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Effect of nutrition education intervention on undernutrition among under five children in urban and rural areas of Bhopal district, Madhya Pradesh

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ABSTRACT

Background: Nutrition education is defined as instruction or training intended to lead to acquired nutrition-related knowledge and/or nutrition-related skills and be provided in individual. It is also demonstrably capable of improving dietary behaviour and nutrition status on its own.

Methods: A prospective observational study was conducted in the urban and rural ICDS projects of Bhopal district, Madhya Pradesh from July 2014 to June 2015. Three types of instruments were used: NIPCCD Suposhan Guide, a structured questionnaire and anthropometric measurements including weight, height and MUAC. Data was entered into Microsoft Excel and was analyzed by using EPI Info version 7.

Results: As per Z score 7.9% children had normal weight (Z score above -1SD), 31.7% had mild underweight (Z score between -1SD to -2SD), 40.7% had moderate underweight (Z score between -2SD to -3SD) and 19.6% had severe underweight (Z score below -3SD). Reduction in moderate underweight was from 39.2% to 33.9% and in severe underweight it was from 19.3% to 15.2% in urban area. In the rural area reduction in moderate underweight was from 44.1% to 36.6% and in the severe underweight group it was from 20.4% to 9.7%.

Conclusions: In our nutrition education intervention we found that a well planned, short, simple, focused and based on locally available food items delivered with little empathy can do a lot even in weaker sections of the society.

Keywords: Nutrition education, Breast-feeding, Dietary intake, Undernutrition, Children under 5 year

INTRODUCTION

Nutrition education is defined as instruction or training intended to lead to acquired nutrition-related knowledge and/or nutrition-related skills and be provided in individual. In order to be well-nourished, individuals need access to sufficient, safe and good quality food. But focussing solely on food security is unlikely to solve global malnutrition: improvements in food production alone do not necessarily translate to improvements in nutritional status. People need to know what constitutes a healthy diet and how to make good food choices.

Nutrition education is also coming into the limelight. It is now acknowledged as an essential catalyst for nutrition impact in food security, community nutrition and health interventions. It is also demonstrably capable of improving dietary behaviour and nutrition status on its own. Moreover it has long-term effects on the independent actions of parents and through them on the health of their children. At the same time it is low-cost, practicable and sustainable.²

Scarcity of suitable foods, lack of purchasing power of the family as well as traditional beliefs and taboos about

what the baby should eat, often lead to an insufficient balanced diet, resulting in malnutrition.³ Undernutrition is a global public health problem considered to be a principal cause of ill-health and premature morbidities.⁴ Undernutrition continues to be a global burden as reflected in World health Statistics 2016 which revealed that wasting affected 50 million children under 5 years of age (around 7%) globally in 2015 and the highest prevalence of wasting was observed in the WHO South-East Asia Region (13.5%, or 24 million children). Major portion of this burden belongs to India as reflected in National Family health survey-IV (2015-16) report which shows that 38.4% children under 5 years of age are stunted, 21% are wasted, 7.5% are severely wasted and 35.7% are under weight.⁶ Within India Madhya Pradesh has the worst case scenario as 42% children under 5 years of age are stunted, 25.8% are wasted, 9.2% are severely wasted and 42.8% are under weight as shown in the NFHS-4 report for Madhya Pradesh.

Prolonged early childhood nutritional deficiencies lead to inadequate growth, which in turn impairs brain development, creates academic difficulties and can lead to a lifetime of diminished earning capacity and an elevated risk of non-communicable diseases. Longitudinal studies indicate that if nutritional deficiencies are not treated by 2 years of age, the intellectual, health and human capital consequences are likely to be irreversible.⁸

A lack of food is not the sole cause of malnutrition. Lack of awareness and knowledge about feeding amount, frequency, type of food, *etc.*, contributes significantly to poor nutritional status among children even in families where adults meet their daily requirements. Interventions have shown that it is possible to improve infant growth and feeding practices through action-oriented messages.⁹

Nutrition education is such an intervention that provides people with the knowledge, skills and motivation to make wise dietary and lifestyle choices, building thus a strong basis for a healthy and active life. Whether food supplies are scarce or abundant, it is essential that people know how best to use their resources to access a variety of safe and good quality foods; to ensure nutritional wellbeing. To be food secure and adequately nourished, households need sufficient resources to produce and/or purchase adequate food. In addition, they need the understanding of what constitutes an appropriate diet for health, as well as the skills and motivation to make sound choices on family care and feeding practices.

Food and nutrition education thus play a vital role in promoting food security, as it is especially important for poor households to make optimal use of local foods and practice healthy eating patterns. ¹⁰

Probably the most comprehensive Indian studies of infant-focused nutrition education interventions have been conducted by Bhandari and colleagues. The findings

from these studies suggest that nutrition education messages can result in a longer duration of exclusive breastfeeding, decreased diarrheal morbidity, and increased energy intake. 11

Limited evidence exist that nutrition education and counselling delivered by trained community-based volunteers or health workers can significantly improve CF practices adopted by the mothers and growth of their infants in different settings.

In India, very few studies demonstrate the effectiveness of educational interventions delivered either through trained community health workers or through health workers from the existing government system on improved CF practices and growth of infant. Present Study was conducted to find out the effectiveness of a properly planned and executed nutrition education intervention on under nutrition among under five children in urban and rural areas of Bhopal district, Madhya Pradesh.

METHODS

A prospective observational study was conducted in the urban and rural ICDS projects of Bhopal district, Madhya Pradesh. The duration of the study was twelve months from July 2014 to June 2015. The target population in the urban setting was the under-five children population attending anganwadi centres while in the rural setting it was the under-five children population attending anganwadi centres of rural ICDS block of Bhopal district. Sampling frame consisted of all under-five children attending anganwadis in the above mentioned areas. Sampling unit was an under-five child.

Sampling method and sample size

The minimum estimated sample size was calculated as 296, using the standard formula $(n=z^2pq/d^2)$ where P is the prevalence of undernutrition and q is the complement of p. Considering the prevalence of stunting among under-five children as 26% as per NIN study (2010) and assuming an alpha error of 0.05 and relative precision of 5% (d=relative precision). To obtain the desired sample size, two ICDS project were selected from 10 functional ICDS projects of Bhopal district. From the above selected urban and rural ICDS project, 5 Anganwadi centres from each project were selected. Purposively all under-five children who were suffering from undernutrition and children got malnutrition during study period were taken as study subjects to get the desired sample size of 296. At the end we got 265 such under-five children whose mothers were given consent and participated in the study.

Inclusion criteria

All under five children, who were undernourished and all those children who developed malnutrition during the study period were included as study subjects. These children were enrolled from the selected anganwadi centres and included only when mothers were willing to participate in the study.

Exclusion criteria

Children whose mothers are not willing to participate and healthy children attending anganwadi centre.

Study tools

Three types of instruments were used: NIPCCD Suposhan Guide for anganwadi workers, a structured questionnaire and anthropometric measurements including weight, height and MUAC.

Data source and method of data collection

Data collection was started after obtaining clearance from ethical committee and respective authorities of ICDS scheme in Bhopal district. Primary information regarding undernourished children was obtained by reviewing the growth monitoring record, available at anganwadi centres. Weight was recorded while the subjects were minimally clothed using a digital weighing scale for children less than two years of age and by Salter's weighing scale for 2 to 5 year old children nearest to 100 gram. Height and length were measured with bare foot using measuring board for babies and toddlers with 0.10 cm accuracy and by using stadiometer nearest to 1 cm and MUAC was taken by Shakir's tape available at AWCs.

Nutrition education intervention

It was implemented by using audio-visual aids like short films on Laptop, flipchart and special guide called "Suposhan Kunji" developed by NIPCCD through group meetings and one to one in-depth interviews organized either at AWCs or at child residence.

The whole study was implemented in two phases first in the urban area then in the rural area. In each phase three visits were made. During the first visit growth monitoring records of last one year was assessed to find out undernourished children. Second visit was a pre-planned visit to implement nutritional education intervention through group meetings with the mothers of children identified during the previous visit. In the third and final visit that was made after the 3 months of second visit, weight for age was recollected to find out the effect of nutrition education intervention. Anthropometric indices including stunting, underweight, and wasting were respectively defined as height for age, weight for age, and weight for height at least 2 standard deviations below the mean for children aged 0-5 according to reference growth charts based on WHO child growth standards. ¹³

Data analysis

Data was managed by entering it into MS office and analysed by using Epi-Info software for windows, Version 7. Centre for Disease Control, Atlanta, USA. Chi- Square, Unpaired & Paired t test and McNemar Bowker test was used to see significance and association. A p value <0.05 is considered as statistically significant.

RESULTS

There were total 10 AWC visited, five each from one urban and one rural ICDS block of Bhopal district. There were total 1230 children enrolled in anganwadi centres under study. Urban anganwadis had more no. of children as compare to rural anganwadis. The ratio of boys and girls was found to be equal among enrolled children and same trend was observed in rural and urban area (Table 1). As per WHO child growth standards 2009 for weight for age, the prevalence of undernutrition was obtained in terms of Z scores. As per Z score 7.9% children had normal weight (Z score above -1SD), 31.7% had mild undernutrition (Z score between -1SD to -2SD), 40.7% had moderate undernutrition (Z score between -2SD to -3SD) and 19.6% had severe undernutrition (Z score below -3SD) (Table 2).

Table 1: Residence and gender wise distribution of children enrolled among AWCs under study.

Gender	Urban area (n=659)		Rural area (n=571)		Total c	Total children (n=1230)	
	n	%	n	%	n	%	
Male	335	50.83	281	49.21	616	50.08	
Female	324	49.17	290	50.79	614	49.92	

Table 2: Magnitude of undernutrition as per WHO child growth standards (weight for age) among study subjects.

Undernutrition grade	Urban% (n=172)	Rural% (n=93)	Total% (n=265)	Chi-Square	P value
Above -1 SD	10.4	3.2	7.9		0.217
Between -1 SD to -2 SD	31.3	32.2	31.7	4.44	
Between -2 SD to -3 SD	38.9	44	40.7	4.44	
Below -3SD	19.2	20.4	19.6		

Table 3: Socio-demographic characteristics of study population.

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		Urban (%) (n=172)	Rural (%) (n=93)	Total (%) (n=265)	Chi- Square	P value
Family and SES		(II-172)	(n-23)	(H-203)	Square	
	Nuclear	79.6	50.5	69.4	24.1	0.001
Family type	Joint	20.4	49.5	30.6	24.1	< 0.001
	Class I	0.5	2.1	1.1	2.010	0.734
	Class II	8.7	10.7	9.5		
SES of family	Class III	29.6	28	29		
•	Class IV	51.1	51.7	51.4		
	Class V	9.9	7.5	9		
Child characteristics						
Age in years (Mean: SD)		3.65 (1.022)	3.74 (1.132)	3.69 (1.063)	t=0.732	0.465
Gender	Male	48.2	45.1	47.2	0.232	0.630
Jenuel	Female	51.8	54.9	52.8	0.232	0.030
	1	20.9	10.7	17.4		
	2	47	35.5	43		
No of living shildness	3	19.9	30.1	23.4	13.400	0.020
No. of living children	4	7.6	16.2	10.5	13.400	0.020
	5	1.7	3.2	2.3	_	
	6	2.9	4.3	3.4		
	1	38.9	36.5	38.1	-	0.838
	2	35.5	35.4	35.5		
Birth order	3	17.5	20.5	18.5	1.440	
	4	5.2	6.4	5.6		
	5	2.9	1.2	2.3	_	
6.1.11	Home	27.9	23.66	26.41	0.54	0.454
Place of delivery	Institutional delivery	72.1	76.34	73.59	0.561	0.454
	1. < 1 hr	48.84	26.88	41.13	- 18.700	<0.001
Time of commencing	2. 1-4 hr	30.23	56.99	39.62		
breast feeding	3. 4-24 hrs	11.63	8.60	10.57		
C	4. > 24hrs	9.30	7.53	8.68		
	1. < 6 month	11.63	13.98	12.08	11.700	0.019
	2. 6 month	54.07	55.91	54.72		
Duration of EBF	3. 1 year	25.58	11.83	21.13		
	4. > 1 year	5.81	8.60	6.79		
	5. Never	2.91	9.68	5.28	_	
	1. Since birth	5.81	5.38	5.66		0.001
	2. Before 6 month	2.91	17.20	7.92		
Complementary feeding	3. At 6 month	50.00	51.61	50.57	19.800	
Start at age of	4. At 1 year	20.93	11.83	17.74	19.000	
	5. After 1 year	20.35	13.98	18.11	_	
Mother's characteristics	,					
	1.Primary	35.47	21.51	30.57		0.038
	2.Middle	24.42	18.28	22.26		
	3.High school	6.98	8.60	7.55		
Education status	4. 12th	5.81	5.38	5.66	11.700	
	5.Graduate	1.16	1.08	1.13	_	
	6. illiterate	26.16	45.16	32.83		
	1.Unemployed	65.70	74.19	68.68		0.307
	2.labourer	30.81	20.43	27.17		
Occupation status	3.Clerical/shopkeeper	2.33	3.23	2.64	3.610	
	4. Semiskilled work	1.16	2.15	1.51		
	1. 1	6.40	4.30	5.66		<0.001
	2. 2	36.63	54.84	43.02		
Antenatal care; No. of	3. 3	43.60	9.68	31.70		
ANC visits	4.4	4.07	2.15	3.40	52.700	
TITE VISITS	5. >4	4.65	2.15	3.40		
	6. No ANC visits	4.65	26.88	12.53		

Table 4: Pre and Post intervention change in weight for age of study participants.

Factor	Pre intervention status Mean (SD)	Post intervention status Mean (SD)	P value
Weight for age (rural area)	10.99 (2.11)	11.69 (2.10)	< 0.001
Weight for age (urban area)	11.00 (2.11)	11.47 (2.08)	< 0.001
Weight for age (overall)	10.99 (2.10)	11.58 (2.09)	< 0.001

Paired samples 't' test applied

Table 5: Effect of nutrition education intervention on the magnitude of malnutrition among study subjects in urban area.

Nutritional status	Z score	Before intervention status frequency (%)	After intervention status frequency (%)
Normal	>1 SD	18 (10.5)	31 (18.1)
Mild underweight	-1 SD to -2 SD	54 (31)	56 (32.7)
Moderately underweight	>-2 SD to -3 SD	67 (39.2)	58 (33.9)
Severely underweight	< -3 SD	33 (19.3)	26 (15.2)

McNemar Bowker test applied, No. of valid cases=172, p=0.001

Table 6: Effect of nutrition education intervention on the magnitude of malnutrition among study subjects in rural area.

Nutritional status	Z score	Before intervention status Frequency (%)	After intervention status Frequency (%)
Normal	>1 SD	3 (3.2)	14 (15.1)
Mild underweight	-1 SD to -2 SD	30 (32.3)	36 (38.7)
Moderately underweight	>-2 SD to -3 SD	41 (44.1)	34 (36.6)
Severely underweight	< -3 SD	19 (20.4)	9 (9.7)

McNemar Bowker test applied, No. of valid cases=93, p≤0.0001

Table 7: Overall effect of nutrition education intervention on the magnitude of malnutrition among study subjects.

Nutritional status	Z score	Before intervention status Frequency (%)	After intervention status Frequency (%)
Normal	>1 SD	21 (8)	45 (17)
Mild underweight	-1 SD to -2 SD	84 (31.4)	93 (34.8)
Moderately underweight	>-2 SD to -3 SD	108 (40.9)	92 (34.8)
Severely underweight	< -3 SD	52 (19.7)	35 (13.3)

McNemar Bowker test applied, No. of valid cases=265, p≤0.0001

Maximum numbers of study subjects were belong to nuclear family (69.4%) and upper lower SES (51.4%). Mean age of study subjects was 3.69 year (SD 1.063). 73.59% were delivered in health institutions & 41.13% received breast feed within 1hr of birth. EBF was practiced in 54.72% study subjects. 50.57% received complementary feeding from the age of 6 months. 32.83% mothers were illiterate and 68.68 were unemployed. 80.38% mothers did not receive 4 ANC visits during antenatal period of study subjects.

We found significant change in weight of children post Nutrition education intervention (Table 4). Reduction in moderate underweight was from 39.2% to 33.9% and in severe underweight it was from 19.3% to 15.2% in urban area (Table 5). In the rural area reduction in moderate underweight was from 44.1% to 36.6% and in the severe

underweight group it was from 20.4% to 9.7% (Table 6). Overall reduction was from 40.9% to 34.8% and from 19.7% to 13.3% in moderate & severe group respectively (Table 7).

DISCUSSION

Our nutrition education intervention was successful in reducing undernutrition in both urban and rural areas. As mentioned in the Table 5, 6 and 7, reductions in moderate underweight was from 39.2% to 33.9% and in severe underweight it was from 19.3% to 15.2% in urban area. In the rural area reduction in moderate underweight was from 44.1% to 36.6% and in the severe underweight group it was from 20.4% to 9.7%. Overall reduction was from 40.9% to 34.8% and from 19.7% to 13.3% respectively. Results suggest that poor households within their given resources without food provision can improve

growth if specific nutrition education based on personal dietary assessment is provided to them. The increase in weight may be attributed to the advice given leading to change in the feeding habits and better hygienic practices followed. Change in weight for age is found highly statistically significant in urban area, rural area and among overall study subjects (p<0.001). Similar findings were reported by Brown et al in their study in rural Bangladesh, Guldan et al in Rural Sichuan, China, Walsh et al in Bloemfontein, South Africa, Salehi et al in Iran and by Kilaru et al in rural Karnataka, Bankwar et al in Bhopal, Madhya Pradesh. 7,9,14-18

CONCLUSION

As far as our nutrition education intervention we found that a well planned, short, simple, focused and based on locally available food items delivered with little empathy can do a lot even in weaker sections of the society. We found a significant improvement in the nutritional status of "at risk" children with in three month after intervention.

Recommendations

If appropriate messages are marketed through appropriate channels, changes in infant-feeding practices resulting in growth improved infant are possible, impoverished conditions and are also cost-effective. Despite their poverty, families should be encouraged to feed hygienic and cheap energy and protein enriched foods with one fruit daily as expensive practices are not likely to achieve sustained compliance. Teaching families to increase feeding frequency, increase dietary diversity, modify household food as well as raising awareness on existing food taboos for young children (e.g., bananas and eggs), could reduce the incidence of growth faltering and subsequent malnutrition.

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