

Original Research Article

A study of immunization status of children in the age group 2-5 years

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ABSTRACT

Background: An evaluation by UNICEF India coverage survey (2009) showed that in India, 61% of children are fully immunized which is significantly low. Objectives of this study were to determine Immunization status of children in the age group of 2 to 5 years and study the social factors influencing immunization status of a child. To know the reasons for partial and non-immunization and study relation of socio-economic status with immunization status.

Methods: A total 2000 children aged 2-5 years who are attending Pediatric OPD, Immunization clinics and admitted in Pediatric ward between May 2015 to May 2017 are enrolled in the present study. Subjects were selected by Simple random sampling method. Immunization status of these children was analyzed and the cause for partial and un-immunization were studied.

Results: Of 2000 children studied, 1303 (65.2%) were fully immunized, 681 were partially immunized (34%) i.e the child had received at least one of the immunization mentioned in NIP and 16 of them were un-immunized (0.8%) i.e they had not received even a single vaccine.

Conclusions: The present study of immunization coverage of 65.2% among children attending pediatric hospital is far from satisfactory. The goal of achieving even 85% coverage seems to be an uphill task. Adverse effects following immunization, busy parents, lack of knowledge seems to be a major contributing factor for the non-success of this national programme. Age, birth order, parent's occupation, parent's education, mother's age are statistically significant contributing factors for the poor immunization coverage among these children.

Keywords: Fully immunized, Partially immunized, Unimmunized

INTRODUCTION

India has experienced 1.21 billion population explosion which has led to crucial alteration between age groups, economic status, residential areas.¹ Options chosen by millions of couples, in future and at present, will influence how the future of this nation is shaped. Subcontinent of India, the world's 2nd leading populous nation with 3/4th population coming from a rural background with poor economic status and illiteracy.²

12-15% of this population constitutes children below 5 years. In children morbidity and mortality is caused mostly by infections. Approximately three million children die annually worldwide, and several others become disabled as a result of vaccine-preventable diseases.³ In India 5 lakh yearly deaths of children are recorded because of diseases that can be prevented by vaccination.⁴

Despite all efforts put in by the governmental and non-governmental institutes for 100% immunization coverage

there are still clusters of low coverage. Immunization services in India are free of cost in public sector, nevertheless, some areas lag in immunization coverage. In India, National Family Health survey (NFHS-4) publishes that only 56.3% of the children of age one to two years have received the basic package. In 5 rural areas of Maharashtra, 66.7% were fully immunized status, 1.8% were unimmunized as per DLHS-4 (2012-2013), while the total rates in the state of Maharashtra were 65.3% and 1.5%, respectively.⁵ NFHS-4 data revealed that the percentage of children in Maharashtra with full immunization (measles, BCG, and DPT/three doses of polio) was 55.8%, in the rural area of Maharashtra it was 56.7%.⁶

METHODS

The present study was conducted on children aged 2 to 5 years attending Pediatric OPD, immunization clinics and children admitted in Pediatric ward in D. Y. Patil hospital, Kolhapur.

The study was conducted between the periods of May 2015 to May 2017 and was studied total 2000 children.

Based on hospital statistics of 2015, 2016, 2017 an average number of admissions, number of OPD and immunization clinics visiting study age group (2-5 year) children was found to be 2500/year Depending on this information about 4000 children were expected to get enrolled during present study period (22 months).

Sampling method

Sampling was determined as follows:

Sampling Interval = $\frac{\text{Population size (N)}}{4000} = 2$
Sample no. (2000)

Simple random sampling method was applied to select 2000 children i.e. every 2nd child in the age group of 2 to 5 years was taken for analysis.

Data collection

Parents of all children aged 2-5 years visiting OPD, immunization clinics and those admitted in the ward at our hospital were interviewed and information in a structured format was collected regarding immunization status of the child. Subjects were selected by systematic sampling method. Immunization status of these children was analyzed and the cause for partial and unimmunization were studied.

Information on socio demographic factors and immunization status was analyzed. The immunization status was confirmed by inspecting the immunization card of the child. If immunization card is not available, BCG scar was inspected to confirm whether BCG was given. If scar was not present, we enquired about the age

of child when the immunization was given and site of injection. For DPT, Measles, Hepatitis B vaccination we enquired the age of child when the child was immunized, site of injection gives us an accurate data.

Informed oral and written consent was taken from parents of the child. All the information was filled, studied, tabulated and interpreted through standard statistical methods.

Inclusion criteria

Children in the age group of 2 to 5 years attending Pediatric OPD, immunization clinics and children admitted in pediatric ward in D. Y. Patil hospital, Kolhapur.

Exclusion criteria

Children enrolled during previous visit.

Analysis

Codes were prepared for each options of the questionnaire. Data was entered in excel sheet to prepare a master chart. Chi square test was used to find out factors affecting immunization status.

Immunization status^{7,8}

Fully immunized

The child who had received all primary doses of BCG, DPT /OPV123, Hepatitis-B, Measles and 1st booster doses of OPV/DPT as mentioned in immunization schedule. J. E. vaccine was not included in this study as our area is non-endemic.

Partially immunized

If child had missed even a single dose as mentioned in immunization schedule.

Un-immunized

If the child had not received even a single dose of any vaccine. Considering these variables, we under took this study.

RESULTS

Table 1: Distribution of children according to immunization status.

Immunization status	Number	Percentage
Fully immunized	1303	65.2%
Partially immunized	681	34%
Unimmunized	16	0.8%
Total	2000	100%

Table 2: Association of age and immunization status.

Age group (years)	Fully immunized		Partially immunized		Unimmunized		Total	%
	No.	%	No.	%	No.	%		
2-3	703	100%	0	0%	0	0%	703	35.2%
3-4	0	0%	681	100%	0	0%	681	34%
4-5	600	97.4%	0	0%	16	2.6%	616	30.8%
Total	1303	65.2%	681	34%	16	0.8%	2000	100%

Chi-Square value (2.02), Degree of freedom (4), P value (<0.000); significant

Table 3: Association of socioeconomic status and immunization status.

socioeconomic status	Fully immunized		Partially immunized		Unimmunized		Total	%
	No.	%	No.	%	No.	%		
Class I	144	60%	94	39.2%	2	0.8%	240	12%
Class II	225	67.2%	109	32.5%	1	0.3%	335	16.7%
Class III	287	66.7%	140	32.6%	3	0.7%	430	21.5%
Class IV	198	58.8%	135	40.1%	4	1.1%	337	16.9%
Class V	449	68.2%	203	30.8%	6	1%	658	32.9%
Total	1303	65.2%	681	34%	16	0.8%	2000	100%

Chi-Square Value-14.18, degree of freedom= 8, P value= 0.077(not significant).

Table 4: Association of birth order and immunization status.

birth order	Fully immunized		Partially immunized		Unimmunized		Total	%
	No.	%	No.	%	No.	%		
One	649	64.3%	353	35%	7	0.7%	1009	50.4%
Two	500	65.5%	256	33.5%	7	1.6%	763	38.2%
Three	121	62.4%	71	36.6%	2	1%	194	9.7%
Four	23	95.8%	1	4.2%	0	0%	24	1.2%
Five	10	100%	0	0%	0	0%	10	0.5%
Total	1303	65.2%	681	34%	16	0.8%	2000	100%

Chi-Square value-16.7, degree of freedom= 8, P value= 0.033(significant)

Table 5: Association of mother's education and immunization status.

Mothers education	Fully immunized		Partially immunized		Unimmunized		Total	%
	No.	%	No.	%	No.	%		
Illiterate	461	69%	204	30.55%	3	0.45%	668	33.4%
Primary school	244	62.24%	148	37.76%	0	0%	392	19.6%
Middle school	54	73%	20	27%	0	0%	74	3.7%
High school	230	60.7%	141	37.2%	8	2.1%	379	19%
PUC	174	63.5%	98	35.8%	2	0.7%	274	13.7%
Degree	136	65.07%	70	33.5%	3	1.43%	209	10.4%
Post graduate	4	100%	0	0%	0	0%	4	0.2%

Chi-Square value-26.5, degree of freedom= 12, P value= 0.009(significant)

Table 6: Association of mother's occupation and immunization status.

Mother's occupation	Fully immunized		Partially immunized		Unimmunized		Total	%
	No.	%	No.	%	No.	%		
Professional	43	55.85%	31	40.26%	3	3.89%	77	3.8%
Business	3	42.9%	4	57.1%	0	0%	7	0.4%
Skilled	13	48.1%	14	51.9%	0	0%	27	1.4%
Unskilled	232	65.16%	123	34.55%	1	0.29%	356	17.8%
Housewife	1012	66.01%	509	33.21%	12	0.78%	1533	76.6%
Total	1303	65.2%	681	34%	16	0.8%	2000	100%

Chi-Square value-19.46, degree of freedom= 8, P value= <0.018(significant)

Table 1 shows immunization status of children ,1303 (65.2%) children were fully immunized, 681 (34%) are partially immunized and 16 (0.8%) children were unimmunized.

Present study showed that 100% fully immunized in 2-3 years age group, 100% partially immunized in 3-4 years age group and 97.4% were fully immunized and 2.6% were unimmunized in 4-5 years age group which is statistically significant.

Parents are more concerned about the immunization of the child at younger age.

Table 3 shows that socio-economic status of all the children included in the study and majority belongs to class V i.e. 658 (32.9%) as this is a sub-urban area. This may be because of free cost of vaccination and mass immunization campaign conducted by the government.

And in class I fully immunized are only 144 (60%) because of AEFI, immunization session inconvenience. This is statistically not significant.

Majority of the children belongs to 1st born i.e. 1009 (50.40%) and number decreases as the birth order increases. In 4th born 23 (95.8%) fully immunized and in 5th born 100 % fully immunization was seen because in class IV and V the population was small (1.2% and 0.5%), so immunization coverage was high. It is statistically significant.

Only 461 (69%) among children of illiterate mothers as they are unaware of need to return for booster doses. Parental education status had significant role to play in the immunization status of child. These values were statistically significant. The immunization was highest among children (66.01%) of mother who are housewife because of immunization session and time convenience. These values were statistically significant.

Table 7: Association of age of mother and immunization status.

Age of mother	Fully immunized		Partially immunized		Unimmunized		Total	%
	No.	%	No.	%	No.	%		
16-20 years	119	62.6%	71	37.4%	0	0%	190	9.5%
21-25 years	844	65.7%	414	32.6%	12	1.7%	1270	63.5%
26-30 years	286	63.8%	158	35.3%	4	0.9%	448	22.4%
31-35 years	44	53.7%	38	46.3%	0	0%	82	4.1%
36-40 years	10	100%	0	0%	0	0%	10	0.5%
Total	1303	65.2%	681	34%	16	0.8%	2000	100%

Chi-Square value-11.4, degree of freedom= 8, P value= 0.051 (significant)

Table 8: Distribution of children according to causes for partial and un-immunization.

Causes for partial and un-immunization	No.	%
Adverse effects following immunization	154	22%
Busy parents	140	20%
Lack of health facility near by	121	17.32%
Not aware of need to return for 2 nd and 3 rd dose	109	16%
Concern for loss of work /wages	105	15%
Unwell child	85	12.25%
Ignorance of parents	82	11.8%
Lack of motivation	77	11%
Time inconvenience	74	10.70%
Lack of knowledge of immunization schedule	70	10%
Belief that immunization may be harmful	32	4.5%
Child was away from home	7	1%

Table 7 Shows Unimmunized were (1.7%) among children born to mother of 21-25yrs and (0%) in children born to mother of 36-40yrs. As they have better

awareness about immunization. It is statistically significant.

Table 8 shows causes for partial and un-immunization and major causes are AEFI 22%, busy parent’s 20%, lack of health facility near by 17.32%, concern for loss of work 15%.

Table 9: Distribution of children according to number of causes for partial and un-immunization.

Causes for partial and un-immunization	Number	Percentage
One cause	471	56.4%
Two causes	192	23%
More than two causes	171	20.6%
Total	834	100%

Table 9 shows distribution of children according to number of causes for partial and un-immunization 471 (56.40%) have one reason, 192 (23%) children have two reasons and 171 (20.60%) have more than two reasons.

Table 10: Dropout rates.

Immunization status	Total no. of children	No. of children vaccinated	Percentage of drop rates
Birth-BCG	2000	1930	3.5
BCG-DPT1	1930	1842	4.4
DPT1-DPT2	1842	1606	5.2
DPT2-DPT3	1746	1606	8.01
DPT3-Measles	1606	1420	11.6
Measles -DPT 1 st Booster	1420	1160	18.3
BCG-DPT3	1930	1606	16.7
BCG-Measles	1930	1420	26.4
BCG-DPT1 st Booster	1930	1160	39.8
DPT1- DPT1 st Booster	1842	1160	37
Birth- DPT1 st Booster	2000	1160	42

Birth to DPT 1ST dose overall has 42% drop out. So, we see a progressive rise in the drop out levels for subsequent immunization. Overall dropout rate for DPT was 37%. This is due to unaware of need to return for 2nd and 3rd dose and lack of motivation. Hence it is very important to lay a heavy emphasis on importance of follow up visits for subsequent vaccines.

DISCUSSION

In the present study the percentage of fully immunized children was 65.2%. Similar findings on fully immunized children were noted in studies of Malini Kar et al (69.3%), Yadhav et al (60.8%) and Prabhakaran Nair et al (77.5%).⁹⁻¹¹ While Mathew et al and Nirupam et al noted 25% and 34.5% of fully immunized children which was very low percentage.^{12,13}

Thirty four percentage were partially immunized children in the present study and similar findings were also seen by Manjunath et al (31.3%), Malini Kar et al (15.7%), Prabhakaran Nair et al (18.3%), Yadhav et al (27.7%) and Nirupam et al (32.6%).^{9-11,13,14} While in the study conducted by Kumar et al shows 48% of the children assessed in tertiary care hospital of North India were partially immunized which was very high as compared to above studies.¹⁵

0.8% children in the present study were un-immunized which was less in comparison with Prabhakaran Nair et al (4.2%) in Kerala (Trivandrum) and Kumar et al (34.15%), Manjunath et al (18.7%), Yadhav et al (11.5%), Malini Kar et al (15.1%), and Nirupam et al (32.9%).^{9-11,13-15} The difference in the observations of these studies make it necessary for the effective and uniform implementation strategy of UIP to cover every child in society.

In the present study 100% immunization was seen in the age group 2-3 years, 100% partial immunization was seen in 3-4 years age group and 2.6% un-immunization was seen in 4-5 years age group. Similar findings were observed by Anjani Kumar Srivastava, and Gowri Shankar showed 52.6% children were fully immunized in 24-60 month.¹⁶ Common reasons observed were not aware of need to return for 2nd and 3rd doses and inconvenient immunization session.

As author observed most of the children belongs to socio-economic class III (21.5%) and class V (32.9%), immunization status is also more in these two classes (66.7% and 68.2%). Similar observations made by Srivastava AK et al and Malini Kar et al states that there is no association between socio-economic status and immunization status of children where, 73.5% children of lower socioeconomic group were fully immunized as compared to middle S. E. group (59.2%).^{9,16} The common reasons are free of cost vaccination, mass immunization campaign.

Present study shows that fully immunized are 64.3% of 1st born, 65.5% of 2nd born, 62.4% of 3rd born and 95.8% of 4th born which is similar to study conducted by Khargekar NC in which he had observed 66.6 % in 4th born are fully immunized.¹⁷ As the total number of children in 4th and 5th birth order is low, immunization status is high. Parent's education and occupation status had a significant impact on immunization status of the child. Most of the parent's in the study are illiterates and employed in skilled work who showed high immunization status. The most common reasons for under immunization were fear of AEFI, busy parents, inconvenient immunization camps.

100% full immunization was observed in children born to mothers of age 36-40 years where as it is only 62.6% in mother's aged 16-20 years. These findings are similar to study conducted by Elizabeth et al observed 70.3% children of mother <19yrs, 71.9% of children of mother 19-29yrs and 76.5% of children of mother 30+yrs are fully immunized.¹⁸ So younger mothers are less likely get their children fully immunized compared to older ones probably because they may be unaware of immunization schedule.

Author had taken 12 reasons in to consideration to know the causes for partial and un-immunization of the child. Out of which the most common reasons are AEFI (22%), busy parent's (20%), lack of health facility nearby (17.32%), not aware of need to return to 2nd and 3rd doses (16%) and concern of loss of wages / work (15%) constituting almost 60%. Similarly, lack of knowledge about immunization schedule was the reasons responsible for under immunization noted by Kumar et al, (52.4%) and Tiwari et al (29.8%) while, ignorance was the reason quoted by Tiwari et al, (36.8%), Yadav et al (80.36%).^{10,15,19} Thus, even after 25 years of UIP implementation, bulk of children were missed for their

basic right of immunization. This underlines the intensive need to create awareness about immunization among the parents. In the present study, 8% children among the partial and unimmunized were due to unaware of missed dose and 1% is due to child is away from home.

Limitations of present study include, as this is a hospital-based study, it does not represent the component of the society. Since study group was between 2 to 5 years there might be chances for recall bias in those who don't have immunization card.

CONCLUSION

Out of 2000 children, 1303 (65.2%) were fully immunized, 681 (34%) were partially immunized and 16 (0.8%) were un-immunized. Education and age of the mother significantly influences the immunization coverage. Though the immunization coverage has increased over the last few years in general, booster doses are still neglected and there is need to create awareness about importance of booster doses. Parents should be given counselling regarding AEFI and its management.

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