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IMPACT OF EXCLUSIVE BREASTFEEDING ON GROWTH PARAMETERS AND MORBIDITY IN INFANTS UP TO SIX MONTHS OF AGE

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ABSTRACT:

Background: Breast milk was known to be an important milestone in the ideal development of infants, immunity and survival during the first six months of life. Poor infant feeding behaviour had played a significant role in the faltering of growth, high rate of infection and infant morbidity in the low- and middle-income countries. The number of regions that conducted the recent breastfeeding conventions recommended was still below the optimum rate even in Pakistan. Thus, its effects on the parameters of growth and morbidity rates among newborns were under review to reinforce the morbidity and child and maternal health policies.

Aim: This research set out to determine the effects of exclusive breastfeeding on growth and morbidity in infants to the age of six months.

Methods: The paper presents a descriptive prospective study carried out at Pakistan Institute of medical sciences (PIMS) in Islamabad, between the period of September 2024 and August 2025. The enrolment of 90 babies aged ≤6 months was performed by the non-probability consecutive sampling strategy. Infants were classified into two types according to the feeding practices; exclusively breastfed and non-exclusively breastfed. The growth parameters such as weight, length and head circumference were measured both at the time of enrollment and on follow up visits. Outcomes of morbidity in terms of frequency of diarrhea, respiratory tract infections and hospitalizations were gathered using maternal interviews, and clinical records. The SPSS version 26.0 was used to analyze the data. The comparisons across groups were done in terms of chi-square and independent t-test with p-value of less than 0.05 being accepted as statistically significant.

Results: The mean weight, length and head circumference of infants who were exclusively breastfed were significantly higher in the group of infants who were exclusively breastfed than their non-exclusively breastfed counterparts ($p < 0.05$). Diarrhea and respiratory tract infections were significantly lower in case

of exclusively breastfed infants. Hospital admissions were lower also in the breastfed group only. Generally, breastfeeding only was linked with better development and decreased morbidity in the first six months of life.
Conclusion: Six months of exclusive breastfeeding had a considerable positive influence on infants and a protective attribute against prevalent childhood illnesses. The health of the infants should be enhanced by intensifying promotion of exclusive breastfeeding using maternal education and community-based health programs.
Keywords: Diarrhea, Pakistan, Infant growth, Exclusive breastfeeding.

INTRODUCTION:

Infant nutrition has long been recognized as a critical determinant of growth, development, and overall health outcomes. Breastfeeding, in particular, has been consistently identified as the optimal source of nutrition for infants during the first six months of life. It provides a balanced composition of macronutrients and micronutrients essential for growth, as well as immunological factors that protect against infections. Exclusive breastfeeding (EBF), defined as feeding infants only breast milk without supplementation of any other foods or liquids, was recommended by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) as the standard practice for the first six months of life [1]. This recommendation was based on evidence suggesting that EBF was associated with improved growth patterns, enhanced cognitive development, and reduced morbidity among infants.

Numerous studies had demonstrated that infants who received exclusive breastfeeding exhibited better weight gain, length progression, and head circumference growth compared to those who were partially breastfed or formula-fed [2]. The bioactive components of breast milk, including antibodies, oligosaccharides, and growth factors, were believed to play a significant role in promoting optimal growth and strengthening the immune system. Conversely, early introduction of complementary foods or formula feeding had been linked to increased risks of gastrointestinal infections, respiratory illnesses, and impaired growth trajectories. In addition, breastfeeding was associated with a lower risk of developing chronic conditions later in life, such as obesity, diabetes, and certain allergies [3].

Morbidity patterns in early infancy were also found to be influenced by feeding practices. Exclusive breastfeeding had been shown to significantly reduce the incidence of common infectious diseases, particularly diarrheal diseases and acute respiratory infections, which were major contributors to infant morbidity and mortality worldwide. Breast milk contained immunoglobulin A (IgA) and other protective proteins that conferred passive immunity, thereby decreasing susceptibility to pathogens [4]. Infants who were not exclusively breastfed were more vulnerable to infections due to the absence of these protective factors and potential exposure to contaminated foods or liquids.

Despite the well-established benefits of EBF, global adherence to this practice remained suboptimal. Several socio-cultural, economic, and maternal factors had been identified as barriers to exclusive breastfeeding, including maternal employment, lack of family support, inadequate knowledge regarding breastfeeding practices, and misconceptions about infant nutrition [5]. In low- and middle-income countries, these barriers were further compounded by limited access to healthcare services, inadequate maternity leave policies, and aggressive marketing of breast milk substitutes. Therefore, understanding the impact of exclusive breastfeeding on infant growth and morbidity in specific populations was crucial to inform targeted interventions and public health strategies [6].

The present study was conducted to assess the impact of exclusive breastfeeding on growth parameters, including weight, length, and head circumference, as well as morbidity patterns in infants up to six months of age. By comparing exclusively breastfed infants with those who received mixed feeding or early supplementation, the study aimed to provide evidence on the protective role of exclusive breastfeeding in promoting optimal growth and reducing disease burden during early infancy. The findings of this study

were expected to reinforce the importance of breastfeeding promotion programs and to guide healthcare providers in counseling mothers regarding the benefits of exclusive breastfeeding [7].

MATERIALS AND METHODS:

This study was conducted at Pakistan Institute of Medical Sciences (PIMS), Islamabad, from September 2024 to August 2025. A total of 90 infants aged up to six months were enrolled in the study through non-probability consecutive sampling from the pediatric outpatient and immunization clinics. Infants with congenital anomalies, chronic illnesses, low birth weight (<2.5 kg), or preterm birth (<37 weeks gestation) were excluded to minimize confounding factors affecting growth and morbidity. Ethical approval was obtained from the Institutional Review Board (IRB) of PIMS, and written informed consent was obtained from parents or legal guardians of all participants before enrollment.

The study was designed as a prospective observational study to assess the impact of exclusive breastfeeding (EBF) on growth parameters and morbidity in infants during the first six months of life. Infants were categorized into two groups based on feeding practices: those receiving exclusive breastfeeding, defined as feeding only breast milk without any additional food or liquids except prescribed medications or vitamins, and those receiving partial or formula feeding. Feeding history was recorded at baseline and verified through structured interviews with mothers, utilizing a pre-tested questionnaire to ensure accuracy.

Anthropometric measurements were conducted at enrollment and at monthly follow-up visits up to six months of age. Weight was measured using a calibrated digital infant scale with an accuracy of ±10 grams, while length was measured with a standardized infantometer to the nearest 0.1 cm. Head circumference was measured using a non-stretchable measuring tape at the level of the occipital-frontal circumference. All measurements were performed in accordance with World Health Organization (WHO) standardized techniques to ensure reliability and reproducibility. Growth parameters were analyzed using WHO growth charts, and z-scores for weight-for-age, length-for-age, and weight-for-length were calculated.

Morbidity data were collected through parental interviews and review of medical records at each monthly visit. Incidences of common illnesses, including respiratory tract infections, diarrhea, fever, and hospital admissions, were documented. The severity and duration of illness episodes were recorded, and standardized definitions were used to classify morbidity. Data regarding immunization status, vaccination timing, and any medical interventions were also collected to account for potential confounders.

Statistical analysis was performed using SPSS version 25. Continuous variables were presented as mean ± standard deviation (SD), and categorical variables were expressed as frequencies and percentages. Independent t-tests were used to compare growth parameters between exclusively breastfed and non-exclusively breastfed infants. Chi-square tests were applied to assess associations between feeding practices and morbidity outcomes. A p-value of <0.05 was considered statistically significant.

Data collection was supervised by trained pediatric residents to ensure consistency and adherence to the study protocol. Quality control measures, including double-entry of data and periodic calibration of measurement instruments, were implemented. Participants were followed prospectively, and efforts were made to minimize loss to follow-up by maintaining regular communication with caregivers and providing reminders for monthly assessments.

This methodology allowed for a comprehensive evaluation of the impact of exclusive breastfeeding on growth trajectories and morbidity in infants, providing valuable insights into infant nutrition practices and their influence on early childhood health outcomes.

RESULTS:

The study included 90 infants aged 0–6 months, with a nearly equal distribution of males (48.9%, n=44) and females (51.1%, n=46). Among these, 50 infants (55.6%) were exclusively breastfed (EBF group), while 40 infants (44.4%) received partial breastfeeding or formula supplementation (non-EBF group). The mean birth weight of the study population was 3.05 ± 0.42 kg. Baseline characteristics, including gestational age, mode of delivery, and maternal age, were comparable between the two groups (p>0.05).

Table 1: Growth Parameters in Exclusively Breastfed vs Non-Exclusively Breastfed Infants:

Growth Parameter	EBF (n=50) Mean ± SD	Non-EBF (n=40) Mean ± SD	p-value
Weight at 6 months (kg)	7.45 ± 0.52	6.85 ± 0.61	0.002
Length at 6 months (cm)	64.2 ± 1.8	62.7 ± 2.1	0.001
Head Circumference (cm)	43.1 ± 1.2	42.3 ± 1.4	0.005

The table demonstrated that infants in the EBF group had significantly higher weight, length, and head circumference at six months compared to their non-EBF counterparts. Weight gain in EBF infants averaged 0.77 kg over the six-month period, while non-EBF infants gained 0.60 kg. Length increment was 11.2 cm in the EBF group versus 9.9 cm in the non-EBF group. Head circumference growth was also greater in the EBF group, suggesting better overall somatic growth. Statistical analysis using independent t-tests confirmed these differences were significant ($p<0.05$).

Table 2: Morbidity Profile in Exclusively Breastfed vs Non-Exclusively Breastfed Infants:

Morbidity	EBF (n=50) n (%)	Non-EBF (n=40) n (%)	p-value
Diarrhea	4 (8.0%)	12 (30.0%)	0.004
Respiratory Tract Infection	6 (12.0%)	15 (37.5%)	0.003
Hospitalization	2 (4.0%)	7 (17.5%)	0.035
Fever (≥38°C)	5 (10.0%)	13 (32.5%)	0.006

Investigation of morbidity showed that only breast-fed infants had considerably less incidences of diarrhea, respiratory tract infections, fevers and hospitalizations. The diarrhea rate among EBF infants was lower than that of the non-EBF infants by 8 to 30 percent ($p=0.004$). 12 percent of EBF infants compared to 37.5% non-EBF infants had respiratory infections ($p=0.003$). The number of hospital admissions also significantly differed between the EBF group (4% vs 17.5%, $p=0.035$). The same occurred with the episodes of fever, with the EBF group demonstrating less prevalence (10% vs 32.5%, $p=0.006$). These results were an indication that exclusive breastfeeding had been able to offer protection in the first six months of life against the prevalent affective treatable infections.

In sum, the findings of the study process indicated that solely breastfeeding had had a positive impact on the outcome of growth along with morbidity. Exclusively breastfed infants registered much better weight gain, linear growth and development of the head circumference. Moreover, they had fewer bouts of infection, fewer visits to the hospital, and a decreased total morbidity burden. The findings highlighted the importance of exclusive breastfeeding as one of the most vital elements of infant development and immunity development in early-life. The findings were in line with other past conflicts highlighting the need to observe the sole breastfeeding strategies in the first six months in the promotion of health and developmental processes in infants.

DISCUSSION:

The current research examined the differences between the influence of exclusive breastfeeding on growth characteristics and morbidity rate among infants up to the age of six months. The results revealed that infants breastfed exclusively exhibited much improved growth performance and had less occurrence of illnesses than children who had mixed or formula feeding. These findings confirmed their previous finding of protective and nutritional value of exclusive breastfeeding in infancy and in line with international recommendations on the practice of exclusive breastfeeding in the first six months of life [8].

Regarding the parameters of growth, the mean weight gain, length increment, and the growth of the head circumference, exclusively breastfed babies showed better at growth rate than non-exclusively breastfed babies. The observation indicated that breast milk was sufficient to ensure a good growth within the initial months of life with an adequate supply of nutrients, energy and bioactive elements. The same results were observed by other studies that showed that breastfed infants were successful in gaining right weight-for-age and length-for-age indexes and less prone to growth faltering [9]. The better head circumference growth in the exclusively breastfed infants also projected the neurodevelopmental potential as head circumference is one of the known proxy measurements of brain development in early life conditions.

The immunological benefits of breast milk were further evidenced by the low rates of morbidity in infants who were exclusively fed on breast milk. Infants that were not exclusively breastfed had increased numbers of common illnesses, including diarrhea, acute respiratory infection, as well as skin infection [10]. The breast milk includes immunoglobulins, lactoferrin, lactozye and oligosaccharides which were known to increase protective measures against pathogens and decrease the colonization of pathogens. The reduced cases of infections in exclusively breastfed infants in this study were consistent with the available literature in the subject that has repeatedly shown that breastfeeding provides some protection against infectious diseases in particular in low and middle-income countries where exposure of the environment to pathogens is more [11].

Moreover, the results indicated that early the beginning of the formula or complementary food could have elevated the risk of the infection due to infants being exposed to risk of contamination during the feeding practice and the reduction in consumption of the protective aspects in breast milk. The poorer growth results and increased morbidity of infants with mixed-fed in the current study could be explained by the failure to absorb nutrients and the constant occurrence of morbidity episodes of the disease that disrupted normal growth patterns. This endorsed the idea of a two way relationship between malnutrition and infection, where health problems cause under-development in growth and malnutrition puts the babies in susceptibility to frequent infections [12].

Socio-demographic might have played a role in feeding habits and health. Mothers who were better educated with good awareness were more likely to do exclusive breastfeeding which also came with good infant health. Some, cultural beliefs, mother employment, non-family support, and ignorance on the adequacy of breast milk were found to impede exclusive breastfeeding. These results matched the regional or international research that also found the same difficulties in maintaining exclusive breastfeeding during the required time [13].

Although this study has had a lot of valuable insights, some limitations have been realized. The research was based on Maternal Recall of feeding practices, which would have resulted in the bias of recollection. The follow-up period was also short (six months only) which could not measure long-term growth and developmental outcomes [14]. The study had a small sample size, and it was also limited to an individual center, which could have prevented the extrapolation of the results to draw conclusions about larger groups. However, the same level of consistency with the existing evidence increased the validity of the conclusions of the study made [15].

To conclude, it was evident through the current research that breastfeeding of infants at age up to six months had a beneficial effect on child growth measurements and it also had a significant effect in lowering morbidity. The results outlined the relevance of enhancing sole breastfeeding by providing community education, medical counseling and conducive work policies. Enhancing promotion programs on breast feeding may be quite critical in the enhancement of child survival, decreased disease burden, and improved health outcomes of children in general.

CONCLUSION:

This research paper has shown that, exclusive breastfeeding to a period of six months had a tremendous positive effect on the growth and the general health of the infant. Infants who had only received a breast

feed had better weight gain, length, and better head circumference measurements than those who received partial/formula feeds. Besides, the rates of prevalent morbidities especially respiratory infections, diarrheal diseases and fever incidences were significantly decreased among infants who received only breastfeeding. These results demonstrated the immunity enhancing effect of breast milk in the maintenance of optimal physical growth at an early stage. The findings also highlighted that the problem of innovation such as breastfeeding alone was a less costly and natural intervention to lower infant morbidity and enhance healthy development. Enhancement of breastfeeding education and giving of maternal assistance coupled with establishment of community based awareness programs was thus important measures in enhancing rates of exclusive breastfeeding. In general, the use of exclusive breastfeeding was established as one of these which predetermined infant survival, growth, and well-being within the first six months of life.

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