



## STUDY OF INCIDENCE OF HYPONATREMIA IN CHILDREN WITH COMMUNITY ACQUIRED PNEUMONIA

**Dr. Jagdish Avtar Nagar\***

PG Resident, Department of Pediatrics, Jhalawar Medical College, Jhalawar, Rajasthan, India. \*Corresponding Author

**Dr. Rajendra Kumar Gupta**

Senior Professor, Department of Pediatrics, Jhalawar Medical College, Jhalawar, Rajasthan, India.

**Dr. Subhash Chandra Meena**

Assistant Professor, Department of Pediatrics, Jhalawar Medical College, Jhalawar, Rajasthan, India.

### ABSTRACT

**Introduction-** Hyponatremia is a common electrolyte imbalance observed in children with community acquired pneumonia. Presence of hyponatremia may increase morbidity and mortality in community acquired pneumonia. **Objective-** To study frequency of hyponatremia in 6 months to 5 years old children hospitalized with community acquired pneumonia. **Materials And Methods-** This cross-sectional analytical study involved 80 children of 6 months to 5 years, admitted in tertiary care hospital with community acquired pneumonia. Subjects were classified as pneumonia and severe pneumonia. Relevant demographic, clinical data were noted. Serum sodium was analyzed and was correlated with pneumonia. **Results-** Out of 46 cases of Pneumonia 15% had hyponatremia while 85 % had no hyponatremia, while out of 34 cases of severe pneumonia 83% had hyponatremia and 17% with no hyponatremia. Hyponatremia was more commonly seen in severe pneumonia group when compared to the pneumonia group ( $p < 0.0001$ ).

**KEYWORDS :** Pneumonia, Hyponatremia

### INTRODUCTION

Pneumonia is infection that occurs in lower respiratory tract that cause airway obstruction and inflammation of lung parenchyma with consolidation of alveolar spaces.<sup>1,2,3</sup> When severe pneumonia occurs, it is often associated with dyselectrolytemia, most common as hyponatremia and gradually leads to imbalance in level of serum sodium which significantly correlates to overall outcome of patient.

According to the United Nations Children's Fund (UNICEF)<sup>5</sup> and WHO<sup>3</sup> pneumonia occurs in children below 5 years of age and globally effects more than 8,00,000 young children<sup>5</sup> and 14% (7,40,180) of all 5 year old children deaths but 22% of all deaths in children aged 1 to 5 due to pneumonia in 2019.<sup>3</sup> Though pneumonia effects all the children over the world, it is mostly observed that high deaths rates occur in South Asia and sub-Saharan Africa.<sup>3</sup> According to the World Health Organization (WHO), one in three deaths in India is caused by pneumonia. Pneumonia in India is the leading cause of infant deaths. Every year almost 2,00,000 children under five die of pneumonia in India. On a global level, pneumonia kills around 9,00,000 children in the world every year.<sup>5</sup>

Hyponatremia is defined as a serum sodium concentration of less than 135mq/dl.<sup>7</sup> Hyponatremia could result from a sodium deficit or surplus of water. Exact cause of hyponatremia in community acquired pneumonia is still being studied. The basic pathophysiology is thought to be due to stress induced release of antidiuretic hormone (ADH). This inappropriate production of ADH produces water retention and hence euvolemic hyponatremia leading to SIADH.<sup>8,9</sup>

### MATERIAL AND METHODS

This cross-sectional analytical study involved 80 children of 6 months to 5 years, admitted in tertiary care hospital from 2021 to 2022 with community acquired pneumonia. Subjects were classified as pneumonia and severe pneumonia according to WHO classification 2014. Relevant demographic, clinical data were noted. Serum sodium was analyzed and was correlated with pneumonia.

### Inclusion Criteria

Children with age 6 months to 5 years, admitted in the hospital and diagnosed as community acquired pneumonia

according WHO criteria (presence of fever, cough, tachypnea for the age)<sup>10</sup> were included in the study.

### Exclusion Criteria

Children with preexisting respiratory and cardiac morbidity, with associated diarrhea, on medications and diseases affecting sodium homeostasis and with pneumonia due to nosocomial infection or aspiration were excluded.

### OBSERVATION AND RESULTS

Out of 46 cases of Pneumonia 15% (7) had hyponatremia while 85% (39) had no hyponatremia, while out of 34 cases of severe pneumonia 83% (28) had hyponatremia and 17% (6) with no hyponatremia. Hyponatremia was more commonly seen in severe pneumonia group when compared to the pneumonia group ( $p < 0.0001$ ).

**Table 1: Correlation of severity of pneumonia with hyponatremia**

WHO classi. of Pneumonia	Normo-natremia	Hypo-natremia	Total number of children	P- Value
Pneumonia	39 (85%)	7 (15%)	46	<0.0001*
Severe pneumonia	6 (17%)	28 (83%)	34	
Total (n)	45	35	80	

Fisher's exact test applied, two sided ( $\alpha < 0.05$ ), \* = Significant Out of 32 cases who had hyponatremia, 7 (15%) cases had upto 5 days of hospital stay, 78% had stay more than 5 days. Out of 45 cases without hyponatremia, 39 (85%) had upto 5 days hospital stay and 22% had stay more than 5 days. Children with hyponatremia required longer duration of hospital stay ( $p$  value  $< 0.0001$ ).

**Table 2: Correlation of hyponatremia with duration of hospital stay**

Duration of hospital stay	Normo-natremia	Hypo-natremia	Total number of survived children	P- Value
Upto 5 days	39 (85%)	7 (15%)	46	<0.0001*
6-10 days	6 (22%)	21 (78%)	27	
>10 days	0 (0%)	4 (100%)	4	
Total	45	32	77	

Chi square test applied, df = degree of freedom, \* = Significant

## DISCUSSION

In this study we observed hyponatremia in 44 % of children with pneumonia. Studies done by Don Met al<sup>11</sup> and Praneetha et al<sup>12</sup> showed almost similar frequency of hyponatremia in pneumonia i.e., 45% and 43% respectively. However, other studies have reported varying percentages of hyponatremia in patients with pneumonia ranging from 21% to 47% (Mandal et al<sup>13</sup>, Guruswamy et al<sup>14</sup>).

## CONCLUSION

Hyponatremia is commonly seen in children with pneumonia with incidence of 44% in the present study. Hyponatremia is a strong indicator of higher morbidity in children hospitalized for pneumonia. Hyponatremia is significantly associated with prolonged hospital stay. Therefore, early detection and management of hyponatremia is required to reduce duration of hospital stay and indirectly the cost of treatment and morbidity.

## REFERENCES:

- 1) Pahal P Rajasurya V, Sharma S, Typical Bacterial Pneumonia. (Updated 2022 may 25). StatPearls (Internet). Treasure Bacterial Island (FL): StatPearls Publishing; 2022 Jan.
- 2) Mani CS. Acute Pneumonia and its complications. Principles and practice of Pediatric Infectious Disease. 2018;238-249.e4.
- 3) World Health Organization. Pneumonia. 11 November 2021. <https://www.who.int/news-room/fact-sheet/detail/pneumonia>.
- 4) Das M, Narain B. Hyponatremia in children with severe pneumonia and its effect on overall outcome. Int J Contemp Pediatr 2019; 6:2516-21.
- 5) UNICEF. Save the Children, and Every Breath Counts. Every child's right to survive: a 2020 agenda to end pneumonia deaths. UNICEF. Available at <http://www.unicef.org/reports/every-childs-right-survive-pneumonia-2020>. 2020 Jan; Accessed: June 4 2020.
- 6) World Health Organization. Pneumonia. Fact sheet. Updated on 2 June 2017 (internet). WHO; 2017 June. Available at: <http://borngenprojeject.org/pneumonia-inIndia>.
- 7) Greenbaum LA. Electrolyte and Acid Base Disorders. In: Kliegman RM, Stanton BF, SchorNF, St.GemeJW (Eds). Nelson Textbook of Pediatrics. 21th ed. Philadelphia: Elsevier; 2016. p.350. (International Edition).
- 8) Howard Trachtman MD. Sodium and water homeostasis. Pediatric Clin North Am. 1995;42(6):1343-1363. doi: [https://doi.org/10.1016/S0031-3955\(16\)40088X](https://doi.org/10.1016/S0031-3955(16)40088X).
- 9) Charles R, Rees JR. Inappropriate secretion of antidiuretic hormone in pneumonia. Postgrad Med J. 1975;51(599):663-664. doi: 10.1136/pgmj.51.599.663.
- 10) World Health Organization. Revised WHO Classification and Treatment of Pneumonia in Children at Health Facilities: Evidence Summaries. Geneva: World Health Organization; 2014. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK264162>.
- 11) Don M, Valerio G, Korppi M, Canciani M. Hyponatremia in pediatric community acquired pneumonia. Pediatric Nephrology. 2008;23(12):2247-53.
- 12) Praneetha, C. K., Ahirrao, V. S., Srinivasa, K., Premalatha, R., & B., R. Hyponatremia in children of 2 months to 5 years of age with community acquired pneumonia and its correlation with severity of illness and outcome. Pediatric Review: International Journal of Pediatric Research, 2019, 6(11), 561566.
- 13) ParthaPratim Mandal, Madhu Garg, I.P Choudhary. To study the association and significance of hyponatremia in pneumonia in pediatric patients treated in hospital setting. International Journal of Contemporary Medical Research 2018;5(1):11-14.
- 14) Guruswamy N T, Habeeb Khan, Pavan Hegde. Correlation of hyponatremia in children presenting with acute lower respiratory tract infection in a tertiary care hospital. International Journal of Recent Trends in Science and Technology October to December 2019; 9(4): 77-80.