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Original Research Article

Exposure to early childhood development interventions and its association with responsive feeding and nutritional status of 6 to 35 months old children

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ABSTRACT

Background: The objective of the study was to study the association between exposure to early childhood development (ECD) interventions and responsive feeding and nutritional status among 6-35 months' children.
Methods: The present analytical cross-sectional study was conducted with 360 children from a primary health centre (PHC) area under the ECD project and 360 children from comparison PHC area. The anthropometric measurement and responsive feeding was assessed and compared among 6-35 months' children.
Results: There was significant difference in mean scores of ECD activity ($p=0.001$) and responsive feeding ($p<0.001$) in ECD area as to comparison area. In the ECD program area, the proportion of children who were malnourished (33.3%) were less as compared to control area (53.9%).
Conclusions: The present study shows ECD interventions at community level delivered through frontline workers resulted in improved responsive feeding practices better nutritional outcomes for children.

Keywords: Early childhood development, Responsive feeding, Malnutrition

INTRODUCTION

Child growth is multidimensional phenomenon and these dimensions are interdependent which includes social, emotional, cognitive and motor performance. Child growth may be defined as "a change in size," whereas development may be seen as "Change in complexity and function".[1]

Under nutrition is an important factor contributing to the death of young children. Recent evidences show that malnutrition is one of the major public health problems throughout the developing world and underlying cause for 60% of all the deaths among children under five years every year.[2] Over two-thirds of these deaths are associated with inappropriate feeding practices primarily during the first year of life.[2]

WHO joined with UNICEF to define 12 family care behaviours that were necessary for child survival, one of which was active feeding. Active feeding was subsequently broadened to responsive feeding.[3] Various studies recognised responsive feeding for its role in nutrient intake, growth and also in child development. According to the studies responsive feeding is defined as feeding young infants requires active care and stimulation, where the caregiver is responsive to the child clues for hunger and also encourages the child to eat.[4] In systematic review, Imdad et al demonstrated improvement in weight and linear growth of interventions

providing either responsive feeding or nutritional counseling.[5]

Evidence also shows that nutrition interventions and early childhood care and Development (ECCD) program have positive impacts on the physical growth and cognitive, motor, and behavioral development of young children.[6]

In India, problem of malnutrition is very big. India's main early child development intervention, the integrated child development service scheme, has not yet succeeded in making significant dent in child malnutrition. This is mostly due to priority the program has placed on food supplementation rather than on nutrition and health education and early childhood development interventions. A necessary further step is required to further develop and test a model that combines nutrition and psychosocial interventions.

Looking at the huge opportunities for early childhood development available through ICDS scheme and health sector, Project has been launched with the objective to develop, pilot and scale up an intervention to improve early development and care with focus on children 0-3 years at the Department of Community Medicine along with funding agency. The project was initiated with the broad objective to test the feasibility and effectiveness of 'Care for Child Development' Package delivered utilizing the current opportunities available in India through ICDS, health sector and other service delivery channels.

This intervention was delivered through ASHA and Anganwadi worker at home and community level. Preliminary analysis of the study conducted within this project shows that the interventions aimed for improving the early childhood development activities through community workers appeared to be beneficial for the quality of mother-child interaction and it had a positive impact on child's physical growth also suggesting effective implementation of 'adapted version of 'care for child development package for India' through ICDS and health sector offer vital opportunities to address the problems of malnutrition and promote physical growth of children.

With this background in mind, it has been observed that there have been only a few studies in the past which have studied effect of early childhood development on nutritional status and responsive feeding. Hence conducted this study to assess the effects of early childhood development interventions on the family practices of improvement in responsive feeding and nutritional status among 6 months-35 months old children with early childhood interventions.

METHODS

It was an analytical cross-sectional observational study utilizing the setting of community-based ECD intervention delivered under a WHO-INTERVIDA collaborative project which was carried out from August 2014 to July 2015. The study was carried in the two PHC areas of the district, one PHC was from the intervention area from setting of the ECD project, and another PHC from the same District where interventions of ECD project were not implemented was selected as the control PHC. Both the PHCs were selected considering the feasibility of carrying out this research work. There were 24 villages in the intervention PHC area and 25 villages in the control PHC area. Two villages were excluded from the control area because they come under suburban population. The population of intervention PHC was 34,986 and the population of control PHC was 42,863. Study subjects were children of age group 6 months to 35 months. Sample size was calculated for a difference in 20% in the proportion of mothers practicing responsive feeding with confidence of 95% and power of 80%. With this a sample size of 107 is required. With aim to have adequate sample size separately for age-group 6-11 months, 12-23 months and 24-35 months, it was decided to take 120 children in three age-groups from the PHC with (ECD) early childhood development intervention in place and same number of children from the PHC with no ECD intervention in place. Therefore a total of 360 children (in three groups) in the intervention and control area each was recruited in the study i.e. total of 720 children in both group. List of all children in the age-group 6 – 35 months was procured from Anganwadi center (AWC). Separate lists were created for the three age-groups for the two PHC areas.. The required sample size of children i.e. 120 children each in the three age-groups of 6-11 months, 12-23 months and 24-35 months - was selected using simple random sampling method from both the intervention PHC, where ECD intervention is going on and from control PHC where the ECD interventions were not being implemented. The study was initiated after taken approval from the Institutional Ethics Committee. Written Informed consent was obtained from the mothers/primary care given before enrolment in this study. Confidentiality of information was maintained.

Intervention

Early childhood development project was going on in the Department of Community Medicine. The interventions were implemented through accredited social health activist (ASHA) and anganwadi workers (AWW) at village and community level. Training was conducted and toys kit was given to each worker for the demonstration of play activities to the mothers. A Marathi version of care for child development package was given to them in form of counselling cards.

The interventions were as follows:

Home visits by ASHA workers

ASHA during their monthly home visits meet the primary caregiver and try to assess the primary caregiver's interaction with the child. Mothers were encouraged to

talk, to kiss, to copy the activities, to use home-made toys to play with their children in their daily routine. Mothers were encouraged to praise their child and were discouraged to use bad words, scolding and giving physical punishment to their child. They were also encouraged how to feed their child while talking, playing with the child. They also counsel fathers and other family members to provide quality time to their children and to support the primary caregiver.

Mother's group meeting

Mother's groups were formed in every village. Meeting of the mother's group were conducted at the AWCs where AWWs acted as a facilitator and supported by ASHA. Facilitators provide information on age appropriate play, communication activities and feeding style. Facilitators demonstrated and facilitated the play interaction between child and caregiver

Parenting workshop

Parenting workshop aims to empower future/ new parents with appropriate knowledge and skills related to care for child development, to improve understanding between the mother and father on the issues related to care for child development and to provide a platform in the village where issues related to child care and development may be freely discussed.

Women's self-help group meeting

SHG provided a mechanism to reach elderly women and those who are respected in the village. Thus, it is expected that this mechanism would help change the social norms at village level.

Data collection technique

For each study subject, the mother was interviewed using a pre-designed pre tested questionnaire. The information regarding socio-demographic characteristics of the child and frequency of play activities by mother regarding care of the baby was collected. Information was also collected about the age appropriate ECD activities done by the mother. Nutritional status was assessed with the help of anthropometric measurements using the newly developed WHO growth standards. Information on age was obtained from a written birth record maintained at Anganwadi center/ Gram Panchayat. If information was not available, then verbal information on date of birth was collected from Primary caregiver. If birth date was not known with certainty, then caregiver was asked about appropriate date of birth according to local calendar-related event. Age was calculated in months. For responsive feeding assessment a tool used in Bangladesh by Frances et al was adapted.[8] The current tool includes information on who fed the child, child eats meal alone or together with someone, hand washing before the meal, talking to the child while feeding, refusal to eat, forced feeding, self-feeding and adult feeding.

Primary caregiver's attitude was measured in terms of ECD activity score. There were a set of questions for three types of ECD activity viz practices for expressing love and affection, practices for promotion of child learning through play and practices for promotion of child learning through communication. Scoring was done for Responsive feeding and ECD activity. According to these scores caregivers were divided into responsive and non-responsive caregivers.

Data entry and analysis

The data was entered using EPI-INFO program. Analysis was done using EPI-INFO version 7.1.3.10. Initially frequencies of all variables were taken to check the completeness of data. Chi square test was used to identify the difference between socio-demographic characteristics of two areas.

Scoring was done for ECD activity and responsive feeding.

Indices (weight for height, weight for age, height for age, BMI for age) of physical growth that describe the nutritional status of child were calculated.

WHO-ANTHRO software was used to calculate the Z score for weight for age, weight for height, height for age and BMI for age. Mean Z score were calculated WHZ, WAZ, HAZ and BMI for age and was analyzed by t test.

WHO global database format (Excel) in WHO-ANTHRO software was used to calculate the proportion of children with underweight, wasting, stunting, BMI for age <-2 SD (both moderate and severe) in both the areas.

RESULTS

The socio- demographic characteristics were comparable in ECD program and comparison area (Table 1). The primary caregiver was mother in all cases in both groups and there was no significant difference between the education level of mother and work nature of mother. Table 2 shows the ECD activity score in intervention and control arm. It was found the proportion of cases with higher ECD score is more in intervention area compared to control area in all three age groups.

Table 2 shows mean scores of ECD activity in intervention and control arm. It was found that mean ECD activity score is more in intervention area in all age groups compared to control area and found to be statistically significant ($p<0.001$).

Table 3 shows proportion of responsive feeding by mothers in intervention and control area which was found to be higher in intervention area compared to control area in all three age groups.

Table 1: Socio-demographic profile of study subjects in intervention and control area.

Characteristics		Intervention area n=360		Control area n=360		P value
		Number	%	Number	%	
Relationship of primary caregiver with the child	Mother	360	100	358	99.44	
	Grandmother	0	0	1	0.28	
	Other family member	0	0	1	0.28	
Type of ration card available in the family	APL	222	61.67	235	65.28	
	BPL	79	21.94	82	22.78	
	Antodayi	9	2.5	6	1.67	0.40
	Ration card not available	50	13.89	37	10.28	
Education	Illiterate/primary	30	8.33	15	4.16	
	High school	71	19.72	55	15.24	
	SSC	135	37.5	152	42.11	
	HSC	96	26.67	99	27.42	
	Under graduate	24	6.67	32	8.86	0.06
	graduate	3	0.83	7	2.2	
	Post graduate	1	0.28	0	0	
Work outside home	Working	37	10.28	40	11.11	
	Non-working	323	89.72	320	88.89	0.14

Table 2: Early child development activity score in intervention and control area and mean of scores of early child development activity in intervention and control area.

Characteristics		Intervention area (n=360)	Control area (n=360)	Intervention area Mean±SD	Control area Mean±SD	P value*
Age group	ECD activity score					
6-11 months (n=120)	Less than 10	15 (11.76)	71 (59.1)	12.05±1.58	9.25±2.18	0.0005
	10-14	105 (88.24)	49 (40.83)			
12-23 months (n=120)	Less than 10	23 (19.17)	72 (60)	12.04±1.77	8.46±2.4	0.001
	10-14	97 (80.83)	48 (40)			
24-35 months (n=120)	Less than 10	30 (25)	76 (63.33)	11.55±1.78	8.46±2.4	0.001
	10-14	90 (70)	44 (36.67)			

(Figures in parentheses denote percentage) (*P value was calculated for change in Z scores in intervention and control area).

Table 3: Proportion of responsive feeding in intervention and control area mean of responsive feeding score in intervention and control area.

Characteristics		Intervention area number of mother (%)	Control area Number of mothers (%)	Intervention area Mean±SD	Control area Mean±SD	P value
Age group	Responsive feeding					
6-11 months	Responsive	62 (51.67)	45 (37.5)	19.3±3.19	17.44±4.07	
	Non responsive	58 (48.33)	75 (62.5)			
12-23 months	Responsive	74 (61.67)	55 (45.83)	20.7±3.86	18.8±3.5	(<0.001)
	Non-responsive	46 (38.33)	65 (54.17)			
24-35 months	Responsive	93 (77.5)	65 (54.17)	21.85±2.76	17.29±3.76	
	Non-responsive	27 (22.5)	55 (45.83)			

(Figures in parentheses denote percentage) (*P value was calculated for change in Z scores in intervention and control area).

Table 3 shows mean responsive feeding score in intervention and control area. Mean responsive feeding score more in intervention area than control area and was found to be statistically significant (p<0.001).

WHZ, HAZ, WAZ and BAZ in intervention area as compared control was found to be statistically significant (p<0.05) (Table 4).

Table 4: Nutritional status between intervention and control area.

Indicators of nutritional status	Intervention area Mean±SD	Control area Mean ± SD	P value*
Weight for height Z score (WHZ)	-0.82±1.31	-1.16±1.22	0.001
Height for age Z score (HAZ)	-1.40±1.5	-1.69±1.38	0.002
Weight for age Z score(WAZ)	-1.34±1.11	-1.75±1.04	0.001
BMI for age Z score (BAZ)	-0.67±1.41	-0.99±1.31	0.005

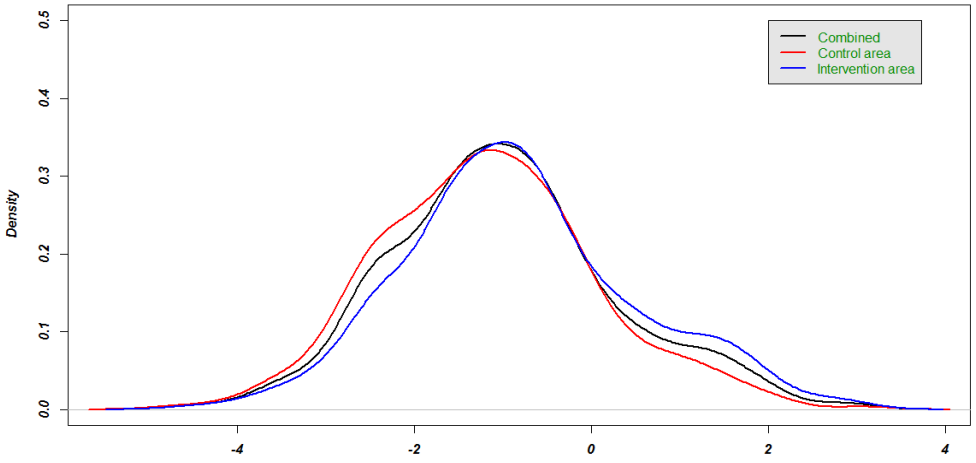

Figure 1: Distribution of weight for height Z scores in intervention and control area.

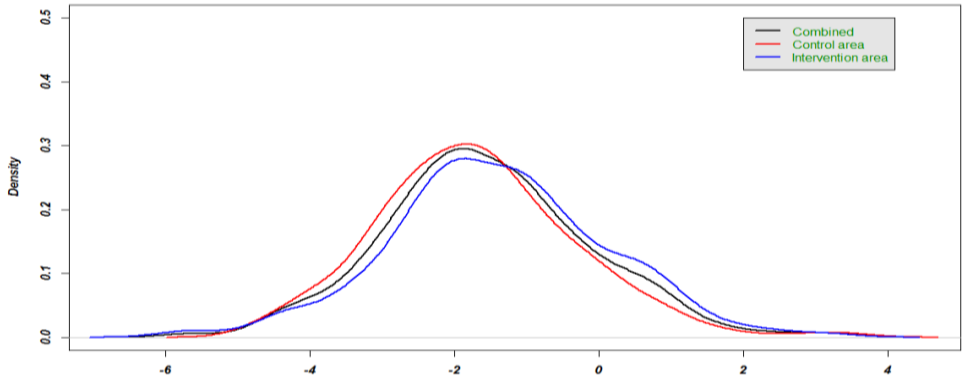

Figure 2: Distribution of height for age Z scores in intervention and control area.

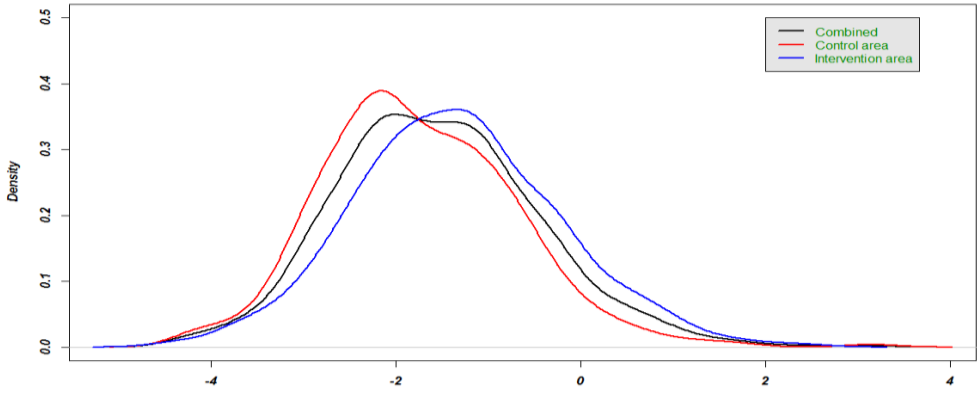

Figure 3: Distribution of weight for age Z scores in intervention and control area.

Table 5: Underweight, wasting, stunting and BMI for age in intervention and control area and proportion of malnourished children in intervention and control area.

Characteristics						
	(<- 3SD)	(>-3SD) – (-2SD)	(>-2SD)	Malnourished	Normal	P value
Weight for height						
Intervention area	12 (3.3)	59 (16.4)	289 (80.3)	71 (19.7)	289 (80.3)	0.001
Control area	17 (4.7)	89 (24.8)	254 (70.5)	106 (29.5)	254 (70.5)	
Height for age						
Intervention area	50 (13.8)	124 (34.6)	186 (51.6)	174 (48.4)	186 (51.6)	0.001
Control area	58 (16)	156 (43.3)	146 (40.7)	214 (59.3)	146 (40.7)	
Weight for age						
Intervention area	23 (6.4)	97 (26.9)	240 (66.7)	120 (33.3)	240 (66.7)	<0.0001
Control area	32 (8.9)	162 (45)	166 (46.1)	194 (53.9)	166 (46.1)	
BMI for Age						
Intervention area	11 (3.3)	58 (16.1)	291 (80.6)	69 (19.4)	291 (80.6)	0.004
Control area	13 (3.6)	86 (23.8)	261 (72.6)	99 (27.4)	261 (72.6)	

(Figures in parentheses denote percentage).

Figure 1, 2 and 3 shows the distribution of Z scores for weight for height, Height for age, Weight for age respectively. Shift of the curve towards right was observed in the intervention area.

In study area, proportion of children with severe wasting, stunting and BMI for age <-3SD were less compared to control area. This difference in intervention and control area for Weight for Height, Weight for age, Height for age and BMI for age was found to be statistically significant (p<0.001) (Table 5).

DISCUSSION

Survival, growth and development in the earliest years of life are fundamental for the future of every individual and future of societies into which those individuals were born.[9] A remarkable degree of consensus is emerging on the essential requirements that positively influence a child's growth and development as well as on the ways that parents and others can provide our youngest children with healthy start.[10] Strengthening and expanding existing strategies, and identifying and testing creative new approaches can help ensure that all children have access to the essential requirements for healthy growth and development.

The present study assessed the effect of ECD interventions on child feeding practices including responsive feeding and nutrition status of children. The socio-demographic characteristics of the children in the study were compared in intervention and control area at baseline which was comparable (Table 1). There was significant increase in early child development activity scores in intervention area as compared to control area (Table 2). There was significant difference in the mean scores of ECD activity in all age groups (p<0.001) (Table 2). It suggests that the intervention made the mother more responsive towards child care. The finding was supported by other studies.[11-17] Cooper et al in his study "Impact of a mother-infant intervention in an indigent peri-urban South African study" found that six months of home visits by trained non- professionals to encourage responsiveness increased the maternal sensitivity by three times.[11] Super et al in his study found that three years of home visits for psychosocial stimulation increased responsiveness of mothers.[13]

In the present study it was observed that there was significant increase in responsive feeding score in intervention area as compared to control area (Table 3). There was significant difference in the mean scores of responsive feeding in all age groups (p<0.001) (Table 4). It suggests that the intervention made the mother more responsive towards child feeding. The finding was supported by other studies.[7,12,18-21] Dettwyler in 1980 developed a rudimentary maternal scale and reported that children of attentive mothers had better growth than children of inattentive mothers suggesting that caregiver's practices are related to child's growth.[22] Bhandari, Mazumder et al in their study found that at 9 months, 34.8% mothers in the intervention group reported that they actively encouraged their child to eat more compared with 7.7% in control group (p< 0.0001).[7]

In the present study it was observed that there was statistically significant difference (p<0.05) in mean of Z scores for weight for height, weight for age, height for age and BMI for age (Table 4). These findings were supported by the findings from other studies.[11,23] Differences were observed between two groups at 6 months in terms of infant physical development in the study by Cooper et al.[11] The infants in the intervention group were significantly heavier (p=0.001), and their weights were less variable than those of comparison group infants. Height also differed significantly between two groups (p=0.02), with infants in intervention group being taller than those in comparison group and this was not found in our study.

In the present study, the proportion of children who had severe wasting, stunting and underweight were less in intervention area as compared to control area (Table 5). This difference in intervention and control area for Weight for Height, Weight for age, Height for age and BMI for age was found to be statistically significant (p <0.001) (Table 5). Ruel et al observed that there is strong association between care practices and child nutritional status.[24] The prevalence of stunting and underweight was significantly smaller among children whose mothers scored in the highest tercile of care practices.

There are several limitations of the present study, first is we do not have a baseline survey to assess the ECD care, Responsive feeding as well as nutritional status of children. It is based on the assumption that the intervention and control area had similar characteristics to begin with, which may not be true. Second limitation is that the ECD scores and responsive feeding scores are as reported by the primary caregiver. It is well-known that parents may not report their behaviour correctly. Inaccurate self-reporting can be caused by recall bias, social desirability bias and errors in self-observation. Most important disadvantage of primary caregiver reported questionnaire is reference bias due to differing standards of comparison.

Irrespective of these limitations, the findings of the study are promising. The findings of the present study, supported by the findings of the other studies, suggest that the ECD interventions can help in improving the nutritional status of children in a community, especially wasting.[11,12,23]

CONCLUSION

The present study shows that the interventions aimed for improving the ECD activities through community workers appeared to be beneficial for the quality of mother child interaction and it had positive effect on child's growth and responsive feeding.

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