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A prospective study to evaluate the protective effect of breastfeeding on diarrheal morbidity in infants in rural Rajasthan

Narottam Samdarshi[1*], Akhilesh Bhargava[2], Parmal Saini[3]

[1*]Assistant Professor, Department of Community Medicine, Adesh Medical College, Kurukshetra, Haryana

[2] Professor, Department of Community Medicine, Pacific Medical College, Udaipur, Rajasthan

[4]Associate Professor, Department of Community Medicine, Adesh Medical College, Kurukshetra, Haryana

*Corresponding Author: Dr. Narottam Samdarshi

Abstract

The benefits of breastfeeding on infant and child morbidity and mortality are well known since ages. Human milk protects breastfed infants against diarrhoeal disease by virtue to its various immunological properties. As diarrhoeal diseases are a major cause of deaths among children aged 0-12 months, it is important to quantify the preventive effect of breastfeeding on diarrhoea-specific morbidity and mortality. To assess the breast-feeding practices and its effect on incidence of diarrhoea in infants in rural Rajasthan. A Prospective study was carried out in Achrol village, field practice area of National Institute of Medical Science (NIMS) Hospital and Research Centre, Jaipur, over a period of one year. 246 infants were enrolled by convenience sampling through house to house visits and followed-up on monthly basis to record information on feeding practices and episodes of diarrhoea by interviewing their mothers. Descriptive statistics were presented as frequencies and percentages and association between breastfeeding practices and incidence of diarrhoea was found using Chi-square test. 48.8% of the infants studied were started on breast feeding between 1-6 hours while only 13% started breastfeeding within an hour of birth. Majority (66.3%) of infants were denied colostrum feed and 92.68% infants were given pre lacteal feeds as is customary in the area. Among infants who were put on breastfeeding within 1 hour of their birth, 12.2% suffered from diarrhoeal where as infants who were started on breast feeding within 1-6 hours, 46.6% reported diarrhoeal episodes during the follow up period. This difference in diarrhoeal episodes based on initiation of breastfeeding was found to be statistically significant ($p< 0.05$). There is enough evidence in favour of breast feeding (exclusive breast feeding for 6 months and continued breastfeeding up-to 2 years) as an effective tool against diarrhoeal morbidity in the studied infants.

Keywords: Infant, Exclusive Breast Feeding, Diarrhoea, Colostrum, Pre-lacteal feed.

Introduction

Children are the most prized possession for their parents and the future of the world. As far as growth and development of the child is concerned, infancy is the most crucial period when the child is growing fast physically, mentally and emotionally and at the same time is vulnerable to vaccine preventable diseases (VPDs) and other conditions like diarrhoea, acute respiratory tract infection (ARI), accidents and malnutrition[1].

The benefits of breastfeeding on infant and child morbidity and mortality are well known and documented, through research[2-5]. Studies show that human milk glycans, that includes oligosaccharides in its free and conjugated forms, is a natural immunological mechanism that protects breastfed infants against gastro-intestinal diseases including diarrhoeal disease[6].

As diarrhoeal disease accounts for approximately 1.04 million deaths among children aged 0-12 months and continues to act as the second leading cause of death in this age group[7], it is important to quantify the preventive effect of breastfeeding on diarrhoea-specific morbidity and mortality. Limited individual studies have been conducted to relate the impact of breastfeeding practices on diarrhoea-specific morbidity and mortality in infants in resource-limited settings.

In developing countries, breastfeeding reduces the incidence and severity of diarrhoea in infants[8-12], even-though this effect may be less pronounced in areas with better water supply and sanitation facilities[10-12]

There is ample evidence of a positive influence of breastfeeding, especially of exclusive breast feeding (EBF) on diarrhoea. Yoon et al.[13] reported a higher risk of mortality due to diarrhoea associated with no breastfeeding. A similar pattern has also been reported from another studies[11-12]. In a meta-analysis of data from six developing countries, breastfeeding provided a greater degree of protection against diarrhoea, attributable to acute respiratory infection in the first six months of life, whereas the level of protection was similar for infants who were 6 to 11 months of age (WHO 2000) [8,11,14].

The Lancet series on child survival has emphatically demonstrated that exclusive breastfeeding (EBF) for the first six months and continued breastfeeding for second six months is a highly effective intervention against the three major causes for the child mortality (neonatal sepsis, diarrhoea and pneumonia). If universalized, breastfeeding can prevent 13% of all child deaths[15].

In India, breastfeeding is almost universal, but the EBF rate is quite low. The third National Family Health Survey (NFHS III) from India reports rates of EBF to be 46.3% at 5 months, although there is wide state wise and region wise differences[16].

All these evidences indicate that breastfeeding protects against diarrhoea, therefore this study was undertaken further to gain a first-hand documentation of association between Breastfeeding and Diarrhoea in a rural setting in Rajasthan.

Aims and objectives

1. To assess the breast-feeding practices in infants aged 0 -12 months.
2. To assess the effect of breast-feeding on incidence of diarrhoea in infants.

Materials and methods

Setting

The present study was carried out in 246 infants in Achrol village, field practice area of National Institute of Medical Science (NIMS) Hospital and Research Centre (a constituent college of National Institute of Medical Science (NIMS) University).

Study design

Prospective study carried out over a period of one year.

Inclusion criteria

Infants 0-12 months of age.

Exclusion criteria

Parental refusal to participate in study.

Any congenital disease in the child.

Sample size and sampling technique

As per NFHS-3 (2005-06) prevalence of diarrhoeal morbidity in infants (0-12 months) is 20%[16]. Population of Achrol was 15,077 as per Census 2011[17], population growth rate of Rajasthan was 2.11(Census 2011)[17] Projected population of Achrol village in 2014 was 16,051 (with the help of geometric progression in the mid-year). Total number of expected infants were calculated as follows:

In the estimated population of Achrol, i.e-16,051, crude birth rate is calculated as 24.1×16,051÷1000 = 387 Birth, where Crude birth rate of Rajasthan 24.1 (Modified Annual family health survey (AFHS),2012-13) per 1000 population[18]. The infant mortality is calculated as 50×387÷1000 = 19, Infant mortality of Rajasthan (Jaipur) is 50 per 1000 live births (According to Modified AFHS-2012-13)[18]. So, the total number of live infants were 387-19 = 368.

Sample size formula is $n= Z^2 pq÷e^2$,

$$= (1.96)2 (0.2) (0.8) ÷ (0.05)2$$

$$=245$$

So, calculated sample size is 245 infants. where n=sample size, Z= Area under normal curve at 5% level of significance= 1.96, P=prevalence of diarrhoeal morbidity in infants = 0.2, q=1-P (1-0.2=0.8), e=absolute Error (5%).

246 infants were enrolled by convenience sampling through house to house visit. All enrolled infants were followed on monthly basis to record information on episodes of diarrhoea and feeding practices were obtained by household interview.

Ethical approval

This study was part of dissertation submitted by the author in partial fulfilment of the requirement for postgraduate degree for which requisite approval was obtained from Institutional protocol committee of National Institute of Medical Science (NIMS) Medical College, Jaipur, Rajasthan.

Statistical analysis

Data gathered was compiled, tabulated using MS excel 2007. All the collected data were entered and analysed based on its type and distribution using SPSS version 17. Qualitative data is expressed in percentages. Association between incidence of diarrhoea and breast feeding practices was ascertained using Chi square test. P value less than 0.01 (0.05) was taken to be highly significant (significant).

Results

Table 1 presents the sociodemographic characteristics of mother and infant. There were 246 respondents involved in the study majority (52.8%) were male. Most of the respondents were Hindu (73.6%). There was a predominance of OBC (41.5%), General (26.4%) and. ST (15%) category. SC and ST put together accounted for almost 32%. Educational status of mothers show that 65 (26.4%) mothers were illiterate, however majority 95 (38.6%) had their education till secondary level. The basis of mother education housewives (88.6%) dominated the scenario. On the basis of Socio-economic status of the study subject parents (according to Modified B.G. Prasad classification)[19], majority 66 (26.8%) were from Class III.

Table 2 Provides information on breastfeeding practices. It was noticed that majority of mothers (48.8%) started breast feeding their new born between 1-6 hours while only 13% started breastfeeding within an hour of birth. Of the total, majority 163 (66.3%) were denied colostrum feed and 228(92.68%) infants were given one or the other pre lacteal feeds as is customary in the area. Defying the concept of EBF, majority of the infants i.e. 222 (90.3%) were given some kind of top feed during first 6 months. Only 24 (9.7%) were exclusively breast fed. Majority 152 (61.8%) of mothers breastfed their Infants on demand.

It was observed that infants who were put on breastfeeding within 1 hour (Table 3) of their birth, 12.2% suffered from diarrhoeal episodes during their infancy. In infants who were started on breast feeding within 1-6 hours, 46.6% reported diarrhoeal episodes, while infants initiated on breast feeding after 6 hours 41.2% reported diarrheal episodes during the one year follow up period. This difference in diarrhoeal episodes based on initiation of breastfeeding was found to be statistically significant. ($p< 0.05$)

Similarly infants who were given colostrums, 35.7% reported suffering from diarrhoea while 64.3% of those who were not given colostrums reported diarrhoeal episodes during the study period.

Among infants who were given pre-lacteal feeds, 93.2% reported diarrheal episodes and only 6.3% of infants who were exclusively breast fed reported diarrhoea. The statistical association between exclusive breast feeding and diarrhoea was found to be highly significant ($p<0.001$).

Discussion

This community based Prospective study was conducted on 246 infants enrolled through house to house visits. The study primarily aimed at assessing the effect of breast feeding on diarrhoeal morbidity in the studied infants.

In our study, majority (73.6%) of the infants were Hindus and 26.4% mothers were illiterate (Table- 1). As per census of Rajasthan 2011[17], Achrol village had 27.0% illiterate women and this finding is well supported in the current study.

In the present study, 33.7% infants were fed on colostrum while an astounding 66.3% of infants were denied colostrum on account of social customs, taboos and myths relating to colostrum being difficult to digest by the child (also supported by Ayurveda). Similar study results were found by Shrivastava SP, et al.[20], which showed that colostrum was discarded by 82.9% of mothers. Similar findings are reported by Rogers N L, et al.[21] and Devang R, et al.[22] wherein colostrum was discarded by 79.0% of mothers.

In our study, 42.19% hospital delivered children & 20.0% of home delivered children had received colostrum. Similar differences were also found by Kartar PS, et al.[23], Roy S, et al.[24].

Our study revealed a positive association between pre-lacteal feeding and diarrhoeal morbidity ($p< 0.05$). Similar findings were also observed by Avachat SS, et al.[25.] However, contrary to our findings in an earlier study conducted by Moy RJ, et al.[26] no association between pre lacteal feeding and diarrhoeal morbidity ($p>0.05$) was reported.

Demand feeding is seen to be a popular practice in most Indian households. Even in this study, majority (61.8%) of mothers breastfed their infants on demand while 38.2% followed scheduled feeding (Table-2).

Our study revealed a positive association between demand type of breastfeeding and diarrhoeal morbidity ($p = 0.003$) with lesser number of infants on scheduled feeding reporting with diarrhoea.

A possible explanation for this could be the practice of older siblings/ relatives in family offering available food to pacify the crying infant when mother is busy or is not available to feed for obvious reasons. This finding conforms to findings of Kandala NB, et al.[27].

In our study, majority of the infants (90.24%) were not on exclusive breast feeding (EBF) during the first 6 months (Table-2) and only 9.76% were exclusively breast fed. Similar figures have been reported by Kartar PS, et al.[23] who showed that only 15.5% of babies were exclusively breast fed, while majority 76.8% were given water along with breast feeding. Chandrasekhar T S, et al.[28], however, found that exclusive breast feeding (EBF) was practiced by 82.3% of the mother and Mohammad K, et al.[29] showed that 58.3% mothers practiced EBF. Difference in findings were also reported by Sinhababu A, et al.[30] and Joseph N, et al.[31.]

Exclusive breastfeeding was found to be protective against diarrhoeal morbidity in our study ($p < 0.001$) (Table -3). In 24 infants who were on exclusively breastfed only 9.7% reported any diarrhoeal morbidity as against 90.3% among infants who were not exclusively breastfed thereby proving efficacy of that Exclusive breastfeeding (EBF) in preventing diarrhoea. These observations are well supported by Bela SD, et al.[32], Laura ML et al.[33.]

In 2004, Kramer et al.[34] reviewed the evidence on the effect of child health and growth by exclusive breastfeeding for 6 months. Morbidity from gastrointestinal diseases was lower among infants who were exclusively breastfed for 6 months, in comparison to infants exclusively breastfed for 3–4 months. Likewise, Lamberti et al.[35] evaluated the effect of breastfeeding duration on morbidity and mortality from diarrhoea. Among infants younger than 6 months, the risk of dying from diarrhoea was 10.5 (95% confidence interval: 2.79; 39.6) times higher among those infants who were not breastfed in relation to those who were exclusively breastfed**.**

Conclusion

There is enough evidence in favour of breast feeding (exclusive breast feeding for 6 months and continued breastfeeding up-to 2 years) as an effective tool against the three major causes of child mortality vis-a-vis diarrhoea, neonatal sepsis and pneumonia.

This study concludes that breast milk offers substantial protection against gastrointestinal infections including diarrhoea. At the same time, the study results points towards the importance of educating mothers on the usefulness of exclusive breastfeeding and the advantages of colostrum. Awareness programs should be directed towards mothers to improve practice of breastfeeding, weaning practices, food hygiene, and childcare particularly in rural; areas so that infants can gain maximally from mothers' milk.

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Tables

Table-1. Socio-demographic characteristics of infants

Variables	Numbers	Percentage (%)
Gender		
Male	130	52.8
Female	116	47.2
Religion		
Hindu	181	73.6
Muslim	65	26.4
Category		
General	65	26.4
OBC	102	41.5
SC	42	17.1
ST	37	15
Educational status of mothers		
Illiterate	65	26.4
primary	67	27.2
Secondary	95	38.6
Graduate	19	7.7
Mother's Occupation		
Housewife	218	88.6
Working	28	11.4
Socio-economic Class		
Class-I	47	19.1
Class-II	34	13.8
Class-III	66	26.8
Class-IV	55	22.4
Class-V	44	17.9

Table- 2: Breast feeding practices in infants

Breast feeding Practices	Numbers	Percentage (%)
Initiation of Breast feeding		
Within 1 hour	32	13
1-6 hour	120	48.8
> 6 hours	94	38.2
Colostrum feed		
Yes	83	33.7
No	163	66.3
Pre-lacteal feed other than Colostrum		
Yes	228	92.7
No	18	7.3
Exclusive Breast feeding up to 6 months		
Yes	24	9.7
No	222	90.3
Type of Breast feeding		
On demand	152	61.8
Scheduled	94	38.2

Table- 3: Association of Breast-feeding practices with incidence of diarrhoea

Breast feeding practices	Incidence of Diarrhoea		Total n (%)	P Value
	Yes n (%)	No n (%)		
Initiation of Breastfeeding				
Within 1 hour	27 (12.2%)	5 (20.0%)	32 (13%)	0.016**
1-6 hour	103(46.6%)	17 (68.0%)	120 (48.8%)	
> 6 hours	91 (41.2%)	03 (12%)	94 (38.2%)	
Colostrum feed				
Yes	79 (35.7%)	04 (16%)	83 (33.7%)	0.047**
No	142 (64.3%)	21 (84%)	163 (66.3%)	
Pre-lacteal feed other than Colostrum				
Yes	206 (93.2%)	22 (88%)	228 (92.7%)	0.2
No	15 (5.8%)	12 (18%)	18 (7.3%)	
Exclusive Breast feeding up to 6 months				
Yes	14 (6.3%)	10 (40%)	24 (9.7%)	0.001*
No	207 (93.7%)	15 60%)	222 (90.3%)	
Type of Breast feeding				
On demand	151 (68.3%)	1 (4%)	152 (61.8%)	0.003*
Scheduled	70 (31.7%)	24 (96%)	94 (38.3%)	

*** Significant at 1 % level of significance**

**** Significant at 5 % level of significance**