International Journal of Contemporary Pediatrics
Pahwa HS et al. Int J Contemp Pediatr. 2019 Mar;6(2):837-841
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20190739

Original Research Article

Evaluation of immunization coverage and its determinants in children aged 12-24 months from rural and urban areas of Udaipur, Rajasthan, India

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Received: 12 January 2019
Accepted: 11 February 2019

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ABSTRACT

Background: Infectious diseases are now the world's biggest killer of children and young adults. Over the last three decades a lot of progress has been made globally as far as protection against six important vaccine preventable diseases is concerned. The major cause of non-immunization and partial immunization in most of the studies conducted in India and abroad suggest lack of knowledge and awareness about vaccination in the community.
Methods: 400 children aged 12-24 months from urban and rural areas (200 each) of Udaipur in a randomized manner were included in this study. For coverage and evaluation of vaccination in this study, informants preferably mothers were interviewed using pre-coded and pretested questionnaire by door to door visit from 1st April 2017 to 31st March 2018, in urban and rural areas of Udaipur and if mother was not available then father or any other person >18 years belonging to the household was asked to respond to questionnaire.
Results: The present study was undertaken to find out the vaccination coverage in eligible population in rural and urban blocks of Udaipur. Out of 400 children evaluated. More than half (60.25%) of children were completely immunized. 29.5% children were partially immunized and 10.25% were not immunized at all.
Conclusions: Lack of knowledge and awareness were the main reason for non-immunization (44.4%) and partial immunization (29.4%) respectively.

Keywords: Awareness, Immunization, Knowledge

INTRODUCTION

Immunization is the single most successful child survival strategy, world over.[1] They account for more than 13 million deaths a year i.e. one in two deaths in developing countries.[2] Prevention of vaccine preventable diseases is the responsibility of any government. Wild poliovirus has not been found in India since 13 January 2011 meaning that, from that date, India is no longer a country where polio is endemic. 98 Currently it is estimated that immunization saves the life of 3 million children a year but still 2 million more lives can be saved by proper channelization of the existing vaccines.[3] Recent immunization coverage evaluation surveys have shown some improvement at the all India immunization coverage levels.[4] Estimates from the 2015-2016 Indian National Family Health Survey (NFHS-4) indicate that only 62.5% of children aged 12-24 months were fully vaccinated (received BCG, measles, 3 doses of DPT and polio vaccines) and 5% had received no vaccinations at all.[5] Coverage of BCG is 92% (an increase of 14% from NFHS-3 survey). The inoculation of 3 doses of polio was 82%, an increase of 4%. There was a vast improvement in coverage of DPT vaccine. The result of 3 doses of DPT

immunization which showed 3 doses coverage of 85%. Rajasthan had coverage of less than 50% till 2000.[5]

METHODS

Four hundred children aged 12-24 months from urban and rural areas (200 each) of Udaipur in a randomized manner were included in this study. For coverage and evaluation of vaccination in this study, informants preferably mothers were interviewed using pre-coded and pretested questionnaire by door to door visit from 1st April 2017 to 31st March 2018, in urban and rural areas of Udaipur and if mother was not available then father or any other person >18 years belonging to the household was asked to respond to questionnaire. The interview was based on simple questions in local language after getting the respondent in full confidence.

Immunization coverage was categorized into three groups of completely immunized, partially immunized and non-immunized children.

a. The child was considered as fully immunized if he/she had received 3 doses of PENTA, 3 doses of OPV, 3 doses of Hepatitis-B, one dose of BCG and one dose of measles by the age of one year.
b. On the contrary if the child had received any dose of above vaccination, but had not received full doses, was considered as partially immunized.
c. If the child had not received even a single dose of any of the above vaccines was considered as non-immunized.

Nutritional status was assessed on the basis of weight for age. WHO charts were used for assessment. Children with weight for age less than 3rd percentile were considered malnourished and labeled as having Protein Energy Malnutrition.

RESULTS

The maximum numbers of children were males (53.5%). The male: female ratio was 1.15:1 (Table 1).

Table 1: Demographic profiles of children studied.

	Variable	Completely immunized No. (percentage)	Partially immunized No. (percentage)	Non-immunized No. (percentage)	p value
Sex	Male	132 (61.7)	54 (25.2)	28 (13.1)	<0.05
	Female	109 (58.6)	64 (34.4)	13 (7.0)	
Religion	Hindu	188 (68.6)	62 (22.6)	24 (8.8)	<0.05
	Muslim	53 (42.1)	56 (44.4)	17 (13.5)	
Delivery	Institutional	198 (75.0)	64 (24.24)	2 (0.76)	<0.001
	Home	43 (31.6)	54 (39.70)	39 (28.70)	
Mother's education	Illiterate	12 (16.67)	28 (38.89)	32 (44.44)	<0.001
	Primary	46 (47.92)	44 (45.83)	6 (6.25)	
	Middle school	45 (60.0)	12 (20.0)	3 (5.0)	
	High school	32 (61.54)	20 (38.46)	0 (0.0)	
	Intermediate	39 (75.0)	13 (25.0)	0 (0.0)	
	Graduate/PG	67 (98.53)	1 (1.47)	0 (0.0)	
Socioeconomic	Lower	6 (40.0)	5 (33.3)	4 (26.7)	<0.001
	Low middle	11 (44.0)	9 (36.0)	5 (20.0)	
	Middle	92 (42.6)	96 (44.4)	28 (13.0)	
	Upper middle	68 (89.5)	4 (5.3)	4 (5.3)	
	Upper	64 (94.1)	4 (5.9)	0 (0.0)	
Family size	0-2 children	193 (88.5)	13 (6.0)	12 (5.5)	<0.05
	3-4 children	40 (37.7)	45 (42.5)	21 (19.8)	
	≥5 children	8 (10.5)	60 (78.9)	8 (10.5)	
Maternal age	>25 years	174 (73.1)	48 (20.2)	16 (6.7)	<0.05
	≤25 years	67 (41.4)	70 (43.2)	25 (15.4)	
Nutrition status	PEM	37 (23.30)	86 (54.10)	36 (22.60)	<0.001
	Healthy	204 (84.65)	32 (13.28)	5 (2.07)	

More than half (60.25%) of children were completely immunized. 29.5% children were partially immunized and 10.25% were not immunized at all. Lack of knowledge and awareness were the main reason for non-immunization (44.4%) and partial immunization (29.4%) respectively. However, 9.25% of parents deferred vaccination because of customs and believes. A vast majority of mothers (24.0%) studied till primary school.

18.0% were illiterate. 17% of them were either graduates or post graduates.

Table 2: Immunization coverage under NIS during 1st year (n=400).

NIS vaccines	Total immunized children	Percentage
0' Polio	359	89.8
BCG	352	88.0
Pentavalent 1	324	81.0
Pentavalent 2	288	72.0
Pentavalent 3	272	68.0
OPV 1	328	82.0
OPV 2	292	73.0
OPV 3	274	68.5
Measles	238	59.5
ROTA (3 doses)	116	29.0
IPV 1	319	79.5
IPV 2	275	68.75

There was direct co-relation of mother's education with immunization status. Only 16.67% of Illiterate mothers had their children completely immunized whereas mothers who had attended up to middle school had 60% completely immunized children. Almost all the children of mothers with higher education were completely immunized. The place of delivery in 66.0% children was institutional and only 34% children were born at home. Majority of children born at hospitals (75.0%) were completely immunized as compared to 31.6% children born at home. Immunization record was present with 65.25% families. 87.9% completely immunized children had immunization record and only 41.5% partially immunized children were having immunization record. Out of a total of 400 families, almost half the families (54%) belonged to middle class of socio-economic status. Only 17% families were from upper class and 19% from upper middle class. Rest 6.25% were from lower middle class and 3.75% from lower class of socio-economic status according to BG Prasad classification. There was direct correlation of SES with immunization status.

Maximum numbers of families (54.5%) were having two children and only 19% families were with 5 or more children. The families with less than 2 children had complete immunization coverage among 88.5% children whereas it was among 10.5% children of families with five or more children. The percentage of unimmunized children in families with one child was 5.5% and in families with five or more children was 10.5%. Mothers (Group II) were 40.5% and (Group I) were 59.5%. Completely immunized children of mothers in ≤25 years of age were 73.1% and >25 years 41.4%. Immunization status was higher in children of Hindu religion (68.6%) compared to Muslim religion (42.1%). Only 8.8% of Hindu children were unimmunized compared to 13.5% Muslim children. The difference between immunization statuses of both communities was statistically significant. Completely immunized male and female children were 61.7% and 58.6% respectively.

Table 3: Reasons of non or partial immunization in relation to the immunization status (n=159).

Reason of non/partial immunization	Unimmunized	Percentage	Partially immunized	Percentage
Lack of knowledge	24	44.4	43	29.4
Side effects	4	7.4	13	8.9
Sick child	1	1.85	19	13.01
Lazy, casual attitude	3	5.55	14	9.5
Lack of vaccines	2	3.7	12	8.2
Customs and believes	5	9.25	15	10.27
No faith	8	14.8	3	2.05
Previous child healthy	3	5.55	10	6.8
Schedule not known	4	7.40	17	11.6

Maximum number of children (88.0%) had BCG vaccination. It was followed by OPV1 (82.0%), PENTA1 (81.0%), OPV2 (73.0%), PENTA2 (72.0), OPV3 (68.5%) and PENTA3 (68.0%). Only 59.5% of children were immunized against measles vaccination. A dropout rate between 1st and 2nd dose of PENTA was 9.0% and between 2nd and 3rd dose being 4.0%. The immunization coverage of newly introduced vaccines IPV1,2 and Rota (3 doses) was 79.5%, 68.75% and 29.0% respectively. The main reason given by the parents of unimmunized children was lack of knowledge regarding immunization in 44.4% of the parents. 14.8% parents had no faith in vaccination. Customs and beliefs prohibited 9.25% of parents, from taking their child for inoculation. Lazy, Casual attitude towards vaccinating their children were the cause of non-immunization among 5.55% parents (Table 3).

DISCUSSION

In present study 60.25% children (62.14% males and 58.06% females) were fully immunized, 29.5% (24.3%

males and 35.48% females) partially immunized and 10.25% (13.5% males and 6.4% females) were unimmunized, a coverage comparable to National average (NFHS-4), which indicated 62.0% children as completely immunized.[5] The NFHS 4 coverage of Rajasthan was 55%, lower than present study. The higher coverage of immunization in present study must be because Udaipur is a prosperous and economically better city.

In present study only 16.67% children of illiterate mothers were completely immunized which was comparable to that mentioned by Chabbra et al in their study.[6] They concluded that illiterate mothers had 34.4% children were completely immunized. This is because parental education, specifically the mother's education level, played a key role in child immunization coverage, a finding that is also supported by Desai and Alva in their study.[7] 75.0% (198) of children born at hospitals were completely immunized in comparison to 31.60% (43) children born at home. Cutts et al, showed that delivery in a hospital had a positive impact on the immunization status of the child later in the life.[8] Visits taken during antenatal period and delivery in hospital or at home by trained personnel exposes mothers to health personnel, leading them to know about the immunization of children, which may be probable cause of significant association in present study. 94.10% of children belonging to upper and 89.5% upper middle class socioeconomic status were completely immunized in comparison to 44% and 40% children belonging to lower middle and lower class respectively. The completely immunized children belonging to middle socioeconomic status were 42.6%. The correlation was statistically significant. present findings correlated with that by Dalal and Silveria and Kar et al.[9,10] NFHS 4 data suggested vaccination status of children belonging to highest and lowest socio-economic status were 70.0% and 52.8% respectively.[5] The percentage of unimmunized children in families with less than 2 children was 5.6% and in families with 5 or more children was 10.5%. Similar observation was made by Dabi et al.[11] This is due to the neglect of the children when family has 2 or more number of children. With the birth of the younger child, elder children are bound to be less cared for. The love, affection and time are divided with more number of children in the house. Moreover, parents feel more responsible when they have lesser children. NFHS 4 data had findings similar to present findings.[5] The immunization coverage for children with 1st and 6th birth order were 67.3% and 43.3% respectively.

The completely immunized status of children of mother belonging to Group I (Maternal age>25 years) was 73.1% compared to 41.4% in Group II (Maternal age< 25years). 15.4% children from Group II were unimmunized, whereas only 6.7% from group I were not immunized. present study suggests that elder mothers were more likely to get their children immunized. Adenike et al in their study from Nigeria found that immunization status for children of oldest mothers was maximum (78.3%) followed by that of youngest mothers (71.4%).[12] Immunization status of children of middle aged mothers was lowest. So younger mothers are less likely get their children fully immunized compared to older ones probably because they may be unaware of immunization schedule. Moreover, elder mothers have more number of children so they are already aware about the vaccination schedule and are more experienced.

Immunization status was higher in children of Hindu religion (68.6%) compared to Muslim religion (42.1%). Only 8.8% of Hindu children were unimmunized compared to 13.5% Muslim children. The difference between immunization status of both communities was statistically significant.

The NFHS-4 survey defined the religion of infants by that of the head of the family.[5] In general, complete vaccination coverage was higher among Christians and Sikhs. Muslim households had lower complete vaccination coverage and higher non-vaccination than Hindu families. present findings were similar to the study done by Kumar et al in urban slum in New Delhi.[13] Lesser immunization status amongst Muslim children is due to poor socioeconomic status of the Muslim families. More over present study also showed that Muslim mothers have a lower literacy rate and many of them haven't even received primary education. More number of children amongst Muslim families also contributes to the neglect of the children.

Completely immunized male and female children were 61.7% and 58.6 % respectively. Though more immunized male children were seen as compared to female children, but the correlation was not statistically significant. In a study by Bhatt et al reverse trend of immunization coverage was seen with more number of female children being completely immunized compared to male children.[14]

Our findings correspond to the NHFS-4 data which also showed no difference in immunization status amongst males and females. Traditionally neglect of female children have been seen amongst uneducated and lower socioeconomic status females. Government initiatives and propagations of slogans like "save the girl child" and "beti bachaao, beti padaao" have had a huge impact in the society.

In present study, it was observed that maximum number of children with normal nutritional status were completely immunized (84.65%) where as it was only 23.30% for malnourished children. Priyanka R et al, in their study in Thrissur from Kerela had findings similar to present study.[15] They used the same criterion as ours to assess nutritional status

Immunization protects the children from the vaccine preventable diseases and those who are not fully

immunized are at risk of developing recurrent infections, and under-nutrition. 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.

As it is evident from the present study that the main reason of partial or non-immunization was lack of knowledge of families about vaccination and unsatisfactory practices. Considering the incomplete knowledge, and inappropriate practices with positive attitude of the people, it is recommended that the policy makers and medical professionals must do the efforts to raise the knowledge and to break the old beliefs of the vulnerable populations.

CONCLUSION

Lack of knowledge and awareness were the main reason for non-immunization (44.4%) and partial immunization (29.4%) respectively.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Pahwa HS, Goyal D, Sareen D. Evaluation of immunization coverage and its determinants in children aged 12-24 months from rural and urban areas of Udaipur, Rajasthan, India. Int J Contemp Pediatr 2019;6:837-41.