Research Article

Morbidity Differences Between Breastfed and Formula Fed Children, a Hospital Based Cross Sectional Study

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Abstract

Background: Human milk is the preferred feed for children. Some mothers, however, supplement their breast milk with formula because they are unable to satisfy the requirements for various reasons. Exclusive breastfeeding is thought to protect against infant morbidity, according to some of the studies. The prevalence of exclusive breastfeeding in Pakistan is 53.6 %. Hence, the study is designed to determine the difference in morbidity among breastfed and formula-fed children in Pakistan.

Objectives: To compare the morbidity differences between breastfed and formula-fed children.

Methods: This comparative cross-sectional was conducted in Paediatric Ward of public hospital of Lahore. Children up to five years of age, both genders males and females, presenting with signs and symptoms highly suggestive of sepsis, gastrointestinal infections, respiratory infections, or with a history of prolonged hospital stay were included in research. Data were analysed by using SPSS version. A chi-square test was applied. P value less than 0.05 was considered significant.

Results: Out of 96 participants, 41(42.7%) were exclusively breastfed while 55(57.3%) were formula fed.17(41.5%) of breastfed children while 35(70%) of formula fed children had respiratory tract infections. 22(55%) of breastfed children while 42(76.6%) of formula fed children were having sepsis. 10(27.8%) of breastfed children while 27(49%) of formula fed children required ICU care during their stay at hospital. Among breastfed 10(24.4%) while among formula fed 12(21.8%) were having necrotizing enterocolitis. Among breast fed 36(87.8%) while among formula fed 50(90.9%) required hospitalization during treatment.

Conclusion: Breastfed children experienced lower rates of respiratory infections and incidence of sepsis as compared to their formula-fed counterparts. Though the association between feeding method and necrotizing enterocolitis was not statistically significant. However, the results underscore the potential benefits of breastfeeding in preventing severe infections and reducing hospital care requirements.

Key Words: breastfeeding, formula feeding, morbidity.

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Introduction

The time from a child's birth to one year of age is known as the "critical window' for promoting healthy growth and development. To meet the changing nutritional needs of newborns, breastfeeding should be introduced within an hour of birth.[1] The World Health Organization (WHO) has advised exclusively breastfeeding children until they are six months old to promote healthy growth development and wellbeing and to lower children mortality rates in all nations, including those in South Asia. After that the child should receive age appropriate, safe and responsive supplemental feedings that are nutritionally adequate. Breast milk is extremely nutrient-dense. Breastfed babies grow better muscles, have better respiratory and digestive functions, have higher IQs and visual acuities, experience fewer illnesses, and have a stronger immune system. Since breastfeeding offers babies and children a considerable level of protection against infections, it is evident that breastfeeding is a matter of public health.

Given the strong boosting effects of breastfeeding that have

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been demonstrated in underdeveloped nations, it is projected that a 40% increase in breastfeeding globally will result in a 50% decrease in respiratory infection-related fatalities among children under the age of 18 months.[2] Exclusive breastfeeding has also been linked to a lower risk of newborn death from gastrointestinal tract infections as well as necrotizing enterocolitis in preterm children. Human milk is the feed of choice for children. However, not all mothers can provide sufficient milk to meet requirements for certain reasons, so they supplement it with formula milk. The prevalence of exclusive breastfeeding in Pakistan is 53.6 %.[3] In recent years many studies in both developing and developed countries suggested that breastfeeding has many health advantages, and it protects from diseases like diarrhoea and otitis media[4,5] but with improvements in modern techniques, there is a lot of skepticism about the advantages of breast milk in modern society.

To our knowledge, the morbidity differences between formula-fed and breastfed babies have not been studied beyond 6th months of age. We also hypothesized that morbidity differences between formula-fed and breast-fed babies have not been extensively studied in Lahore Pakistan. The aim of this study is to broaden the investigation of morbidity differences between breastfed and formula-fed babies up to 5 years of age in the population of Lahore, Pakistan.

Methods

This comparative cross-sectional study was conducted in Paediatric Ward Mayo Hospital Lahore, 6 months after approval of synopsis. Using raosoft, a sample size of 96 patients was estimated taking 95% confidence interval, 10% absolute precision with expected percentage of prevalence as 53%[(6)] by consecutive non-probability sampling techniques. Chil-dren up to five years of age, both genders males and females, presenting with signs and symptoms highly suggestive of sepsis, gastrointestinal infections, respiratory infections, or with a history of prolonged hospital stay were included in research. While premature children, children with low birth weight, children with inborn metabolic problems or heart disease were excluded.

Data were collected from the Paediatric ward, at Mayo Hospital, Lahore. Informed consent was taken from mothers of children following inclusion criteria. A self-generated but pre tested questionnaire was used to collect data from mothers of included children and data was recorded. The questionnaire consisted of two parts. The first part included the demographic information of the child i.e. biodata, maternal education status and father's occupation. The second part included four parameters to assess the morbidity of the children i.e. sepsis, respiratory infections, necrotizing enterocolitis, and prolonged hospital stay. Exclusive breastfeeding is a situation in which a child receives only breast milk from his/her mother or a wet nurse for the first six months and no other solids and liquids except for drops or syrups consisting of vitamins, minerals, supplements, and medicines. Formula feeding refers to the practice of feeding children and babies under 12 months of age with manufactured infant formula, either in powder or liquid form, as a substitute for breastmilk.[7] Morbidity is a crucial concept in public health and demography, encompassing the frequency of illness, disease, and disability within a population.[8,9,10] It is represented as an increased incidence of respiratory tract infection, infective enterocolitis, gastrointestinal tract infections, and neonatal sepsis within a given population. The independent variables of our study include feeding methods that is breastfeeding and formula feeding while the dependent variables include morbidities (sepsis, respiratory infections, necrotizing enterocolitis), their rates, severity of illness (mild, moderate, severe), and frequency of doctor or hospital visits due to illness.

Table 1: *Demographic information of participants*

CHARACTERISTICS OF STUDY PARTICIPANTS			
Variables	**Categories**	**Frequencies**	**Percentages**
Age	Less than 6 months	26	27.1
	More than 6 months	70	72.9
Gender	Male	56	58.3
	Female	40	41.7
Birth weight	Less than 2.5 kg	22	22.9
	2.5kg-4 kg	70	72.9
	More than 4 kg	4	4.2
Birth order	Less than 3	68	70.8
	More than 3	28	29.2
Primary feeding	Breast feeding	41	42.7
	Formula feeding	55	57.3
Supplementary feeding	No	41	42.7
	Yes	54	56.3
Mother's age	Under 20	3	3.1
	20-30	65	67.7
	30-40	27	28.1
	40-50	1	1
Mother's education	No formal education	45	46.9
	High school	40	41.7
	College	9	9.4
	Graduate	2	2.1
Father's employment	Unemployed	27	28.1
	Employed	69	71.9

Data were analysed by using SPSS version 27. Mean and SD were calculated for quantitative variables such as the age of the child, weight of the child, duration of breastfeeding,

Table 2: *Relationship between morbidity and primary feeding pattern*

Variables		Primary feeding pattern				P value
		Breast feeding		Formula feeding		
		frequency	percentage	frequency	percentage	
Respiratory infections	no	24	58.5%	20	36.3%	0.05129
	yes	17	41.5%	35	70.0%	
Frequency of respiratory infection	once	8	47.1%	31	56.3%	0.0046
	twice	5	29.4%	4	7.2%	
	three	2	11.8%	0	0.00%	
	More than three	2	11.8%	0	0.00%	
Severity of respiratory infection	mild	0	0.00%	10	18.8%	0.043
	moderate	3	17.6%	6	10.9%	
	severe	14	82.4%	19	34.54%	
Hospitaliza tion for respiratory	no	3	17.6%	9	16.36%	0.766
	yes	14	82.4%	26	47.27%	
sepsis	no	18	45.00%	13	23.6%	0.048
	yes	22	55.0%	42	76.6%	
Age of sepsis	Less than 12 months	21	95.4%	31	56.36%	0.103
	More than12 months	1	4.5%	10	18.18%	
Severity of sepsis	mild	1	4.5%	3	5.4%	0.907
	moderate	8	36.4%	14	25.45%	
	severe	13	59.1%	25	45.5%	
Hospitalization for sepsis	no	1	4.5%	4	20.0%	0.8301
	yes	21	95.5%	38	70.0%	
Necrotizing enterocollitis	no	31	75.6%	53	96%	0.626
	yes	10	24.4%	12	21.18%	
Age of nec. enterocollitis	<12 months	7	77.8%	9	16.3%	1.00
	>12 months	2	22.2%	3	5.4%	
Severity of nec. enterocollitis	mild	4	44.4%	4	20.0%	0.378
	moderate	1	11.1%	0	0.0%	
	severe	4	44.4%	8	14.0%	
Hospitaliza tion for nec.enter.	no	2	22.2%	5	22.0%	0.64
	yes	7	77.8%	7	7.2%	
Hospital stay	no	5	12.2%	5	9.0%	0.8769
	yes	36	87.8%	50	90.9%	
Duration of hospital stay	<1 week	33	82.5%	41	74.5%	0.867
	1-2 weeks	7	17.5%	11	20.0%	
Requireme nt of ICU	no	26	72.2%	23	41.8%	0.0276
	yes	10	27.8%	27	49.0%	
Overall health	Excellent	1	2.4%	2	3.6%	0.269
	good	15	36.6%	29	52.7%	
	fair	19	46.3%	21	38.0%	
	poor	6	14.6	3	5.4%	
	no	41	100.0	53	96.3%	
Any other health issue	yes	0	0.0	1	3.7%	1.00
vaccination status	no	2	4.9	27	14.2%	<.001
	yes	39	95.1	28	50.9%	

length of hospital stays, and rate of respiratory infections, enterocolitis, and sepsis. Frequency and percentages were calculated for qualitative variables such as feeding methods, type of morbidity, and demographic information such as gender of the child, family history of illness, and maternal health and educational status. A chi-square test was applied. P value less than 0.05 was considered significant.

Results

Out of 96 participants included in the study,56(58.3%) was male while 40 (41.7%) were female. Regarding feeding practices, 41(42.7%) were exclusively breastfed, 55(57.3%) were formula fed .Further demographic details are shown in table 1. 17(41.5%) of breastfed children while 35(70%) of formula fed children had respiratory tract infections. 22(55%) of breastfed children while 42(76.6%) of formula fed children were having sepsis. 10(27.8%) of breastfed children while 27(49%) of formula fed children require ICU care during their stay at hospital. Among breastfed 10(24.4%) while among formula fed 12(21.8%) were having necrotizing enterocolitis. Among breast fed 36(87.8%) while among formula fed 50(90.9%) required hospitalization during treatment.

As compared to breastfed children formula fed children have higher incidence of respiratory tract infections (p=0.05), sepsis (p=0.04) and ICU requirement (p=0.02) during hospital stay. However, insignificant p value for necrotizing enterocolitis (p=0.626) and requirement of hospitalization during treatment (p=0.876) shows no statistical co relation of these variables with primary feeding pattern.

Discussion

The study was conducted to determine the morbidity differences between breastfed and formula fed children. The study suggested that the primary feeding pattern has a significant impact on the prevalence and severity of respiratory infections, sepsis, and the need for ICU care in newborn. Respiratory tract infections were more common in formula-fed children compared to breastfed children. Incidence of sepsis among breastfed children is higher than formula fed children. While the co relation between incidence of necrotizing enterocolitis and primary feeding pattern is statistically insignificant. ICU care during hospital stay was mostly required by formula fed children as compared to breast fed children. Overall, the study suggests that the primary feeding pattern has a significant impact on the prevalence and severity of respiratory infections, sepsis, and the need for ICU care in newborns.

Our findings of 41.5% of the breastfed children reporting respiratory tract infections show a positive correlation between the prevalence of respiratory tract infection with the primary feeding pattern indicated by a p-value of 0.02. Similar reductions in the incidence of respiratory infections in exclusively breastfed children were seen in a study by Kathryn[11] and P W Howie[12] in Dundee. This result correlates with the study in Jerusalem by H.Palti which indicates a lower incidence of cough and respiratory infections by exclusive breastfeeding practices. However, a study also claims that feeding pattern has no impact on respiratory tract infections, mild upper respiratory infections in particular.[13] Our study further indicates that among the children hospitalized for sepsis, 21 out of 96 children were exclusively breastfeeding while the remaining were formula feeding. The significant P value of 0.04 again shows the positive correlation between the incidence of neonatal sepsis and primary feeding practices. A study by A S Cunningham[14] supports this result, which shows higher hospitalization rates due to bacterial meningitis and bacteraemia in developing countries, such as Pakistan. And suggests that human milk is the best preventive measure against sepsis. However, this result contradicts a similar study conducted in Peshawar, Pakistan[15] which shows no significant association between feeding pattern and neonatal sepsis.

As the sample size was only 96 participants and the study was limited to the paediatric ward of Mayo Hospital which could limit the generalizability of the study. The collection of data from parents may introduce bias due to recall and reporting issues. Factors such as parental socioeconomic status, maternal education, access to healthcare, and parental smoking can influence morbidity rates and are difficult to control completely.

The sample size should be large and should include both urban and rural settings to increase the generalizability of the research. Data from all across Pakistan should be included. Education and training should be provided to healthcare workers to better support and encourage breastfeeding, as well as to address any challenges mother may face. If formula feeding is necessary, ensure that parents receive proper guidance on safe formula preparation and feeding practices to minimize health risks.

Conclusion

This study evaluated the differences in morbidity between breastfed and formula-fed children, focusing on respiratory infections, sepsis, necrotizing enterocolitis, requirement of hospital stays. Analysis revealed that breastfed children experienced lower rates of respiratory infections and incidence of sepsis as compared to their formula-fed counterparts, supporting the hypothesis that breastfeeding offers protective benefits against these conditions. While the correlation bet-

ween feeding method and necrotizing enterocolitis was not statistically significant, the results underscore the potential benefits of breastfeeding in preventing severe infections and reducing hospital care requirements. The study found that formula-fed children had a higher incidence of ICU admissions, indicating that breastfeeding may reduce the severity of illness necessitating intensive care

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Authors Contribution:

MS: Involved in conceptualization of study

AI, AA: Involved in data collection

AH, AA, MS: Involved in manuscript writing

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