

## A Prospective Observational Study on Protective Role of Exclusive Breastfeeding on Hospital Stay and Morbidity Due to Various Diseases in Infants

Shalabh Kumar Agarwal

Associate Professor, Department of Paediatrics, TMMC & RC, Moradabad, UP, India.

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### \*Correspondence to:

Dr Shalabh K Agarwal

Associate Professor,

Department of

Paediatrics,

TMMC & RC,

Moradabad, UP, India.

drshalabh@hotmail.com

### ABSTRACT

**Introduction:** Breast milk has been considered as the best feed for infants. However in the last few decades research has been going on for finding a perfect formula as a substitute to human milk; still the truth remains that the human milk is the best for babies. This study assessing the relation of feeding and duration of hospital stay or morbidity.

**Methods:** This study was conducted in 132 infants were in age group of 14 weeks to 6 months. The nutritional status was determined using WHO growth charts for recording growth percentiles. Each relation was statistically tested through odds ratio and chi square test. P value <0.05 considered as statistically significant.

**Result:** The sample of the study was 132 infants ≤6 months of age. There were 94 (71.21%) males and 38 (28.79%). The majority of the infants were from Class IV, 68(51.51%) of socioeconomic status as per Kuppaswamy scale while 5 (3.79%), 12 (9.09%), 28 (21.21%), and 19 (14.39%) belonged to Class I, Class II, Class III, and Class V, respectively. Among the infants 76 (57.5%) were exclusively breastfed and 56 (42.4%) were top fed.

**Conclusion:** Statistically significant association has been observed between exclusively breastfed infants and shorter hospital stay in case of gastroenteritis, bronchopneumonia, otitis media, and skin diseases in comparison with the top fed infants.

**KEYWORDS:** Morbidity, Gastroenteritis, Bronchopneumonia, Otitis media.

### INTRODUCTION

Breastfeeding has well-established short-term benefits, particularly the reduction of morbidity and mortality due to infectious diseases in childhood. A pooled analysis of studies carried out in middle/ low income countries showed that breastfeeding substantially lowers the risk of death from infectious diseases in the first two years of life.<sup>1</sup> Since times immemorial breast milk has been considered as the best feed for infants. However in the last few decades research has been going on for finding a perfect formula as a substitute to human milk; still the truth remains that the human milk is the best for babies.

Breastfeeding for at least 6 months can decrease worldwide infant mortality due to diarrhea, respiratory illness and other infectious diseases by up to 55% according to the American academy of pediatrics and world health organization.<sup>2</sup> Pneumonia is the leading cause of death in children under 5 years old worldwide.<sup>3</sup> Bacterial gastroenteritis tends to cause a secretory diarrhea. This can produce severe dehydration particularly in young children and is one of the leading cause of death in under developing countries.<sup>4-6</sup>

Children who are breastfed have lower rates of childhood cancers, including leukaemia and lymphoma. They are less susceptible to pneumonia, asthma, allergies, childhood diabetes, gastrointestinal illnesses and infections that can damage their hearing. Studies suggest that breastfeeding is good for neurological development.

A large body of epidemiological studies suggest that breastfeeding is associated with significant health benefits for children. These benefits are wide ranging, including lower incidence of asthma, allergy and respiratory illnesses, fewer infections of the gastrointestinal tract, middle ear and urinary tract with consequently lower rates of hospitalizations (American Academy of Pediatrics 1997, Quigley et al. 2007).<sup>7</sup> Breastfeeding mothers are also found to be less likely to develop breast or ovarian cancer and to exhibit a lower incidence of type II diabetes.<sup>8</sup>

Although breast feeding is associated with lower rates of both morbidity and mortality in the developing world,<sup>9,10</sup> evidence in the developed world has been and remains

more controversial.<sup>11,12</sup> Yet, recent investigations show that respiratory tract infections<sup>13-16</sup> and asthma<sup>17,18</sup> are reduced in breast fed infants. On the other hand inverse relationships with breast feeding and health outcomes have been reported.

Exclusive breastfeeding is defined as feeding the infant only breast milk, with no supplemental liquids or solids except for liquid medicine and vitamin/mineral supplements.<sup>19</sup> The Bellagio Child Survival Study Group identified breastfeeding during the first year as one of the most important strategies for improving child survival.<sup>20-22</sup>

Breastfeeding is also associated with a decreased risk of type 2 diabetes later in life after adjusting for birth weight, parental diabetes, socioeconomic status, and body size.<sup>23</sup> Studies report that formula-fed infants have higher glucose concentrations and higher basal and post-prandial concentrations of insulin and neurotensin when compared to breastfed infants.<sup>24</sup>

Though there have been a lot of studies relating breastfeeding to morbidity, impact of breastfeeding in decreasing hospital stay has been studied to lesser extent. We conducted this research to identify if any relation exists between feeding and hospital stay or morbidity.

## MATERIALS AND METHODS

This was a prospective observational study conducted in Teerthanker Mahaveer Medical College and Hospital, U.P (India). This study was conducted in 132 infants were in age group of 14 weeks to 6 months. The exclusion criteria were infants who expired due to serious illnesses, preterm infants, infants weighing less than 2.5 kg, and infants having APGAR less than 7. A detailed pro forma was prepared and written consent obtained from the parents of the child. Demographic data of the infants, mode of delivery, prelacteal feeds, type of milk, and previous illnesses were recorded. Anthropometric data was also recorded, that is, birth weight, length, and head circumference. Morbidity was defined as the occurrence of gastrointestinal infections, lower respiratory infection, otitis media, meningitis, septicemia, urinary tract infection, skin infections, eye infections, congenital diseases, and inborn errors of metabolism. Study was approved by institution's ethics committee. Socioeconomic status (SES) was calculated as per Kuppuswamy<sup>25</sup> scale.

Based on the feeding pattern infants were categorized as exclusively breastfed and top fed.

(a) Exclusively Breastfed. This comprised infants who were given only breastfeeding excluding water even.

(b) Top Fed. This included infants who were given milk other than exclusive breastfeeding, that is, cow's, buffalo's, goat's, and formula milk, both breast and other milk (mixed fed), and those who were given water in addition to breast milk.

All other details of feeding practices were taken as per pro forma. The nutritional status was determined using WHO growth charts for recording growth percentiles. Physical examination and necessary tests of each child were conducted. Detailed clinical examination and necessary investigations like Hb, TLC, DLC, and if needed blood C/s, urine C/s, chest X-ray, and so forth were also done.

## Statistical Analysis

The number of infants was counted under different parameters and each relation was statistically tested through odds ratio and chi square test. P value <0.05 considered as statistically significant.

## RESULTS

The sample of the study was 132 infants ≤6 months of age. There were 94 (71.21%) males and 38 (28.79%). (Table 1) The majority of the infants were from Class IV, 68(51.51%) of socioeconomic status as per Kuppuswamy scale while 5 (3.79%), 12 (9.09%), 28 (21.21%) and 19 (14.39%) belonged to Class I, Class II, Class III, and Class V, respectively. (Table 1) Among the infants 76 (57.5%) were exclusively breastfed and 56 (42.4%) were top fed. (Table 1)

**Table 1: Showing baseline data of infants.**

	No. of infants	Percentage
<b>Male</b>	94	71.21
<b>Female</b>	38	28.79
<b>Socioeconomic status</b>		
Class I	5	3.79
Class II	12	9.09
Class III	28	21.21
Class IV	68	51.51
Class V	19	14.39
<b>Feeding pattern (Age ≤ 6 months)</b>		
Exclusively breastfed	76	57.5
Top fed	56	42.4

**Table 2: Showing number of breastfed and top fed infants in terms of hospital stay (<7 days and >7 days) due to various diseases.**

Morbidity	Breastfed		Top fed	
	<wk	>wk	<wk	>wk
<b>Gastroenteritis</b>	24	3	5	26
<b>Bronchopneumonia</b>	11	2	7	13
<b>Meningitis/encephalitis</b>	0	0	0	1
<b>Septicemia</b>	1	2	1	1
<b>Fever</b>	7	3	1	1
<b>Otitis media</b>	10	1	1	0
<b>Injuries</b>	5	1	0	0
<b>Birth defects</b>	3	1	1	0
<b>Total</b>	<b>61</b>	<b>13</b>	<b>16</b>	<b>42</b>

In case of breastfed infants majority of infants suffering from gastroenteritis bronchopneumonia , stayed for less than a week compared to top fed infants where majority of infants suffering from gastroenteritis, bronchopneumonia, and stayed for more than a week. (Table 2)

In meningitis/encephalitis and septicemia all the infants stayed in the hospital for more than a week because these diseases require prolonged treatment of 15 to 20 days or more.

In fever breastfed infants stayed for less than a Week while in top fed infants stayed for less than a week. In otitis media in breastfed infants stayed for less than a week and top fed infants stayed for more than a week. In injuries breastfed infants stayed for less than a week. (Table 2) correlation of morbidity pattern and feeding pattern (breastfed versus top fed) in infants up to 6 months of age showing below in table 3.

The association between prolonged hospital stay (>7 days) of infants with feeding pattern was observed to be statistically significant in case of various diseases as the breastfed infants afflicted with gastroenteritis,

bronchopneumonia, otitis media, or fever had less prolonged hospital stay (Table 3). Mean hospital stay was less in case of breastfed infants afflicted with gastroenteritis, bronchopneumonia, otitis media, compared to top fed infants (Table 3). There was no statistically significant difference between Septicemia and birth defect, (p value <0.05) .

**Table 3: Showing correlation of morbidity pattern and feeding pattern (breastfed versus top fed) in infants up to 6 months of age.**

Morbidity	Breastfed		Top fed	
	No.	%	No.	%
Gastroenteritis	27	20.45	31	23.48
Bronchopneumonia	13	9.84	20	15.15
Meningitis/encephalitis	0	0	1	0.76
Septicemia	3	2.27	2	1.52
Fever	10	7.58	2	1.52
Otitis media	11	8.33	1	0.76
Injuries	6	4.54	0	0
Birth defects	4	3.03	1	0.76
<b>Total</b>	<b>74</b>	<b>56.06</b>	<b>58</b>	<b>43.99</b>

**Table 4: Statistical analysis: hospital stay versus feeding pattern.**

Morbidity	Odds ratio	Chi square test	p value	Mean hospital stay (breastfed versus top fed)
Gastroenteritis	0.0453	39.9	<0.05*	2.23 days (1.54–5.29 days) versus 6.53 days (2.14–10.29 days).
Bronchopneumonia	0.0632	12.61	<0.05*	2.56 days (1.3–8.32 days) versus 7.48days (3.17–12.4 days).
Septicemia	0.0913	4.98	>0.05	1.21 days (0.46–2.54 days) versus 5.60days (0.45–15.37 days).
Fever	0.0246	7.3	<0.05*	2.49 days (1.17–6.11 days) versus 7 days.
Otitis media	0.0123	8	<0.05*	1.32 days (0.28–4.13 days) versus 7.30 days (1.34–12.59 days).
Birth defects	0.115	2.6	>0.05	1.80 days (0.56–3.21 days) versus 6.19 days(-0.34–12.61 days).

**P value<0.05\* (significant)**

**DISCUSSION**

In our findings the association between prolonged hospital stay (>7 days) of infants with feeding pattern was observed to be statistically significant in case of various diseases as the breastfed infants afflicted with gastroenteritis, bronchopneumonia, otitis media, or fever had less prolonged hospital stay. Mean hospital stay was less in case of breastfed infants afflicted with gastroenteritis, bronchopneumonia, otitis media, compared to top fed infants.

study conducted by Cushing et al. in USA on 1202 healthy infants who were followed up for the first 6months of life and incidence of lower respiratory infection in form of wheezing or cough or both was

noted. It was shown that infants who were breastfed had shorter duration of hospital stay being 5 days as compared to 6 days in case of non-breastfed infants (results were significant at 95% confidence interval) .<sup>26</sup>

A longer duration of lifetime breastfeeding is also associated with a decreased risk for developing type 2 diabetes among women with no history of gestational diabetes, although for women with a history of gestational diabetes the increased risk of developing type 2 diabetes is not ameliorated by lactation.<sup>8,27</sup> Breastfeeding may be associated with a reduced risk of hip fractures in postmenopausal women<sup>28</sup> and improve bone mineral density during young adulthood in adolescent mothers.<sup>29</sup>

Another study from AIIMS, New Delhi, on admitted pneumonia infants also showed that lack of exclusive breastfeeding is associated with prolonged hospital stay, that is, >5 days, as 86% of infants who had prolonged hospital stay were not exclusively breastfed compared to 14% of exclusively breastfed.<sup>30</sup> Our study is supported by another study from Brazil on bronchiolitis patients in which it was concluded that exclusive breastfeeding was negatively correlated with hospital stay.<sup>31</sup>

A study from Scotland concluded that exclusively breastfed infants had a shorter length of hospital stay (mean: 2.81 days) compared with formula fed infants (mean stay: 3.25 days) but length of hospital stay was not calculated for diseases individually.<sup>32</sup>

Parikh et al<sup>33</sup> evaluated the protective effect of breastfeeding for cardiovascular disease risk factors among subjects enrolled in the Framingham Third Generation cohort. The mean age of the studied population was 41 years, and diabetes was defined as fasting plasma glucose  $\geq 126$  mg/dL or treatment with either insulin or oral hypoglycemic agents. The odds ratio of diabetes among ever breastfed subjects was 0.40 (95% CI: 0.09; 1.70), after adjustment for several confounding variables. A review by Williams et al. included 6 studies from developed countries in which risk of hospitalization for diseases in breastfed was compared to non-breastfed children. Two studies reported relative risk of hospitalization for any infection as 0.39 and 0.51 in breastfed compared to never breastfed infants. Four studies reported hospitalization for respiratory tract illnesses and 3 studies mentioned relative risk of hospitalization in breastfed compared to never breastfed infants as 0.6, 0.53, and 0.43 while one study reported that rate of hospitalization did not differ based on mode of feeding. Two studies reported hospitalization for gastrointestinal illnesses and relative risk of hospitalization in one of the studies was 0.54 in breastfed compared to never breastfed infants while another study found rates of hospitalization did not differ significantly based on mode of feeding.<sup>34</sup>

## CONCLUSION

There was statistically significant association has been observed between exclusively breastfed infants and shorter hospital stay in case of gastroenteritis, bronchopneumonia, bronchiolitis, otitis media, and skin diseases in comparison with the top fed infants. Further studies require to give more information about the protective role of exclusive breastfeeding on hospital stay and morbidity due to various diseases in infants.

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