 1;83(980):373-8.

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