ISSN: 2278-5213

RESEARCH ARTICLE

The effect of vaccination on nutritional status of pre-school children in rural and urban Lucknow

Ali Jafar Abedi[1] and J.P. Srivastava[2]
[1]Dept. of Community Medicine, JN Medical College, Aligarh Muslim University, Aligarh-202002, India
[2]Dept. of Community Medicine, Era's Lucknow Medical College and Hospital, Lucknow, UP, India
alijafarabedi@gmail.com; 09219510553

Abstract

Childhood vaccination may protect children's nutritional status and lead to improved child growth in developing countries. Therefore, a study was conducted to assess the immunization and nutrition status of children under 5 years of age. A cross-sectional community based field study was conducted in urban and rural Lucknow, Uttar Pradesh, India. Children (*n*=402) of 12-59 months were randomly selected and mothers were interviewed after taking informed consent on pretested predesigned questionnaire on socio-demographic and vaccination status. Anthropometry was performed using standard procedures. Hundred and seventy six (43.8%) children were fully immunized, 168 (41.8%) and 58(14.4%) children were partially immunized and unimmunized respectively. The most common form of malnutrition was stunting (51.4%), followed by underweight children (43.5%) and 21.7% of children had wasting. It was observed that fully immunized children had better nutrition status. Significant association was found with immunization status of the pre-school child with underweight ($p<0.005$). The study indicated that majority of children were malnourished and most of them were unimmunized. This suggests that childhood vaccination in addition to being a major intervention for reducing child mortality might be considered a tool for mitigating under nutrition.

Keywords: Vaccination, immunization, nutrition, anthropometry, questionnaire, malnutrition.

Introduction

Expanded Programme of Immunization (EPI) was initiated by WHO in 1974 to provide countries with guidance and support to improve vaccine delivery and to help make vaccines available for all children. A standard immunization schedule was established in 1984 on the basis of a review of immunological data for the original EPI vaccines: BCG, diphtheria tetanus-pertussis (DTP), oral polio, and measles vaccines (Halsey and Galazka, 1985). A successful immunization program is of particular relevance to India, as the country contributes to one-fourth of global under 5 mortality with a significant number of deaths attributable to vaccine preventable diseases. The relationship between immunization and prevention of malnutrition is well-established. Childhood vaccination may protect children's nutritional status and lead to improved child growth in developing countries (Anekwe and Kumar, 2012). Given the fact that immunization can play such a vital part in protecting growth, this study covers the immunization and the level of nutritional status among the children under 5 years of age in urban and rural Lucknow, Uttar Pradesh, India. This study has been undertaken with the following objectives:

1. To identify the immunization status of the children under 5 years of age in the study area.
2. To assess the nutritional status of the children under 5 years of age in the study area.
3. To find association between them, if any.

Material and methods

Study area: A cross-sectional house to house study was conducted in district Lucknow in one rural block (Malhiabad) and one urban sector (Chowk) which was chosen randomly.

Sample size and survey: Sample size was calculated based on the formula $4PQ/L^2$, where P is the prevalence (50%), Q is 100-P (50) and L is the permissible error ie. 10% of P, sample size comes out to be ~400 (Lwanga and Lemeshow, 1991). Requisite sample size was reached in two stages: first stage: number of household to be taken for the survey was decided according to population proportion to size (PPS). In second stage, simple random technique was used to select the first household for the survey. A household wise complete list of eligible sampling unit i.e. children of 12-59 months of age, was prepared separately for all villages and mohallas. Serial number were allotted by sequence to household in each of the list, starting from randomly selected household and desired number of household were selected with the help of random number table. In case of non-availability of the child in selected household due to any reason, next household was selected for the survey in order to attain the adequate sample size. Each respondent was explained the purpose of the study by the investigator prior to the administration of interview and informed consent was obtained. The confidentiality of the information was assured.

Interview was started with general discussion to gain confidence and it slowly extended to specific points. Using a pre-tested interview schedule, the respondents were inquired about background information and immunization status of children. Prasad's classification (1961) based on the per capita monthly income and later modified in 1968 and 1970, was used. In order to offset inflationary trends, All India Whole Price Index (AIWPI) of year 2010 was used (Agarwal, 2008). The tools of investigation were: Interview Schedule, Calendar of local events, spring balance scale, Non stretchable height measuring scale, Wooden Length Board and WHO growth standards. The schedule was pretested on a sample of 40 children, 20 each for rural and urban areas. Necessary modification was made in the schedule to overcome the difficulties encountered in pretesting.

Mother of child was preferred as primary respondent. In the absence of mother, father was taken as respondent. In case of absence of both of them, the adult in the household who remained with the child for most of the time was taken as respondent. Help of other available adult member of the household or nearby household who was present at the time of birth of child was taken as respondent in case mother was not able to recall the event or absent. Respondents were asked for immunization card, if it was not available, then mothers were asked leading questions and immunization status was ascertained. BCG scar was also seen for verification. The immunization status was categorized as: Fully immunized: administered BCG, three doses of DPT and OPV and measles, partially immunized: child was administered some but not all vaccines and not immunized: child was not given any of the above vaccine. Anthropometry was performed by standard technique.

Anthropometry: Anthropometric data was entered in WHO Anthro (version 2, 2005) and macros, and *Z* scores of Weight, Height/length and Weight for height were computed. Children were graded as stunted (height for age Z score <-2), wasted (the weight for height Z score of < -2) as severe wasting, similarly a weight for age Z score of -2 was graded as underweight (WHO, 2007). Data was entered by two different persons separately on Microsoft Access and cross matched to detect any discrepancy in data entry before the data was analyzed using SPSS software version 17.01 for Windows XP.

Results and discussion

A total of 402 pre-school children was studied spreading in 10 villages and 11 urban mohallas. The study population of 402 children differed little in religion, area of residence and sex. Majority of them were born to uneducated mothers (43.5%) of social class V (60.9%) (Table 1 and 2). Table 3 shows the immunization status in preschool children. Two fifty hundred and fifty one family had immunization card with them, in others immunization status was ascertained through recall. It was noted that 176 (43.8%) children were fully immunized, 168(41.8%) and 58(14.4%) children were partially immunized and unimmunized. Immunization status of urban children was better than rural children (p=0.029). As depicted in Table 4, the most common form of malnutrition seen was stunting (51.4%), followed by underweight (43.5%) and 21.7% of children had wasting. Nutrition status parameters were analyzed with immunization status of children, it was observed that fully immunized children had better nutrition status.

Table 1. Socio-demographic characteristics of studied population (*n*= 402).

Characteristics	*n* (%)
Religion	
Hindu	193(48.0)
Muslim	209(52.0)
Locality	
Rural	194(48.3)
Urban	208 (51.7)
Mother's education	
Uneducated	175(43.5)
Primary	89(22.1)
Junior high school	42(10.4)
High school	27(6.7)
Inter	19(4.7)
Graduate	39(9.7)
Post Graduate	11(2.7)
Social class	
II	22(5.5)
III	47(11.7)
IV	88 (21.9)
V	245(60.9)

Table 2. Distribution of pre-school children according to age, sex and area of residence.

Age group (months)	Rural (192)			Urban (210)			Total (402)		
	Male *n* (%)	Female *n* (%)	Total *n* (%)	Male *n* (%)	Female *n* (%)	Total *n* (%)	Male *n* (%)	Female *n* (%)	Total *n* (%)
12-23	23(12.0)	28(14.6)	51(26.6)	40(19.0)	27(12.9)	67(31.9)	63(15.7)	55(13.7)	118(29.4)
24-35	36(18.8)	24(12.5)	60(31.3)	32(15.2)	29(13.8)	61(29.0)	68(16.9)	53(13.2)	121(30.1)
36- 47	22(11.5)	29(15.1)	51(26.6)	22(10.5)	29(13.8)	51(24.3)	44(10.9)	58(14.4)	102(25.4)
48-59	10(5.2)	20(10.4)	30(15.6)	17(8.1)	14(11.4)	31(14.8)	27(6.7)	44(10.9)	61(15.2)
Total	91(47.4)	101(52.6)	192(100)	111(52.9)	109(51.9)	210(100)	202(50.2)	200(49.8)	402(100)

Table 3. Immunization status of pre-school children.

Immunization status	Rural (192)		Urban (210)		Total (402)	
	No.	%	No.	%	No.	%
Not immunized	37	19.3	21	10.0	58	14.4
Partially immunized	77	40.1	91	43.3	168	41.8
Fully immunized	78	40.6	98	46.7	176	43.8
Chi square (df)	7.061(2)					
p=0.029						

Table 4. Nutritional status of children (*n=402*).

Characteristic	Underweight 175 (43.5%)		Stunting 207 (51.4%)		Wasting 87(21.7%)	
	No.	%	No.	%	No.	%
Rural (*n=192*)	90	46.9	108	56.3	40	20.8
Urban (*n=210*)	85	40.5	99	47.1	47	22.4
Chi square (df)	1.671(1)		3.330(1)		0.142(1)	
p=0.029	0.196		0.068		0.707	

Table 5. Nutrition parameters in relation with immunization status.

Immunization status	Underweight (175)		Stunting (207)		Wasting (87)	
Full immunization	No.	%	No.	%	No.	%
Yes (*n=176*)	66	37.5	77	43.8	35	23.0
No (*n=226*)	109	48.2	130	57.5	52	19.9
Chi square (df)	4.6341(1)		7.514(1)		0.569(1)	
p=0.029	0.031		0.006		0.451	

Significant association was found with immunization status of the pre-school child with underweight and stunting rates ($p<0.005$) (Table 5). Vaccination provides protection against morbidity and this in long run improves nutrition status as repeated illness leads to deterioration of health. The study showed that the nutrition status of children with almost 50% suffering from any of the forms of malnutrition. Hand in hand more than 50% have either no or incomplete vaccination which is also decimally low. Das and Hossain (2008) in Bangladesh studied 6005 children aged 12-59 months and they noted that those children who did not receive any vaccines, over one-fifth and two-fifths were found severely and moderately undernourished. Further, the proportion of underweight was found significantly higher ($p<0.01$) among partially immunized children (60%) than that of fully immunized children (52%)**.** Similarly, Ray (2000) in Siliguri, India studied 316 children (under 5 years) and found a significantly higher ($p<0.05$) prevalence of malnutrition children amongst partially immunized and non-immunized children (81.25% and 88.23%) in comparison to fully immunized children (62.07%). This implies that partially and non-immunized children were at higher risk of malnutrition as they were not protected against the vaccine preventable diseases including measles and contributing to the vicious cycle of malnutrition and infection. The results of these studies corroborate well with the present study.

Conclusion

The study concludes that the vaccination coverage and nutrition status of children under 5 years of age is alarmingly poor. Children who had been fully vaccinated had better nutrition status than unvaccinated or partially vaccinated children. This suggests that vaccination programs-in addition to being a major intervention for reducing child mortality might be considered a tool for mitigating under malnutrition. Thus, efforts should be directed towards improving vaccination coverage to combat malnutrition.

References

1. Agarwal, A.K. 2008. Social classification: The need to update in the present scenario. *Ind. J. Community Med*. 33: 50-53.
2. Anekwe, T.D. and Kumar, S. 2012. The effect of a vaccination program on child anthropometry: Evidence from India's universal immunization program**.** *J. Public Health*. 2012 May; doi:10.1093/pubmed/fds032.
3. Das, S. and Hossain, M.Z. 2008. Levels and determinants of child undernutrition in Bangladesh. *Pak. J. Statist.* 24: 301-323.
4. Halsey, N. and A. Galazka. 1985. The efficacy of DPT and oral poliomyelitis immunization schedules initiated from birth to 12 weeks of age. *Bull. WHO*. 63(6): 1151–1169.
5. Lwanga, S.K. and Lemeshow, S. 1991. Sample size determination in health studies: a practical manual. WHO, Geneva.
6. Ray, S.K., Biswas, A.B, Gupta, S.D., Mukherjee, D., Kumar S., Biswas, B. and Joardar, G. 2000. Rapid assessment of nutritional status and dietary pattern in a municipal area. *Ind. J. Commun. Med*. 42: 14-18.
7. WHO Anthro for personal computers, version 2, 2007: Software for assessing growth and development of the world's children. Geneva: WHO, 2007: http://www.who.int/childgrowth/software/en Accessed May 18th, 2012.
8. WHO expert committee. 1995. Physical status: The use and interpretation of anthropometry. *WHO technical report series.* 854: 424-438.