International Journal Dental and Medical Sciences Research
Volume 3, Issue 1, Jan-Feb 2021 pp 333-337 www.ijdmsrjournal.com ISSN: 2582-6018

Prevalence of hyponatremia in pulmonary tuberculosis: a retrospective observational study

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Date of Submission: 25-12-2020 Date of Acceptance: 12-01-2021

ABSTRACT: Introduction: Tuberculosis is the major public health problem in India. Hyponatremia is the most common electrolyte abnormality in clinical practice[1] Hyponatremia can be a potential source of morbidity so it's very important to recognize it[2]. Pulmonary tuberculosis is one of the causes of hyponatremia through a various mechanism like local invasion to adrenal gland[5,6] local invasion to hypothalamus[7,8] tubercular meningitis [9-11] inappropriate ADH secretion via pulmonary infection[12-14] The present study aimed to analyze the prevalence of hyponatremia and its correlation with sputum positivity in adult patients with pulmonary tuberculosis.

Materials and methods: It was a retrospective observational study that was conducted from August 2019 to March 2020 in JK hospital and, Lnmc Bhopal. Data were collected from the medical record department of in medical college Bhopal. Sixty-five patients with active pulmonary tuberculosis who were admitted to the pulmonary and medicine department were included in the study

Results: Out of 65 subjects with PTB 32 (49.23%) patients had hyponatremia, a serum sodium value less than 135 mmol/L. This study included an almost equal number of patients among 1+ sputum AFB, 2+ sputum AFB, and 3+ sputum AFB positivity groups. It has been observed that as the sputum AFB positivity increases the prevalence of hyponatremia increases. But it is not statistically significant.(p-value 0.199).

Conclusion: This study has found 49.23% of the patients had hyponatremia which is a very high prevalence of electrolyte abnormality that has to be kept in mind while treating pulmonary tuberculosis patients. Timely intervention towards hyponatremia might be beneficial to the patients.

KeyWords: Hyponatremia Tuberculosis Pneumonia SIADH

I. INTRODUCTION

Tuberculosis is the major public health problem in India. In the year 2019 2406944 cases were notified in India (nishchay) tuberculosis is one of the top ten causes of death worldwide and the leading cause of death due to a single infectious agent. Approximately 10 million cases (range 9-11.1) were identified worldwide (WHO) with about 1.2 million deaths in HIV-negative patients in the year 2018. Geographically, most TB cases in 2018 were in the WHO regions of South-East Asia (44%), Africa (24%), and the Western Pacific (18%), with smaller percentages in the Eastern Mediterranean (8%), the Americas (3%) and Europe (3%). Eight countries accounted for two-thirds of the global total: India (27%), China (9%), Indonesia (8%), the Philippines (6%), Pakistan (6%), Nigeria (4%), Bangladesh (4%) and South Africa (3%). These data suggest the high gravity of tuberculosis in developing countries like India. This is one of the most common causes of infection in India and carries a high mortality rate. Hyponatremia is the most common electrolyte abnormality in clinical practice[1] Hyponatremia can be a potential source of morbidity so it's very important to recognize it[2]. The most common cause of hyponatremia is SIADH which is characterized by hyponatremia, elevated urine osmolality high urine sodium with decreased serum osmolality in the euvolemic state[3]. SIADH occurs as a common complication of malignancy, pulmonary infections neurological conditions kidney liver failure, and cardiac failure[4]. Pulmonary tuberculosis is one of the causes of hyponatremia through a various mechanism like local invasion to adrenal gland[5,6] local invasion to hypothalamus[7,8] tubercular meningitis [9-11] inappropriate ADH secretion via pulmonary infection[12-14] The present study aimed to analyze the prevalence of hyponatremia and its correlation with sputum positivity in adult patients with pulmonary tuberculosis.

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II. MATERIALS AND METHODS:

It was a retrospective observational study that was conducted from August 2019 to March 2020 in JK hospital Lnmc Bhopal. Data were collected from the medical record department of in medical college Bhopal. Sixty-five patients with active pulmonary tuberculosis who were admitted to the pulmonary and medicine department were included in the study. Investigation records like CBC, LFT, KFT serum electrolyte chest x-ray sputum AFB, and xene xpert were collected for analysis of those patients who meet inclusion criterion and was analyzed. The grade of sputum smear at the baseline was defined as: negative -no bacilli in 100 high power fields; scanty as less than 10 bacilli in 100 high power fields; 10–99 bacilli in 100 high power fields = 1+; 1–10 bacilli in one high power field = 2+; more than 10 bacilli in one high power field = 3+. Serum sodium concentration less than 135 mmol/L was taken as hyponatremia.

Inclusion criterion; Adult patients
diagnosed with Pulmonary tuberculosis with age 18 years and above

Exclusion criterion; Patients taking diuretics, Patients with kidney, failure, liver disease, cardiac failure Patients with malignancy, Patients with neurological disorders, Patients with H/O old Pulmonary tuberculosis, kidney disease, malignancies, patients on diuretics and medications related to SIADH.

III. STATISTICAL ANALYSIS:

The presentation of the Categorical variables was done in the form of number and percentage (%). On the other hand, the presentation of the continuous variables was done as mean ± SD and median values. The association of the qualitative variables was analyzed using the Chi-Square test. The data entry was done in the Microsoft EXCEL spreadsheet and the final analysis was done with the use of Statistical Package for Social Sciences (SPSS) software version 21.0. For statistical significance, the p-value of less than 0.05 was considered significant.

IV. RESULTS:

The study was conducted on 65 patients who were diagnosed with ZN staining of sputum for AFB. Out of 65 patients, 32 found to have hyponatremia (49.23%). Mean age was found to be 47.06 years out of which 34 were males and 31 females. Maen sodium among the study population was 132.15 mmol/l with a range from 116-147.

Table 1:-Distribution of baseline characteristics of study subjects.

Baseline characteristics	Mean ± SD	Median(25th-75th percentile)	Range
Age(years)	47.06 ± 14.2	47(35-60)	18-71
Gender(n(%))			
Female	31	47.69%	
Male	34	52.31%	
Sputum(n(%))			
1+	21	32.31%	
2+	22	33.85%	
3+	22	33.85%	
Hemoglobin(g/dL)	11.29 ± 2.25	11.5(9.5-13.5)	6.8-15.2
Total leucocyte count(cells/cumm)	9786.92 ± 2967.88	9500(7500-11600)	5300-20000
Lymphocytes(%)	11.55 ± 3.27	12(9-14)	5-20
ESR(mm/hour)	35.26 ± 12.48	35(27-42)	6-68
Total bilirubin(mg/dL)	1.16 ± 0.56	1.2(0.8-1.5)	0.2-3
Direct bilirubin(mg/dL)	0.6 ± 0.44	0.5(0.3-0.8)	0.1-2.4
Indirect bilirubin(mg/dL)	0.56 ± 0.26	0.57(0.3-0.8)	0.1-1.1
Albumin(g/dL)	2.76 ± 0.58	2.9(2.5-3.1)	1-3.9
Globulin(g/dL)	4.26 ± 0.6	4(4-5)	3-5.8
Urea(mg/dL)	35.06 ± 13.55	36(25-45)	10-65
Creatinine(mg/dL)	0.92 ± 0.55	0.8(0.67-1.1)	0.3-4.8
Platelet count(lacs)	3.38 ± 0.86	3.4(2.7-3.9)	1.9-6.2

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Sodium(mEq/L)	132.15 ± 8.24	135(124-139)	116-147
Potassium(mEq/L))	4.05 ± 0.69	4.1(3.7-4.5)	0.8-5.5

Table 2:-Prevalence of hyponatremia of study subjects.

Hyponatremia	Frequency	Percentage
No	33	50.77%
Yes	32	49.23%

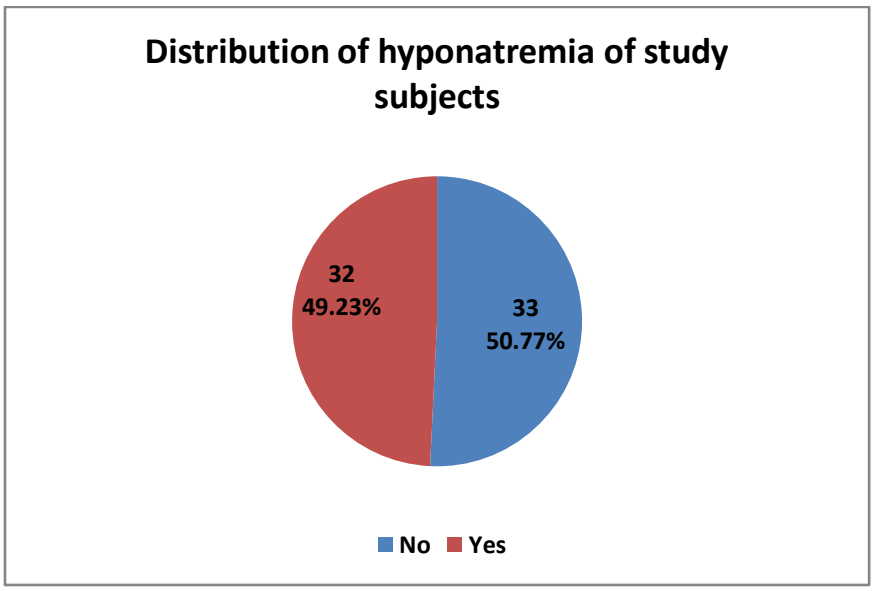

Figure 1:-Distribution of hyponatremia of study subjects.

Table 3:-Association of hyponatremia with sputum positivity.

Hyponatremia	1+ (n=21)	2+ (n=22)	3+ (n=22)	Total	P value	Test performed
No	14 (66.67%)	10 (45.45%)	9 (40.91%)	33 (50.77%)	0.199	Chi square test,3.228
Yes	7 (33.33%)	12 (54.55%)	13 (59.09%)	32 (49.23%)		
Total	21 (100%)	22 (100%)	22 (100%)	65 (100%)		

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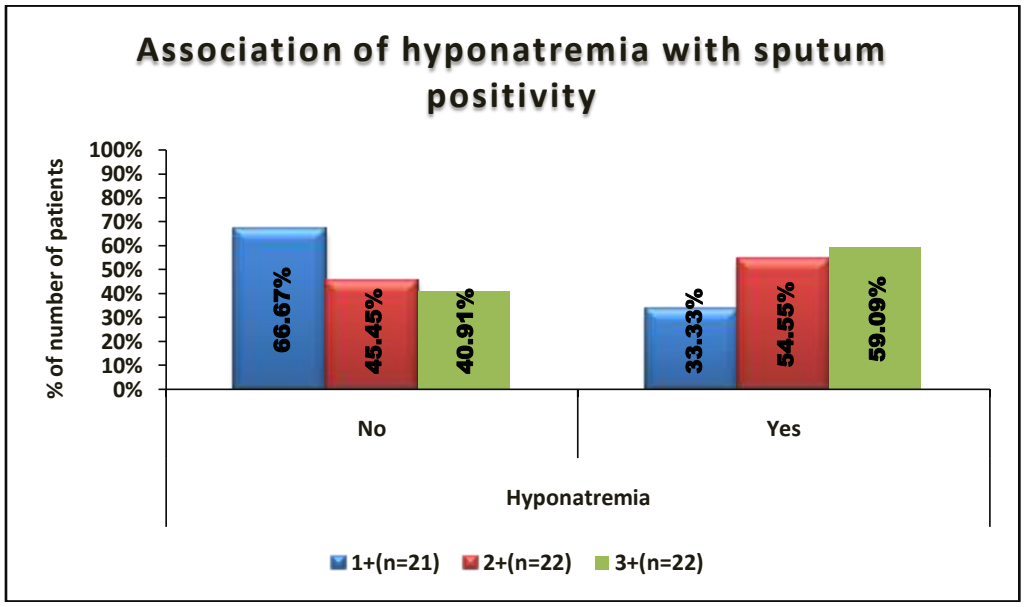

Figure 2:-Association of hyponatremia with sputum positivity.

V. DISCUSSION

About 65 patients having active PTB were taken as subjects for the study. Their ages ranged from 18-71 years with a mean of 47.06 ± 14.2 years and median 47(35-60). Around 47.69% of the subjects were females, the rest being males. Out of 65 subjects with PTB 32 (49.23%) patients had hyponatremia, a serum sodium value less than 135 mmol/L. The mean age of the patients in a study conducted by Shwetha MS et al mean age was 50.92 + 17.76 and many were in the age group of 20–60 years[15] In this study mean age of patients was 47.06 ± 14.2 years. A study by Mukherjee et al found that more subjects were in the age group between 20 and 40 years when compared to other age groups[16]. in our study age ranges from 18-71 years. In the present study ratio of gender was almost equal in the study population (Female-47.69% and Male-52.31%) while Qadeer et al[17]. found pulmonary tuberculosis 1.8 times more in men as compare to females this difference could be due to inclusion criteria as we had taken only admitted patients for the study. Jafari et al in their study found that 51% of subjects with pulmonary tuberculosis had hyponatremia[15] in our study also the prevalence of hyponatremia is 49.23% which is comparable to the previous study. We had excluded those patients who were taking diuretics, other drugs that cause hyponatremia so the cause of hyponatremia in our study most probably is a syndrome of inappropriate antidiuretic hormone secretion (SIADH), which is one of the most common causes of hyponatremia. syndrome of inappropriate antidiuretic hormone secretion (SIADH) was also found to be the most common cause of hyponatremia in a study conducted by Biswas et al[18] Eleven out of 65 patients had diabetes mellitus which is around 16.92%.out of 11 patients with diabetes mellitus 3 have hyponatremia i.e. around 27.27%. which is more than the overall prevalence of hyponatremia in this study. This study included an almost equal number of patients among 1+ sputum AFB, 2+ sputum AFB and 3+ sputum AFB positivity groups. It has been observed that as the sputum AFB positivity increases the prevalence of hyponatremia increases. But it is not statistically significant.(p-value 0.199).

VI. CONCLUSION

This study has found 49.23% of the patients had hyponatremia which is a very high prevalence of electrolyte abnormality that has to be kept in mind while treating pulmonary tuberculosis patients. Timely intervention towards hyponatremia might be beneficial to the patients.

Funding: Nil
Conflict of interest: Nil
Acknowledgment: Nil

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