Assessing the relationship between infant and young child feeding practices, nutritional status and developmental progress among 0-3 year old children in rural Vadodara

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ABSTRACT

The nutritional status of the infant and young children cannot be isolated from their feeding practices and their developmental progress. The present study aimed at assessing the infant and young child feeding (IYCF) practices and nutritional status and study its relationship with the developmental progress of young children (0-3y) in a rural setup. It was a cross sectional study. From an ongoing project site in rural Vadodara (CSR/TSIPL/2014-15), households with children 0-3 years (n=72) were enrolled. Qualitative and quantitative methodologies were used to elicit data on IYCF practices (UNICEF guidelines, 2001), nutritional status (HAZ, WAZ and WHZ using WHO Anthro Software, 2011) and developmental progress of children (Baroda Development Screening Test, BDST, 1991), data were scored, entered in MS Excel and analysed using SPSS software. IYCF practices ranged from poor to very good (31.9% to 76.4%) but the quality of complimentary food ranged from poor to average which was reflected in the nutritional status of children (33.3% wasted, 75% stunted and 62.5% underweight), wherein, stunting and wasting had significant relationship with the developmental progress of children (27.9% children normal, 34.4% average and 37.7% children had developmental delay as per Baroda Developmental Screening Test. Developmental programs focusing on young children need to strengthen associations between IYCF, nutritional status and developmental progress among children using appropriate behaviour change communication strategies.

Key Words : Infant and young child feeding, Developmental delay, Nutritional status, Developmental progress

INTRODUCTION

Childhood malnutrition is a public health priority to which one-third of child deaths can be attributed and long-term malnutrition manifest as stunting increases the risk of infections

and reduces cognitive development and economic productivity (Bentley *et al.*, 2015). Globally approximately 156 million children under 5 were estimated to be stunted (too short for age), 50 million were estimated to be wasted (too thin for height) (Prendergast and Humphrey, 2014). India contains about 40 per cent of the world's stunted children under the age of 5 and nearly 50 per cent of the wasted children. (UNICEF, 2013). It has been recently estimated that in developing nations, 200 million children (roughly 39%) under age five are not reaching their developmental potential because poverty, malnutrition, high rates of infection, lack of stimulation and education and instability in the home have negative effects on child development. (Chilton *et al.,* 2007). Undernutrition affects brain development directly, and also affects physical growth, motor development, and physical activity, which may, in turn, influence brain development through both caregiver behaviour and child interaction with the environment (Ngure *et al.,* 2014).

Appropriate infant feeding, namely, early initiation of breastfeeding with colostrum as the first food, exclusive breastfeeding to six months, followed by the introduction of complementary foods with continue breastfeeding, is important for survival as well as physical growth and mental development of the child (WHO, 2007). Child development interventions primarily benefit developmental outcomes, whereas nutrition can benefit both development and nutritional status (Grantham-McGregor *et al.,* 2014).

The present study was conducted to assess the infant and young child feeding practices and nutritional status and study its relationship with the developmental progress of young children (0-3y) in a rural setup.

METHODOLOGY

Study design :
Cross sectional study .

Study area :
The study was conducted in two clusters of Ekalbara village in Padra Taluka of Rural Vadodara district of Gujarat state.

Sampling technique :
The households with children in the age group (0-3 years) from the two clusters with similar culture and population size were purposively selected.

IYCF practices :
The mothers of all children in the age group 0-3 years were interviewed regarding socioeconomic factors, infant and young child feeding (IYCF) practices using pretested semi structured questionnaire. Information on infant and young child feeding practices: initiation of breastfeeding, colostrum feeding, exclusive breastfeeding upto 6 months, complementary feeding, feeding during illness, bottle feeding etc. was collected.

Nutritional status assessment :
Nutritional status was assessed using Weight for Height Z scores (WHZ), Height for

Age Z scores (HAZ) and Weight for Age Z scores (WAZ) and classification of children was done using WHO Anthro software (WHO, 2012).

Developmental progress assessment :

The Developmental progress of children was assessed using the Baroda Development Screening Test for infants (based on Bayley Scale of Infant Development – BSID) (Phatak *et al.,* 1991). It consists of 54 items based on mental and motor items for children upto 30 months. According to their individual scores they were plotted on the graph to find their age placements and developmental age was calculated.

On the full scales assessment, the developmental quotient (DQ) was calculated using the formula:

$$\text{Developmental Quotient (DQ)} = \frac{\text{Developmental Age (DA)}}{\text{Chronological Age (CA)}}$$

Those having age placement levels below 50% pass level were considered normal, between 50 and 97% pass level were considered average and >97% pass level were delayed.

Data handling and analysis :

The data were scored, entered in MS Excel and analysed using SPSS software. The sample consisted of a total of 72 mothers who gave consent for participating in the study.

Ethical clearance :

Before conducting the study, a detailed protocol was submitted to the institutional ethical committee of Department of Foods and Nutrition, Maharaja Sayajirao University of Baroda for ethical clearance (No. IECHR 2015/5). The researcher obtained written consent from each and every participant's family member by reading out the consent form before them before conducting the assessment.

RESULTS AND DISCUSSION

Infant and young child feeding practices among mothers of children aged 0-3 years:

The results based on infant and young child feeding practices in Table 1 indicate that the initiation of breastfeeding within one hour was found to be 54.2%. Only 58.3% children were fed colostrum while 56.9% children were given prelacteals after birth. The most commonly consumed prelacteal was "*Patasha water*" (56.1%). It was found that 58.3% children were given water in the first six months.

To determine whether the child was exclusively breastfed upto 6 months, all children in the age group six months to two years were included along with those infants below 6 months who received water or complementary foods. Only 31.9% children were exclusively breastfed for the first six months and 73% children received complementary food after 6 months of age which was considered as a positive practice. Also 22.8% children were bottle fed while 76.4% children were breastfed during illnesses. Among the children who were given complementary foods, only 40.3% children received sprouted as well as fermented foods which are considered as healthy for young children.

VANISHA S. NAMBIAR AND TANYA KHANNA

Table 1: Infant and young child feeding practices carried out by subjects under study (n=72)		
Indicators	Frequency	Percentage
Initiation of breastfeeding		
Within one hour	39	54.2%
1-3rd day	23	31.9%
After 3days	10	13.9%)
Colostrum feeding		
Yes	42	58.3%
No	30	41.7%
Children who were given prelacteals after birth	41	56.9%
Type of prelacteals given		
Glucose water	6	14.6%
Patasha water	23	56.1%
Honey	3	7.3%
Powder milk	4	9.8%
Others(Please specify)	5	12.2%
Water given in the first six months		
Yes	42	58.3%
No	30	41.7%
Children who were exclusively breastfed in the first six months	22	31.9%
Children receiving solid or semi-solid food along with breast milk after 6 month	46	73%
Bottle feeding		
Yes	16	22.8%
No	54	77.1%
Mothers who continued breastfeeding during illness	55	76.4%
Fermented food consumed by children		
Yes	25	40.3%
No	37	59.7%
Sprouted food consumed by children		
Yes	25	40.3%
No	37	59.7%

Nutritional status among children under study :

The classification of children was done using WHO Anthro cut offs based on WHO growth standards (WHO, 2012). As indicated in Table 2, the Weight for Height Z scores (WHZ) showed that overall 50% children belonged to the normal category, 16.7% children were mildly wasted, 22.2% children were moderately wasted and 11.1% children were severely wasted accounting for 33.3% wasting among children.

The Height for Age Z scores (HAZ) showed that only 8.3% children belonged to the normal category, 16.7% children were mildly stunted, 30.6% children were moderately stunted and 44.4% children were severely stunted, thereby indicating stunting rates as 75% among

Table 2 : Nutritional status of children (0-3y) under study				
Degree of under nutrition	z-score cut off points	Weight for height Z score(Wasting)		
		Experimental (n=40)	Control (n=32)	Pooled (n=72)
Normal	1SD-<-1SD	19(47.5)	17(53.1)	36(50)
Mild	-2SD-<-1SD	6(15)	6(18.8)	12(16.7)
Moderate	-3SD-<-2SD	8(20)	8(25)	16(22.2)
Severe	<-3SD	7(17.5)	1(3.1)	8(11.1)
		Height for age Z score(Stunting)		
Normal	1SD-<-1SD	4(10)	2(6.3)	6(8.3)
Mild	-2SD-<-1SD	7(17.5)	5(15.6)	12(16.7)
Moderate	-3SD-<-2SD	11(27.5)	11(34.4)	22(30.6)
Severe	<-3SD	18(45)	14(43.8)	32(44.4)
		Weight for age Z score (Underweight)		
Normal	1SD-<-1SD	6(15)	7(21.9)	13(18.1)
Mild	-2SD-<-1SD	10(25)	4(12.5)	14(19.4)
Moderate	-3SD-<-2SD	10(25)	15(46.9)	25(34.7)
Severe	<-3SD	14(35)	6(18.8)	20(27.8)

*Figures in parenthesis indicate percentages

the study group.

Similarly, the Weight for Age Z scores (WAZ) showed that 18.1% children belonged to the normal category, 19.4 % were also mildly undernourished, 34.7% children were moderately undernourished and 27.8% children were severely undernourished. Thus, 62.5% children were undernourished.

Developmental progress among children under study :

As indicated in Table 3, only 27.9% children were in the normal category, 34.4% children belonged to average category and 37.7% children were found to be delayed according to their developmental quotients(DQ) based on their developmental and chronological age. (Fig. 1).

Table 3 : Developmental progress of children in the groups under study		
Status of development	Pass level	Developmental Progress (n=61)
Normal	<50%	17(27.9)
Average	50-97%	21(34.4)
Delayed	97-100%	23(37.7)

*Figures in parenthesis indicate percentages

As seen in the scattered plot (Fig. 2), the developmental delay (in months) is less than 8 months for most of the subjects with around 90% children having less than 6 months delay.

The relationship between infant and young child feeding practices and developmental progress indicated that there was a significant relationship between practices such as initiation of breastfeeding, prelacteals, exclusive breastfeeding for 6 months, continued breastfeeding
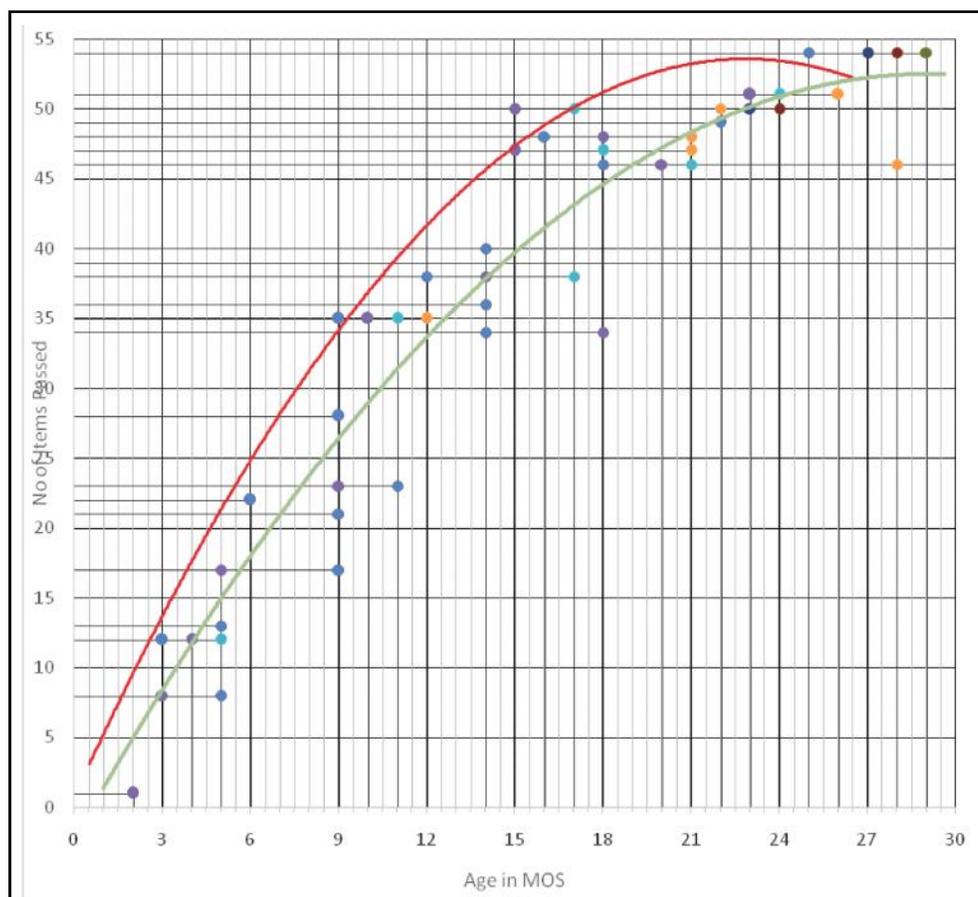
Fig. 1 : Developmental age graph plotting

and delayed initiation of complimentary foods with the developmental status of the children. Table 4 establishes the fact that good nutritional practices have a positive effect on the developmental progress of children.

As indicated in Table 5, the nutritional status of the children was correlated with their status of development. It was found that there was a positive correlation between underweight and status of development but was non-significant.

A significant relationship between stunting, wasting and status of development can be seen thus indicating that children who are stunted or wasted have poor developmental scores and are thereby delayed.

This study examined the effect of infant and young child feeding practices and nutritional status on the developmental progress of children ranging from 0-3 years. The underlying variables important to explaining poor development among children included high rates of wasting and stunting among children < 3 y old and poor feeding practices, which were associated with an increased developmental delay.

A study by Walker *et al*. (2007) stated inadequate cognitive stimulation as one of the
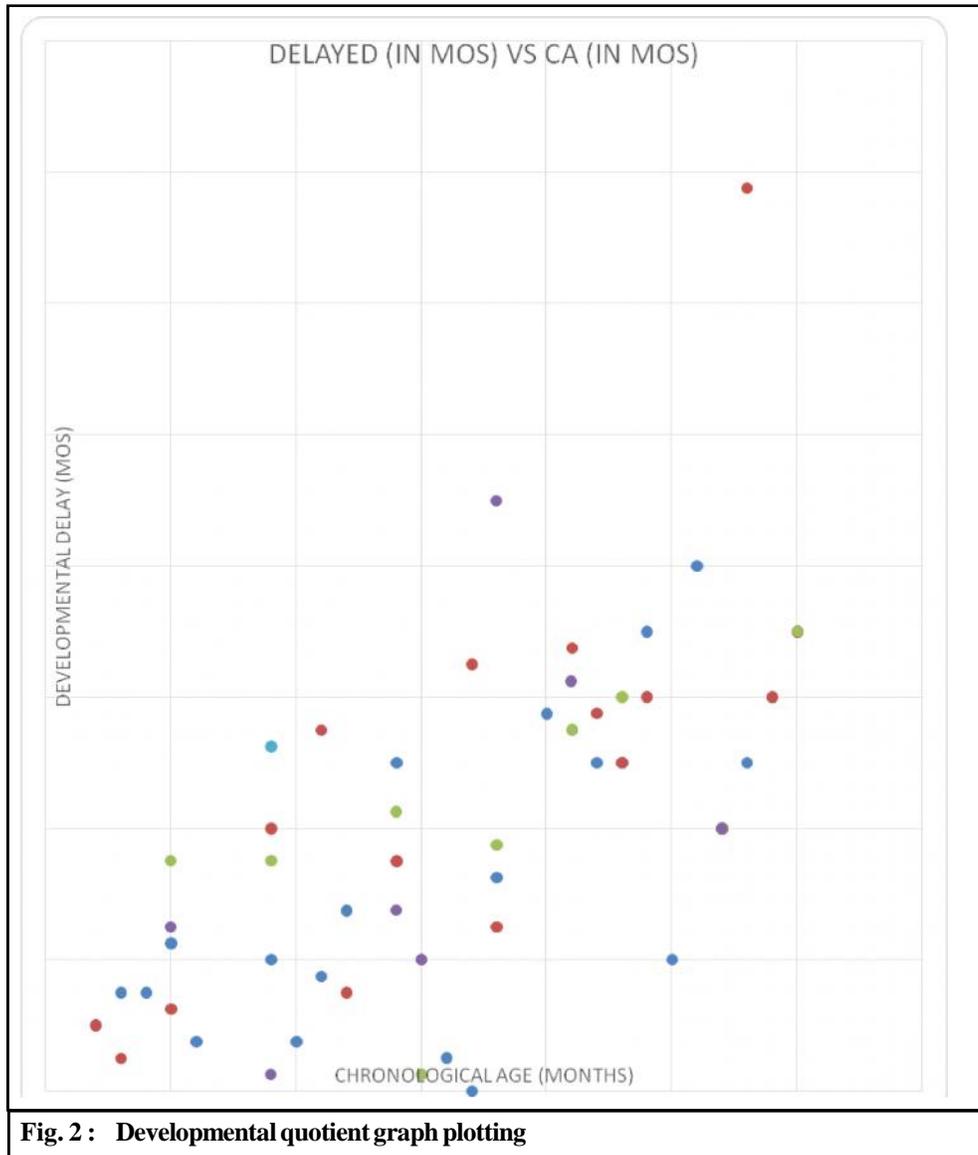
Fig. 2 :   Developmental quotient graph plotting

four most urgent modifiable risk factors that are encountered by young children in developing countries (the other three urgent risk factors identified were stunting, iodine deficiency and iron deficient anemia) (Walker *et al.,* 2007).

In our study only 54.2% infants were breastfed within one hour of birth and 73% children had started receiving complementary food after 6 months of age whereas in a study carried out by Katara *et al*. in urban slums of Vadodara showed that 75% of infants received breastfeeding within one hour of birth and 27% children had received complementary food after 6 months of age. It also showed that 87% children had received colustrum which is much higher in comparison to our study which revealed that only 58.3% children had received colustrum (Katara *et al.,* 2010).

Table 4 : Association between key IYCF practices and the status of development among subjects under study				
Sr. No.	Variable	Status of development		
		Normal	Average	Delayed	Chi square
1.	Initiation of breastfeeding				
	Same day	12	11	8	14.146***
	2-3rd day	4	4	13	
	After 3days	0	6	2	
2.	Prelacteals given				
	Yes	6	9	17	6.451**
	No	10	12	6	
3.	Colostrum feeding				
	Yes	9	10	13	.424 NS
	No	7	11	10	
4.	Exclusive breastfeeding				
	Yes	4	11	5	6.876**
	No	12	9	16	
	NA	0	1	2	
5.	Continued breastfeeding up to 2 years				
	Yes	9	4	5	9.048**
	No	2	1	2	
	NA	5	16	16	
6.	Initiation of complementary feeding after 6 months				
	Yes	11	15	12	
	No	5	3	5	6.242*
	NA	0	3	6	

In our study 56.9% children were given prelacteals after birth and only 31.9% children were exclusively breastfed in the first six months whereas a study by Khan *et al*. (2012) stated that 76.3% mothers discarded colustrum, 90% mothers had given prelacteal feeds like honey, cow's milk or jaggery water and 57% of the children had received exclusive breastfeeding (Khan *et al.,* 2012).

A cause and effect relationship has not been established between malnutrition and psychosocial development due to the fact that malnutrition and other deprivations always coexist in an environment of poverty. It is extremely difficult to disentangle individual environmental effects as measurable impact variables causing delay in mental development. The role of multiple influences that is of particular relevance to children at risk in both developed and less developed countries is school failure and drop-out rates (Vazir *et al.,* 1998).

A strong evidence exists that poor growth is associated with delayed mental development and that there is a relationship between impaired growth status and both poor school performance and reduced intellectual achievement (Shonkoff, 2003).

In our study, there was a significant relationship between status of development and wasting and stunting rates. These findings are in line with the study by Oberhelman *et al*.

Table 5 : Association between anthropometric indices and the status of development among subjects under study					
Sr. No.	Variable	Status of development			
		Normal	Average	Delayed	Chi square
1.	Weight for age (Underweight)				
	Mild	4	4	4	3.122 NS
	Moderate	6	5	9	
	Severe	2	6	3	
	Normal	4	6	7	
2.	Height for age (Stunting)				
	Mild	0	5	6	7.915*
	Moderate	4	8	7	
	Severe	2	2	1	
	Normal	10	6	9	
3.	Weight for height (Wasting)				
	Mild	4	2	4	6.257*
	Moderate	3	4	8	
	Severe	8	13	7	
	Normal	1	2	4	

(1998) which found that on the Denver II, suspect test, results in all four categories (language, social, gross motor, and fine motor) were associated with poor nutritional status (Oberhelman *et al.,* 1998).

Conclusion :

This study provides information relevant for determining courses of action to be taken at the microlevel to improve child health and development. Our analysis identified key basic factors that have been most related to poor overall development among children in their formative years and has shown a significant linkage between nutritional status, infant and young child feeding practices and developmental progress of children in disadvantaged settings.

Undernourished children regain their health by effective nutritional interventions but they continue to show poor cognitive or social development without the inclusion of early child development programmes.

The gap between knowledge and practices among the rural population should be filled with proper interaction and education. There is a need for improved counseling and training of the ICDS and health workers as well as strengthening outcome based supervision in order to strengthen the Government run schemes such as the Integrated Child Development Scheme (ICDS) in the rural setup. Thus, interventions that protect children against undernutrition and lack of cognitive or social stimulation, both of which lead to the loss of developmental potential early in life need to be promoted.

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