ORIGINAL ARTICLE

A case control study to find out child feeding practices responsible for severe acute malnutrition among under-five children admitted in MTC at a tertiary care centre, Bikaner, Rajasthan

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Citation

Abstract

Introduction: There is no significant difference between NFHS II &III with respect to under- nutrition data but Gross national income has increased many times, so poverty and unavailability of food alone cannot be the only reasons of under- nutrition. Under-nutrition is the result of many interrelated factors such as poverty, insufficient household food security, inadequate health services, poor maternal and child care practices and inadequate water and sanitation. For communities with a high prevalence of under- nutrition, it may take years or even decades before all of these factors can be addressed. **Aims and Objectives:** to find out child feeding practices responsible for severe acute malnutrition among Under-five Children and to recommend a Community Action Plan based on Positive Deviance Approach to deal with under-nutrition quickly, affordably and sustainably in a culturally acceptable manner. **Materials & Methods**: **Study design**: Matched Case Control study. **Sample size**: 143 cases and age, socio-economic status matched 143 controls. **Study place**: MTC and Immunization clinic. **Study Duration:** May, 2013- May, 2014. **Study Tool and Data Collection**: Semi-structured pre-tested questionnaire. **Data analysis:** with help of SPSS16 (Mean, SD, Proportion, odds ratio). **Results:** Strong positive association was found between duration of exclusive breast feeding(both shorter and longer), prelacteals, diluted milk as weaning food, bottle feeding, giving excess milk and less solid protein diet, not able to recognize cue of hunger by mother, lack of demand feeding, and severe acute malnutrition. **Conclusion**: Not any nutritional programme can help in preventing SAM unless we motivate the mothers for good child feeding and rearing practices. This can be achieved by identification of the Positive Deviant mothers from the same community and SES, who can motivate the mothers of SAM children and can practically demonstrate positive child feeding practices in a culturally acceptable manner.

Key Words

SAM; Community Action Plan; Positive Deviance Approach

Introduction

Childhood is a time when food preferences and habits are shaped and childhood nutrition affects growth and development, immune status, and social and cognitive ability. Early childhood, that is the first six years constitutes the most crucial period in life, when the foundations are laid for cognitive, social and emotional language, physical/motor development and cumulative lifelong learning (1).

Childhood under nutrition is a critical public health and development challenge in many developing countries including India (2). An estimated forty per cent of the world's severely malnourished under-5 children live in India (3) and one in every three malnourished child in the world lives in India (4) . Under-nutrition encompasses stunting (chronic under-nutrition) wasting (acute under nutrition) and deficiencies of micronutrients (essential vitamins

and minerals). The level of child under nutrition is unacceptably high in almost all states, and more than 6,000 Indian children below the age of five die every day due to malnourishment or lack of basic micronutrients such as vitamin A, iron, iodine, zinc or folic acid (5).

India accounts for highest prevalence of under-nutrition in children (under 5) i.e. more than 40% and ranked second to last on child underweight out of 19 countries (6).

There is no significant difference between NFHS II &III with respect to under-nutrition data but Gross national income has increased many times, so poverty and unavailability of food alone cannot be the only reasons of under- nutrition. Nutrition behavior (including food selection, preparation and consumption) is the product of culture, education, economics, food availability, social strata, family position and health status. Nutritional status depends on all those factors plus biological and genetic factors.

Guiding all members of the population toward more healthful food choices and optimum nutritional health is a great challenge. Meeting this challenge requires the use of multiple, reinforcing behavior change strategies, including food and nutrition information and education, structuring the environment to enable positive food choices, modifying food ingredients and preparation techniques to increase nutrient value and improving the availability of foods such as fruits and vegetables. These indirect, environmental strategies complement the direct, individualized nutrition education and counseling provided in health care and other settings.

Under-nutrition is the result of many inter-related factors such as poverty, insufficient household food security, inadequate health services, poor maternal and child care practices, and inadequate water and sanitation. For communities with a high prevalence of under-nutrition, it may take years or even decades before all of these factors can be addressed.

Aims & Objectives

1. To find out child feeding practices responsible for severe acute malnutrition among under- five Children.
2. To recommend a Community Action Plan based on Positive Deviance Approach to deal with under- nutrition quickly, affordably and sustainably in a culturally acceptable manner.

Material and Methods

We conducted a study of matched sets of cases and controls. Permission from the ethical committee was taken prior to the study. Prior data indicate that the probability of exposure among controls is 0.4 and the correlation coefficient for exposure between matched cases and controls is 0.5. If the true odds ratio for disease in exposed subjects relative to unexposed subjects is 2.3, we will need to study 136 case patients with 1 matched control(s) per case to be able to reject the null hypothesis that this odds ratio equals 1 with probability (power) 0.8. The Type I error probability associated with this test of this null hypothesis is 0.05. So, the required sample size was 136 in each group but as we found 143 cases during the study duration (from May 2013 to May 2014) so included all of them.

Case was defined as the SAM (Severe Acute Malnourished) child of under five years and who was admitted (UNICEF Criteria of admission) at the Malnutrition Treatment Center and age and socio-economic status (Modified BG Prasad classification) matched healthy Controls (Weight for Height > 90% of NCHS median value and height for age above 95% of the NCHS median value) were taken from the Immunization clinic run under the Department of Community Medicine.

The units of study were children between 6 and 60 months of age. Children older than 6 months were included on the assumption that this is the minimum amount of time the child is exposed to family-related factors; also, this is the average age in which children are weaning (this is defined as the time when mothers begin to introduce food other than milk into the child's diet). Thus infants become more exposed to environmental causes of under-nutrition.

Data were collected using structured questionnaire after informed consent on important demographic characteristics (Gender, Mothers education, birth weight, birth order), and practice on nutrition (prelacteals, duration of exclusive breast feeding, bottle feeding, weaning food, frequency of feeding, food compositions, health seeking behavior, demand feeding, mother's ability to recognize cue of hunger in child) from primary caregivers (mothers).

Data were entered in SPSS16 software and were analyzed with applications of Mean, SD, Proportion, Odds ratio.

Socio demographic characteristics: A total of 286 children below 5 years were analyzed. Table 1 &2

shows the frequency distribution of cases and controls.

Results

Socio demographic characteristics: A total of 286 children below 5 years were analyzed. Table 1 &2 shows the frequency distribution of cases and controls. The mean age of the cases and controls were 19.66±9.96 and 19.74±9.95 months respectively. Total number of females among cases were 90 (62.9%) and 78 (54.5%) among controls (Odds ratio=1.45, 95% CI 0.882-2.27, χ^2=1.74, p=0.18). The literacy rate of mothers were high among controls (101, 70.6%) than the cases (56, 39.1%) (Odds ratio= 3.73, 95% CI 2.28 to 6.11, χ^2= 27.33, p=0.000). Majority of the primary care givers were house makers both among cases (112, 78.3%) and controls (110, 76.9%). Higher birth order was more among cases (72, 50.3%) as compared to controls (30, 21%) (OR= 3.82, 95% CI= 2.27 to 6.41, χ^2= 25.6, p=0.000). Low birth weight was also common among cases (81, 56.6%) as compared to controls (36, 25.2%) (OR= 3.88, 95% CI=2.35 to 6.42, χ^2=28.0, p=0.000). Table 3 shows the Socio demographic characteristics of cases and controls.

Nutritional practices: 138 (96.5%) cases and 139 (97.2%) controls were fed at breast. Among cases 111 (78%) received breast feeding within one hour of birth and among controls 125 (88%) received within one hour of birth. Prelacteals were given more frequently among cases (99, 69.2%) as compared to controls (40, 28%) (Odds ratio=5.97, 95% CI=3.48 to 9.64, χ^2= 47.08, p= 0.000). Most commonly used prelacteals were Sugar solution and Ajwayn water. Discontinuation of breast feeding before 24 months were seen in 11/29 (37.9%) cases and 9/32 (28.1%) controls (Odds ratio= 1.5, 95% CI= 0.53 to 4.57, χ^2= 0.29, p= 0.5). Lack of exclusive breastfeeding were more common among cases 64 (44.75%) as compared to controls (28, 19.5%) (OR=3.32, 95% CI=1.96 to 5.64, χ^2=19.63, p=0.000). Continuation of exclusive breastfeeding even after six months was more common among cases as compared to controls (OR=3.9, 95% CI= 1.88 to 8.45, χ^2= 13.2, p=0.000). Less frequency of feeding was more common among cases as compared to controls (OR=3.8, 95% CI=2.33 to 6.34, χ^2= 27.8, p=0.000). Diluted milk as weaning food was more common among cases as compared to controls (OR= 7.15, 95%CI= 4.21 to 12.12, χ^2= 56.3, p=0.000).

Excess of milk in diet was more common among cases as compared to controls (OR= 2.6, 95% CI= 1.53 to 4.56, χ^2= 11.8, p=0.000). Lack of demand feeding was more common among cases as compared to controls (OR=3.13, 95% CI=1.91 to 5.14, χ^2= 19.96, p=0.000). (Table 4 shows the Nutritional practices of cases and controls)

Discussion

Maternal illiteracy is significantly associated with severe acute malnutrition. In a case control study from Bangladesh, Maternal illiteracy was associated with a fourfold increase in the risk of severe acute malnutrition in their children (7) which is higher than our observation.

Higher birth order and low birth weight are found to be significantly associated with the risk of severe acute malnutrition. The similar association has been reported between low birth weight and subsequent childhood malnutrition in other reviewed studies. (8,9,10,11,20).

Phengxay et al in Laos and Veghari and Gholam in Gorgan, Iran, reported male gender as a risk factor for malnutrition in children under 5 years, (12, 13) but in research by Setswe in Southern Africa, (14) Sanghvi et al in Southern India, (9) and Saadaat et al in Kashan, Iran, (15) female gender was found to be more strongly related to childhood malnutrition but in our study it appears that gender is not a risk factor in malnutrition. Basu (16) also concluded that gender discrimination in food allocation between boys and girls did not exist in South Asia.

A higher percentage of children received breast feeding both in cases and control group. The children who receive prelacteals are 5.97 times more at risk of developing severe malnutrition as compared to controls. The use of prelacteals feed is not recommended as it can cause infections and can interfere with breastfeeding. Children with lack of exclusive breastfeeding are 3.32 times more at risk of developing severe malnutrition. Children with late initiation of complementary feeding are also at 3.9 times more risk of developing severe malnutrition as compared to controls. This indicates that children with severe malnutrition are started either early or late with complementary feeding. Similarly a study in Kenya showed an increase risk of being underweight when complementary food was started early (17).

Bottle feeding is more commonly observed among severe malnourished children then the control group. The similar results were found by Solomon et

al (2008) (18). Bottle feeding is discouraged at any age as it can cause diarrhea and other illness because of the difficulty in sterilizing the nipples properly.

Less frequency of child feeding is significantly associated with severe malnutrition. Similarly less protein diet and excess of milk alone is also significantly associated with severe malnutrition. Excess of milk reduces the iron absorption and can lead to anemia and infections that again can add in malnutrition. Children who received diluted milk as weaning food are 7.15 times at risk of being severe malnourished than the controls. This is similar to a study done in 4 selected anganwadi areas in UP by Dinesh Kumar et al which found that improper complementary feeding is a significant (P<0.05) risk factor for underweight (19).

Lack of inability to recognize the cue of hunger by the mother and lack of demand feeding are significantly associated with severe malnutrition.

Conclusion

We concluded that it is not the shortage of food that predispose the young children to severe malnutrition but inappropriate infant and young children feeding practices are responsible for the same.

Recommendation

Restricted public health approach towards SAM management in societies with high levels of under-nutrition is a serious challenge as the nutrition behavior is very difficult to change by health education alone. So we recommend a community action plan based on Positive Deviance Approach. Positive deviance in nutrition describes young children who grow and develop adequately in poor families and communities, where a high number of children are malnourished and frequently ill. They are positive deviant children, and they live in positive deviant families. These families have developed culturally appropriate positive deviant practices that enable them to succeed in nourishing and caring for their children in spite of poverty and an often high risk environment. These families are uniquely able to provide solutions to malnutrition to other poor families in their communities. In more precise meaning it is to study successful mothers and adopt their child feeding and appropriate food preparing skills for their children with the same available resources and in the same environment as well.

Positive deviant children are the living proof that it is possible today in the community for a very poor family to have a well-nourished child before economic improvements occur or clean water and sanitation are accessible to all. Through a Positive Deviance Inquiry, villagers together with the program staff identify the Positive Deviant Families' special and demonstrably successful current feeding, caring and health-seeking practices which enable them to "out-perform" their neighbors whose children are mal-nourished but who share the same resource base. Based on the Positive Deviance Inquiry findings the programme managers can develop strategies to enable all members of the community not only to learn about these practices, but also to act upon them specially the mothers of the severely malnourished children.

Limitation of the study

Some of the limitations of the study are that we have not explored maternal factors like maternal BMI and antenatal care, co-morbidities and other environmental factors which also play significant role in childhood under nutrition.

Relevance of the study

This study provides sufficient evidence that if the child feeding practices of caregivers are improved we can significantly reduce the burden of SAM among under-five children.

Authors Contribution

KC: designed the study, analyzed the data and interpreted the results. KS: Revised the work critically. RA: Final approval of work to be published.

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Tables

TABLE 1 FREQUENCY DISTRIBUTION OF CASES AND CONTROLS ACCORDING TO AGE

Age in months	Cases (%)	Controls (%)
6-12	46 (32.2)	46 (32.2)
12-24	68 (47.5)	68 (47.5)
24-36	24 (16.8)	24 (16.8)
36-60	5 (3.5)	5 (3.5)

TABLE 2 FREQUENCY DISTRIBUTION OF CASES AND CONTROLS ACCORDING TO SOCIO-ECONOMIC STATUS (MODIFIED BG PRASAD CLASSIFICATION).

Socio-economic status	Cases (%)	Controls (%)
II	6 (4.2)	6 (4.2)
III	84 (58.7)	84 (58.7)
IV	53 (37.1)	53 (37.1)

TABLE 3 SOCIO DEMOGRAPHIC CHARACTERISTICS OF CASES AND CONTROLS

Risk factors		cases	controls	OR (95% CI)
Female gender	Yes	90	78	1.45 (0.882-2.27)
	No	53	65	
Maternal illiteracy	Yes	87	42	3.73 (2.28- 6.11)**
	No	56	101	
Higher birth order	Yes	72	30	3.82 (2.27- 6.41)**
	No	71	113	
Mothers' unemployment	Yes	112	110	1.08 (0.621-1.8)
	No	31	33	
Low birth weight	Yes	81	36	3.88 (2.35- 6.42)**
	No	62	107	

** Significant Associations

TABLE 4 NUTRITIONAL PRACTICES OF CASES AND CONTROLS

Risk factors		cases	controls	OR (95% CI)
Not breast fed	**Yes**	5	4	1.2 (0.331-4.71)
	No	138	139	
Lack of exclusive breast feeding for first 6 months of birth	**Yes**	64	28	3.32 (1.962-5.64)**
	No	79	115	
Continuation of exclusive breast feeding after 6 months of birth **Yes** **No**		33 110	10 133	3.9 (1.88-8.45)**
Prelacteals given	**Yes**	99	40	5.97 (3.48- 9.64)**
	No	44	103	
Bottle fed	**Yes**	84	44	3.2 (1.96-5.21)**
	No	59	99	
Less frequency of feeding	**Yes**	82	37	3.8 (2.33-6.34)**
	No	61	106	
Excess milk	**Yes**	53	26	2.6 (1.53-4.56)**
	No	90	117	
Less protein diet	**Yes**	90	58	2.48 (1.54-4.00)**
	No	53	85	
Diluted milk as weaning food	**Yes**	112	48	7.15 (4.21-12.12)
	No	31	95	
Inability to recognize cue of hunger by mother	**Yes**	81	45	2.84 (1.75-4.61)**
	No	62	98	
Lack of demand feeding	**Yes**	76	38	3.13 (1.91-5.14)**
	No	67	105	

** Significant association