ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 8 | August - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ASSESSMENT OF NUTRITIONAL STATUS IN BRONCHOPNEUMONIA PATIENTS AT A RURAL TERTIARY CARE HOSPITAL

Paediatrics

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ABSTRACT

Introduction: Bronchopneumonia is the most common type of pneumonia in children and the leading cause of death from infection in children aged < 5 years. **Aim:** The present study was undertaken to assess the nutritional status in bronchopneumonia patients at a rural tertiary care hospital. **Materials and Methods:** A total 256 patients diagnosed with bronchopneumonia having aged between 1-96 months were enrolled in the study and thoroughly assessed with particular emphasis on the anthropometric measurements. Z score of weight for height was calculated. Z score +2 to -1 was defined as normal, -1 to -2 z score as mild, -2 to -3 z score as moderate and <-3 z score was defined as severe nutritional status. **Results:** Among 256 children, 122 (47.65%) were females and 134 (52.34%) were males. Maximum numbers of patients were in the age group of 1 to ≤12 months (156; 60.93%). Most of the patients (170; 66.40%) diagnosed with only bronchopneumonia and remaining with one or more comorbid conditions. Amongst all the children, 9.76% children was found as severely wasted and 7.03% were moderately wasted (-2SD to <-3SD). 23.04% of the children were mild wasted, W/H- Z-score was between – 1.00 to –1.99 SD of the NCHS median and 60.15% were normal. Ventilation was required in 5 (1.95%) cases, 252 (98.43%) cases were discharged and 4 patients were died. **Conclusion:** The results showed that the majority of children aged 1-12 months with male predominance and also nutritional status in children having bronchopneumonia was normal in maximum cases. Thus the nutritional status of children does not affect the incidence of bronchopneumonia.

KEYWORDS

Bronchopneumonia, Pneumonia, Nutritional status, Anthropometry, Z score, Ventilation

INTRODUCTION

Bronchopneumonia is the most common clinical manifestation of pneumonia in the pediatric population, and the leading cause of death in children under the age of 5 years. It is an infection that affects the air passages going into the lungs, also known as the bronchus. Symptoms can range from mild to severe and may include coughing, breathing difficulties, and fever. This condition is mainly caused by bacterial infections, but it can also be caused by viral and fungal infections. This illness is particularly life threatening in young children, older adults, and patients with other chronic immunity lowering health conditions. However, the symptoms, causes, complications, diagnosis, treatment, and prevention of bronchopneumonia are typically the same as that for pneumonia [1].

Risk factors for pneumonia include nutritional status, breastfeeding, babies with low birth weight, gender and physical factors of the house [2]. Other research results suggest that poor nutritional status can cause toddlers to be more susceptible to lower airway disease [3]. According to the Ministry of Health poor nutritional status in children can make the child's immune system low, and eventually the child will be susceptible pneumonia [2]. Globally, pneumonia accounts for 16% of all deaths of children under the age of 5 years. Moreover, morbidity and mortality from pneumonia are high in developing countries [4]. In 2015, worldwide 920,136 children under the age of 5 years died from pneumonia. This incidence of mortality was predominantly from bronchopneumonia [1]. Malnutrition aggravates the severity of pneumonia and increases mortality from these diseases [5].

In addition, child mortality can be an indicator in determining the child's health status. Efforts to reduce child mortality are to encourage and mobilize all forms of health services to create excellent service [6]. Health centre as a form of leading health services has a role in reducing child mortality by taking into account the state of children's nutritional status [7]. Research conducted by Arianto and Nanda found that age under-five children with nutritional status were not at high risk for pneumonia. Other studies show a significant or significant relationship between the nutritional statuses of children with the degree of pneumonia in infants [8]. Given the impact of pneumonia on children is very bad and in terms of previous research there has been no research that specifically compares the nutritional status of children with bronchopneumonia. Hence the present study was undertaken to determine the nutritional status in bronchopneumonia patients at a rural tertiary care hospital.

MATERIALS AND METHODS

The present prospective observational study was conducted in the Department of Pediatrics, at a Tertiary Care Institute during a period of 6 months from 1 May 2019 to 31 October 2019. Study subjects were consecutively admitted patients who received a diagnosis of bronchopneumonia. Total 256 patients of aged 1-96 months diagnosed with bronchopneumonia were enrolled in the study. The study was approved by Institutional Ethical Committee and written informed consent was obtained from child parents.

A detailed history was taken, physical and clinical examination, dietary habit, and the various disease associated with malnutrition were evaluated. Nutritional status was assessing by taking anthropometric measurement. Data was collected and entered into a computer database, summarized and presented descriptively. Z-scores were calculated for weight–for–height (W/H) using Epi Info software. Prevalence of malnutrition i.e. wasting was determined using the reference population defined by the National Centre for Health Statistics (NCHS) of the United States, as local reference standards are not available. The procedure of transforming the anthropometric data into Standard Deviation scores (SD) usually mentioned as Z - scores was adopted. Z score +2 to -1 was defined as normal, -1 to -2 z score as mild, -2 to -3 z score as moderate and <-3 z score was defined as severe nutritional status.

RESULTS

A total of 256 bronchopneumonia patients of aged 1-96 months were enrolled in the study, among them 122 (47.65%) were females and 134 (52.34%) were males. Maximum numbers of patients were in the age group of 1 to ≤12 months (156; 60.93%) as shown in table [1].

Most of the patients (170; 66.40%) diagnosed with only bronchopneumonia and remaining with one or more new comorbid conditions as depicted in table [2].

Distribution of children's weight for height (Z-score) shows that

amongst all the children, 9.76% children was found as severely wasted and 7.03% were moderately wasted (-2SD to <-3SD). 23.04% of the children were mild wasted, W/H- Z-score was between – 1.00 to –1.99 SD of the NCHS median and 60.15% were normal, (Table 3 and Figure 1). Ventilation was required in 5 (1.95%) cases. Out of 256 patients, 252 (98.43%) cases were discharged from hospital and 4 (1.56%) patients were died.

DISCUSSION

The present study was an observational study in which nutritional status were assessed in patients with bronchopneumonia. Nutrition status of children from the data above, it can be is good nutritional status/ normal status in majority of cases, but suffering from bronchopneumonia. The opinion of the Ministry of Health that nutritional status factors are not the main cause of pneumonia, there are other factors, namely the physical environment of children under five which can affect the health and illness of infants [1]. Nutritional status determines normal health and functioning of all systems in the body, including the immune system which is responsible for host resistance to various infectious diseases [9]. There is also the purpose of assessing nutritional status is to evaluate the nutritional status of children, the status can identify the balance between income and use or nutrient requirements. In addition, according to Arianto and Nanda toddlers is a critical period [8], where balanced nutritional needs at that age are very important, because at the age of five is a golden period for optimal brain growth and development. Some studies report that malnutrition will reduce immune capacity to respond to pneumonia infections including impaired granulocyte function, decrease in complement function, and also cause micronutrient deficiencies [10]. Decreasing micro substances in the body of a toddler will cause a decrease in serum retinol levels of less than 20mcg / 100ml which has an impact on the decline of the toddler's immune system, which in turn can increase the incidence of infections in children [8].

However, the risk of pneumonia is greater in children under 2 years of age than the older children; this is because the immune system of children under 2 years is not perfect so it is easier to get infected [11]. The present study showed that 72.26% of the children less than two years of age were more affected with bronchopneumonia than the other age groups; this finding was supported from a case control study conducted in Pakistan [12]. The gender distribution indicated that pneumonia was more prevalent in male children (52.34%) than in female children (47.65%), which revealed that a relation existed between gender and pneumonia. This finding agrees with the other studies [13-15]. Also present study supported by the data from Ministry of Health of the Republic of Indonesia (2012) which describes the distribution of pneumonia patients who were hospitalized based on gender - male (55.6%) and female (44.4%) [16]. This may be due to genetic factors or cultural practice of seeking medical care frequently for males than females, considering males more precious [17, 18]. Sunyataningkamto et al [10] explains that male sex has higher percentage of being affected by pneumonia. This is because the respiratory tract diameter of boys is smaller than that of girls, there is a difference in body resistance between boys and girls.

Most of the patients (170; 66.40%) diagnosed with only bronchopneumonia and remaining with one or more new comorbid conditions. Severe acute malnutrition (SAM) is associated with increased severity of common infectious diseases, and death amongst children with SAM is almost always as a result of infection. In current study, SAM with bilateral bronchopneumonia and left sided bronchopneumonia was most common comorbid condition observed in 21 (8.20%) cases each followed by bronchopneumonia with moderate acute malnutrition (MAM) (17; 6.64%), known history of thalessemia (6; 2.34%), right sided empyemic pneumonia (5;1.95%) known history of seizure disorder (4; 1.56%), megaloblastic anemia (4; 1.56%) and right sided aspirational pneumonia (4; 1.56%), bilateral bronchopneumonia was observed in 3 (1.17%) cases. Bronchopneumonia with acyanotic CHD and right sided synpneumonic effusion was observed in 1 (0.39%) case each. Several investigators had already found a correlation between certain underlying diseases and specific bacterial microorganisms. Ruiz et al [19] showed that pneumococcal pneumonia was more likely in patients with pulmonary or hepatic comorbid illnesses, and gram-negative enteric bacilli were associated with the presence of chronic pulmonary diseases. Similarly, Porath et al [20] observed a significant association between comorbid conditions, particularly chronic obstructive pulmonary disease, and several bacterial etiologies. Furthermore, studies on the etiology of pneumonia in patients with HIV infection or hematologic malignancies have detected a low incidence of atypical microorganisms [21].

A number of previous studies were conducted to evaluate the nutritional status of children with pneumonia. Most of those studies assessed only one or two components of nutritional anthropometry. Similarly in present study only one components of nutritional anthropometry such as weight for height/length was assessed. Nutritional status of bronchopneumonia patient showed that amongst all the children, 9.76% children was found as severely wasted and 7.03% were moderately wasted (-2SD to <-3SD). 23.04% of the children were mild wasted, W/H- Z-score was between – 1.00 to –1.99 SD of the NCHS median and 60.15% were normal. These findings are correlated with the previous studies [22, 23]. Thus, this study shows the phenomenon of maximum children under five with normal nutritional status, getting exclusive breastfeeding and immunization but still experiencing bronchopneumonia. This occurs may be due to children living in the pollution city with a dense environment and high air pollution.

In addition nutritional status is a principal determinant of the health trajectory and outcomes following discharge from hospital. In existing study, the need for requirement of respiratory assistance/ ventilation in children of bronchopneumonia was 1.95% (5 cases). Out of 256 patients, 252 (98.43%) cases were discharged from hospital and 4 (1.56%) patients were died. Among Gambian children admitted with pneumonia, even being moderately underweight was associated with a rate ratio of 32 for death [24]. In Kenya, children discharged alive from hospital had an eight-fold higher risk of death during the following year than their community peers, with undernutrition being the main determinant of mortality risk [25]. The modifiable factors associated with these deaths following care are not well defined, but potential targets include addressing nutrient composition of therapeutic and supplementary feeds, suboptimal infant feeding practices, food insecurity, an unhealthy gut microbiome, recurrent infection due to ongoing susceptibility and exposure to pathogens, and restricted access to care. Improved prevention, early identification, and appropriate diagnosis of undernourished children with pneumonia are critical, yet clinical presentation of pneumonia in this population is not straightforward, and the stratification of risk to identify those with greatest likelihood of mortality is currently dependent on non-specific indicators of nutritional status [26].

CONCLUSION

The present study concluded that bronchopneumonia is more prevalent in children under one year of age, but it is still a health problem among children under five years of age. The results showed that the majority of children aged 1-12 months, male sex, and normal nutritional status. Bronchopneumonia also presented with other comorbid conditions, the overall nutritional status in children having bronchopneumonia was normal. Thus, the nutritional status of children does not affect the incidence of bronchopneumonia; however further studies with statistical model is needed to confirm this results.

Tables

Table 1: Demographic data of the patients

Age (Months)		No. of patients	Percentage
1 to ≤12		156	60.93
>12 to ≤24		29	11.32
>24 to ≤36		26	10.15
>36 to ≤48		30	11.71
>48 to ≤60		11	4.29
>60		04	1.56
Sex	Male	134	52.34
	Female	122	47.65

Table 2: Distribution of patients according to diagnosis

Diagnosis	No. of patients	Percentage
SAM with bilateral bronchopneumonia	21	8.20
MAM with bronchopneumonia	17	6.64
Bronchopneumonia	170	66.40
Acyanotic CHD with bronchopneumonia	1	0.39
Left sided bronchopneumonia	21	8.20
Right sided empyemic pneumonia	5	1.95
Bilateral bronchopneumonia	3	1.17

K/C/O seizure disorder bronchopneumonia	4	1.56
Right sided synpneumonic effusion	1	0.39
Megaloblastic Anemia With bronchopneumonia	4	1.56
K/C/O thalessemia with bronchopneumonia	6	2.34
Right sided aspirational pneumonia	4	1.56

Severe acute malnutrition (SAM), Moderate Acute Malnutrition (MAM)

Table 3: Nutritional status in bronchopneumonia patients

Nutritional status (Weight for Height)	No. of Patients	Percentage
Normal (z score >-1SD)	154	60.15
Mild (-2 ≤ z-score < −1 SD	59	23.04
Moderately wasted (−3 ≤ z-score < −2 SD)	18	7.03
Severely wasted (z-score < −3 SD)	25	9.76
Total	256	100

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