



A Study of Vaccine Hesitancy among Mother and Care Provider during MR Vaccine Campaign

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ABSTRACT

Background: Despite evidence regarding the crucial beneficial effects of vaccines, vaccination has not been carried up to the mark across the globe. The latent issue of vaccine hesitancy for new emerging vaccine leading to vaccine refusals has not been widely addressed particularly in the Indian context.

Objectives: The present study was conducted to find out the proportion and factors contributing to vaccine hesitancy for childhood vaccinations in urban area.

Methods: A cross-sectional study was carried out among 712 children of 9 months to up to 15 years old and adolescent residing in urban areas. Associations were analyzed using percentage proportion, logistic regression and by student 't' test.

Results: 140 (19.7%) of the families were vaccine hesitant and 572 (80.3%) were not hesitant. Nuclear families, mothers of lower educational status and have history of incomplete previous immunization had significantly higher odds of vaccine hesitancy. Lacks of trust / fear of new vaccination (42.1%) and Reluctance to new vaccine (37.8%) were the major reasons cited for vaccine hesitancy.

Conclusion: Along this spectrum of indecision, there is a range of vaccine uptake, depending on additional influences that move an individual toward or away from ultimately accepting a particular vaccine.

Key words: Vaccine hesitancy, MR vaccination campaign, attitude, urban area

INTRODUCTION

Vaccine hesitancy is a complex global problem and are regarded as one of the most important public health measures to combat both communicable as well as non-communicable diseases. However, over the years, vaccine hesitancy has become a growing focus of attention and concern.^{1,2} The World Health Organization (WHO) Strategic Advisory Group of Experts (SAGE) on immunization has defined vaccine hesitancy as "delay in acceptance or refusal of vaccination despite the availability of vaccination services." Vaccine hesitancy is complex and context specific, varying across time, place, and vaccines. Vaccine hesitancy occurs along a continuum between full acceptance and outright refusal of all vaccines, i.e., when there

is acceptance of some and delay or refusal of some of the recommended vaccines. It is influenced by factors such as complacency, convenience, and confidence.²

Public health experts now refer to this loss of confidence as 'vaccine hesitancy', so as to capture concerns in both vaccinated and unvaccinated individuals^{3, 4}. The Strategic Advisory Group of Experts [SAGE]⁵ on Immunisation defined vaccine hesitancy as 'a behaviour, influenced by a number of factors including issues of confidence [level of trust in vaccine or provider], complacency [do not perceive a need for a vaccine, do not value the vaccine], and convenience [access issues]⁶. Vaccine-hesitant individuals are part of a heterogeneous

group and have different levels of concern about vaccines, ranging from those who refuse vaccines entirely, to individuals who refuse or delay specific vaccines, and those who have doubts and concerns about vaccination but accept all vaccines^{3,7}.

This phenomenon has developed due to the confluence of multiple social, cultural, political and personal factors. As immunization programs continue to expand, understanding and addressing vaccine hesitancy will be crucial to their successful implementation. This study explores the status of vaccine hesitancy, its causes, and attitude regarding hesitancy those may be helpful to strengthening vaccine acceptance in further course. Countries should incorporate a plan to measure and address vaccine hesitancy into their country's immunization program as part of good program practices. Immunization programs of countries must fit their setting and resources to support vaccine uptake. Education and training of health-care workers need to be undertaken to address vaccine hesitant behaviors among them.⁸

Access to vaccine information and misinformation from a wide range of sources has influenced vaccine decision-making. Parents now hear a multitude of messages, often conflicting, and this can lead to questions about vaccines. Not all of this information is accurate and instead contributes to misperceptions that can influence vaccine acceptance. It is also known that parents who lack sufficient knowledge about vaccines or VPDs are more likely to have negative attitudes towards immunizations, providers, immunization requirements, and trust in the individuals and institutions responsible for immunization policy.⁶

Vaccine hesitancy, thus, risks the public health consequences of vaccine preventable disease outbreaks. While addressing vaccine hesitancy within a country or subgroup, an in depth understanding of magnitude and setting of the problem is required.⁸

Countries should incorporate a plan to measure and address vaccine hesitancy into their country's immunization program as part of good program practices. Immunization programs of countries must fit their setting and resources to support vaccine uptake. A qualitative study was conducted to capture determinants of vaccine hesitancy among mothers/care providers of children & adolescents and insights into their perceptions of vaccine safety.

AIMS AND OBJECTIVES

The research described in this study was conducted to assess potential concerns among community

regarding new launched vaccine MR (Measles & Rubella). It is a part of surveillance carried out by SMO (Surveillance medical officer) WHO. The aim of this research project is to have a better understanding of vaccine hesitancy and safety concerns among parents. The following research objectives were defined: Improve our understanding of vaccine hesitancy among parents: shed light on their doubts and concerns over vaccine safety and the reasons behind these doubts and Identify reasons for parents' vaccine hesitancy.

MATERIALS AND METHODS:

A community based study with cross-sectional design was conducted in the urban area of Gwalior city, India, from Jan to March 2019. The city has a total of 60 wards with a total population of 1069276 as per census 2011.⁹ Study subjects Children aged 9 months to adolescent of up to 15 years, whose family resides in the study area for the past 12 months, were the primary study subjects. Those who were not willing to participate and not confirmed about previous UIP vaccination were excluded from the study. Thirty wards or "clusters" were identified using principles of cluster sampling from 60 wards. From each selected cluster equal number, i.e., twenty five children & adolescent were selected (anticipated to get in average 7(20%) vaccine hesitancy. Sampling Owing to the scarcity of studies in India showing vaccine hesitancy in the urban areas, the anticipated proportion of sample size were taken as sample of 750, out of which 38 were excluded with said reasons so final sample size was taken as 712. Tools and techniques Data were collected by interviewing the mothers/primary caregivers using a predesigned schedule and reviewing immunization cards of the children. In addition to the questions on socio-demographic characteristics of the family and immunization status related variables, the schedule comprised questions based on vaccine hesitancy survey questions: Version 1.0 developed by the SAGE Working Group on vaccine hesitancy.¹⁰ Before starting the present study, the schedule was validated in local vernacular by initial translation, back translation, and retranslation, followed by a pilot study in urban field practice area of G. R. Medical College, Gwalior. Socio-demographic variables included age of the child, gender, birth order, education of mother, type of family, and socioeconomic status (SES) scale for using social classification taken of Agarwal AK.¹¹ Immunization status related variables included, "vaccine delay" and "vaccine refusal/ reluctance" for any dose in the questionnaire after pilot study. The main outcome variable was "vaccine hesitancy." Vaccine hesitancy was considered to be present in those families who refused, were reluc-

tant or delayed any of the recommended vaccine doses of their child, as per his/her age. Vaccine hesitancy was considered to be absent in those families, where the selected child, received all the recommended vaccines within stipulated time as operationally defined. Open ended questions were also asked the respondents regarding the reason for vaccine hesitancy. The responses were then grouped into discrete non overlapping categories. Responses to vaccine hesitancy attitude statements regarding childhood vaccinations ranged from 1 (strongly disagree) to 5 (strongly agree).

Data collection: After obtaining clearance from Institutional Ethics Committee, permission and co-operation were sought from the local authorities. In a cluster, from a known landmark, in a random direction twenty five consecutive households (having 9-month- 15 years old aged child & adolescent) were visited with the help of local health workers. On reaching the selected household, the family was explained about the purpose of the study and assured about confidentiality and anonymity of the information and mother/ primary caregiver of the child was interviewed. In case of more than one children of the required age group in the same household, only one was included randomly in the study. In case of the absence of mother/primary

caregiver, refusal to respond, or if the immunization cards were incomplete/not confident to tell about previous UIP vaccination etc., it was considered as nonresponder. Univariate and multivariate analysis was done using binary logistic regression to find predictors of vaccine hesitancy among the families. The crude odds ratio (OR) was calculated for each of the predictor variables.

RESULTS

Of 750 families approached for the study, 712 participated in the study. In 16 cases, mother/primary caregiver of the child was absent during visit, 11 cases immunization cards were incomplete /or unable to tell about previous UIP immunization status, and 9 of the families refused to respond. (Response rate 94.9%). The mean age of the children was 7.16 ± 4.35 years. The study subjects contain more male 378 (53.1%) than females 334(46.9%) and belonging to first order birth 53.9% belonging to nuclear families 362(50.8%), and majority of subjects were related with middle income socioeconomic status 431(60.5%). About 428(60.1%) had education primary to up to high secondary. [Table1].

Table 1: Variables of hesitancy for MR vaccination (n=712)

Variables	Vaccine MR hesitancy		Total (%)	OR (95% CI)	P value
	Present (%) N=140(19.7)	Absent (%) N=572(80.3)			
Type of Family					
Nuclear	79(21.8)	283(78.2)	362(50.8)	Reference	0.22
Joint	61(17.43)	289(82.6)	350(49.2)	0.79;(0.55 to 1.15)	
SES#					
Upper	36(27.3)	96(72.7)	132(18.5)	0.56 (0.31 to 1.00)	0.051*
Middle	81(18.79)	350	431(60.5)	0.82(0.49 to 1.35)	0.439
Lower	23(15.45)	126	149(21.0)	Reference	-
Education of Mother					
Up to Primary	41(25.31)	121	162(22.7)	Reference	-
Upto Higher Secondary	88(20.56)	340	428(60.1)	0.81 (0.53 to 1.22)	0.323
Graduate & More	11(9.24)	108	119(16.7)	0.36 (0.18 to 0.74)	0.005*
Child gender					
Male	74(19.57)	304	378(53.1)	0.99(0.68 to 1.42)	0.959
Female	66(19.76)	268	334(46.9)	Reference	
Birth Order					
First(384)	73(19.01)	311	384(53.9)	Reference	0.697
Second & More	67(20.43)	261	328(46.1)	1.07 (0.74 to 1.54)	

*P<0.05 [Significant], Figures in parentheses indicate percentage. OR was determined using binary logistic regression. #socioeconomic status was measured according to modified BG Prasad scale by Agarwal AK based on All India Consumer Price index of April 2018. Upper (Class I & II) Per capita income \geq INR 10000 Middle Class (Class III & IV), INR 5000-<10000; Lower Class (Class IV +V), INR <5000 OR: Crude odds ratio CI: Confidence interval, INR- Indian Rupees

Table 2: Status of UIP vaccination and vaccine hesitancy among beneficiaries

Status of UIP vaccination	Vaccine hesitancy		Odds Ratio (95% CI)	P value#
	Absent (N=572) (%)	Present (N=140) (%)		
Complete	501(87.58)	72(51.43)	Reference	0.0001*
Not Complete	71(12.42)	68(48.57)	6.66(4.4;10.0)	

#Chi square test, *Statistically highly significant

Table 3: Causes of vaccine hesitancy (n=140#)

Reasons for hesitancy	Frequency* (%)
New vaccines carry more risks than older vaccines	27 (19.3)
I am concerned about serious adverse effects of vaccines	47 (33.5)
My child does not need vaccines for diseases that are not common anymore	53 (37.8)
Reluctant due to fear of vaccination	17 (12.1)
Forgets date	22 (15.7)
Unaware/not explained/no reliable information	34 (24.3)
Sickness of child/irritable child	48 (34.3)
Lack of caregiver/mother pregnant/sick	12 (8.6)
Being away from home	29 (20.7)
Household problems/other children	4 (2.8)
Discouragement by family/felt unnecessary	36 (25.7)
Lack of Trust	59 (42.1)
Others**	7 (5.0)

#140 families were vaccine hesitant, *Multiple responses, **Due to work, costs, time constraint, etc.

Table 4: Mothers/caregivers' attitude toward childhood MR vaccinations (n=712)

Statements	Vaccine hesitancy		
	Present (N=140) Mean Score (±SD)	Absent (N=572) Mean Score (±SD)	P value*
Vaccine is effective (Childhood vaccine good way to protect my child from disease)	2.8(0.94)	3.88(1.12)	0.001
New vaccine carries more risk than other	3.77(1.28)	2.8(1.24)	0.001
Concerned about serious adverse effects	3.8(0.78)	2.45(0.99)	0.001
I trust information received about vaccine	2.62(0.74)	3.65(1.12)	0.001
Have you delayed having your child getting vaccine for reason other than allergy or illness	3.78(0.74)	2.48(0.94)	0.001

* 'P' value calculated by student 't' test

Vaccine Hesitancy was also significantly found in those mothers /care provider who had previous history of not complete immunization under UIP of their children (OR 6.66, P <0.0001) (Table 2). When asked about the reasons for vaccine hesitancy, majority of mothers/caregiver complain of lack of trust /fear of new vaccination 59(42.1%) and they expressed that their child does not need vaccines for diseases that are not common anymore 53(37.8).some other causes cited by mothers for vaccine hesitancy were sickness of child/irritable child 48(34.3%), I am concerned about serious adverse effects of vaccines 47(33.5 %). Discouragement by family/ felt unnecessary 36(25.7%), Unaware/ not explained/ no reliable information 34(24.3%), New vaccines carry more risks than older vaccines 27 (19.3%), Forgets date 22(15.7%), Being away from home 29(20.7%), Reluctant 17 (12.1%), Lack of caregiver/mother 12 (8.6%), Household problem/other children 4(2.8%), Others 7(5.0%). (Table 3). Mother/care provider attitude difference towards vaccination has been judged by asking few questions in hesitant and non hesitant mothers hesitant mothers has found more mean scale in negative question i.e., 'New vaccine carries more risk' (mean score 3.77±1.28: 2.8±24) among hesitant versus non hesitant mothers, 'concerned about serious adverse effects' (mean score 3.8±0.78:2.45±0.99, and mean score for

'have you delayed having your child new vaccination' was more in hesitant mothers (3.78±0.74vs 2.48±.94).Those mothers not hesitant during study have more mean score for question i.e., 'vaccine is effective' (3.88±1.12; 2.8±0.94, p<0.001), and 'I trust information received about vaccine' (3.65±1.22; 2.62±0.74, p<0.01) than hesitant mother (Table 4).

DISCUSSION

The interviews with parents in urban community of Gwalior revealed that although those interviewed were aware of the benefits of vaccination, most of them also had some concerns about the risks. Public health experts now refer to this loss of confidence as 'vaccine hesitancy', so as to capture concerns in both vaccinated and unvaccinated individuals. ³Vaccine hesitancy in the present study has adopted the WHO definition which describes a continuum between unquestioning acceptance and refusal to new vaccines.¹²The interviews with mothers/caregiver revealed that although those interviewed were aware of the benefits of vaccination, most of them also had some concerns about the risks.

Although most of the caregivers in the present study were convinced of the role of vaccines to protect children and reported that most would like

to have their children vaccinated with all as well as the new vaccines like MR but there was wide variation found. Detailed study shows that only 19.5% had actually not gone for all recommended doses on time previously and majority 49.2% were found in hesitant mothers. Dutta et al and Barman and Dutta¹³ found month specific immunization coverage to be 16.4% in West Bengal and Dasgupta P et al¹⁴ in Siliguri, despite the picture of high non month specific full immunization coverage of 75.9%. Clark and Sanderson¹⁵ have found that there is wide variation in timeliness of vaccine coverage within and between 45 low- and middle-income countries.

Association between nuclear family and vaccine hesitancy was not found significantly, but the vaccine hesitancy was found more in nuclear family than joint family because the mother is the only caregiver, it results in delays, reluctance to take for vaccination due to household or other job. Often the problem is aggravated if the mother is sick, pregnant or she has to take care of other children. In traditional settings in India, the joint family structure has an added advantage of additional caregivers, where chances of getting timely vaccinated increase due to other parents of the household taking care, even if the mother is working.¹⁴ In the present study education status of mother/caregiver plays the vital role in understanding the effectiveness of vaccination and its role in safe livelihood. Vaccine hesitancy was least among graduate mother. Higher educational status of mothers has been associated with better immunization coverage in previous studies conducted in India^{16,17} and neighboring countries.¹⁸ Educated mothers are less hesitant and more likely to remember dates, understand the importance of timely vaccination and interact more freely with health workers. In the present study, higher SES showed a higher likelihood of vaccine hesitancy in contradiction to observations by previous authors.¹⁷

In the present study, parents who are economically better off, have more hesitant and reluctant towards free govt supply vaccine because they must pay for vaccines as well as the services. If on the scheduled day or week, there is not enough money, they tend to be vaccine complacent^{2, 14} and delay or miss doses of costly vaccines such as pentavalent and MR vaccine. Among the characteristics of children, the gender of the child and birth order were not significant predictors for vaccine hesitancy in the present study. Barman and Dutta¹³ support our observation. Although statistically not significant, the proportion of vaccine hesitancy in case of male child was marginally higher than girl child. This contradicts findings from some of earlier studies.^{19, 20} Information regarding vaccines is often not properly disseminated resulting in ap-

prehension and fear about newer vaccines like MR vaccine. This might have refrained the families from getting the children vaccinated during the initial MR campaign in 2019. Freed et al.²¹ reported more than half of the parents to be concerned regarding serious adverse reactions and question the safety of newer vaccines. In a study by Gust et al.⁶ largest proportion of parents who changed their minds of delaying or not getting vaccinated gave "Lack of trust/fear of vaccination" due to lack of information or assurance from health care provider is the main reason.

Environmental/personal factors reluctance to vaccinate the child was the primary cause of vaccine hesitancy in the present study. Lack of awareness, forgetfulness, and laziness was reasons cited in previous studies in India.^{22, 23} Lack of trust in service providers and fear with adverse conditions of newer vaccine was another reason cited by the respondents. This corroborates with the finding that a higher proportion of families who get their child vaccinated follow instructions of their doctors and health-care providers. The inherent migratory and temporary nature of the slum population makes delay and hesitancy even more prominent. This can be deduced from the fact that about 15.7% of caregivers reported being forgets dates as the reason for hesitancy. Parents' decisions to vaccinate are also influenced by multiple factors, as outlined by Dube, et al.²⁴ These include parent-specific characteristics such as experience with previous immunization under UIP

Personal opinion that 'my child does not need vaccines for diseases that are not common anymore' is a major obstacle. Previous studies²⁵ support this observation. It is also known that parents who lack sufficient knowledge about vaccines or VPDs are more likely to have negative attitudes towards immunizations, providers, immunization requirements, and trust in the individuals and institutions responsible for immunization policy.⁶

Mothers/caregivers' responses regarding vaccine hesitancy were corroborated with appropriate records. While there are a small number of parents who unequivocally refuse all vaccines, and many parents who overwhelmingly accept vaccines, many families fall between these extremes and express some level of vaccine hesitancy, as characterized by these different models.²⁶ This group of vaccine-hesitant individuals has been a focus for more recent and ongoing research to identify strategies that can effectively move individuals toward vaccine acceptance.³ A survey in France also showed that family doctors believed that one of the barriers to MMR vaccination was parental opinion that measles was not a severe illness (80%), as well as a fear of vaccine side effects (50%)²⁷.

CONCLUSION

This survey study has confirmed the existence of vaccine hesitancy in all group of community but has shown that concerns relating to vaccines are status and context-specific. Parents had concerns relating to the risks of vaccination and expressed a lack of trust in health authorities. It is important that strategies to improve confidence in vaccines focus on these concerns and are therefore adapted to the specific political, social, cultural and economic context of the country or region. Improving vaccine confidence among community is crucial as they have been shown to have the potential to influence patient vaccination uptake. Ongoing research is needed to develop the most effective strategies to confront vaccine acceptance. Such strategies will require a multi-faceted approach. A systematic review of interventions designed to reduce parental hesitancy identified three key areas: state laws, school- and state-level implementation of laws, and parent-centered education. However, there is limited evidence to guide widespread implementation of a specific strategy at this time to effectively minimize the impact of vaccine refusal.²⁸

The knowledge gained from this study is used to inform the development of a 'Let's Talk about Hesitancy' supplement to the vaccination instruction guide. It will also allow public health professionals in India to understand the extent of the problem of vaccine hesitancy among mothers/caregivers and to develop more targeted and effective public health measures to prevent and respond to vaccine hesitancy, especially among mothers/caregivers of the children & adolescents.

Limitations

There are some limitations to this study which need to be addressed. Although a standardised interview guide was developed to allow comparability of study results, some differences in the results provided might stem from the interviewers' roles in guiding the discussions. Therefore the participants views interviewed in this study must be interpreted with caution. This said, the intent with this study was to identify whether hesitancy occurs at what level and to begin to identify its characteristics.

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