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To find out the incidence of hyponatremia in pneumonia in children between 2 months and 5 years of age.

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Abstract

Background & Methods: The aim of the study is to find out the incidence of hyponatremia in pneumonia in children between 2 months and 5 years of age. Routine blood investigations like Complete blood count, Renal function tests, Serum electrolytes, Random blood sugar, C reactive protein, Blood culture etc. were drawn from the patient and sent without any delay on the day of admission before commencing any treatment.

Results: 59% of children had normal sodium values at admission. Mild hyponatremia was seen in 24% of children and moderate hyponatremia was seen in 17% of children. 97% of children were discharged and 03% expired. The chi-square statistic is 4.6968. The p-value is .020547. The result is significant at $p < .05$.

Conclusion: Hyponatremia is a common finding in children with severe pneumonia and it can be useful in predicting the morbidity of children admitted with community acquired pneumonia.Hence serum electrolytes should be done in all children hospitalised with CAP. The serological diagnosis to determine the aetiology of the organism causing pneumonia was not done in this study. If the serological diagnosis had been done then it would have thrown light on the organism causing more hyponatremia.

Keywords: incidence, hyponatremia, pneumonia & children.

Study Design: Observational Study.

Introduction

Pneumococci are gram positive lanceolate diplococci. It is typically small slightly elongated cocci with one end broad and the other end rounded[1]. They occur in pairs with broad ends in apposition. The capsule usually encloses each pair of cocci. The polysaccharide capsule of the bacteria is an important virulence factor which prevents phagocytosis by the neutrophils.

It is the most common bacterial cause of pneumonia in children. Primary infection with pneumococci is as such rare. Usually follows a viral URI. The disease onset is marked by sudden onset of fever, breathlessness, chills etc. The child appears toxic and ill. Often leads to consolidation of lobes. Invasive pneumococcal disease (IPD) is rare in immunocompetent children[2-4].

The pathogenesis of pneumonia and the response of the immune system varies between organisms. Most of the viral pneumonia begins as infection of the upper respiratory tract. The infection then spreads to the lower respiratory tract[5]. The organisms then multiply and

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spread to involve the distal parts of the respiratory tract. The ciliary function of the respiratory epithelium is lost which results in stasis of secretion. The alveoli also will lose their function and structural integrity. This results in loss of surfactant synthesis and finally leads to development of pulmonary oedema. The mononuclear cells infiltrate the sub mucosa and interstitium. This results in tissue oedema and narrowing of the airway calibre. The exchange of gas across alveolar capillary membrane is also affected. The important factors which determine the severity of viral pneumonia are anatomy of the respiratory tract, pre-existing pulmonary disease and immunity of the host[6-7].

Material and Methods

Present study was conducted on 10 cases for 01 Year. Children with radiologically confirmed pneumonia admitted as inpatients in the medical wards of hospital who meet the inclusion criteria. The severity of pneumonia is classified according to British Thoracic Society Guidelines. The classification divides the children into two age groups (infants and older children). The severity of pneumonia is classified into 2 groups as mild to moderate and severe.

Informed written consent was obtained from the parents of the study subjects. The baseline demographic characteristics and clinical characteristics were obtained from all the children at the time of admission after detailed history taking and clinical examination. Temperature of the children was measured at the axilla using digital thermometer. Oxygen saturation was measured using Nelcor pulse oximeter.

INCLUSION CRITERIA

1. Children aged 2 months to 5 years.

2. Symptoms of LRI (fever, increased respiratory rate, chest retraction).

3. X ray showing evidence of pneumonia

EXCLUSION CRITERIA

1. Chronic diseases involving other systems.

2. Previously treated with intravenous fluids.

3. Chronic drug intake

Table 1: Age Distribution

S. No.	Age	No.	Percentage	P Value
1	**Below 01**	**43**	**43**	.79185
2	**01-05**	**57**	**57**	
	Total	**100**	**100**	

The study around 43% of children was under 1 year of age and around 57% were between 1 to 5 years of age. The chi-square statistic is 0.0696. The *p*-value is .79185. The result is *not* significant at $p < .05$.

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Table 2: Initial Temperature

S. No.	Temperature	No.	Percentage	P Value
1	<38.5°C	58	58	.654162
2	> 38.5°C	42	42	

58% of children had high initial temperature (> 38.5) and 42% had temperature less than 38.5 degree Celsius. The chi-square statistic is 0.2007. The *p*-value is .654162. The result is *not* significant at $p < .05$.

Table 3: Serum Sodium

S. No.	Serum Sodium	No.	Percentage	P Value
1	Normal	59	59	.003295
2	Mild hyponatremia	24	24	
3	Moderate hyponatremia	17	17	

59% of children had normal sodium values at admission. Mild hyponatremia was seen in 24% of children and moderate hyponatremia was seen in 17% of children. The chi-square statistic is 8.6365. The *p*-value is .003295. The result is significant at $p < .05$.

Table 4: Outcome

S. No.	Serum Sodium	No.	Percentage	P Value
1	Improved	97	97	.020547
2	Death	03	03	

97% of children were discharged and 03% expired. The chi-square statistic is 4.6968. The *p*-value is .020547. The result is significant at $p < .05$.

Discussion

The main result of the study described here was that hyponatremia was a common finding in children admitted with CAP. In this study 40.8% children had hyponatremia. However majority of the cases had only mild hyponatremia. The frequency (40.8%) of hyponatremia in this study is comparable with the results of previous studies by Massimiliano[7] et al (45.4%), and Sakellaropoulou[8] et al (35.2%). The fact that none of the cases had severe hyponatremia could be due to release of ANP in these children. ANP helps in maintaining water and electrolye balance through its diuretic and natriuretic effects as described by Haviv et al[9].

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Most of the children with hyponatremia had low estimated serum osmolality, high urine sodium and high urine osmolality indicating that it is euvolemic hypotonic hyponatremia. By the conventional criteria all these patients may be labelled as having SIADH since most of the features fit into the criteria[10]. Thus stress induced release of ADH causing salt loss and water retention might be reason for hyponatremia. But further studies are needed to unravel the cause of hyponatremia in acute infections.

Four children included in the study had expired. All the four children were found to be hyponatremic. This deserves a special mention but studies are to be done in large population to establish a significant association with mortality. All the children who required mechanical ventilation were found to be hyponatremic[11-12]. Hence this study showed that hyponatremia was associated with poor outcome and increased morbidity of the disease like requirement of mechanical ventilation and prolonged hospital stay.

Conclusion

Hyponatremia is a common finding in children with severe pneumonia and it can be useful in predicting the morbidity of children admitted with community acquired pneumonia.Hence serum electrolytes should be done in all children hospitalised with CAP. The serological diagnosis to determine the aetiology of the organism causing pneumonia was not done in this study. If the serological diagnosis had been done then it would have thrown light on the organism causing more hyponatremia.

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