

ORIGINAL ARTICLE

Evaluation of Infant and young child feeding through a Trial for Improved Practices (TIPs) in rural VaranasiFahmina Anwar¹, Ratan. K. Srivastava², S.P.Singh³¹Senior Research Fellow, ²Professor ³Head & Professor, Department of Community Medicine, Institute of Medical sciences, Banaras Hindu University, Varanasi

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Abstract

Background: Intervention targeting exclusive breastfeeding and complementary feeding has the greatest impact on child survival. In view of these facts a formative research was conducted in rural Varanasi with **objectives**-To assess the status of IYCF practices prevailing in the experimental area and to demonstrate the effect of intervention among selected mothers for improved IYCF practices. **Methodology:** Follow up intervention study, on 2 types of cohort (0-6 and 7-36 months old mother & child pair) conducted for the period of November 2011-October 2012. Cohorts were followed for a period of 3 months, using a formative research methodology. A total of 293 mother & child pair were enrolled for intervention using appropriate sampling methodology. WHO Infant and Young Child Feeding (IYCF) and a child feeding index (CFI) were created. The latter consisted of five components: breastfeeding, use of bottle, dietary diversity, food frequency and meal frequency which were adjusted for three age groups: 7-24 and 25-36 months **Results:** There was inadequacy of optimal breastfeeding and sub optimal Practice regarding Complementary feeding. Measurement of anthropometric Indies indicates that 46.7% were stunted, 35.5% are wasted and 29.6% are underweight. Inferential analysis for Difference in exclusive breast feeding and complementary feeding Index during pre and post TIPs intervention phase indicated a significant ($p=0.001$) change in exclusive breast and complementary feeding. **Conclusion:** Study indicated, it is possible to change short-term child-feeding behaviours to promote exclusive breast feeding and complementary feeding using TIPs methodology. However, long-term sustainability of these changes requires further study, and the effect of increased feeding of complementary foods, intakes of breast milk and total daily consumption of energy & nutrients requires further research.

Key Words

Infant and young child feeding; exclusive breastfeeding; complementary feeding; formative research methodology

Introduction

Introduction Optimum nutrition and good feeding of infants and young children are among the most important determinants of their health, growth and development. The period from birth to two years of age "**critical window period**" is particularly important because of the rapid growth and brain development that occurs during this time, this period is often marked by growth faltering, micronutrient

deficiencies, and common childhood illnesses such as diarrhoea and pneumonia (1).

Child feeding practices are multidimensional they change rapidly within short age-intervals in the first years of life, and of all proven preventive health and nutrition interventions, Infant and Young Child Feeding (IYCF) has the single greatest potential impact on child survival (2). Therefore, reduction of child mortality can be reached only when nutrition in early childhood and IYCF specifically are highly

prioritized in national policies and strategies. Optimal IYCF, especially exclusive breastfeeding, is estimated to prevent potentially 1.4 million deaths every year among children under five (out of the approximately 10 million annual deaths) (3). According to the Nutrition Series, over one third of under-five mortality is caused by under nutrition, in which poor breastfeeding practices and inadequate complementary feeding play a major role.

Infant and Young Child Feeding (IYCF) is a set of well-known and common recommendations for appropriate feeding of new-born and young children defined by world health organization (WHO 2003) (4). It includes the following care practices: Early Initiation of Breastfeeding, Exclusive breastfeeding for the first 6 months, Complementary feeding i.e. complementing solid/semi-solid food with breast milk after child attains age of six months.

Despite the volume of evidence favoring mainstreaming of these interventions, many countries, including India are yet to achieve universal appropriate infant and young child feeding practices. Proper IYCF practice remains a problem in much of the developing world. With this background the present study was undertaken in rural area of Varanasi, Uttar Pradesh India, as this state accounts for a quarter of India's neonatal deaths and for 8% of those worldwide, and shares similar sociocultural, demographic, and health system characteristics with other high-mortality Indian states and south Asian countries(5). Socioeconomic indicators are low in this state. This study was undertaken with a Hypothesis: Trial for improved Practices as a behaviour change method may improve infant and young child feeding practices.

Aims & Objectives

1. To assess the status of infant and young child feeding practices prevailing in the experimental village.
2. To demonstrate the effect of intervention among selected mothers for improved infant and young child feeding practices.

Material and Methods

Methodology: The study was a community based follow up intervention study, on 2 types of cohort selected in rural district of Varanasi, which is situated in Uttar Pradesh. The cohort of mothers and child pair of 0 -6 and 7-36 months old children was followed for a period of 3 months, using a formative research methodology. Study was conducted for a

period of one year (November 2011- October 2012). Initial period of the study was devoted to extensive literature search and pilot study.

Sample size determination: Extensive literature search and a pilot study on 30 children (aged 0-24 months) conducted on non-study samples in rural Varanasi, demonstrated the prevalence (percentage) of Exclusive breast feeding at 26% and complementary feeding at 30%.

1. Sample size for estimation of Problem: To determine the sample size for understanding bottleneck and constraints, we have considered proportions of “Non Exclusive breast fed” children and “untimely initiated complementary feeding (6-8 months)”. In pilot study proportion of “Non Exclusive breast fed” Children was 80% and “not timely initiated complementary feeding (6-8 months)” was 70%. Hence based on these values the sample size was calculated using following formula:

$$N = \frac{Z^2 \cdot p \cdot q}{L^2}$$

Where, N= Sample size, z= 1.96, q= 100-p, L= relative permissible level of error in the estimated prevalence, taken as 10%. Thus, the required sample size Thus was calculated came out to be:

[A] For Exclusive breast fed: 95 [B]. For timely initiated Complementary Feeding (6-8 months): 162

2. Sample size for evaluation of intervention: Since it's a paired study Design (Pre and post) to evaluate change in Exclusive breastfeeding and complementary feeding, for every component we have considered 30% as practicing correct method. Therefore the differences between two phases (Pre & post) Practices, measured in proportion was considered. We have considered an improvement of 20% after intervention as of practical importance. The differences between two phases (Pre & post) was tested by McNemar and Paired t test which was based on discordant pair. It was calculated by formula

$$N = \frac{[Z_{\alpha} \sqrt{f} + Z_{\alpha} + Z_{\beta} \sqrt{f-d^2}]^2}{d^2}$$

Where f (discordant pair) is a unknown value, its highest value was be calculated by formula: {P1+P2 – 2P1*P2) – d 2}

P1= 30%, P2=50%, d= 0.2 (differences between P1&P2). It is one sided test Z α =1 .645 & Z β =0.84 (80% power). By putting the value the sample size came to be 68 for each cohort. Hence, A total enumeration of the two villages was done (total population 6778) in which 0—6 and 7 -36 months of

mother and child pair were 115 and 470 respectively. Consider a non-participatory rate of 20% in each age group, and to get required sample size (as mentioned above) of 95 and 162 in 0- 6 months and 7-36 months respectively, we had to contact 119 mother & child pair in 0-6 months and 203 mother & child pair in 7-36 months. In 0-6 months all mothers were contacted for the study and 99 gave consent to participate in the study so we enrolled all 99 mothers for the study as they fulfilled the required sample size. In 7-36 months, out of 203 mothers contacted, only 194 agreed to participate in the study which again fulfilled the required sample size. However during the analysis and presentation of data 7-36 months were further divided into two groups of 7-24 months and 25- 36 months (feeding guideline as per WHO are different for two groups). Therefore the eligible study subjects taken from two villages and were further categorized into 3 respective cohorts of

- 0-6 months infants = 99 children for practices of breast feeding.
- 7-24 months infants & children= 107 children. For practices of complementary feeding using CFI* (complementary feeding index).
- 25-36 months children = 87 children. For practices of complementary feeding using CFI.

Complementary feeding Index (CFI): consisted of five components: breastfeeding, use of bottle, dietary diversity, food frequency and meal frequency which were adjusted for two age groups: 7-24 and 25-36 months. The lowest score was 2 and highest possible score was 9, grouped into three terciles to of CF practices: low (score 1-3), medium (score 4-6), and high (score 7-9)(6).

A total of 293 mother & child pair were enrolled for study. Mother of twin children, children with special needs e.g. Down syndrome, autism, children requiring medical emergencies, mother who did not give consent and pregnant women were excluded from the study.

Implementation of Trial for improved Practices (TIPs): A baseline survey was conducted in the study area to identify mother and child pair of 0-36 months. They were interviewed to assess their knowledge, Perception and Practices regarding IYCF and subsequently were enrolled for TIPs study. Three home visits were conducted for selected mother and child pair in study area.

Visit One (Assessment visit): Interviews of mother and child pair was conducted using pretested semi-

structured questionnaire. During interview, anthropometric measurements of mother and child were recorded after taking informed consent.

Visit two (Negotiation visit): Age specific feeding practices which were Acceptable, Feasible, Affordable, Sustainable and Safe to mothers was communicated in TIPs communication and counselling guide. Home based reminder materials were prepared by analyzing the data from assessment visit. Mothers were asked to select and try new recommended practices over an arbitrary period of 4-5 weeks.

Visit three (Evaluation visit): At the end of the trial period, evaluation was carried out to know whether mothers could implement new practices or not and what were the motivating factors/barriers to implement.

Results

In a total of 293 mother and child pair enrolled for the study, half (50.5%) of the children were male. About half (49.8%) of the mothers were young (21-24 years) with maximum age being 38 years. Mean age of the mothers at first pregnancy was 20.12 + 2.57 years. Two third (65.5%) mothers had less than or equal to two children, where as 31.7% mothers had 3-4 children. Nearly one fourth (29.3%) father and 29.0% mother had no formal education. Overall mean family size was 8.18 + 4.27 and Socio economic status as per Uday Pareek classification indicated that majority of family (62.5 %) belonged to lower middle class. Most of deliveries (84.6%) were conducted at health facility (Institutional). [Table 1](#) presents rates of stunting, wasting and underweight in all studied children, nearly half (46.7%) were stunted, 35.5% were underweight where as 29.6% were wasted as per WHO child growth standard (2008).

There were no case of overweight and tallness (>2 SD) but there were 9 (8.4%) children who were >2 SD in Weight for height anthropometric Indices, since it comprised a small proportion it was therefore clubbed together with healthy children. There was no statistically significant difference between sex of children and various anthropometric indices.

Breastfeeding practices: Rate of exclusive breastfeeding (EBF) in the cohort of 0-6 months old children was 25.3% (mothers were practicing exclusive breastfeeding for their children till the date of interview with variable duration) though nearly half (53.5%) of mother had exclusively breastfed

their child in past 24 hour. Where as in cohort of 7-24 and 25-36 months old mothers and child pairs it was 22.4% and 23 % respectively.

Complementary feeding practices: complementary Feeding practices as per complementary feeding index (CFI) indicated that the overall mean CFI score of 107 mothers (7-24 months old children) and 87 mothers (25-36 months old children) was 5.28 +1.5 and 5.31+ 1.25 respectively. As seen in [Table 2](#), 66.3% and 75.8% of mothers in 7-24 months and 25-36 months old children had medium score CFI.

Improvement in EBF practices for past 24hour , after TIPs (Trial for improved practices) phase in mothers of (0-6 months) old children is shown in [Table-3](#) Rate of EBF for past 24 hour changed significantly after intervention trail ($p=0.001$). Mothers were more likely to practiced EBF after trail (76.0%) as compared to before trail (55.2%).

Inferential analysis for Difference in CFI practices after TIPs (Trail for improved practices) intervention phase in mothers (7-24 and 25-36 months) was done using t –test (paired variable). Table represents the same and shows that, there was significant difference ($p=0.001$) in CFI scores in pre and post TIPs intervention phase at 95% CI. Mean differences in CFI was 0.77 + 0.3 and 1.12 + 0.17 in cohorts of 7-24 and 25-36 months old mother & child pair respectively. Also attrition rate during the intervention period was 3.7 % in 7-24 months and 2.2% in 25-36 months cohort.

Discussion

Study has highlighted that there is inadequacy of optimal breastfeeding and paucity of knowledge regarding Complementary feeding, which is evident from Measurement of Anthropometric, which indicates that 46.7% are stunted, 35.5% are wasted and 29.6% are underweight, which is nearly similar to the National data (NHFS-3) for Uttar Pradesh study ([Figure-1](#)).

Exclusive Breastfeeding (EBF) up to 6 months of age is one of the primary aims of nutrition and public health programs across the world (WHO 2007). Although, breastfeeding (BF) is almost universal in India as 96% children are breast fed, the intended EBF is not a usual practice and the same was observed in this study. The NFHS -3 reported exclusive breastfeeding up to the age of six month among 46.3% ([Figure: 5.1](#)) which is almost double from the finding of this study , whereas DLHS 3 Varanasi district data shows rate of EBF as only 3% in

rural area. A cross sectional study conducted in Chiraigaon, by Alok kumar et.al (2011) (7) indicated a EBF rate of 21% which is almost similar to the finding in this study. 57.1%. According to DLHS 3, in 485 districts exclusive breastfeeding for the first six month is below 50%.This pattern of low rate of exclusive breastfeeding for the first six month is equally prevalent in both rural and urban India, including urban slums. Studies in India with historic recall noted that about one-fourth of study children received exclusive breastfeeding for six months (Roy S et.al 2009(8), Kumar D et.al 2006)(9) which is in line with present study. Explanations put forward for low rate of EBF in different studies indicate that beliefs among mothers that breast milk does not contain water, and breast milk alone is insufficient (Wamani H et.al 2005 (10), Dewey KG et.al 2003) (11). Similar finding was also pointed out in this study also during TIPs phase .Further analysis of age wise data also reveals that exclusive breastfeeding rapidly declines from first month to sixth month, and only about 27.6 % children continued it by six month, giving a real low figure of exclusive breastfeeding.

Globally, a couple of studies evaluated the role of CFI (complementary feeding index) as a summary measure to predict the nutritional status of children. This study indicated Mean CFI score towards medium category score (table). Khatoon T et al. have reported an overall, the mean CFI score for the study children as 6.4+1.8, which is higher than the present study though falls in medium range score ,same as in the present study.

During the intervention phase breast feeding and complementary feeding were studied and mothers were suggested for adoption of improved practices. Data from before and after intervention trial to evaluate the change in behavior for better practices indicated significant change ($p=0.001$) after intervention. Similar finding was also reported by Haider R et.al (2000) (13) in a trial conducted in Bangladesh. In a systematic review of literature conducted by Imdad et.al (2011)(14) identified all studies that evaluated the impact of breastfeeding promotional strategies on any breastfeeding and EBF rates at 4-6 weeks and at 6 months in developing and developed countries. There was an overall 137% increase, with a significant 6 times increase in EBF in developing countries, compared to 1.3 folds increase in developed country studies.

Inferential analysis for Difference in CFI practices after TIPs (Trial for improved practices) intervention

phase showed that there was significant difference ($p=0.001$) in CFI scores in pre and post phase (Table-4), Similar finding was also reported by Zhang et al. (2013) (15). Also Kimmons E et al. (2004) (16) in their study in rural Bangladesh in four separate short-term behavioral change trials concluded that it was possible to change short-term child-feeding behaviours to promote increased food intake, meal frequency, energy density, and micronutrient consumption. When context-specific infant feeding messages promoting the use of local foods are delivered directly to mothers through counseling as was done in this study, significant improvements in complementary feeding practices and dietary intake were possible.

Improving infant health in resource poor setting requires more than making appropriate food and health care available. Caregivers must also understand and follow recommended infant-feeding practices. Although general recommendations have been published on breastfeeding practices, infant nutrient needs, meal frequency, complementary food, and other care giving needs, these recommendations need to be adapted according to locally obtained empirical data on current feeding practices. The study revealed some non-optimal infant and young child feeding practices in this part of rural India, such as low rates of exclusive breastfeeding, early introduction of nutrient-poor gruels, and the scarcity of nutrient-dense foods such as animal products in the diet.

Conclusion

This study indicated that it is possible to change short-term child-feeding behaviours to promote exclusive breast feeding and enhances the practices related to infant and child feeding and “Trial for improved Practices as a behaviour change method improve infant and young child feeding practices”. Since child feeding is a dynamic process and changes rapidly with short period of time and each of these interventions lasted for only about three to four weeks, therefore the long-term sustainability of these changes requires further study. Moreover, the effect of increased feeding of complementary foods, intakes of breast milk and total daily consumption of energy and nutrients requires further research.

Recommendation

The behaviour-change trials reported herein were intended to assess the flexibility of feeding practices in rural Varanasi. The results will be useful in

planning longer-term trials to develop programmatic recommendations to resolve the previously identified shortfalls in infant and young child feeding practices.

Relevance of the study

This study indicated that providing clear and motivating information about the benefits of modifying feeding behaviors can be sufficient for facilitating adoption of improved practices. It is possible to change short-term child-feeding behaviours to promote optimal infant and young child feeding Practices.

Authors Contribution

RKS & FA conceived and designed the study; FA conducted the interviews and data collection; SPS analyzed the data and drafted the manuscript; RKS revised the manuscript. All authors read and approved the final manuscript.

References

1. WHO/UNICEF. Complementary feeding of young children in developing countries: a review of current scientific knowledge. Geneva: World Health Organization, WHO/NUT/98.1, 1998.
2. PAHO/WHO Guiding principles for complementary feeding of the breastfed child. Washington DC: PAHO, WHO; 2003.
3. Naylor, A.J., Morrow, A.L. (2001). Developmental readiness of normal full term infants to progress from exclusive breastfeeding to the introduction of complementary foods. Washington DC: LINKAGES/ Wellstart International.
4. Dewey KG. Nutrition, growth and complementary feeding of the breastfed infant. *Ped Clin N Amer* 2001;48:87-104.
5. Kumar V, Mohanty S, Kumar A, Misra RP, Santosham M, Awasthi S, Baqui AH, Singh P, Singh V, Ahuja RC, Singh JV, Malik GK, Ahmed S, Black RE, Bhandari M, Darmstadt GL; Saksham Study Group. Effect of community-based behavior change management on neonatal mortality in Shivgarh, Uttar Pradesh, India: a cluster-randomized controlled trial. *Lancet*. 2008 Sep 27;372(9644):1151-62.
6. Arimond M, Ruel MT. Progress in developing an infant and child feeding index: an example using the Ethiopia demographic and health survey 2000. Washington, DC: International Food Policy Research Institute, 2002. 53 p. (FCND discussion paper no.143).
7. Alok Kumar, Preeti Verma, VS Singh, Sangeeta Kansal. Breastfeeding practices in rural eastern Uttar Pradesh: a descriptive cross-sectional study. *Indian J. Prev. Soc. Med.* Vol. 42 No.2, 2011
8. Roy S, Dasgupta A, Pal B. Feeding practices of children in an urban slum of Kolkata. *Indian J Community Med.* 2009;34:362-3.
9. Kumar D, Goel N, Mittal PC, Misra P. 2006. Influence of infant-feeding practices on nutritional status of under-five children. *Indian J. Pediatr.* Vol. 73. pp.417- 421.
10. Wamani H, Astrom AN, Peterson S, Tylleskar T, Tumwine JK. Infant and young child feeding in western Uganda:

knowledge, practices and socio-economic correlates. J Trop Pediatr.2005; 51:356–61.

11. Dewey KG. Nutrition, growth and complementary feeding of the breastfed infant. Ped Clin N Amer 2001; 48:87-104.
12. Khatoon t, Abid hossain mollah, ahmed murtaza choudhury,M. Munirul islam, and kazi mizanur rahman. Association between infant- and child-feeding index and nutritional status: results from across-sectional study among children attending an urban hospital in Bangladesh. J health popul nutr 2011 aug; 29(4):349-356.
13. Haider R., Ashworth A., Kabir I. & Huttley S.R.A. (2000) Effect of community-based peer counsellors on exclusive breastfeeding practices in Dhaka, Bangladesh: a cluster randomized controlled trial. Lancet 356, 1643–1647.
14. Imdad A; Yakoob MY; Bhutta ZA. Effect of breastfeeding promotion interventions on breastfeeding rates, with special focus on developing countries. BMC Public Health. 2011 Apr 13;11 Suppl 3:S24.
15. Zhang, Jingxu, et al. "An infant and child feeding index is associated with child nutritional status in rural China." Early human development 85.4 (2009): 247-252.
16. Kimmons JE, Dewey KG, Haque E, et al. Behavior-change trials to assess the feasibility of improving complementary feeding practices and micronutrient intake of infants in rural Bangladesh. Food Nutr Bull 2004 Sep; 25(3):228-38

Tables

TABLE 1 PREVALENCE OF UNDER NUTRITION AS PER VARIOUS ANTHROPOMETRIC INDICES

Age group (months)	Weight for age		Height for age		Weight for height	
	Underweight*	healthy**	Stunted*	Healthy**	Wasted*	healthy**
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
0-6 months (n=99)	34 (34.3)	65 (65.6)	27 (27.3)	72 (72.8)	36 (36.4)	63 (63.6)
7-24 months (n=107)	37 (34.5)	70 (65.4)	54 (50.4)	53 (49.5)	34 (31.7)	73 (68.2)
25 -36 months (n=87)	33 (37.9)	54 (62)	56 (64.4)	31 (35.6)	17 (19.5)	70 (80.5)
Total (N =293)	104 (35.5)	189 (64.5)	137 (46.7)	156 (53.2)	87 (29.6)	206 (70.3)

* < - 2SD underweight, stunted, wasted as per WHO child growth standard (2008).

** Others and those who were >+ 2 SD within normal range, over weight and tallness as per WHO child growth standard (2008).

TABLE 2 DISTRIBUTION OF MOTHERS ACCORDING CFI SCORE CATEGORIES.

Categories on the basis of CFI score	Children of different Age group (months)					
	7-24 months			25-36 months		
	Mothers No	(%)	Mean CFI score + SD	Mothers No	(%)	Mean CFI score + SD
Low (0-3)	11	10.2	2.18 +0.40	8	9.3	2.9+ 0.31
Medium (4-6)	71	66.3	5.04 + 0.80	66	75.8	5.3+ 0.64
High (7-9)	25	23.3	7.32 + 0.50	13	14.9	7.36 + 0.50
Total (0 –9)	107	100	5.28 +1.5	87	100	5.31+ 1.25

TABLE 3 CHANGES IN EXCLUSIVE BREAST FEEDING PRACTICES AFTER TIPS (TRIAL FOR IMPROVED PRACTICES) PHASE IN MOTHERS (0-6 MONTHS).

Pre TIPs phase	Exclusive breast feeding practiced during past 24 hrs				MacNemar test for significances P=0.001
	Post tips phase				
	Practiced		Non practiced		
	No.	(%)	No.	(%)	No. (%)
Practiced	53	(72.6)	0	(0)	53 (55.2)
Not practiced	20	(27.4)	23	(100)	43 (44.8)
Total	73	(100.00)	23	(100)	96 (100)

TABLE 4 IMPROVEMENT IN COMPLEMENTARY FEEDING INDEX (CFI) PRACTICES AFTER TRAIL FOR IMPROVED PRACTICES INTERVENTION AMONG MOTHERS OF 7-24 AND 25-36 MONTHS OF AGE.

TIPs intervention Phase	Time Period	Mean CFI + SD	Differences Mean CFI	Test for significances
Pre TIPs Phase (N=103) Vs Post TIPs phase (N=103)	2-3 weeks	5.26 + 1.5 6.03 + 1.2	0.77 + 0.3	t = - 8.55 p=0.001
Pre TIPs Phase (N=85) Vs Post TIPs phase (N=85)	2-3 weeks	5.29 + 1.2 6.41 + 1.03	1.12 + 0.17	t =.9.910 P=0.001

Figures

FIGURE 1 COMPARISON OF THE PREVALENCE OF UNDER NUTRITION AS PER VARIOUS ANTHROPOMETRIC INDICES IN THE STUDY SUBJECT AND NATIONAL DATA (NHFS-3) FOR UTTAR PRADESH.

