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Research Article

THE EFFECT OF IMMUNIZATION ON NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN FROM BELOW POVERTY LINE FAMILIES IN LUCKNOW DISTRICT, NORTH INDIA

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ABSTRACT

Introduction: Nutritional status is a major determinant of health and wellbeing of children, as undernutrition is a common cause for child morbidity and mortality, especially among the poor. Childhood immunization may protect children's nutritional status and lead to improved child growth.

Objective: To assess the effect of immunization on nutritional status of preschool children from BPL families.

Methods: A community based cross sectional study was conducted using multistage sampling in rural and urban areas of Lucknow district. Total 352 children aged 12-47 months from families having income less than 1.25 USD per capita per day at 2005 PPP (criteria for BPL) were enrolled in this study. Mothers were interviewed after taking informed consent on pretested predesigned questionnaire on socio-demographic and vaccination status. Anthropometry was performed using standard procedures.

Results: About 77.3% children were fully immunized, 14.2% and 8.5% children were partially immunized and unimmunized respectively. Vitamin A coverage was 76.1%.The most common form of undernutrition was stunting (47.2%), followed by underweight children (41.8%) and 19.3% of children had wasting .Significant association was found between immunization status of the children and underweight.

Conclusion: The study indicated that children who were not completely immunized had higher risk for being underweight. This highlights an underlying need to educate the poor community regarding the need of complete and timely immunization.

Keywords:Preschool children, Immunization status, Undernutrition, BPL families.

INTRODUCTION

Nutritional status is a major determinant of health and well being of children, as undernutrition is a common cause for child morbidity and mortality, especially among the poor. Unfortunately malnutrition is rarely perceived as a morbid event by families, communities, and health¹.Malnutrition among children is often caused by the synergistic effects of inadequate or improper food intake, repeated episodes of infectious diseases, and improper care during illness². An estimated 53 percent of all child deaths are associated with underweight status .Being underweight puts children at greater risk of mortality from infectious diseases such as diarrhoea (61%), malaria (57%), pneumonia (52%), and measles (45%)³.In turn, infections contribute to malnutrition through a

variety of mechanisms, including loss of appetite and reduced capacity to absorb nutrients⁴.

The role of immunization in prevention of malnutrition is well-established. Childhood immunization may protect children's nutritional status and lead to improved child growth in developing countries⁵. Given the fact that immunization can play such a vital part in protecting children growth, this study has been conducted with the objective to assess the effect of immunization on nutritional status of preschool children from BPL families of Lucknow district, Utter Pradesh, India.

MATERIALS AND METHODS

1. Study area

This community based cross sectional study was conducted from August, 2012 to July, 2013 in rural and urban areas of Lucknow district.

2. Study subjects

Children aged 12-47 completed months from families who had permanent residence in the area (for at least 6 months) and having income less than 65 INR equivalent to 1.25 USD per capita per day at 2005 Purchasing Power Parity, World Bank, 2008(criteria for Below Poverty Line) were included in this study^{6,7}.

3. Sample size

The required sample size for this study was calculated using formula: $N = Z^2_{(1-\alpha/2)} p q/d^2$

(Lwanga&Lemeshow). Taking the prevalence (p) of underweight in India among under 5 children of lowest wealth index 56.6% (NFHS-3)⁸ and the absolute permissible error(d) of 7% with 5% level of significance and a 95% confidence limit value obtained was 192. Considering design effect of 1.75 and allowance for possible non-response rate of 5% makes the final sample size comes out to be ;336+17= 353 ≈360. Using proportional allocation to the rural and urban based on population; 120(33%) samples from the rural area and 240(66%) samples from the urban area was selected.

4. Sampling Design

A multistage sampling method was employed to select mohallas/villages. Total 16 mohallas from urban and 8 villages from rural areas were included in this study. Study households were selected by EPI random walk method. In households with more than one children of age between 12-47 months, one child was selected randomly.

5. Data collection procedure

The respondents were briefed about the survey in local language and after agreement reached upon. Interview was conducted with mothers of the children of BPL families to fill the pretested structured schedule. If the birth certificate was not available, age of the child was ascertained from the mother. Cultural and religious events were utilized to facilitate recall.

Standardized, portable, stepping, digital weighing machine, whose validation was done daily with standard random weight, was used to measure the weight of children to the nearest 100 gm with minimum clothing and no shoes. Weighing of smaller or sick children was done with their mother and then weight of the mother was deducted to get the weight of child. Height was measured using slandered procedures⁹.

WHO child growth standard reference was used to convert height and weight measurements into Z-scores of the height for age, weight for height and weight for age indices considering age and sex of the children. Children were graded as Wasted: It refers to weight-for-height Z score < -2 SD of the median value of the WHO child growth standard reference. Stunted: Stunting is defined as height-for-age Z score < -2 SD of median value of the WHO child growth standard reference. Underweight: Underweight defined as weight for age Z score < -2 SD of the median value of the WHO child growth standard reference¹⁰.

Immunization status of children was checked by observing immunization card and if it was not available mothers were asked to recall it. BCG vaccination was checked by observing scar on left deltoid. The immunization status was categorized

as: Completed primary immunization: A child receiving all these vaccines - BCG, 3 doses of DPT, 3 doses of OPV (excluding Polio 0) and 1 dose of measles, Partially immunized: Not completely immunized but received one or more doses of the above vaccines, Not immunized: Did not receive any vaccine dose.

All the children covered for study were examined clinically for the presence of signs of nutritional deficiency and other morbidity at the time of interview. If any child was found sick and malnourished, appropriate treatment and advice was given.

6. Statistical Analysis

Data entry and analysis was done using SPSS-17 version of soft ware. Pearson's Chi Square test was used to test the significance. P values less than 0.05 were considered significant.

7. Ethical considerations

The study protocol was submitted to the Institutional Ethical Committee and clearance was obtained. Verbal consent was taken from each selected participant to confirm willingness. Affirmation that they are free to withdraw consent and to discontinue participation without any form of prejudice was made after honest explanation of the survey purpose. Privacy and confidentiality of collected information was ensured throughout the process. Clinical examination and anthropometric measurement of children were done as much as possible without posing any discomfort. If any child was found sick and malnourished, appropriate treatment and advice was given.

RESULTS

A total of 360 BPL households with at least one preschool child were planned to participate in the study, out of which 352 children were enrolled making a response rate of 97.77 percent. Out of these 352 children, 234 and 118 were from urban and rural areas. Majority of children were from Hindu families (73.6%) and illiterate mothers (44.3%). Out of total children, 44.0 percent were female and 56.0 percent were males (Table 1).

About 51.1 percent mothers were able to show the immunization card, in others immunization status was ascertained through recall. In urban areas, 47.9 percent of the children's immunization information was collected from the card as compared to 57.6 percent in rural areas. It was observed that 77.3 percent children were fully immunized, 14.2 percent and 8.5 percent children were partially immunized and unimmunized respectively. Immunization status of rural children was better than urban children. Out of total, 76.1 percent of children had received vitamin A and 78.7 percent had measles immunization (Table 2).

The most common form of undernutrition was stunting (47.2%), followed by underweight children (41.8%) and 19.3% of children had wasting (Table 3). The result also showed that fully immunized children had better nutrition status. A significant association was found between immunization status of the children and underweight (Table 4).

Table1: Distribution of children according to their socio-demographic Characteristics

Characteristics	Urban (n=234)		Rural (n=118)		Total (352)	
	No.	%	No.	%	No.	(%)
Religion						
Hindu	158	67.5	101	85.6	259	73.6
Muslim	76	32.5	17	14.4	93	26.4
Mother's educational status						
Illiterate	102	43.6	54	45.8	156	44.3
Primary school	46	19.7	18	15.3	64	18.2
Middle	38	16.2	24	20.3	62	17.6
High school	23	9.8	11	9.3	34	9.7
Intermediate, above	25	10.7	11	9.3	36	10.2
Age in month						
12-23	92	39.3	38	32.2	130	36.9
24-35	77	32.9	48	40.7	125	35.5
36-47	65	27.8	32	27.1	97	27.6
Sex						
Male	127	54.3	70	59.3	197	56.0
Female	107	45.7	48	40.7	155	44.0

Table 2: Distribution of children according to their immunization characteristics

Characteristics	Urban (n=234)		Rural (n=118)		Total (352)	
	No.	%	No.	%	No.	%
Having immunization card						
Yes	112	47.9	68	57.6	180	51.1
No	122	52.1	50	42.4	172	48.9
Primary immunization status						
Complete	170	72.6	102	86.4	272	77.3
Partial immunization	41	17.5	9	7.6	50	14.2
No immunization	23	9.8	7	5.9	30	8.5
Measles						
Yes	175	74.8	102	86.4	102	78.7
No	59	25.2	16	13.6	75	21.3
Vitamin A						
Yes	168	71.8	100	84.7	268	76.1
No	66	28.8	18	15.3	84	23.9

Table 3: Distribution of children according to their Nutritional status

Children's nutritional status	Urban(n=234)		Rural(n=118)		Total(n=352)	
	No.	%	No.	%	No.	%
Weight for age(underweight)	97	41.5	50	42.4	147	41.8
Height for age(stunting)	116	49.6	50	42.4	166	47.2
Weight for height(wasting)	52	22.2	16	13.6	68	19.3

Table 4: Association between children immunization characteristics and their nutritional status

Characteristics	No. of children	Underweight			Wasting			Stunting		
		No.	%	P-value	No.	%	P-value	No.	%	P-value
Primary immunization status										
Complete	272	104	38.2	.013	52	19.1	.861	121	44.5	.064
No/Partial immunization	80	43	53.8		16	20.0		45	56.2	
Measles										
Yes	277	107	38.6	.022	53	19.1	.866	125	45.1	.141
No	75	40	53.3		15	20.0		41	54.7	
Vitamin A										
Yes	268	104	38.8	.045	52	19.4	.943	122	45.5	.272
No	84	43	51.2		16	19.0		44	52.4	

DISCUSSION

Our study showed that underweight and stunting were more prevalent among children with no or partial immunization and who did not receive vitamin A dose than those who were completely immunized and had received Vitamin A dose.

In this study a significant association was found between immunization status of the pre-school children and underweight. Documented evidences exist regarding increased risk of infections in un-immunized children, eventually leading to under nutrition¹¹. A study conducted in Mysore slums showed that prevalence of PEM was found to be higher in children (1-5 years) who were partially immunized and was statistically significant¹². Another study conducted in Bangladesh on children aged 12-59 months showed that the proportion of underweight was significantly higher ($p < 0.01$) among partially immunized children (60%) than that of fully immunized children (52%)¹³. In a study from Lucknow, it was observed that fully immunized children had better nutrition status. Significant association was found between immunization status of the pre-school child with underweight¹⁴. Similarly, a study in Siliguri, studied 316 under 5 children and found a significantly higher prevalence of malnutrition amongst partially immunized and non-immunized children in comparison to fully immunized children¹⁵. However, a study conducted in Ludhiana slums showed no significant association between immunization status and malnutrition among under 5 children¹⁶.

Our study also showed that children who received Vitamin A supplementation were significantly less likely to be underweight as compared to those who did not receive vitamin A supplementation. Vitamin A deficiency increases vulnerability to a range of illnesses including diarrhea, measles, and respiratory infections¹⁷. This may lead to an increase in undernutrition among children. A study conducted in rural Indonesia on children aged 12-59 months showed, children who did not receive a vitamin A capsule were significantly more likely to be underweight, stunted, wasted compared with children who received a vitamin A capsule¹⁸.

CONCLUSION

The study concludes that the burden of under nutrition among preschool children from BPL families was very high. At the same time vaccination coverage was also unsatisfactory, which may be the important factor for their poor nutritional status. An effort should be directed towards educating the poor community regarding importance of immunization and Vitamin A supplementation to keep their children healthy.

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