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Original Research Article

Effect of exclusive breastfeeding up to 6 months on mortality of children due to pneumonia

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ABSTRACT

Objective: To observe the effect of exclusive breastfeeding up to 6 months in children in terms of mortality due to pneumonia.**Materials and Methods:** This was a hospital-based, prospective, observational study. Study was done in a tertiary care hospital. 300 children of both sexes between 2 months to 5 years of age were enrolled in this study according to WHO defined criteria for severe and very severe pneumonia.**Results:** In the study, chances of getting very severe pneumonia was 4.1 times more and mortality was 24.7% in the children who did not get exclusive breast feeding up to 6 months in comparison only 3.9% children died who had exclusive breastfeeding up to 6 months.**Conclusion:** Children who do not receive exclusive breastfeeding up to 6 months are more prone to have more severe pneumonia and relatively higher chance of mortality.This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.For reprints contact: reprint@ipinnovative.com

1. Introduction

Pneumonia has been described as the major “forgotten killer of children” UNICEF and WHO because historically it has received little attention it deserves. Every 20 second one child dies due to pneumonia- more than AIDS, malaria and measles combined. Pneumonia is a leading cause of mortality in under-five children. Approximately 1.4 million under-five children deaths in 2010 were due to pneumonia.¹ According to WHO, pneumonia is responsible for 20% of death in the under-fives and 3 million deaths every year.² Two- third of these deaths occur under 1 year of age and more than 90% occur in developing countries.^{3,4} The estimated clinical pneumonia incidence expressed as events per child year is highest in South East Asia (0.36), then

Africa (0.33), followed by Eastern Mediterranean (0.28).⁵ Breastfeeding may be effective in reducing hospitalizations for acute lower respiratory infections in the first years of life.^{6,7} A systematic review published in 2002, assessed the optimal duration of breastfeeding for reduction of respiratory illness and mortality and supported the global recommendation for exclusive breastfeeding during the first 6 months of life.⁸

This study aimed to quantify the protective effect of exclusive breastfeeding against mortality and severity due to pneumonia in children under-five age group.

2. Materials and Methods

The study conducted over a period of 18 months from October 2019 to March 2021 in a tertiary care hospital in pediatrics department. A total 300 children of both sex

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with WHO defined severe and very severe pneumonia were enrolled in the study.⁹ The age group was 2 months to 5 years. Children who had other co-morbid conditions like Severe malnutrition, Congenital malformations, Congenital heart disease, Severe anemia (Hemoglobin below 7gm% as per WHO cut-offs for age based value of hemoglobin for severe anemia¹⁰), Chronic respiratory disease (eg. asthma, cystic fibrosis, bronchopulmonary dysplasia, previously diagnosed case of tuberculosis) and Pulmonary Koch's were excluded.

After taking informed consent from parents/guardian details of personal, demographic profile, signs and symptoms, relevant past and family history were enquired and recorded. Details of breast feeding and addition of top feeds were recorded. After that a detailed patient examination was done and findings were noted in pre-designed proforma. Chest radiographs were performed in all patients. Results of the investigations including complete blood count, chest x-ray, blood culture, serum electrolytes and arterial blood gas analysis were recorded. The treatment given and progress notes were recorded at 48 hours, 5th day or as required. Patient were observed till the day of discharge or death. Treatment was started as per WHO standard protocol and antibiotics were changed if there was no improvement or worsening of symptoms within 48 hours of admission. Patients were discharged when respiratory rate reduced below the age specific cut off, with absence of hypoxemia, chest in-drawing and fever for at least 24 hours.

Association of severity of pneumonia and mortality due to pneumonia in exclusively breastfed children and non-exclusive breastfed children was assessed through Chi-square test. The association was considered statistically significant at 5% level of significance (i.e., p≤0.05). SPSS software version 17.0 was used for all the statistical analyses.

3. Result

During the study period 423 children of age between 2-59 months having WHO defined severe and very severe pneumonia meeting the inclusion criteria were enrolled in the study. 123 children were excluded from the study among them, 25 patients were diagnosed as CHD, 4 patients were having meningitis, 36 patients having severe anemia, 15 patients were diagnosed as case of tuberculosis, 3 patients were transferred to other departments and 40 patients were having incomplete data. So, 300 patients were analyzed after excluding others. Among them 147 having severe pneumonia (49%) and 153 having very severe pneumonia (51%). In our study 208 children were male (69.3%), 92 were female (30.7%), 167 patients were below 1 year of age (55.7%), 77 were between 1-2 years (25.7%) and 56 were between 2-5 years (18.7%). Among these 300 patients, 207(69%) received exclusive breast milk up to 6 months.

In our study 86 (28.7%) children stayed in hospital for more than 5 days, 18 (6%) patients progress from severe to very severe pneumonia, 113 (37.7%) needed change in antibiotics, 24 (8%) developed complications, 49 (16.3%) required mechanical ventilation and 31 (10.3%) expired.

Among the children who were breast fed up to 6 months, 40.1% were having very severe pneumonia which was significantly less than 75% of the children who were not breast fed up to 6 months (p<0.001). So, children who were not breast fed up to 6 months were 4.1 times more likely to be suffering from very severe pneumonia (vs severe pneumonia) than those who were breast fed up to 6 months (p<0.05).

Table 1: Association between severity of pneumonia with type of feeding (p<0.05)

	Severe pneumonia		Very severe pneumonia		P value
Exclusive breastfeeding upto 6 months	124	59.9%	83	40.1%	<0.001%
Others	23	24.7%	70	75.3%	

Table 2: Association between breastfeeding and severity of pneumonia through logistic regression

	Crude OR(95% CI)	Adjusted OR (95% CI)
Exclusive breastfeeding	Very severe Vs Severe	Very severe Vs Severe
Up to 6 months	Reference	Reference
Others	4.55 (2.6- 7.9)*	4.1 (2.2-7.5)*

* p<0.05, CI= Confidence Interval.

3.9% of the children who were breast fed up to 6 months died whereas 24.7% of those who were not breast fed up to 6 months died (p<0.001). Those who were not breast fed up to 6 months were significantly 83% (OR=0.17) less likely to survive as compared to those who were breast fed up to 6 months(p<0.05).

Table 3: Association between exclusive breastfeeding and outcome due to pneumonia

	Discharged		Death		P value
Exclusive breastfeeding upto 6 months	199	96.1%%	8	3.9%	<0.001%
Others	70	75.3%	23	24.7%	

Table 4: Association between exclusive breastfeeding and outcome due to pneumonia through logistic regression

Exclusive breastfeeding	Crude OR Survival Vs Death	Adjusted OR Survival Vs Death
Others		
Up to 6 months	4.55 (2.6- 7.9)*	4.1 (2.2-7.5)*

* p<0.05

4. Discussion

We conducted this prospective observation study for observing the effect of exclusive breast feeding on childhood mortality due to pneumonia. The mortality rate was 10.3% in our study which compares with the reported case fatality rate of 9.8%, 10.5% and 10.45% in similar settings.^{3,11,12} As age increases, severity of childhood pneumonia decreases. In the study, 57.5% of the children in the age group <1 years were very having very severe pneumonia whereas 45.5% children in the age group of 1-2 years and 39.3% in the age group of 2-5 years were having very severe pneumonia,(p=0.033). In our study adjusted results show that children aged 2-5 years were 66% less likely to suffer from very severe pneumonia (vs. severe pneumonia) as compared to children less than 1 year old (p <0.05). This can be explained by the fact that as the age increases the respiratory passage become wider and respiratory defense mechanism becomes more mature.

Children who were not breast fed up to 6 months were 4.1 times more likely to be suffering from very severe pneumonia (vs severe Pneumonia) than those who were breast fed up to 6 months, p<0.05 in the study. Lack of breast feeding has been also reported to be associated with increased risk of development of severe pneumonia by 1.5 to 2.6 times.^{13,14} Though, mechanism by which breast feeding protects against respiratory infection are incompletely understood. Breast milk seems to have effect on infant's systemic immune system via multiple mechanisms including maturational, anti-inflammatory, immuno-modulatory and antimicrobial action.¹⁵ Changes in immune phenotype after exposure to maternal milk, including increase in post-vaccination interferon- α levels and in natural killer cell numbers could result in prolonged protection against respiratory infections.^{16,17} In addition, there is experimental evidence in animals that maternal milk lymphocytes cross the infant's intestinal wall and enter the circulation.¹⁸ It is postulated that these cells activate the infant's immune system. Anti-inflammatory cytokines such as interleukin-10 and transforming growth factor β are also present in maternal milk and taken up by neonatal tissues, in which they are associated with a decrease in inflammatory immune responses¹⁹ and augmented secretory immunoglobulin A synthesis.^{20,21}

5. Conclusion

Exclusive breast fed children are more healthy and breast feeding provides protection against many infections and reduces its severity, so by increasing awareness of breast feeding in mothers is a simple and effective way to reduce mortality from pneumonia.

6. Source of Funding

None.

7. Conflict of Interest

The author declares that there is no conflict of interest.

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