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ORIGINAL ARTICLE

Hyponatremia in Community Acquired Pneumonia in a Tertiary Care Hospital - An Observational Cross-Sectional Study

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Abstract

Background: Community-acquired pneumonia (CAP) is one of the most common infectious diseases and is an important cause of mortality and morbidity worldwide. Studies have shown hyponatremia to be a common electrolyte abnormality in pneumonia. The current study was planned as there is paucity of data on hyponatremia in CAP in our setup. ***Purpose:*** To evaluate point prevalence of hyponatremia among patients presenting with community acquired pneumonia and to study correlation between CURB 65 score and levels of hyponatremia. ***Material and Methods:*** An observational cross-sectional study conducted in 100 patients of community acquired pneumonia who presented to GMC Jammu to study the correlation between CURB 65 score and levels of hyponatremia in the study cohort. ***Results:*** Out of 100 patients that we enrolled, 53% were males and 47% were females; mean age of patients enrolled in our study was 54.32 ± 17.7 years. In our study we found that hyponatremia was present in 50% of patients. Also, there was association between severity of CAP as determined by CURB 65 score and levels of hyponatremia. Among those with hyponatremia, 25% had mild, 17% had moderate and 8% had severe hyponatremia. ***Conclusion:*** Current study recorded 50%-point prevalence of hyponatremia among patients presenting with CAP. Further the study established significant association between higher CURB 65 score with hyponatremia. However, study failed to record any association with gender, smoking, alcoholism, rural or urban residence.

Key Words

Community-acquired pneumonia, Hyponatremia, CURB 65 score

Introduction

Community-acquired pneumonia (CAP) is one of the most common infectious diseases and is an important cause of mortality and morbidity worldwide (1-3). The studies have shown hyponatremia to be a common electrolyte abnormality in pneumonia (3,4). It is reported that the incidence of hyponatremia is around 40 to 45% in CAP (5). Most of the cases of hyponatremia occur as a response to stress which causes increased ADH release which in turn causes water retention. It is well known that acute severe hyponatremia may have severe neurological consequences due to cerebral edema, and

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can be lethal if not diagnosed and effectively treated.

In India, hyponatremia in pneumonia has extensively been studied in children but we could find only few studies in adults on prevalence of hyponatremia in pneumonia (3,6). So, the current study was done as there is paucity of data on hyponatremia in CAP in our setup. The purpose of study was to evaluate point prevalence of hyponatremia among patients presenting with community acquired pneumonia and to study correlation between CURB 65 score and levels of hyponatremia.

Material and Methods

An observational cross-sectional one-year study conducted in patients of community acquired pneumonia presented to GMC, Jammu after due approval from our Institutional Ethical Committee Vide no IEC/GMC/2019/794.

A minimum of 100 cases were taken. All patients with CAP fulfilling the following inclusion criteria were included in the current study i.e., all adults more than 18 years, symptoms and signs suggestive of pneumonia (fever, cough, tachypnea etc.), x-ray and or CT showing consolidation. Patients with diarrhoea, chronic kidney disease, heart failure, cirrhosis of liver, malignancy, taking diuretics, oral rehydration salt, patients diagnosed as nosocomial pneumonia, tuberculosis and HIV infection, chemical pneumonitis, interstitial pneumonias, adrenal or hypophyseal insufficiency were excluded from the current study.

All patients were subjected to thorough history and physical examination. Baseline characteristics of patients included age, gender, rural/urban, socioeconomic status, and history of smoking, comorbidities, prior antibiotics. Physical examination: GCS, BP, HR, RR, temperature and CURB-65 score were recorded. All research interest parameters were taken into consideration with particular attention to clinical, biochemical and radiological profile. Severity of CAP was assessed using CURB-65 score (4).

CURB-65 score was rated as follows: 0-1: Probably suitable for home treatment, low risk of death; 2: Consider hospital-supervised treatment; and ≥3: Manage in hospital as severe pneumonia, high risk of death.

Serum sodium was assessed in all patients using indirect potentiometric type of measurement via Integrated Multi-sensor Technology to develop an electrical potential proportional to activity of sodium ion in serum with normal values for serum/plasma sodium being 135-145 meq/l and patients were then further categorized based on serum sodium levels. Hyponatremia was defined as serum sodium less than 135 meq/l. Patients having hyponatremia were further categorized into mild hyponatremia when serum sodium was 130-134 meq/l, moderate 125-129 meq/l and severe when serum sodium was less than 125 meq/l (7).

Statistical Analysis: The sociodemographic and clinical profile of all the patients of CAP presenting with hyponatremia were analysed and correlated in a detailed sub group analysis. Data was entered and analysed using SPSS version for windows & Microsoft excel applications. Data was presented as Mean ± SEM for quantitative variables and as N (%) for qualitative variables. The suitable statistical was applied accordingly and $p<0.05$ was considered significant.

Results

In our study we found that hyponatremia was present in 50 (50%) patients. Among those with hyponatremia, 25% had mild, 17% had moderate and 8% had severe hyponatremia (*Table 1*).

Out of 50 patients with hyponatremia, 06 (12%) patients had CURB-65 score of 0, 05 (10%) had 1, 17 (34%) had 2, 16 (32%) had 3, 05 (10%) had 4 and 01 (2%) patient had CURB 65 score of 5 (*Table 2*).

Among those with CURB 65 score of 0, 23.8% had mild hyponatremia, 4.8% had moderate and 0% had severe hyponatremia. Among those with CURB 65 score of 1, 18.2% had mild, 4.5% had moderate and 0% had severe hyponatremia. With CURB 65 score of 2, 42.3% had mild, 15.4% had moderate and 7.7% had severe hyponatremia. 13% patients with CURB 65 score of 3 had mild & severe hyponatremia, and 43.5% had moderate hyponatremia. Nearly 33.3% patients with CURB 65 score of 4 had mild hyponatremia while 50% had severe, and around 50% patients with CURB 65

Table 1: Distribution of Patients of CAP with Hyponatremia

Serum Sodium Levels	Frequency	Percentage
Less than 125 Severe	8	8
125-129 Moderate	17	17
130-134 Mild	25	25
More than 135 Normal Range	50	50
Total	100	100

Table 2: Distribution of Hyponatremia with Severity of CAP as Determined by CURB-65 Score

			Sodium Levels			
			Less than 125	125-129	130-134	More than 135
CURB-65 Score	0	Count	0	1	5	15
		% Within hyponatremia	0.0	5.9	20.0	30.0
	1	Count	0	1	4	17
		% Within hyponatremia	0.0	5.9	16.0	34.0
	2	Count	2	4	11	9
		% Within hyponatremia	25.0	23.5	44.0	18.0
	3	Count	3	10	3	7
		% Within hyponatremia	37.5	58.8	12.0	14.0
	4	Count	3	0	2	1
		% Within hyponatremia	37.5	0.0	8.0	2.0
	5	Count	0	1	0	1
		% Within hyponatremia	0.0	5.9	0.0	2.0
Total		Count	8	17	25	50

Table 3: Subanalysis & Correlation of Hyponatremia with Severity of CAP as Determined by CURB-65 Score

			Hyponatremia				
			Less than 125	125-129	130-134	More than 135	Total
CURB-65 Score	0	Count	0	1	5	15	21
		% Within CURB-65	0.0	4.8	23.8	71.4	
	1	Count	0	1	4	17	22
		% Within CURB-65	0.0	4.5	18.2	77.3	
	2	Count	2	4	11	9	26
		% Within CURB-65	7.7	15.4	42.3	34.6	
	3	Count	3	10	3	7	23
		% Within CURB-65	13.0	43.5	13.0	30.4	
	4	Count	3	0	2	1	06
		% Within CURB-65	50.0	0.0	33.3	16.7	
	5	Count	0	1	0	1	02
		% Within CURB-65	0.0	50.0	0.0	50.0	

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	48.293[a]	15	.000

score of 5 had moderate hyponatremia, thereby indicating that as severity of CAP increases, hyponatremia becomes more pronounced. The study revealed that more severe the CAP, as assessed by CURB65 Score, more severe is the hyponatremia and this was found to be statistically significant ($p<0.001$) (*Table 3*).

Further, hyponatremia in CAP was found to be more pronounced in male patients in our study: 58.4% (31/53) cases vs. 40.4% (19/47) in females ($p=0.2$). Our study also found that in smokers, moderate and severe hyponatremia in CAP patients was more common than nonsmokers with hyponatremia overall being present in 56.2% (27/48) smokers vs. 44.2% (23/52) nonsmokers ($p=0.1$). Similarly, hyponatremia in CAP was found to be present in 55% (11/20) alcoholics compared to 48.7% (39/80) in non-alcoholics ($p=0.3$). Furthermore, our study also showed that hyponatremia in CAP was seen in 46% (28/61) patients belonging to rural area compared to 58%

(22/38) belonging to urban areas, although it was statistically non-significant (p=0.6).

Discussion

Studies have reported the incidence of hyponatremia in CAP to be around 40-45%, likely due to stress related release of ADH leading to SIADH (5,8,9). In our study we found that hyponatremia was present in 50% of patients. Also, there was association between severity of CAP as determined by CURB 65 score and levels of hyponatremia. This is in line with some of the previous studies.

Barcia *et al.* (10) reported that mortality risk by CAP was statistically higher in patients with hyponatremia. However, we did not study the mortality aspect in the current study. Nair *et al.* (11) found in their study that hyponatremia was present at hospital admission in 27.9% of patients, which is relatively less as comparison to our study. Although magnitude was mild with sodium levels <130 meq/l in only 4.1% of patients.

Kruger *et al.* (12) observed in his study that 31.8% CAP patients had hyponatremia. Among 72 cases 61% were females and 39% were males with mean age of patients being 51.3 yrs. Patients with hyponatremia were older and had higher CURB 65 score. Mortality risk was found to be increased with increasing CURB 65 score (p<0.05). The results were almost in accordance to the current study.

Zilberberg *et al.* (13) in retrospective cohort found that patients with hyponatremia were older (72.4 ± 15.7 vs. 68.0 ± 22.0, p<0.01) and had higher rates of ICU admission & mechanical ventilation in first 48 hours of hospitalization than patients with normal sodium. Whereas, Karki *et al.* (14) reported that hyponatremia was common occurrence at hospital admission with an incidence of 36.11%. Mortality increased with increasing CURB 65 score i.e., higher the CURB 65 score, higher is the death rate of CAP patients (p<0.05). The current study also reported similar trends.

Similarly, Muller *et al.* (15) found that overall, hospital mortality rate was 12.5% in pneumonia and 7.7% patients had concomitant hyponatremia. Okauchi *et al.* (16) in their recent study suggested that hyponatremia prolongs hospital stay in patients with community-acquired pneumonia and thus early correction of same may have favorable outcome in CAP patients.

A recent study of Potasso *et al.* (17) suggested that mild to moderate hyponatremia at discharge is associated with an increased risk of recurrence in hospitalized patients with pneumonia. This association is particularly strong for patients who are hyponatremic both on admission and at discharge, emphasizing the importance of hyponatremia correction during hospitalization. Although, no such relation was studied in the current study.

Further, the relationship of hyponatremia and higher CURB 65 scores represents the presence of hypovolemia, severe sepsis and subsequent activation of vasopressin. There is need to investigate further therapeutic benefits if any, of correction of hyponatremia. Hence hyponatremia may be an important prognostic marker in CAP.

Conclusion

Current study recorded 50%-point prevalence of hyponatremia among patients presenting with CAP. Further the study established significant association between higher CURB 65 score with hyponatremia. However, study failed to record any association with gender, smoking, alcoholism and rural or urban residence.

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Conflicts of Interest

There are no conflicts of interest.

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