International Journal of Medical and Health Research
ISSN: 2454-9142
www.medicalsciencejournal.com
Volume 4; Issue 8; August 2018; Page No. 113-116

Factors determining poor immunization coverage in Gwalior district

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Abstract
Introduction: Childhood immunization is a cost effective public health intervention to reduce morbidity and mortality associated with infectious diseases. This study was done to find the reasons for poor immunization coverage in Gwalior district in India.
Methods: The study was conducted in 600 children under 5 years of age over a period of 6 months attending 2 paediatric hospitals and 2 paediatric clinics situated in different areas of Gwalior. Mothers of children who were not immunized as per age were interviewed to find factors behind incomplete immunization, using a semi structured questionnaire.
Results: Only 41.5 % of children were found to be fully immunized as per World Health Organization norms. The main reasons reported were lack of awareness of parents regarding importance of vaccines (23%), sickness of child (17.9%), far location of immunisation centre (8.8%) and family problems (8.5%). About one tenth of mothers gave no reason for poor immunization of their children and a small minority had fear of side effects and religious reasons.
Conclusion: Sustained efforts are required to raise the awareness of the community about importance of immunization.

Keywords: immunisation, children, vaccination, India

Introduction

World Health Organization (WHO) initiated Expanded Programme of Immunization (EPI) globally in 1974 and India adopted it in 1978. Since its inception, there has been a significant reduction in the incidence of vaccine preventable diseases in India. Despite these advances, the burden of vaccine preventable diseases remains unacceptably high in India as compared to developed and developing countries [1]. The recent data from a 2008 study estimated that of 826,000 deaths in children aged 1-59 months, almost 75% deaths were due to vaccine preventable diseases including diarrhoea, pertussis, measles, meningitis and pneumonia [2].

India reports one of the lowest immunization rates of any country in the world, while also reporting world's largest annual birth cohort [3]. The success of any immunization programme depends to a large part on the provision of services by healthcare facilities. Once this is ensured, it is almost exclusively dependent upon timely utilization by the care givers. The latest National Family Health Survey (NFHS) report [4] gives the national average for complete vaccination as only 43.5%; however, state wise coverage is vastly different. Recently, Mission Indradhanush was launched by government of India in December 2014 which aimed to immunize all children under 2 years, as well as all pregnant women, against seven vaccine preventable diseases. The diseases targeted were diphtheria, whooping cough, tetanus, polio, tuberculosis, measles and hepatitis B (Hep B). In addition to these, vaccines for Haemophilus influenza type B (Hib), Rubella, Rotavirus, Injectable Polio vaccine were added in certain states in phased manner along with recent introduction of Pentavalent vaccine. In 2017, pneumonia was also added to the mission in some states.

According to WHO guidelines [5], a child is fully immunized with all basic vaccination if he has received one dose of Bacillus Calmette–Guerin (BCG) vaccine, three doses of oral polio vaccine (OPV) and Pentavalent (diphtheria-tetanus-pertussis-Hep B- Hib) and one dose of measles before 12 months of age. A child lacking any of the recommended dose is consider under-vaccinated and children who have not received any vaccinations are considered non- vaccinated.

The causes of low vaccination coverage in India are varied. Our study was aimed to identify individual level socio-demographic and cultural factors and reasons for non-immunization of children among different income group population in Gwalior city and to suggest measures to improve the immunization coverage.

Material and methods

The study was conducted over a 6 month period from 15 January 2018 to 15 July 2018 on children aged 2 months to 5 years attending the paediatric outpatient departments(OPDs) of two major paediatric hospitals and two paediatric clinics located in different locations in Gwalior city catering to needs of all socio economic groups in Gwalior. Six hundred children were included, irrespective of whether it was their first or a follow up visit. For each of the doses of Pentavalent/OPV, a delay of up to 2 months beyond the scheduled date of immunization was accepted. Similarly, for measles vaccine a delay of up to 3 months beyond scheduled date was acceptable.

The primary outcome of vaccination status was classified into three categories: fully immunized, partially immunized and non-immunized. All team members were trained and explained about the data collection and interviewing techniques so as to minimize interviewer bias. A semi structured pre tested questionnaire was prepared in local language consisting on items on socio demographic profile like age and gender of the child and factors leading to non-

immunization of children. We interviewed mothers/primary care givers to assess the vaccination status of children for primary immunization and cross checked it with immunization records/cards, where available. If an immunization card was not available, then reported immunization data were based on maternal recall. Appropriate advice was given for initiating/updating the immunization, wherever applicable. Informed verbal consent was obtained from all the subjects before start of data collection and anonymity of data was assured.

Results

Out of total 600 children, immunization cards were available with 419 (69.8%). In the remaining 181(30.2%), no record for immunization was available and mother's recall was accepted. Every attempt to cross check it was made by asking specific questions about site of vaccinations, route of administration, number of vaccine in single visit and post vaccination advice.

Characteristics of the study population are summarized in Table 1. Slightly more than half of the children (56 %) were boys. Of the total 600 enrolled children, 248(41.3%) completed age appropriate immunization, while 262(43.6%) were partially immunized and 90(15%) were non-immunized. Of the 90 children with no immunization, 72 (12% of 600) had received one or more doses of pulse polio immunization(PPI).The proportion of fully immunized children in less than 2 years(39.8%) was not significantly different from those above 2 years(43.3%).

Table 1: Age and sex distribution of children enrolled in the study

2-6 months		7-12 months	13-24 months	25-60 months	Total
Male Fully immunised	52 [16]	71 [30]	69 [32]	144 [63]	336 [141]
Female Fully immunised	28 [10]	61 [24]	56 [22]	119 [51]	264 [107]
Total	80 [26]	132 [54]	125 [54]	263 [114]	600 [248]

Among 262 partially immunized children, 232 (38.6% of 600) had received BCG, 218(36.3% of 600) received either one (21% of 600) or two (15.3% of 600) doses of Pentavalent. With regard to primary measles vaccination, 169 of 388 children (43.5%) beyond age of 12 months had been vaccinated.

Factors /reasons for partial or non-immunization were assessed and are presented in Table 2. The most common (23%) reason cited was lack of proper knowledge about what vaccine are needed and when the vaccination was due. This was mostly seen in families belonging to low socio economic group and/or with parents without formal schooling. Sickness of child at the time of due date for vaccination was cited as second most common (17.9%) reason for lack of immunization. Location of vaccination centre too far from residence, domestic problems, migration of child to native place comprised of 8.8%, 8.5% and 7.4% of the reasons, respectively. Other cited reasons were unavailability of vaccine(5.4%), long waiting time(3.9%) and fear of side effects(3.7%). 3.1% of mothers regarded the vaccination is not needed as other non-immunized children in the family did not suffer from any vaccine preventable diseases. Religious reasons for denial of vaccination was cited in 2.5 % of cases. About 10 % of mothers gave no reason for not vaccinating their child.

Table 2: Reasons cited by mothers for poor immunization coverage in children

Reasons	n (%)
Lack of proper knowledge about vaccine	80 (23)
Child sick	63 (17.9)
Vaccination centre too far	31 (8.8)
Domestic problem	30 (8.5)
Migration of child to native place	26 (7.4)
Unavailability of vaccine	19 (5.4)
Long waiting time	14 (3.9)
Fear of side effects	13 (3.7)
No need for vaccination	11 (3.1)
Religious reason	9 (2.5)
Miscellaneous	21 (5.9)
No reason	35 (9.9)
Total	352 (100)

Discussion

India's immunization coverage remained unacceptably low in 2010, with only slightly more than half of all children aged 12-36 months fully vaccinated with the Universal Immunisation Programme (UIP)-recommended vaccines, and the remainder either under vaccinated or not vaccinated at all. This explains the continued high burden of morbidity and mortality from such diseases in Indian children.

Our study has included a cohort of children that presented to the hospital OPD. Ideally, it should have been a community based study in order to represent the entire population. However, the proportion of fully immunized children in our study (41.3%) corresponds with the national average of 43.5 % as per latest NFHS report [4]. This is in contrast with a similar study by Mathew JL which showed a lower vaccination coverage of just 25% [6]. If the data from the UNICEF 2009-10 survey [7] are considered, there appears to be dramatic progress in vaccination coverage; the complete

vaccination rate was 61.0%. NFHS-3 data [4] showed that nine states had full vaccination rate lower than the national average and Madhya Pradesh is one of them. A survey independent of the NFHS compared the vaccination status of children (12-32 months) in four BIMARU states of north India (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh) with the status in India as a whole [8]. These 4 states accounted for 70% of India's unvaccinated children although they have only 40% of the total population. Some common trends were noted in the NFHS-3 report [4] and our study. The coverage for individual vaccines was much higher than the proportion of "fully vaccinated" infants; suggesting significant decline in coverage for each subsequent dose of DPT / OPV; suggesting that coverage rates declined as infants grew older.

Male: female ratio in our study was 1.2:1, nearly equal to the sex ratio in our community. As per NFHS-3 survey [4], the complete vaccination rate was 45.3% for boys and 41.5% for girls. In our study, it was 41.9% for boys and 40.5 % for girls. On contrary, study by Mathew JL [6] suggest lower proportion of vaccination in female child.

The reasons for under- and non-vaccination are multifactorial and complex. In our study sample, coverage for BCG vaccine was high indicating a certain level of healthcare services access. The gradual decrease in the vaccination coverage from the birth administered BCG to Pentavalent -3 given at 3.5 months could be secondary to difficulty accessing immunization services, lack of understanding for the need of vaccination, loss in motivation or a combination of these factors. Earlier studies from our country have highlighted reasons like large family size, higher number of children under 5 years, female child, parent's illiteracy and far located health centre, associated with lack of immunization in children.

Most important factor (23%) for missing vaccination in our study is lack of proper knowledge about usefulness of vaccine and which and when to administer. The Indian Council of Medical Research (ICMR) study also highlighted paucity of information and lack of parental motivation as major reasons for failure to have children immunized [8]. Earlier western studies also highlighted the lack of parental awareness as a major cause of non-immunization [9]. Reports have cited this as a reason for 18-62 % of unimmunized children in India [10-12].

Second most common reason (17.9%) for non-immunization given by mothers was sickness of the child when the vaccination was due and that later on they forgot. In most of the cases the symptoms were not suggestive of any significant illness. Similar reason was quoted in most of the previous studies [9, 11-14]. A possible reason for this finding could be treatment of illness of child by 'non-qualified medical practitioners' as being stated in a study by Singh *et al.* [13].

About 9 % of mothers said that vaccination centre was too far from their residence. The ICMR survey (1999) [15] reported complete vaccination coverage in only 19% infants living in small (population <500) villages located more than 5 km away from health centres. In contrast, villages located within 1 km of a health-care centre had 56.9% coverage. Similar results were found in studies done by Tiwari RR and Ughade *et al.* [11, 12]

Family problems was another important reason cited for not having the child vaccinated by about 8.5 % of women in our study similar to earlier studies [13]. This was also the most common reason (24%) studied by Gupta *et al.* in a study conducted in Lucknow [16]. Issue of inability of mothers to leave the house could be solved by provision of mobile clinics.

In about 7 % cases, mothers reported that as the child was sent away from their home for visit to relatives/native place in rural area, so could not be vaccinated in time. In India, the proportion of immunized rural children has been far lower than their urban counterparts [8]. Government is trying to strengthen this through improved immunization services in rural and periphery through National Rural Health Mission (NRHM) scheme.

Some health system related reasons like non availability of vaccines and long waiting time were also cited. Convenience of immunization services are known factor which improves immunization coverage as stated by Mohammed *et al.* [17]. Similar findings were reported by a study conducted by Lim *et al.* where some of the reasons for refusal for immunization of children were long waiting time and unsatisfactory services at the clinic [18].

Another small group of factors (3.7%) preventing mothers from seeking vaccination for their children is real or imagined risk of side effects following vaccination. This holds to be a major factor in western countries [14] and one Indian study [16]. This problem can be tackled by explaining benefit versus risk ratio of vaccines as compared to contracting a vaccine preventable disease. Counselling services should be provided at the health centre at the time of vaccination to focus on such issues so as to allay the anxiety of parents about side effects of vaccines and importance, place and date of next visit for immunization.

Religious reasons for non-vaccination was cited in about 2.5% of non-immunized mother and majority of them were from Muslim community. Previous vaccination studies [19, 20] that investigated effects of religion on vaccination coverage dichotomized religion as Hindu and non-Hindu and concluded that non Hindu religions have poor vaccination outcomes. The Department of Family Welfare survey [21], reported highest proportion of complete vaccination amongst Sikh families (71.4%), followed by Christian (65.9%), Jain (61.8%), Hindu (56.9%) and Muslim (47.2%) infants.

No reason were given by about 10 % of mothers for missed immunizations, a trend also seen in previous reports [11, 12]. This group is more likely to respond to more concrete measures like complete immunization being made mandatory for school admission.

Our study has several limitations. We have not analysed data as per birth order, type of residential area (rural/ urban/slum), economic status, literacy of parents, caste etc. which should ideally have been done for more comprehensive study. Our study may not reflect community data due to inclusion of OPD attendees, but it does not affect the reasons for non-immunization. Also, in more than a quarter of children, the vaccination information was based on mothers' recall in cases where vaccination cards were not available. However, previous studies have reported that in countries lacking immunization records, maternal recall provides accurate population-level estimates of vaccination coverage [22].

Conclusions

The present study highlights the fact that immunization uptake

in Indian children is low, with many children under- and non-vaccinated. The reason for incomplete vaccination were mainly lack of awareness and knowledge of parents. All efforts should be taken to raise the awareness of community about importance of immunization along with providing complete information about the immunization services being available to them.

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