Parents' Perception Towards Covid-19 Vaccination for Children in Surat: A Cross Sectional Study

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ABSTRACT

Background: Vaccine hesitancy has been recognized as a public health issue which needs to be addressed urgently. With reopening of school unvaccinated children might become major carriers of COVID-19. An assessment of the determinants of vaccine hesitancy will aid in the acceleration of vaccine administration among children.

Objective: This study aims to explore parental COVID-19 vaccine hesitancy in Surat and determine factors associated with it.

Methodology: This is a cross sectional study in Surat among 250 participants selected from Rural and Urban field practice area by Systematic Random Sampling. Data collection was done by data collectors in an interview during the month of January and February, 2022. Univariate analysis was done, followed by Chi square test to establish associations. Predictors were determined by Binomial Logistic Regression.

Results: Mean age of population was 31.3 + 10.7 years. Vaccine Hesitancy was recorded in 154 (61.6%) participants. Urban address (p=0.013), Full Vaccination status of parents (<0.001) and Perceived Benefits of vaccine to the child (p=0.001) were significant predictors of Vaccine Hesitancy.

Conclusion: High proportion of Vaccine hesitancy was found in this study. Interventions can be planned on the basis of factors affecting Vaccine Hesitancy.

Key Words: COVID-19, Vaccine Hesitancy, Child Vaccination, Health belief model

INTRODUCTION

COVID-19 pandemic has imposed enormous burden of morbidity and mortality among the population. Whether children are vulnerable or not has been an ongoing discussion for quite some time. Studies have shown that Children have the same risk as other age groups. Their role as carriers of infection is also established.[1] With school, colleges opening this unvaccinated population might become a major concern in upcoming days.

COVID-19 had less Case Fatality Rate among age group below 18 years of age. However, immunosuppression and coinfection of pneumonia, below 5 years, were major factors of increase in Fatality Rate.[2] Studies have shown that children affected with COVID 19 are at a higher risk of vascular diseases like Kawasaki disease, Takayasu arteritis[3] and Acute Kidney Injury[4]. Multisystem Inflammatory Syndrome complication was also established to be higher among children affected by COVID-19.[5]

With the availability of effective vaccines against COVID-19, vaccination has become one of the most important strategies for controlling the pandemic. Bharat Biotech International Limited (BBIL), had conducted a phase II/III, open-label, multi-centric study to evaluate safety and immunogenicity of Covaxin. Seroconversion was seen in 95-98% participants, after four weeks of second dose with pain at

injection site being reported as the most commonly reported adverse event.[6] In India, vaccination of children 15-18 years of age, was started from January 3, 2022.[7]

The WHO listed vaccine hesitancy among the top ten global threats to health in 2019. Vaccine hesitancy seen due to complacent behavior, lack of confidence and convenience is a major threat to the impact of vaccination in preventing severe disease and death from COVID-19.[8]

COVID-19 Parental Vaccine hesitancy rates among parents have varied in different countries from 7.4%[9] to 51.8%.[10] Even different provinces, Shandong (19.4%) and Zhejiang (11.7%), of China had statistically significant difference of Vaccine Hesitancy.[11] Study in Illinois[12] reported vaccine hesitancy among 33% participants while Brazil[9] had only 7.4% hesitancy. Qatar had a vaccine hesitancy rate of 17.9%.[13] A study in England reported 51.8% vaccine hesitancy among parents.[10]

In Surat Municipal Corporation, 6.05% of total Covid cases have been to patients aged less than 20 years of age.[14] However, as school and colleges have been closed for most part of the pandemic exposure has also been lower in the concerned age group. With reopening of schools and colleges, this picture might change, which beseeches the need to keep a keen eye on the situation. Also, children might carry the disease and spread it to the elderly population at home causing a more menacing issue. Parental COVID-19 Vaccines hesitancy rates are diverse in different places and also different from Vaccine hesitancy rates in general population[15], which limits generalizability of the results.

An assessment of the prevalence and determinants of parental vaccine hesitancy will aid in the acceleration of vaccine administration among children. No such study has been conducted in Gujarat which necessitates the need of this study.

OBJECTIVES

The objectives of this study were to assess the perception of parents towards COVID-19 vaccination for children in Surat and to determine the association between vaccine hesitancy and variables of interest.

MATERIALS AND METHODS

A cross sectional study was conducted on 250 participants (chosen by systematic random sampling) across two sites (chosen by purposive sampling). Parents residing in this area having a child less than 18 years of age were recruited in this study.

This study was conducted during January and February, 2022. Permission was obtained from Scientific Review and Human Research Ethics Board of the Government Medical College, Surat. A structured questionnaire was filed by data collector in digital format in Google form after proper explanation of the study to the participants in a language they can understand and consent form was signed.

Sample Size: Taking Parental COVID-19 vaccine hesitancy rate of 19.4% (11) with 5% absolute allowable error, as sample size of 241 was required at 95% Confidence Level and 80% power. However, for ease of division across two different study settings sample size was rounded off to 250.

Study Setting: This study was done at two sites; field practices area of Community Medicine Department, Surat at Rural and Urban Health Training Centre; which were chosen purposively.

Half of total sample size (125) was collected from each site. At these sites participants were recruited for the study by systematic random sampling on the basis of distribution of houses.

Sampling Process:

Field practice area of Rural health Training Center (Vanz): Total houses: 1086, divided into 11 faliya. Sample size required was 125. Sampling interval 'k' was calculated as 8.6. Every 8th house was recruited in this study. If criteria were not fulfilled for recruitment, next house was approached.

Field practice area of Urban health Training Center: Total houses (Azadnagar, Rasulabad): Around 2,400. Sample size required was 125. Sampling interval 'k' was calculated as 19.2. Every 19th house was recruited in this study. If criteria were not fulfilled for recruitment, next house was approached.

Study Tool: A structured questionnaire was used to collect data. It was prepared by researchers after thorough review of literature. The questionnaire was divided into three parts assessing "sociodemographic characters", "vaccine hesitancy and knowledge" and "perception of COVID-19 and children vaccination".

Vaccine hesitancy was assessed by asking "Will you vaccinate your child if you are provided COVID-19 vaccine free of cost by the govt.?". Responses were categorized on a 5-point Likert scale marked as 'definitely no', 'probably no', 'undecided', 'probably yes' and 'definitely yes'. This was used to measure vaccine hesitancy based on WHO vaccine hesitancy continuum which marks only "Definitely yes" as vaccine acceptant. Parents who had vaccinated their child were also graded as Vaccine acceptant.

Perception towards the disease and its vaccine was assessed using Health Belief Model under four domains: perceived susceptibility, perceived barriers, perceived benefits and cues to action with 3 possible responses for each statement (agree, neither agree nor disagree, disagree).

Data collection and Analysis: Informed written consent was taken from the participants and they were allowed to leave the interview midway if they felt uncomfortable. Data collection was done by face-

to-face interview using a pretested structured questionnaire. Data was downloaded from Google form in the form of Ms-Excel. Data analysis was done in SPSS 26 for Windows (IBM Corp. Chicago, U.S). Univariate analysis was done including descriptive statistics of mean, standard deviation, frequency and percentage. Bivariate analysis was done by Chi-square test. The variables with association of p-value<0.2 were further analyzed by Logistic Regression to assess independent predictors of Vaccine Hesitancy. P<0.05 was considered to be statistically significant. Privacy was maintained by interviewing in a secluded place and confidentiality was ensured by not taking identifiers (names, complete address) and presenting cumulative data.

RESULTS

A total sample size of 250 was recruited from both the study settings. Parental COVID-19 Vaccine Hesitancy was observed in 154 (61.6%) participants. Mean age of participants was 31.3 + 10.7 years. Majority that is 177 (70.8%) of participants were female. Around two-third that is 156 (62.4%) were Hindus, rest were Muslims. Educational status of Class V or below but not illiterate had the highest proportion that is 119 (47.6%).

Knowledge on COVID-19 Vaccine: Only 61 (24.4%) participants knew that Children are now eligible to get vaccinated in India. Out of these 31 (50.8%) participants were able to correctly tell the age group among children for whom vaccination has been started. Participants were asked about the most important source of their information about COVID-19 Vaccines. Friends and family were recorded as the most important source among 100 (40.0%) participants, followed by Media among 82 (32.8%). Health care workers were recorded as most important source in only 37 (14.8%) participants. 31 (12.4%) participants had no source of information about COVID-19 vaccines.

Vaccine Hesitancy: In response to the likelihood of getting their child vaccinated, 17 (6.8%) answered 'Definitely No', 55 (22.0%) answered 'Probably No', 66 (26.4%) answered 'Uncertain' and 16 (6.4%) answered 'Probably Yes'. All these participants were categorized into Vaccine Hesitant category as per WHO Vaccine Hesitancy Continuum. 'Definitely Yes' was answered by 96 (38.4%) and were categorized into Vaccine Acceptant group.

Univariate analysis was conducted across different variables of Interest and Vaccine Hesitancy in Table 1. Chi Square test revealed Vaccine Hesitancy had statistically significant association with Urban Address (p=0.002), History of COVID-19 positive status of spouse (p=0.049) and Full Vaccination status of Respondent (p<0.001). Vaccine Hesitancy did not have statistically significant association with Age, Sex, Religion, Occupation, Educational qualification of the respondent or Positive family history of other family members.

Univariate analysis was conducted between Vaccine Hesitancy and COVID-19 Vaccine perception in Table 2. According to Health Benefit Model, Perceived susceptibility, Perceived Benefit and Perceived Barriers had statistically significant association with Vaccine Hesitancy. Perceived Benefits had the highest Chi square value giving an idea that ignorance about Benefits of vaccine had highest association with Vaccine hesitancy.

Table 1: Association between variables of Interest and Vaccine Hesitance (n=250)

Variable of Interest	Total (%)	Vaccine Hesitant (n=154) (%)	Vaccine Acceptant (n=96) (%)	P Value
Address				
Rural	125 (50)	65 (42.2)	60 (62.5)	0.002
Urban	125 (50)	89 (57.8)	36 (37.5)	
Sex of Respondent				
Female	177 (70.8)	114 (74.0)	63 (67.7)	0.155
Male	73 (29.2)	40 (26.0)	33 (34.3)	
Religion				
Hindu	156 (62.4)	94 (61.0)	62 (64.5)	0.574
Muslim	94 (37.6)	60 (39.0)	34 (35.5)	
Education				
Illiterate	49 (19.6)	28 (18.1)	21 (21.8)	0.073
Class V or below	119 (47.6)	75 (48.7)	44 (45.8)	
Class XII or below	69 (27.6)	47 (30.5)	22 (23.6)	
Above Class XII	13 (5.2)	4 (2.7)	9 (8.8)	
Respondent's COVID positive history				
No	209 (83.6)	130 (84.4)	79 (82.2)	0.655
Yes	41 (16.4)	24 (15.6)	17 (17.8)	
Spouse' COVID positive history				
No	178 (71.2)	103 (66.8)	75 (78.1)	0.049
Yes	72 (28.8)	51 (33.2)	21 (21.9)	
Vaccination status of Respondent				
One dose	141 (56.6)	106 (68.8)	35 (36.4)	<0.001
Two doses	109 (43.6)	48 (31.2)	61 (63.6)	

Table 2: Association between COVID-19 vaccine perception and its hesitancy (n=250)

Perception and Response	Total (%)	Vaccine Hesitant (n=154) (%)	Vaccine Acceptant (n=96) (%)	p-Value
Perceived Susceptibility				
Are you worried that your child may acquire COVID-19				
Disagree	7 (2.8)	7 (4.5)	0	0.005
Neither Agree Nor Disagree	34 (13.6)	27 (17.5)	7 (7.2)	
Agree	209 (83.6)	120 (78.0)	89 (92.8)	
Perceived Barriers				
Do you think Vaccine is not safe for children?				
Disagree	103 (41.2)	38 (36.9)	65 (63.1)	<0.001
Neither Agree Nor Disagree	101 (40.4)	73 (72.3)	28 (27.7)	
Agree	46 (18.4)	43 (93.5)	3 (6.5)	
Do you think Vaccine can cause COVID-19				
Disagree	102 (40.8)	43 (42.2)	59 (57.8)	<0.001
Neither Agree Nor Disagree	113 (45.2)	79 (69.9)	34 (30.1)	
Agree	35 (14.0)	32 (91.4)	3 (8.6)	
Do you think It is difficult to get vaccinated from govt. facilities				
Disagree	132 (52.8)	67 (43.5)	65 (67.7)	0.001
Neither Agree Nor Disagree	50 (20.0)	36 (23.4)	14 (14.6)	
Agree	68 (27.2)	51 (33.1)	17 (17.7)	
Perceived Benefit				
Do you think giving vaccine to a child will prevent complications if he/she develops COVID-19				
Disagree	42 (16.8)	41 (26.7)	1 (1.1)	<0.001
Neither Agree Nor Disagree	71 (28.4)	60 (38.9)	11 (11.4)	
Agree	137 (54.8)	53 (34.4)	84 (87.5)	
Do you think Vaccine will be effective to prevent a child from getting COVID-19				
Disagree	46 (18.4)	46 (29.8)	0	<0.001
Neither Agree Nor Disagree	75 (30.0)	61 (39.7)	14 (14.6)	
Agree	129 (51.6)	47 (30.5)	82 (85.4)	

Table 3: Multiple Logistic Regression for association between the variables of interest and vaccine hesitancy (n=250)

Variable of Interest	cOR	By Regression	
		aOR	p-Value
Address - Urban	2.2 (1.3-3.6)	2.8 (1.2-6.4)	0.013
Sex of Respondent - Female	1.5 (0.9-2.6)	1.6 (0.7-3.5)	0.264
Vaccination Status - Complete	0.3 (0.1-0.4)	0.3 (0.2-0.5)	<0.001
No history of COVID-19 in spouse	0.6 (0.3-1.0)	0.5 (0.2-1.1)	0.093
Educational Status of Respondent			
Class V or below	1	1	0.619
Class VI to XII	0.8 (0.4-1.5)	0.6 (0.2-1.6)	
Above Class XII	0.6 (0.3-1.3)	0.7 (0.2-1.9)	
Illiterate	3.0 (0.8-11.1)	1.1 (0.2-6.80	
Are you worried that your child may acquire COVID-19 - Disagree/ Uncertain	3.6 (1.5-8.5)	1.2 (0.4-3.7)	0.721
Do you think Vaccine is not safe for children? - Agree/ Uncertain	6.4 (3.6-11.2)	1.3 (0.5-3.4)	0.568
Do you think Vaccine can cause COVID-19? - Agree/ Uncertain	4.1 (2.4-7.1)	2.1 (0.7-5.4)	0.160
Do you think It is difficult to get vaccinated from govt. facilities? - Agree/ Uncertain	2.7 (1.6-4.6)	1.1 (0.5-1.2)	
Do you think giving vaccine to a child will prevent complications if he/she develops COVID-19? - Disagree/ Uncertain	13.3 (6.7-26.6)	4.3 (1.8-10.5)	0.001
Do you think Vaccine will be effective to prevent a child from getting COVID-19? - Disagree/ Uncertain	13.3 (6.8-25.8)	3.8 (1.6-9.3)	0.003

(cOR= Crude Odds Ratio; aOR= Adjusted Odds Ratio)

Variables of interest which had p-value < 0.2 were put into Binomial Logistic Regression model. Nagelkerke r-square value was 0.55. Address, Vaccination status, Difficulty to avail services in Government Hospital and Perceived Benefits had statistically significant association with Vaccine Hesitancy. Urban participants had 2.8 (1.2-6.4) times higher odds of being vaccine hesitant than their Rural counterparts. Participants who are fully vaccinated had 0.3(0.2-0.5) times lesser chance of being vaccine hesitant than unvaccinated or incompletely vaccinated participants. As for perceived benefits, people who did not agree that vaccine can prevent the disease 4.3(1.8-10.5) or prevent complications 3.8 (1.6-9.3) higher odds of being vaccine hesitant than people aware of benefits.

When participants were asked if they would get their child vaccinated if health care workers recommend it, 143 (57.2%) participants agreed. 174 (69.6%) participants agreed that they would get their child vaccinated if family members recommended it. Open ended questions were asked to acquire information about cause of vaccine acceptancy or hesitancy. Qualitative analysis of this revealed "Trust of Government" being the most common cause of Vaccine acceptancy among 38 out of 96 (39.5%) vaccine acceptant participants followed by "Full vaccination of self" 30 (31.3%) and "Requirement in School 15 (15.6%). "No confidence on benefits" was the most common cause of vaccine hesitancy as reported by 48(31.1%) participants followed by "No confidence about safety" 36(23.3%).

DISCUSSION

In this study Vaccine Hesitancy was reported in 61.6% parents. Similar results were seen in study done by Grazia et al. in Italy[16], Temsah et al. in Saudi Arabia[15] and Bell et al. in England[10]. Study done by Bagateli et al.[9] reported Vaccine hesitancy in 2.8% participants which was lower than this study. Studies done in Chicago[12], China[11], Qatar[13] also reported higher vaccine acceptance among participants. Study done by Alhazza et al. documented 37% vaccine hesitancy, however it was higher than hesitancy towards routine vaccination (6%).[17] These studies have been done at different stages of Vaccination timeline. Further this study had strict definition for vaccine hesitancy compared to other studies which could also be reason for higher vaccine hesitancy in this study. Further there is variation in the study data collection tools, approaches and definitions used across studies. The variation in time context for the studies also could have influenced the acceptance level. These higher rates of Vaccine Hesitancy will hamper the vaccine coverage rates when vaccines are introduced at all ages.

Study done by Bell et al.[10] had "protection from COVID for self and others" as the main reason of acceptance and "Concern about safety" was elicited as the major cause of Vaccine Hesitancy. This was also the major reason in study of Xu et al.[11] In this study too safety concern was a major reason of Vaccine Hesitancy. However, "No confidence on benefits" was the most frequent reason. "Trust on Government" was the major reason of vaccine acceptancy in this study. These differences might be due to political and social differences in study settings.

In this study, COVID-19 Vaccination Status of respondent had significant association with Vaccine Hesitancy. Similar results were also seen in study done by Temsah et al.(p<0.001)[15] and Grazia et al. in Italy(p<0.05)[16]. Hence, vaccine hesitancy among adult population might be an indicator of Parental Vaccine Hesitancy. Ignorance about 'Perceived Benefits' and 'Convenience to receive vaccine' were other major indicators of Vaccine Hesitancy. Studies done

by Temsah et al.[15] and Bagateli et al.[9] established educational qualification and age of respondent as significant indicators of Vaccine Hesitancy. This study also revealed higher Vaccine Hesitancy among parents who think that COVID-19 vaccine is not effective in controlling the disease. Similar results were also seen in a study conducted Ali et al. (aOR=3.22; p<0.001).[18] Perceived Susceptibility (p=0.005), perceived barriers (p<0.001) and perceived benefit were seen to be significantly associated with Vaccine hesitancy. Similar result was observed in study done by Huynh et al. in Vietnam (all p<0.05).[19]

Study done by Alfieri et al.[12] established Source of Information to have significant association with Vaccine Hesitancy. Such results were not elicited in this study. Study done by Ting et al.[20] in China and Bianco et al.[21] in Italy reported lower Vaccine Hesitancy among parents with higher education (aOR=0.5). However, no such association was seen in this study. The variations in the study settings could have contributed to the contrary results in different studies.

CONCLUSION AND RECOMMENDATIONS

In this study, vaccine hesitancy was observed in around three-fifths of participants. Perceived benefits of vaccine benefitting the baby, complete vaccination status of parents and convenience to receive vaccine were the significant predictors of vaccine acceptance. Identification of factors affecting vaccine hesitancy is the first step to plan specific interventions. This study reveals pockets of vaccine hesitancy present in urban areas being significantly higher than in rural areas. Hence these areas should be targeted first. Intervention might include WHO 3'C model-based Health talk which can be implemented digitally or face to face by ASHA or Anganwadi workers. "Trust on Government" being a major reason of vaccine hesitancy invokes the effect of intervention by politicians, local leaders, Panchayati Raj Institutions and self-help groups. Fully vaccinated parents also had significantly less vaccine hesitancy; hence mass vaccination of adults should be carried out. Valid statistics about vaccine benefits and safety should be disseminated to public in a more personal and interesting way. This can be done by engaging health care workers at all levels from primary to tertiary to spread awareness about importance of COVID-19 vaccination for children among parents and family members during their visit for health check-up.

STRENGTHS AND LIMITATIONS

Socially Desirable answer might have been the limitation of this study. However, proper training of adept data collectors has minimized this effect. The main strength of this study is timing of this study to reveal factors affecting vaccine hesitancy at the dawn of vaccination of children in India. Also, random sampling techniques used in this study will enhance the generalizability of the study findings. Qualitative

analysis gave an in-depth understanding of the situation. Hence findings of this study can be used to plan different ways to tackle this issue.

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