

Research Article

Delayed Childhood Immunization and its Associated Factors in Children under 2 Years of Age in Kelambakkam, Chengalpattu District

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A B S T R A C T

Introduction: Immunisation is the most effective public health intervention for reducing morbidity and mortality among young children. Even though we have witnessed an increase in immunization status, the lag in vaccinating younger children and the rural-urban gap in immunizing kids is still a matter of concern. Any disruption in the ongoing immunization services might even contribute to the initiation of the secondary outbreak of vaccine-preventable diseases.

Methodology: A cross-sectional study was conducted to assess the immunization status of children under 2 years of age in Kelambakkam, along with the determinants of missed/delayed immunization using a semi-structured questionnaire to the parents of children below 2 years of age residing in Kelambakkam area of Chengalpattu district.

Results: Delay in immunization was recorded in 34.28% of children among the entire study participants. Vaccines like MR¹ (Measles, Rubella), and PCV Booster given at 9 months were delayed in 25% of children. Immunization delay and birth order of the baby were found to be significantly associated with each other.

Conclusion: The delivery of basic health services like childhood immunization in Chengalpattu was majorly disrupted due to the ongoing pandemic. The findings of our study may be considered a basic reference for implementing any plan of action to improve childhood vaccination coverage during an epidemic or natural disaster or pandemic.

Keywords: COVID-19 Pandemic, Delayed Immunization, Child health, Birth Order

Introduction

Immunization is the most effective public health intervention for reducing morbidity and mortality among young children.¹

The percentage of children who received all the basic vaccinations was 77% during 2019-21 according to National Family Health Survey data.² Even though we have witnessed

an increase in immunization status, the lag in vaccinating younger children and the rural-urban gap in immunizing kids are still a matter of concern.³ In addition the ongoing pandemic has affected not only the well-being of the general population but also the effective administration of healthcare services globally.⁴ Children are a major chunk of epidemiological groups in disease transmission.⁵ So, school closure was opted as one of the major interventional strategies to reduce community spread.⁶ Although these strategies are necessary for effective management of disease spread, shutting down schools or ICDS centres or Anganwadi centres for an extended period of time had a negative effect on child's mental, emotional and physical well-being.⁷ Childhood immunization is one among the health services that warrants attention as it may be missed or delayed.⁸ Vaccine-preventable diseases are an important concern that requires adherence to recommendations like immunization to prevent severe forms of illness in children.⁹ Any disruption in the ongoing immunization services might even contribute to the initiation of secondary outbreaks of vaccine-preventable diseases.⁸ Administration of vaccines appropriate to scheduled dates is critical. Many factors may influence the timely vaccination of children. According to the World Health Organization (WHO), the ongoing covid pandemic has increased the risk of diseases among children due to the lockdowns and disruptions in healthcare systems.¹⁰ Vaccines, when administered approximately on the scheduled dates, can effectively achieve a noteworthy decrease in childhood mortality and morbidity rates.¹¹ Other studies have also emphasized the fact that if adherence to the immunization schedules and administration of vaccines appropriate to scheduled dates were neglected, children will be more vulnerable to those diseases during the specified period.¹² Hence, this study was done to assess the immunization status of children under 2 years of age in Kelambakkam, along with the determinants of missed/delayed immunization.

Methodology

A cross-sectional study was conducted using a semi-structured questionnaire. The study participants were parents of children below 2 years of age residing in the Kelambakkam area of Chengalpattu district during the study period. The list of children less than 2 years was obtained from Kelambakkam Primary Health Centre, Chengalpattu. Using the $N = z^2pq/d^2$ formula and taking into consideration the prevalence of complete immunization as 56.2 % obtained from District Level Household Survey IV, considering a 95% confidence and taking a 10% non-response rate, the final sample size was estimated to be 105. By computer-generated random numbers method, the required number of children was selected by a simple

random method. After obtaining informed consent from the parents or the caregivers, interviews were done with the parents of selected children using a pretested questionnaire and data were obtained. The questionnaire had four parts; socio demographic profile, current immunization status, attitude towards immunization, and dietary habits during the pandemic which sums up to 25 questions. This questionnaire was pretested with 30 participants initially. Minor changes were made as per expert opinion. These 30 participants were subsequently removed from the main study. Data regarding general socio-demographic factors namely age, sex, education of the informant, socio-economic class, child's age, sex, and birth order were all collected. The maternal and child health card, immunization card, and other records of the particular child were also used to verify the scheduled dates for vaccination apart from the participant's information. The vaccines like BCG (Bacillus Calmette Guerin), OPV (Oral Polio Vaccine), Pentavalent (Diphtheria, Pertussis, Tetanus, Hepatitis B, H. influenza) vaccine, IPV Injectable Polio vaccine, PCV (Pneumococcal Conjugate Vaccine), Rotavirus, MR vaccine (Measles and Rubella) are the vaccines given under National Immunisation Schedule.¹³ Vaccine delay refers to any immunization that happens one month or afterward from the scheduled date of vaccination.¹⁴ Data were interpreted with frequency, percentage, and Chi-square test using SPSS 21 (Scientific Package for the Social Sciences).

Results

The majority (60%) of the study group were found to be less than 1 year of age and 41.9% of parents were above 30 years of age. 54.2% of the study participants were boys and 59.05% of informants were mothers. 54.28% of the children belonged to class I, II and III socio-economic status (according to B.G. Prasad classification) and 9.53% were of birth order 3. Other socio-demographic characteristics of the study participants are explained in Table 1.

Delay in immunization was recorded in 34.28% of children among the entire study participants. In certain cases, we observed that the delay in vaccination had occurred multiple times in the case of a particular child. Vaccines that were recommended to be taken at the time of birth like BCG (Bacillus Calmette Guerin), OPV⁰ (Oral Polio Vaccine), and Hepatitis B⁰ were delayed in 2.85% of children. Vaccines that are to be given at 6 weeks (Pentavalent,¹ OPV,¹ Rota,¹ IPV,¹ and PCV¹), 10 weeks (Pentavalent,² OPV,² Rota²) and 14 weeks (Pentavalent,³ OPV,³ Rota,³ IPV² and PCV²) were delayed in 7.61%, 10.97% and 8.82% of children respectively. Vaccines like MR¹ (Measles, Rubella), and PCV Booster which was recommended to be given at 9 months was found to be delayed in 25% of children.

Table 1. Distribution of study Participants with Regard to Socio-demographic Profile

| Parent's gender | Frequency (n) | Percentage (%) |
|----------------------|---------------|----------------|
| Father | 43 | 40.95 |
| Mother | 62 | 59.05 |
| Parent's age | | |
| <30 | 61 | 58.09 |
| ≥30 | 44 | 41.90 |
| Education level | | |
| Up to schooling | 56 | 53.33 |
| Graduate and above | 49 | 46.67 |
| Socio economic Class | | |
| Class I, II, III | 57 | 54.28 |
| Class IV, V | 48 | 45.71 |
| Age of the child | | |
| ≤1 year | 63 | 60 |
| >1 year | 42 | 40 |
| Gender of the child | | |
| Girl | 48 | 45.8 |
| Boy | 57 | 54.2 |
| Birth order | | |
| 1 | 53 | 50.47 |
| 2 | 42 | 40.00 |
| 3 | 10 | 9.53 |

Delay in vaccination was seen increasingly in parents who were aged more than 30 years, who had female babies, and whose children belonged to class IV and V socio-economic status. Parents whose educational status was low (primary school and high school) were associated with more delay in vaccination. Immunization delay and birth order of the baby were found to be significantly associated with each other ($p < 0.005$) (Table 2).

Various reasons were stated for the delay in vaccination, out of which the most opted reason by the parents was fear of getting infected with COVID-19 (68.2%) which was followed by unavailability or inaccessibility to transport (12.6%) and time constraints (10.4%) Figure 1.

Discussion

In the past two decades, there were variations in the percentage of delayed or postponed administration of vaccines across countries. To be specific, in the United States, it was observed that only 25% of children received vaccinations on the scheduled dates.¹⁵ Whereas in Saudi

Arabia, delayed administration of vaccination was ranging between 9% and 24% due to diverse factors, like non - availability of the vaccines in some health delivery units or facilities and important travel being scheduled when vaccination was due.¹⁶ This study which aimed to assess the prevalence and reasons for any delay in vaccination among children under two years of age gives us a clear picture of the influence or effect of the ongoing pandemic on the timeliness of childhood vaccination in Kelambakkam. Different study reports have pointed out various reasons that have taken a serious hold on childhood immunization. For instance, the study by Abbas et al. declares that the risk of dying due to any of the vaccine-preventable diseases preferably outweighs the risk of death following possible infection contracted in hospitals during the visits to clinics/ health delivery points/health facilities.¹⁷ In the United States, after the implementation of various restrictions following the national emergency, there was a great decrease in the administration of routine vaccines, primarily in children who have crossed one month of age and there was an observed delay in immunizing the children below 2 years of age.¹⁸

Table 2. Association between Immunization Delay and Socio-demographic Characteristics

| Variables | Delay in vaccination (n) | Delay in vaccination (%) | Chi square |
|---------------------------|--------------------------|--------------------------|----------------|
| Parent's age | | | $X^2 = 0.766$ |
| <30 | 20 | 32.7 | d=1 |
| ≥30 | 16 | 36.3 | p=0.089 |
| Sex of the baby | | | $X^2 = 0.066$ |
| Male | 19 | 33.3 | d= 1 |
| Female | 17 | 35.4 | p = 0.798 |
| Socio-economic class | | | $X^2 = 0.332$ |
| I, II, III | 17 | 29.8 | d= 1 |
| IV, V | 19 | 39.5 | p=0.941 |
| Educational Qualification | | | |
| Primary and high School | 11 | 30.5 | $X^2 = 0.416$ |
| Higher Secondary | 10 | 27.7 | d=2 |
| Graduate | 15 | 41.8 | p=0.663 |
| Birth order | | | |
| 1 | 18 | 33.9 | $X^2 = 10.522$ |
| 2 | 10 | 23.8 | d= 2 |
| 3 | 8 | 80.0 | p = 0.004 |

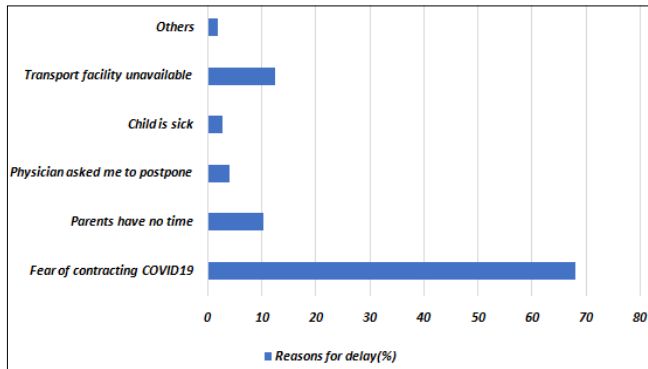


Figure 1. Reasons for delay in Vaccination

There was also evidence for the fact that more than 20% decrease in Mumps, Measles, and Rubella vaccination was visualized in England during the past 2 years. Even hexavalent vaccination has shown a decrease in its administration.¹⁹ In Pakistan, there was a remarkable fall in immunization in the last 3 years. Vaccination coverage accounts for about 52% of young children. Reports from other studies also reveal that the outreach vaccination services were badly affected in comparison to the hospital or facility services.²⁰ This could have been the reason for the fall in immunization in those respective regions. In our study, informants have reported a 25% delayed immunization in the routine paediatric schedule that is given after the child completes 9 months of age. This fact stated by the previous studies is consistent with this finding of ours. More than 25% of the missed or delayed vaccinations have occurred in children belonging to the age of 9 months and above. This finding is consistent with a study finding from the United States, in which they have particularly focussed and promoted timely vaccination in more younger children during the ongoing pandemic.²¹ This gives us a new idea that routine childhood immunization should be prioritized in younger children particularly in pandemic period.

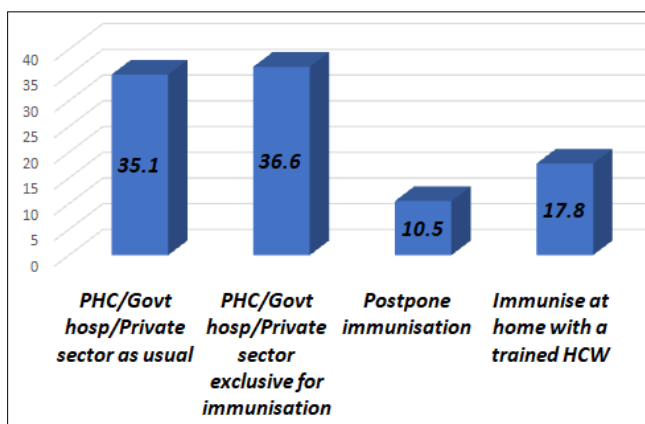


Figure 2. A Preferred place to get Vaccinated by the Study Participants

Our study states that the observed delay in getting vaccinated routinely was majorly due to the fear of getting infected during the hospital visit. Other reasons are the non-availability of transport facilities and restrictions posed on healthcare delivery services to contain the spread of infection. This finding was found to be consistent with a study done in the United States by Santoli et al indicating the potential causes of missed or delayed vaccinations.²² Utilisation of healthcare workers and professionals who were engaged in routine health services for covering other duties,²³ suspension of vaccination camps and campaigns in view of the pandemic, restriction in the use of public transport services, the parental concern of contracting an infection during the visit to immunization clinics, and large populations moving to their hometowns may be listed as few factors that probably affected the immunization rate.

Limitation

This study was done in Kelambakkam, which constitutes a single region of the Chengalpattu district that may not be representative of the entire population. Recall bias might have resulted since participants were interrogated regarding their immunization since birth in the study. However, this study gives a better overview regarding vaccination delay or missed immunization in Kelambakkam.

Conclusion

The delivery of essential as well as basic health services like routine childhood immunisation in Chengalpattu was majorly disrupted due to the ongoing pandemic. This eventually might lead to major health hazards in under five children. In order to cope with this disruption, engaging and empowering the health workers at the ground level like community health workers and multi-purpose workers to identify all the children who have missed immunization due dates would be of great help in filling the lacunae. Organizing Catch-up vaccination camps can eventually restore baseline immunization levels. Routine immunization campaigns particularly in disadvantaged areas or hard-to-reach areas could add greater help. Brainstorming with experts to obtain insights on effective strategies to improve immunization coverage is essential to cover the missed/delayed immunization in children.

Conflict of Interest: None

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