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Breastfeeding Practices and Morbidity Outcomes in Children Under Two Years of Age: A Community-Based Cross-Sectional Study from Rural Barabanki District, Uttar Pradesh, India

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ABSTRACT

Background: Exclusive breastfeeding (EBF) is widely recognized as a key determinant of child health. However, evidence assessing its impact on morbidity among children aged 6–24 months in rural North India remains limited. This study aimed to evaluate the association between exclusive breastfeeding history and morbidity patterns among children aged 6–24 months in rural Barabanki district.

Methods: A community-based comparative cross-sectional study was conducted among 200 children aged 6–24 months (100 EBF, 100 non-EBF). Data on morbidity episodes were collected through structured caregiver interviews and available clinical records. Outcomes assessed included respiratory tract infections, diarrhoeal diseases, otitis media, urinary tract infection (UTI), allergic disorders, and hospitalization. Statistical analysis used chi-square tests and odds ratios (OR) with 95% confidence intervals.

Results: Children who were not exclusively breastfed showed significantly higher morbidity. The odds of bronchopneumonia were 3.69 times higher in non-EBF children. UTI demonstrated a markedly increased risk (OR = 4.66) in the non-EBF group. Diarrhoeal diseases, pneumonia, otitis media, and allergic manifestations were all significantly more prevalent in non-EBF children. Hospitalization rates were significantly elevated among non-EBF children (39% vs 20%, $p = 0.032$). All major associations were statistically significant ($p < 0.05$).

Conclusion: Exclusive breastfeeding is significantly associated with reduced risk of respiratory infections, diarrhoeal diseases, urinary tract infections, otitis media, allergic disorders, and hospitalization among children aged 6–24 months in rural Barabanki. These findings reinforce exclusive breastfeeding as a vital public health strategy in rural settings.

Keywords: Exclusive breastfeeding, non-exclusive breastfeeding, 6–24 months, Morbidity pattern, Urinary tract infection

INTRODUCTION

Breastfeeding is universally acknowledged as the optimal mode of infant feeding, providing complete nutrition and immunological protection during early life. UNICEF has emphasized that exclusive breastfeeding (EBF) for the first six months of life is one of the most effective interventions to reduce infant morbidity and mortality globally [1]. Black et al., in the Lancet Maternal and Child Nutrition Series, demonstrated that suboptimal breastfeeding practices contribute to nearly 45% of under-five deaths in low- and middle-income countries (LMICs), primarily through increased susceptibility to diarrhoea, pneumonia, and malnutrition [2].

The World Health Organization (WHO) defined exclusive breastfeeding as feeding infants only breast milk for the first six months of life, without any additional food or liquid. Deviations from this practice have been strongly associated with increased morbidity, particularly diarrhoeal diseases and acute respiratory infections [3]. Despite global and national recommendations, exclusive breastfeeding rates remain suboptimal. According to WHO data, approximately 35% of infants aged 0–4 months are exclusively breastfed worldwide.

Human breast milk contains a complex array of bioactive molecules that actively support neonatal immune development. Secretory immunoglobulin A (sIgA) is the predominant antibody in human milk, providing broad-spectrum protection against pathogens. Additional immune components include cytokines, growth factors, leukocytes, lactoferrin, and lysozyme, which contribute to antimicrobial defence and immune regulation [44,69,70]. These components collectively protect infants during early life when endogenous immune responses are immature.

Lower respiratory tract infections are a significant cause of infant hospitalization. Evidence indicates that infants exclusively breastfed for at least four months have a reduced risk of severe respiratory infections compared to formula-fed infants [57]. The association between breastfeeding and reduced risk of allergic conditions including asthma, eczema, and atopic dermatitis has also been well established in multiple studies [59].

In rural India, childhood illnesses such as diarrhoea, acute respiratory infections, measles, and malnutrition remain major contributors to under-five morbidity [1]. NFHS-5 reports that only 43% of infants in Uttar Pradesh are exclusively breastfed for six months [2]. This study assesses morbidity patterns among exclusively and non-exclusively breastfed children under two years in Barabanki district.

AIM

The study was aimed to find out the types of morbidity patterns in Exclusive Breast Fed versus Non-Exclusive Breast Fed children under 2 years of age in the rural study area of Barabanki, District, UP, India.

OBJECTIVES:

The objective of the study was to determine the prevalence of common childhood illnesses such as Diarrhoea, Acute respiratory infections, Fever, and other Childhood illnesses under IMNCI guidelines in exclusive breastfed infants compared to non-exclusive breastfed children under two years of age.

MATERIALS AND METHODS

Study Design and Setting

A community-based comparative cross-sectional (observational) study was conducted in rural areas of District Barabanki, UP, India. The study was conducted in and around the field practice areas of RHTC,

Department of Community Medicine, Hind Institute of Medical Sciences, Barabanki, from September 2024 to February 2026 after obtaining prior approval from HIMS-IHEC (Ethics Committee).

Study Population

Inclusion Criteria:

Children aged from 6 months to 2 years, whose mothers were willing to give consent.

Severely ill infants requiring urgent care.

Exclusion Criteria:

Children with feeding problems related to mother or child (e.g., cleft lip and palate, breast abscess).

Children whose mothers were not available or deceased.

Sample Size and Sampling method

Sample size was calculated based on NFHS-5 data showing exclusive breastfeeding rate in rural Uttar Pradesh was 60.9%, using the formula:

$$n = Z^2\alpha \times p[1-p] / E^2$$

Where Z = 1.96 (α = 5%), p = 0.609, E = 0.07. This yielded n = 186.6, rounded up to 200 children (100 in each group).

Multistage random sampling was used to recruit the study participants.

Multi-stage sampling was employed. Two study groups were formed: Group A (Exclusive Breastfeeding) and Group B (Non-Exclusive Breastfeeding).

The study was conducted in two blocks, Harakh and Banki of Barabanki district, under the field practice area of HIMS Barabanki. Out of the total 17 villages, four villages were selected by simple random sampling using the lottery method. From the selected villages, households having children were chosen using probability proportional to size (PPS) sampling; if required, additional villages could also be considered. Thereafter, the required number of study subjects were further selected by random sampling technique. Finally, mothers of the selected children were interviewed at their homes using a pre-designed and pre-tested questionnaire for data collection.

Data Collection

Data on nutritional status, current and intercurrent morbidity, and hospital history were collected using a pre-designed, pre-tested interview schedule. Socioeconomic status was assessed using the Modified BG Prasad Classification. Physical examination was performed with supine weight and height measurements.

Statistical Analysis

Data was analysed using Statistical Package for Social Sciences (SPSS) windows programme (SPSS Inc., Chicago, IL, USA) version 26.0, and results presented in percentages. Chi-square was used to compare proportions. The dependent variables were Exclusive, Non- Exclusive Breastfeeding, and Diseases, subsequently in-dependent variables were Age, Education, Literacy, which also compared. Univariate associations between various factors and EBF/Non-EBF adjusting for the child's age were identified. Further Statistical analysis was done to determine the independent association of various factors to EBF/Non-EBF. The level of Statistical Significance was set at $p < 0.05$. The results also examined the effects of exclusive breastfeeding on the health of the newborn.

RESULTS

A total of 200 children (100 exclusively breastfed and 100 non-exclusively breastfed) and their mothers were enrolled.

Table 1 shows among 200 participants, most mothers were aged 36–45 years, had secondary education or

were graduates, belonged predominantly to Hindu religion, unreserved caste, and middle/lower-middle socioeconomic class. Most were primiparous. Children were mainly 13–18 months old, male, term-born, and had normal birth weight, indicating generally favourable socio-demographic and birth characteristics.

Table 1: Socio-demographic and Birth Characteristics of Study Participants (N=200)

Characteristics	Category	Frequency	Percentage
Mother's characteristics			
Age (Years)	≤25- 25	52	26.0%
	26-35	67	33.5%
	36-45year	81	40.5%
	≤45years	0	0.0%
Education levels	Illiterate	17	8.5%
	primary education	30	15.0%
	Secondary education	77	38.5%
	Graduate	69	34.5%
	Postgraduate	7	3.5%
Religion	Hindu	172	86.0%
	Muslim	28	14.0%
Caste	Unreserved	132	66.0%
	OBC	45	22.5%
	SC/ST	23	11.5%
Socio-economic status	Upper	13	6.5%
	Upper middle	26	13.0%
	Middle	84	42.0%
	Lower middle	54	27.0%
	Lower	23	11.5%
Parity	0	54	27.0%
	1	73	36.5%
	2	36	18.0%
	3 or more	37	18.5%
Child's characteristics			
Child age (Months)	6	39	19.5%
	7-12	63	31.5%
	13-18	78	39.0%
	19-24	20	10.0%
Gender	Female	61	30.5%
	Male	139	69.5%
Birth Characteristics			
Maturity at birth	Term	189	94.5%
	Preterm	11	5.5%

Infants' birth weight	Normal birth weight	174	87.0%
	Low birth weight	17	8.5%
	Large for birth weight	9	4.5%

Table 2 shows most infants were term births (94.5%) and had normal birth weight (87%). Low birth weight was seen in 8.5%, while 4.5% were large for birth weight, indicating favourable birth outcomes.

Table-2: Birth characteristics of the Children

Characteristics	Category	Frequency	Percentage
Maturity at birth	Term	189	94.5%
	Preterm	11	5.5%
Infants'birth weight	Normal birth weight	174	87.0%
	Low birth weight	17	8.5%
	Large for birth weight	9	4.5%

Table 3 shows exclusive breastfeeding was more common in middle and lower-middle socioeconomic groups and among graduate mothers. Non-exclusive breastfeeding was higher among less educated mothers. Significant associations were seen with lower-middle socioeconomic status and higher maternal education, suggesting socio-economic and educational influence on breastfeeding practices.

Table-3: The impact of socio-economic status and mother's educational level on practice of breast feeding.

Characteristics	Category	Exclusive N=100 n (%)	Non-exclusive N=100 % n (%)	p-value
Socio-economic status	Upper class	11 (11.0)	15 (15.0)	0.061
	Upper middle class	10 (10.0)	13 (13.0)	0.064
	Middle class	17 (17.0)	11 (11.0)	0.050
	Lower middle class	18 (18.0)	12 (12.0)	0.032*
	Lower class	44 (44.0)	49 (49.0)	0.050*
Mother's education	Illiterate	16 (16.0)	19 (19.0)	0.063
	Primary education	20 (20.0)	24 (24.0)	0.065
	Secondary education	24 (24.0)	31 (31.0)	0.05
	Graduate	38 (38.0)	16 (16.0)	0.032
	Postgraduate	2 (2.0)	10 (10.0)	0.013

Table 4 shows non-exclusively breastfed children had higher morbidity, including allergies, cough, diarrhoea, otitis media, UTI, and pneumonia, compared with exclusively breastfed children. These associations were statistically significant, suggesting exclusive breastfeeding offers protective effects against childhood infections and allergic disorders.

Table 4: Comparison of the morbidity pattern in exclusively and non-exclusively breastfed child.

Morbidity pattern		**Exclusive N=100**	**Nonexclusive N=100**	**Total N=200%**	**p-Value**
		n (%)	**n (%)**	**n (%)**	
Type of infant allergy	Food allergy	1 (1.0)	10 (10.0)	11 (5.5)	0.05
	Eczema	0 (0.0)	3 (3.0)	3 (1.5)	0.023
	Asthma	2 (2.0)	10 (10.0)	12 (6.0)	0.032
	Atopic dermatitis	1 (1.0)	13 (13.0)	14 (7.0)	0.001
	No allergy	96 (96.0)	64 (64.0)	160 (80.0)	0.042
History of cough	**Positive**	16 (16.0)	28 (28.0)	44 (22.0)	**0.045***
history of frequent diarrhoea	**Positive**	6 (6.0)	23 (23.0)	29 (14.5)	**0.001***
History of Otitis media	**Positive**	4 (4.0)	31 (31.0)	35 (17.5)	**0.014***
History of UTI	**Positive**	7 (7.0)	26 (26.0)	33 (16.5)	**0.010***
History of Pneumonia	**Positive**	29 (29.0)	51 (51.0)	80 (40.0)	**0.001***

Table 5 shows non-exclusively breastfed children showed significantly higher hospitalization rates for gastroenteritis (61.1% vs 16.2%, p<0.001), bronchopneumonia (72.7% vs 37.3%, p=0.005), and urinary tract infections (71.4% vs 11.5%, p=0.001) compared to exclusively breastfed children. Overall hospitalization history was also higher in the NEBF group (p=0.032). Exclusive breastfeeding was associated with substantially lower morbidity requiring hospitalization.

Table 5: Comparison of history of disease specific Hospitalization in Exclusive Breastfed and Non-Exclusive Breastfed child.

Morbidity	**Hospitalization**	**NEBF n (%)**	**EBF n (%)**	**p-value***	**OR**
Positive history of Gastroenteritis (n=73)	Present	22 (61.1%)	6 (16.2%)	< 0.001	1.04
	Absent	14 (38.9%)	31 (83.8%)		
Bronchopneumonia (n=73)	Present	16 (72.7%)	19 (37.3%)	0.005	3.69
	Absent	6 (27.3%)	32 (62.7%)		

Otitis Media (n=35)	Present	2 (50.0%)	26 (83.9%)	0.111	10.783
	Absent	2 (50.0%)	5 (16.1%)		
UTI (n=33)	Present	5 (71.4%)	3 (11.5%)	0.001	4.66
	Absent	2 (28.6%)	23 (88.5%)		
Skin diseases (n=17)	Present	1 (100.0%)	15 (93.8%)	0.797	18.857
	Absent	0 (0.0%)	1 (6.3%)		
Eye disease (n=15)	Present	3 (50.0%)	4 (44.4%)	0.833	1.831
	Absent	3 (50.0%)	5 (55.6%)		
History of ever hospitalization	Present	20 (20.0)	39 (39.0)	59 (29.5)	**0.032***
	Absent	80 (80.0)	61(61.0)	141(70.5)	

DISCUSSION

The present community-based comparative cross-sectional study was conducted in rural areas of Barabanki district to assess and compare morbidity patterns among exclusively breastfed (EBF) and non-exclusively breastfed (non-EBF) children under two years of age. Despite global and national recommendations advocating exclusive breastfeeding for the first six months of life, deviations from optimal feeding practices persist, especially in rural settings [1,2].

Exclusive Breastfeeding Practices and Determinants: In the present study, exclusive breastfeeding practices were significantly influenced by maternal education, socio-economic status, antenatal and postnatal counselling, and family support. Mothers with higher educational attainment were more likely to practise exclusive breastfeeding for six months. Similar findings have been reported by Chauhan et al. and Oche et al., who observed that mothers with secondary or higher education had better knowledge and practice of EBF [19,24]. Education improves maternal awareness regarding the benefits of exclusive breastfeeding and enhances receptiveness to health education messages.

These findings align with Akthar J [106] who found 90.3% EBF mothers had proper knowledge on EBF concepts vs 46.9% non-EBF mothers. Juneja DK [107] similarly observed that infants with mixed breastfeeding had significant morbidity due to various childhood illnesses and increased hospital stay.

Diarrhoeal Diseases: The present study found that frequent diarrhoea was significantly more prevalent among non-EBF children (23% vs 6%, p = 0.001). This is consistent with extensive literature. Perera BJ et al. found that infants exclusively breastfed for six months had a significantly lower 7-day prevalence of diarrhoea (AOR for lack of EBF = 2.50, 95% CI 1.10–5.69, p = 0.03) [128]. Mihrshashi et al. [4] also documented strong associations between non-EBF and diarrhoeal morbidity in Chittagong, Bangladesh.

The protective mechanism operates primarily through sIgA in breast milk, which prevents pathogen adherence to intestinal mucosa, combined with the absence of contaminated supplementary feeds in EBF infants—a critical advantage in rural areas with limited sanitation.

Respiratory Infections and Pneumonia: Pneumonia was significantly more common in non-EBF children (51% vs 29%, p = 0.001). Cough was also more prevalent (28% vs 16%, p = 0.045). The odds of requiring hospitalization for bronchopneumonia were 3.69 times higher among non-EBF children. These results are consistent with Katsinde SM and Sinivas SC [28] who found shorter hospital stays and lesser morbidity

for bronchopneumonia in breastfed infants (p = 0.0012). Cushing AH et al. [66] similarly documented that breastfeeding reduces the risk of respiratory illness in infants.

Otitis Media: Otitis media was nearly 8 times more frequent in non-EBF children (31% vs 4%, p = 0.014). This finding is strongly supported by Aniansson G et al. [42] who conducted a prospective cohort study demonstrating breastfeeding's protective role against otitis media in Swedish infants. The immunological components of breast milk, particularly sIgA, prevent bacterial adhesion in the middle ear via the Eustachian tube.

Urinary Tract Infections: UTI showed a markedly increased risk in non-EBF children (26% vs 7%, p = 0.010, OR = 4.66 for hospitalization). This is a notable finding, as UTI is less commonly discussed in the EBF literature compared to diarrhoea and ARI. The anti-adhesive properties of breast milk oligosaccharides and sIgA may prevent uropathogen colonization. Juneja DK [107] reported 8.6% of mixed-breastfed infants had UTI vs 0% in exclusively breastfed infants, consistent with the present findings.

Allergic Manifestations: All allergic conditions—food allergy, eczema, asthma, and atopic dermatitis—were significantly more prevalent in non-EBF children. The most marked difference was seen in atopic dermatitis (13% vs 1%, p = 0.001). This is consistent with Riva E et al. [131] who demonstrated the immunomodulatory benefits of EBF against infection-related morbidity. Pérez-Escamilla R et al. [129] also documented that breastfeeding is one of the most cost-effective ways for reducing childhood morbidity including gastroenteritis and allergic conditions.

Hospitalization Rates: Overall hospitalization was significantly higher in non-EBF children (39% vs 20%, p = 0.032). For bronchopneumonia, gastroenteritis, and UTI, non-EBF children were significantly more likely to require hospitalization. Kaur A et al. [118] similarly found shorter hospital stays in breastfed infants across multiple disease categories. These findings have important implications for healthcare costs and resource utilization in rural health settings.

Strengths and Limitations: The study's strengths include its community-based design, focus on a vulnerable rural population, and direct comparison of morbidity patterns between EBF and non-EBF children. However, as a cross-sectional study, causal relationships cannot be definitively established. Recall bias regarding past illnesses and feeding practices may have influenced the findings. Despite these limitations, the consistency of results with existing literature enhances the validity of the study conclusions.

CONCLUSION

The present study demonstrates that exclusive breastfeeding has a significant protective effect against common childhood morbidities among children under two years of age in rural Barabanki, Uttar Pradesh. Exclusively breastfed children had a markedly lower prevalence of diarrhoea, acute respiratory infections (including pneumonia), otitis media, urinary tract infections, allergic disorders, and hospitalization compared to non-exclusively breastfed children, with all differences being statistically significant.

The protective benefits of exclusive breastfeeding can be attributed to the immunological components of breast milk, such as antibodies and bioactive factors, which enhance infant immunity and reduce susceptibility to infections. In contrast, early introduction of supplementary feeding increases the risk of exposure to contaminated food and water, particularly in rural settings with limited sanitation.

Maternal education, socio-economic status, and family support were identified as key determinants influencing exclusive breastfeeding practices. Despite strong national and global recommendations, the

prevalence of exclusive breastfeeding remains suboptimal in the study area.

In conclusion, exclusive breastfeeding is a simple, cost-effective, and sustainable intervention that significantly reduces childhood morbidity. Strengthening awareness, promoting maternal education, and enhancing community and health system support are essential to improve exclusive breastfeeding practices and overall child health outcomes.

RECOMMENDATIONS

- Strengthening Antenatal and Postnatal Counselling: Health education on EBF for the first six months should be integral to antenatal and postnatal care, focusing on correct breastfeeding techniques and management of common problems.
- Capacity Building of Healthcare Workers: ASHAs, ANMs, and Anganwadi workers should receive regular training on infant and young child feeding practices to ensure consistent, evidence-based messaging at the community level.
- Community and Family Involvement: Behaviour change communication strategies should actively involve husbands and mothers-in-law, as family support is crucial in sustaining EBF practices.
- Promotion through Community-Based Programs: Village Health and Nutrition Days should be strengthened to promote EBF through group counselling, peer support, and mother support groups.
- Policy and Program Support: Continuous monitoring and evaluation of EBF promotion programs with a focus on improving maternal education, socio-economic empowerment, and institutional delivery rates.
- Integration into National Programs: EBF promotion should be integrated into IMNCI, RMNCH+A, and community-based nutrition initiatives to reduce preventable childhood morbidity and contribute to achieving SDG-3.

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LIST OF ABBREVIATIONS

Abbreviation	Defined As
AOR	Adjusted Odds Ratio
ARI	Acute Respiratory Infection
CI	Confidence Interval
EBF	Exclusive Breastfeeding
HIMS	Hind Institute of Medical Sciences
IHEC	Institutional Human Ethics Committee
IMNCI	Integrated Management of Neonatal and Childhood Illness
IYCF	Infant and Young Child Feeding Practices
LMIC	Low- and Middle-Income Countries
NFHS	National Family Health Survey
OR	Odds Ratio
RHTC	Rural Health Training Centre
RMNCH+A	Reproductive, Maternal, Newborn, Child and Adolescent Health
SDG	Sustainable Development Goal
sIgA	Secretory Immunoglobulin A
SPSS	Statistical Package for Social Sciences
UNICEF	United Nations Children's Fund
UTI	Urinary Tract Infection
WHO	World Health Organization