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Association of Modes of Feeding with Development and Growth Percentile of 13-14 Months Toddlers

Ruqia Begum[1], Wardah Ajaz Qazi[2], Hazeefa Bahadur Khan[3], Mishal Asif Muzaffar[4], Hira Khalid[5], Rida Fatima[6]

Abstract

Background: Different modes of feeding including exclusive breastfeeding, formula milk and combined milk have diverse effects on the health of toddlers. There is a need to explore the actual frequency of modes of feeding in mothers and its relationship with the development and growth percentile of toddlers.

Methodology This cross-sectional study was conducted from January 2022 to June 2022 in the community of Rawalpindi and Islamabad including Hospitals, private setup and daycare centers. A total of 56 Toddlers (13-14 Months old) with exclusively breastfed, formula fed and combination of both were included in this study. Data was collected by using Non-Probability Purposive Sampling Technique. Ages and stages questionnaire-3 (ASQ-3) for the assessment of 5 domains of development (i.e. communication, gross motor, fine motor, personal social and problem solving) and growth percentile was evaluated using anthropometric measurements. Data was analyzed by using SPSS version 21.

Results: A significant difference was found in personal social, gross motor and communication domains with combined mode of feeding as compared to others modes of feeding in toddlers (p=0.05).There was also significant difference in growth percentile for height and weight in combined mode of feeding as compared to others mode of feeding (p<0.05).But non-significant difference in growth percentile for head circumference in combined mode of feeding was found.

Conclusion: This study suggests a positive association of combined modes of feeding with communication, personal social and gross motor domain of development and with growth percentile (height and weight). Combined mode of feeding is found to be the best mode among the three groups in terms of better communication and personal social scores of development.

Keywords: Ages and stages questionnaire-3, breastfeeding, development, growth percentile, modes of feeding

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[1] Foundation University Islamabad, Pakistan

[2] Health Care Australia

[3] TransHelp Pakistan

[4] Connect Health UK

[5] Shaafi International Hospital, Islamabad, Pakistan

[6] Murtaza Medical Complex, Rawalpindi, Pakistan

Correspondence:
Wardah Ajaz Qazi
wardahqazi@outlook.com

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Introduction

Child development is a complex phenomenon which involves progressive revealing of age associated biological and psychosocial traits. Optimal child development is influenced by variety of factors including nutrition, genetics, environment, socioeconomic status, maternal health and education. From day of conception to 2 years of age child attains rapid development this period provides a window to child's physical growth and development. Nutritional deficiencies during this critical period can lead to serious cognitive and physical development complications (1). Globally 250 million children below 5 years of age fail to reach their developmental milestones due to inadequate access to nutrition and health care facilities (2)

Pakistan is one of the countries with highest rates of stunting where 45% children are stunted due to nutritional deficiencies (3). Mother's breast milk is a biological fluid which is considered as the best source of nutrition for the children (4, 5). Despite its importance under certain conditions children are fed through other ways of feeding predominately through formula milk while others opt a combination of breastfeeding and formula milk (6). Only 18% of Pakistani population starts early initiation of breastfeeding and 38% goes for exclusive breastfeeding for 6 months as compared to US which marks 75% of early breastfeeding initiation and 13% of exclusive breastfeeding for 6 months (7).

In Pakistan poor feeding practices e.g. discarding colostrum not breastfeeding within one hour of birth and exclusive breastfeeding are major causes of malnutrition. In addition weaning to nutrient deficient food also leads to malnourishment. A paradigm shift from breastfeeding to formula feeding is observed globally in Pakistan the situation is quite alarming according a report published in Dawn newspaper 2017 "Pakistan has the highest bottle-feeding and the lowest exclusive breastfeeding rates in South Asia" (8). This needs to be find out that can a man-made source compete the natural source or can it fully replace it. Moreover if there are structural and functional differences in

these modes of feeding then there must be growth & developmental differences in children fed on either mode of feeding.

The objective of this study was to find out the frequencies of modes of feeding and establishes that which mode is better in terms of better growth & development of a child.

Methodology

The cross-sectional study was conducted from January 2022 to June 2022 in the community of Rawalpindi and Islamabad including Hospitals, private setup and day care centers. After approval from the Ethical Review Committee of Foundation University Medical College, Islamabad, the sample size was calculated using Raosoft. Informed consent was taken from the parents/guardians of the toddlers. Total 56 Toddlers (13-14 Months old) with exclusively breastfed, formula fed and combination of both were included in this study by using Non-Probability Purposive Sampling Technique. All toddlers with acute injuries, congenital, hereditary, neuromuscular and cardiopulmonary disorders were not included in this study. Data was collected by using demographic form, Ages and stages questionnaire (ASQ-3) which assess the 5 domains of development includes communication, gross motor, fine motor, personal social and problem solving (reliability of 92%, sensitivity 87.4% and specificity 95.7%).WHO Growth percentile calculator was used for Anthropometric measurement including height and head circumference which was measured by using thin plastic measuring tape while weight was measured by using weight machine. All the data collection tools were administered after taking consent from parents/guardians and ensuring confidentiality. Data was analyzed by using SPSS.21.

Results

Out of 56 toddlers 34 (60.7%) were male toddlers and 22 (39.3%) were female toddlers. Mean age of toddlers was 13.56 ± .518. Frequency of toddlers with exclusive breast feeding was 20 (35.7%), exclusive formula milk was 9 (16.1%) and combination of both was 27 (48.2%).The main ingredients of formula milk and combined milk were lactoferin ,nucleotides (28.6 %) ,lactogenic and DHA was (32.1 %) Table 1.

Table 1: Demographic Distribution

Variable			Freq	Mean±SD
Gender	Male Toddlers		34 (60.7%)	1.61±.493
	Female Toddlers		22 (39.3%)	
Mode of Feeding	Exclusive breast feeding		20 (35.7%)	3.25 ± 1.888
	Exclusive Formula milk		9 (16.1%)	2.22 ± 1.093
	Combined		27 (48.2%)	2.67 ± 1.414
Ingredients	Formula milk	Lactoferin& nucleotides	28.6 %	2.27±2.10

As data was not normally distributed at base line non-parametric tests of significance Kruskal Wallis was used to analyze data. Statistically significant difference was found in personal social, Gross motor and communication domains(ASQ) with combined mode of feeding as compared to others modes of feeding in toddlers (p=0.05). The mean values of fine motor and problem solving domains remained statistically non-significant in combined mode of feeding (p>0.05) Graph 1. Similarly, there was a significant difference between combined modes of feeding and growth percentile for height and weight p=0.05 Table 2.

Table 2: Growth Percentile Results

Variable	Mean Rank	P value
Growth Percentile Height for Age	26.70	0.05
Growth Percentile Weight for Age	20.93	0.02
Growth Percentile Head Circumference for Age	11.22	0.929

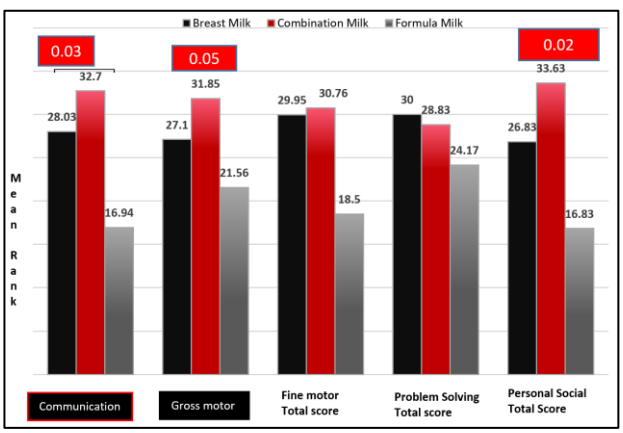

Figure 1: Graphical Presentations of Neurodevelopment Domains

Figure 2: Anthropometric Measurements

Discussion

Exclusive breast feeding is very important, long lasting and cost-effective interventions which help to reduce the morbidity and mortality of infants. However, a large proportion of infants are not exclusively breastfed as recommended by the WHO. Early exclusive breast feeding has many important health benefits for infants through 6 months of age. Exclusively breast feeding is important in low- and middle-income countries where more than a third young children suffer growth impairment causing high risk of morbidity and mortality (9). The importance of breast feeding in low-income and middle-income countries is well recognize i.e. 37% of children younger than 6 months of the age are exclusively breastfed. But in high income countries fewer consensuses exists about its importance (10). In current study out of 56 toddlers, exclusive breast feeding was 20 (35.7%), exclusive formula milk was 9 (16.1%) and combination of both was 27 (48.2%).

In 2019 a systematic review was conducted by B patro et al, in which they found that exclusively breast feeding with long duration is associated with an early peak in infant body mass index and reduce the risk of obesity (11). Another study was conducted in 2021 by L Briollais, the result of their study showed that exclusively breast-feeding increase DNA methylation variations during infancy which decreases the risk of overweight and obesity from infancy to early childhood (12). In contrast to these findings, the current study found out significant correlation between the anthropometric measurements and the combined modes of feeding.

A study was conducted by JT Wallenborn in 2021 in which they found that exclusively breast feed for 6 months followed by complementary feeding until 2 years of age is associated with increase in overall child development with increase in height and decreases the odds of stunning in 67% population (13)

In our study significant difference was also found in growth Percentile for height and weight in toddlers who were on combined mode of feeding $p<0.05$. Combined group showed highest mean scores in growth percentile for height and formula milk the least mean score. Considering growth percentile for weight combined mode of feeding showed highest mean score and exclusive breastfed showed the lowest mean score. In case of growth percentile of head circumference exclusive breastfed showed highest mean score and, combined mode and exclusive formula fed showed the lowest score showing minor difference between both. There was non-significant association in growth percentile for head circumference $p>0.05$

Another study conducted by Cathtal eta al in which they find out the effect of exclusive breast feeding on Neuro development, the results of this study suggested that those toddlers who were on exclusive breastfed have better neurodevelopment which includes Gross motor, fine motor, personal social skills and problem solving except communication over the ones who were on formula fed (14). But in our study the results showed a significant association of combined mode of feeding with three domains of neurodevelopment personal social, Gross motor and communication domains.

Conclusion

There is an association of modes of feeding with communication, personal social and gross motor domain of development. Among the three groups, combined mode of feeding is found to be the best for better child development particularly in terms of communication & personal social domain of development. Moreover, the frequency of combined mode of feeding was also found to be greatest among three groups.

Ethical Approval:
This study was approved by the Ethical Review Committee of Foundation University Medical College, Islamabad.
Ref. No. FF/FUMC/215 Phy/19 Date: 01-11-2019

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Conflict of interest: None declared.

Authors' Contribution:
RB: Conception and designing of the project critically
WAQ: Acquisition of concept, reviewed and approved the initial and final Draft
HBK: Data Collection, Initial write up
MAM: Managed the field work, data analysis and interpretation of data
HK: Data Collection, field work and coordination
RF: Final write up of manuscript, maintained integrity and accountability

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