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Original Research Article

Immunization status of children aged 1-5 years attending tertiary care center and reasons for partial or non-immunization

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ABSTRACT

Background: Immunization is a reliable evidence-based approach to eradicate deadly infectious diseases. National family health survey (NHFS4) data reveals that immunization after 1 year of age dropped in Kanyakumari district, Tamil Nadu, India.
Methods: Our aim was to determine immunization status and reasons for partial or non-immunization of children aged 1 to 5 years in Kanyakumari district from April 2019 to March 2020. It's a prospective and descriptive hospital-based study. Here 613 children were split-up in three categories based on ministry of health and family welfare (MOHFW) guidelines as fully, partially or unimmunized. The samples were analysed with IBM. SPSS statistics software 23.0 Version.
Results: Of the 613 children 5 were excluded from the study due to contraindications to immunizations. Of the 608 children 529 (87%) were fully immunized, 79(13%) were partially immunized and none were unimmunized. Among partially immunized, 2 parents lacked information (2.5%), 26 parents lacked motivation (32.9%), 45 parents faced obstacles (57%) and 6 parents had other reasons (7.6%). 2 parents who lacked information were migrant laborers, illiterates and the children were home delivered. In the partial immunization, chi-square and regression analysis revealed that for female gender the p-value was 0.001, OR 2.084 with 95% confidence interval (CI) (1.347 to 3.226), for parental education the p-value was 0.0005, OR 1.561 with 95% CI (1.034 to 2.335) and for home delivery the p value was 0.0005, OR 1.564 with 95% CI (1.006 to 2.432).
Conclusions: The study determines that factors associated with partial immunization are female children, illiterate/less educated parents and home delivery.

Keywords: Children, Immunization, Partial immunization

INTRODUCTION

One of the most cost-effective public health interventions to prevent the transmission of vaccine preventable disease is immunization.[1] It is essential to ensure maximum coverage of vaccination to avail maximum benefits of immunization. India launched immunization Program as 'extended program of immunization' by 1978 and modified it as universal immunization program (UIP) targeting six vaccine-preventable disease (VPDs) (tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis and measles) by 1985. The united nations children's fund (UNICEF) coverage evaluation survey in 2009 found that through universal immunization program (UIP) only 61 per cent children fully vaccinated.[3] UIP became a part of child survival and safe motherhood program in 1992. In 1997 it was implemented through reproductive and child health program and then merged with national rural

health mission program by 2005 and national health mission since 2013.[4] Major achievements of UIP are elimination of polio by 2014 and maternal and neonatal tetanus by 2015. Due to diligent and determined public health measures, full immunization coverage of Tamil Nadu increased to 81.67% by March 2016.[5]

National family health survey (NFHS) provides information on population, health and nutrition for India and each State/Union territory. The District level household and facility survey-4 (DLHFS-4) survey during 2012-2013, found that 56 per cent of the children aged 12-23 months in the State were fully vaccinated.[6] The NFHS-4 during 2015-16, the fourth in the series, provides district-level estimates for many important indicators for the first time. It covers information on key indicators and trends for Kanyakumari District. NFHS-4 fieldwork for Tamil Nadu was conducted from 23 February 2015 to 29 June 2015. The findings of the NFHS-4 survey indicated that during 2016, only 78.4% of children aged 12-23 months in Kanyakumari District were fully vaccinated.[7] The mortality of under 5 years of age (U5MR) directly reflects the immunization status of any given population. According to sample registration system (SRS) 2018 under 5 mortality of India is 37 for 1000 live births.[8] The U5MR is 17 and 10 for every 1000 live births in Tamil Nadu and Kerala respectively. There is also resurgence of vaccine preventable diseases like diphtheria, pertussis, measles and mumps in Tamil Nadu[9,10] and Kerala.[11,12] During infancy immunization coverage was better and most defaults occur after infancy.[13] Hence a cross-sectional survey is carried out to determine the immunization status of children between 1-5 years in Kanyakumari District and analyses the reasons for partial immunization or non-immunization.

METHODS

The study is prospective and descriptive hospital-based study. This study includes all children aged 1-5 years attended immunization clinic of Kanyakumari Government Medical college Hospital from April 2019 to March 2020 for immunization. Children with severe allergic reaction to a vaccine component or following a prior dose of a vaccine, encephalopathy occurring within 7 days of pertussis vaccination and immunodeficiency or immunosuppressed state children were excluded from the study.

After obtaining approval from the institution ethical committee active surveillance of all children attending the immunization clinic was done. Written informed consent was obtained from the parent or the primary guardian. Vaccination card was used to verify their immunization status. Socio-demographic pattern and factors causing delay or default of immunization was assessed by entering the details in a proforma. The proforma consists of name, age, gender, residence, father and mother's education, place of delivery, immunization status and reasons for partial or non-immunization. Children were split up into fully immunized, partially immunized and unimmunized according to National Immunization Schedule updated in the MOHFW Guidelines.[14]

Definitions

Fully immunized: Fully immunized is defined as when the child had received bacille Calmette-Guerin (BCG), at birth Hepatitis B, three doses of pentavalent and rota virus vaccine, and three doses of oral polio vaccine (OPV)/two doses of inactivated polio vaccine (IPV), two doses of measles and rubella virus vaccine (MR) vaccine and a diphtheria, pertussis and tetanus (DPT) booster if child is less than 24 months and 2 doses of DPT booster if the child is less than 72 months.

Partially immunized: partially immunized is defined as child has received immunization, but not all vaccines.

Non immunized: when the child has not received any of the vaccines.

Reasons for partial immunization or non-immunization are categorized as,

Lack of information: unawareness about immunization, fear of immunization, wrong ideas on immunization.

Lack of motivation: postponing until favorable time, No motivation/motivator.

Obstacles: no faith in immunization, place of immunization too far, time of immunization inconvenient, vaccinator absent, mother unavoidably busy, mother ill, child ill, family problem, shifting home etc.

Others: lost immunization card, forgot about immunization, careless that immunization will be given at school, child missed immunization at school etc.

Sampling size and sampling procedure

The sample size was calculated with the formula where prevalence rate taken from NHFS 4 data of Kanyakumari district.

$N = 4PQ/d^2$

$N = 4\times78.4\times21.6 / (15\% \text{ of } 21.6)^2$

$N = 4\times78.4\times21.6/10.5$

N = 645 children aged 1-5 years.

Totally 613 children attended the immunization clinic in a year period out of which 608 were included in the study. 2 children developed hydrocephalus due to preexisting condition and hence not included in the study,

one child had post immunization encephalopathy hence was referred for acellular vaccination and 2 children were diagnosed with primary immunodeficiency disorder and hence excluded from the study.

The collected data were analyzed with IBM. SPSS statistics software 23.0 Version for MS Windows. For data descriptive statistics, frequency analysis and percentage analysis were used for categorical variables. To find the significant difference between the bivariate samples in Independent groups the Unpaired sample t-test is used. To find the significance in categorical data Chi-Square test is used with Odds ratio, 95% CI and Logistics regression analysis to find the influence of factors for partial immunization. Statistical significance was assessed at 5% level of significance (p-value<0.05).

RESULTS

Data's from 608 children indicates that 87% (n=529) are fully immunized and 13% (n=79) are partially immunized. This is shown in (Figure 1). There were no unimmunized children.

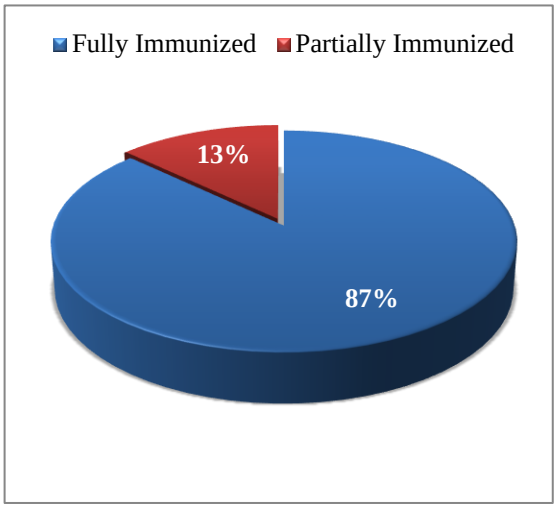

Figure 1: Immunization coverage.

Table 1: Socio-demographic characteristics of children.

Age and immunization		Full (%)	Partial (%)	Total (%)	P value
Age	<60 months	345 (65.2)	51 (64.6)	396 (65.1)	0.5
	≥60 months	184 (34.8)	28 (35.4)	212(34.9)	
Gender	Female	240 (45.4)	52 (65.8)	292 (48)	0.001
	Male	289 (54.6)	27 (34.2)	316 (52)	
Residence	Rural	180 (34)	28 (35.4)	208 (34.2)	0.44
	Urban	349 (66)	51 (64.6)	400 (65.8)	
Mother education	School education	217 (41)	34 (43)	251 (41.3)	0.001
	College education	312 (59)	43 (54.4)	355 (58.4)	
	Illiterate	0 (0)	2 (2.5)	2 (0.3)	
Fathers education	School education	214 (40.5)	40 (50.6)	254 (41.8)	0.0005
	College education	315 (59.5)	37 (46.8)	352 (57.9)	
	Illiterate	0 (0)	2 (2.5)	2 (0.3)	
Delivery	Private institution	291 (55)	53 (67.1)	344 (56.6)	0.0005
	Government institution	237 (44.8)	24 (30.4)	262 (43.1)	
	Home delivery	1 (0.2)	2 (2.5)	3 (0.3)	

The socio demographic data like age, gender, residence, father and mother's education, place of delivery, etc. were obtained and analyzed for association with partial immunization. The details of individual factors are as follows and listed in (Table 1).

Age

65.1% children were <60 months and are studied for delay in immunization of DPT1 booster vaccine, OPV booster vaccine and MR2 booster vaccination as per National Immunization Schedule. 34.9% children >60 months are analyzed for DPT2 booster vaccine default. The p value for age and immunization is 0.5, which concludes that age doesn't influence immunization defaults.

Gender distribution

This categorical variable gender reveals that among the 79 children with partial immunization, 65.8 % (n=52) were female and 34.2% (n=27) were male. Statistics analyzed by Pearson's chi square test shows significant p value of 0.001. This postulate female children were more vulnerable for partial immunization which is of major concern.

Residence

Among the 608 children studied, 34.2% (n=208) children were from urban area and 65.8% (n=400) children were residing in rural area. Among the 79 children partially immunized 35.4% (n=28) were from rural area and 64.6% (n=51) were from urban area. The p value noted

was >0.05. It infers that immunization status of a child is unaffected by the type of residence in Kanyakumari district.

Mother's education

The education levels of parents are studied in detail. Three category of education level as illiterates, school educated, college educated is considered in this study. The analysis shows that illiterate parent was associated with partial immunization. The mother's education influences the immunization of children. The p-value is 0.001 which implies that partial immunization is higher when the mother is illiterate.

Fathers education

Father's education also shows significant association for partial immunization as the p value is 0.0005. This points that the lesser the father's education, higher is the immunization default. College educated fathers 10.5% (n=37), school educated fathers 15.7% (n=40) and all illiterate fathers in our study had partially immunized children.

Place of delivery

The children born in private institutions, government institutions and home delivery were considered in this study. The role of delivery location had significant association with immunization. Out of the 3 home delivered children 66.6% (n=2) were partially immunized and both were children of migrant workers. The children delivered in private institution had 15.8% (n=53) were partially immunized whereas in government institution 10.1% (n=24%) were partially immunized. This indicates the children delivered in government institution have better immunization coverage than private or home delivered children.

Table 2: Reasons for partial vaccination.

Reasons for partial immunization	N (%)
Lack of information	2 (2.5)
Unawareness about immunization	2 (2.5)
Fear of immunization	0 (0)
Wrong ideas on immunization	0 (0)
Lack of motivation	26 (32.9)
Postponing until favourable time	25 (31.6)
No motivation/motivator	1 (1.3)
Obstacles	45 (57)
No faith in immunization	0 (0)
Place of immunization too far	0 (0)
Time of immunization inconvenient	0 (0)
Vaccinator absent	0 (0)
Mother unavoidably busy	7 (8.9)
Mother ill	1 (1.3)
Child ill	29 (36.7)
Family problem	3 (3.8)
Shifting home	5 (6.3)
Others	6 (7.6)
Lost immunization card	1 (1.3)
Forgot about immunization	3 (3.8)
Careless that immunization will be given at school	2 (2.5)

Table 3: Regression analysis.

Variables	B	S.E.	Wald	df	Sig.	OR	95% C.I. for OR	
							Lower	Upper
Age	-0.155	0.262	0.351	1	0.553	0.856	0.513	1.430
Gender	-0.815	0.257	10.038	1	0.002	2.084	1.347	3.226
Residence	-0.146	0.266	0.299	1	0.585	0.864	0.513	1.457
Place of delivery	-0.473	0.270	4.076	1	0.043	1.564	1.006	2.432
Mother's education	0.378	0.339	1.245	1	0.264	1.459	1.051	2.834
Father's education	-0.705	0.341	4.548	1	0.039	1.561	1.034	2.335
Constant	0.067	0.961	0.005	1	0.944	1.069		

Reasons for partial immunization

Table 2 shows the major reasons for partial immunization are lack of motivation 32.9% (n=26) and obstacles 57% (n=45). Of these reasons postponing the immunization until favorable time 31.6% (n=25) and child's minor illnesses 36.7% (n=29) are the major hurdles. The 2 children with lack of information 2.5% as reason for partial immunization are children of migrant workers and home delivered kids whose parents were illiterate.

Regression analysis

Logistic regression analysis in Table 3 shows that female gender, parental level of education and place of delivery has significant association with default in immunization status of children aged 1 to 5 years.

DISCUSSION

Kanyakumari district is the most educated district in Tamil Nadu. It is also one of the good performing districts in achieving the Millennium Development Goals of WHO as per SRS 2018. Immunization is one of the key public health measures in achieving these goals and to reduce under 5 mortality. Regular surveillance on immunization coverage is mandatory to sustain immunization coverage.[15] This study looked on the influential factors for partial or non-immunization with age of the child, gender, place of residence, place of delivery, parental education status and sorted out the common reasons for partial immunization so as to address the concerns. This study did not show any significant association with partial immunization and age of the child which confirms with Tikmani et al and unlike the study of Agarwal et al the p-value was 0.5 and insignificant with OR 0.8 (95% CI 0.513 to 1.430). Gender variation is the next observed variable in this study.[16,17] Our study showed female gender is vulnerable for immunization default with p-value 0.001 and OR 2.084 with (95% CI 1.347 to 3.226) which is similar to the systematic review by Mathew Joseph L and Mugada V et al studies.[18,19] Residence proved no correlation for partial immunization in our study which was similar to Holipa et al study and Madhavi et al study at Kakinada, AP.[20,21] Place of delivery (home delivery) is identified as being associated with failure of immunization with a P value of 0.0005 and OR 1.564 and (95% CI 1.006 to 2.432). This establishes an association between non-institutional delivery to failure of immunization. Similar results were confirmed in Kumar et al study in Delhi, Khan et al study done at Chhattisgarh and in the systematic review by Mathew JL.[22,23]

Parental education with both father and mother's educational status showed association with partial immunization status in children in our study. The odds revealed for mother's education with p value of 0.001, OR 1.459 and 95% CI (1.051 to 2.834) and for father's education level with a p-value of 0.0005, OR 1.459 and 95% CI (1.051 to 2.834) associating lower the education level of parents higher is the chance for immunization default. The results are similar to Upadhye JV et al Mathew Joseph L18 systematic review and Kumar et al studies.[22,24] Obstacles to immunization like mother too busy with work, child ill; mother ill, family problem and shifting of residence are noted in 57% (n=45) of partially immunized children. The second common reason identified is no motivator and postponing immunization until a favorable time with 32.9% (n=26) children being affected. Few children (7.6%) missed the opportunity for immunization due to parents losing the immunization card, forgetting about immunization and child missing immunization at school. This can be addressed by proper IEC workup by public health workers and motivators. Parents of 2 out of the 3 children (66.6%) who were migrant workers are unaware of immunization and also observed to be illiterate. These children are the high-risk children for non-immunization and will act as a nidus for spread of vaccine preventable diseases and needs to be addressed with priority. Similar results were documented in the study by Mamta S et al at Dhule, India.[25]

Limitation of the study were the study is hospital based and not community based which may tamper the real community components and risk factors associated. The tertiary care center being located in a town has less input from rural population and migrant workers who prefer local primary care facility. Hence the impact of rural and migrant workers missed opportunities on immunization would have been under estimated.

CONCLUSION

As per this study, full immunization coverage of children aged 1-5 years in Kanyakumari district is 87%. Female gender, educational level of parents and home delivery are the statistically significant factors associated with partial immunization. Preventable obstacles like undue anxiety about child's illness (36.7%) and postponing immunization until a favourable time (31.6%) are the common reasons observed for immunization default. 2.5% who had lack of awareness about immunization were illiterate migrant workers.

Recommendations

To improve immunization coverage focus should be on creating awareness to prevent gender discrepancy, educating the parents regarding concerns about child's illness and improving overall awareness about the benefits of immunization by IEC (information, education and communication) at primary care level. Migrant workers children who are observed with partial immunization had lack of immunization awareness and information on immunization which is of great concern. This needs to be strongly addressed to prevent resurgence of vaccine preventable disease and achieve full immunization coverage in both native and migrant children.

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