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Research Article

COVID-19 VACCINE HESITANCY FOR CHILDREN IN PARENTS: A CROSS-SECTIONAL SURVEY AMONG HEALTH-CARE PROFESSIONALS IN INDIA

HIMANSHI[1], KRANTI S KADAM[2], PARUL U UTTARWAR[2]

[1]Department of Psychiatry, LTMMC and Sion Hospital, Sion, Mumbai, Maharashtra, India. [2]Department of Psychiatry, Seth G.S. Medical College and K.E.M. Hospital, Parel, Mumbai, Maharashtra, India. Email: himanshihb12@gmail.com

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ABSTRACT

Objectives: There is evidence of morbidity and mortality in children due to COVID-19 infection. "Vaccine Hesitant Parents (VHPs)" may act as barriers to vaccination of children and their knowledge, attitude, beliefs, and perceptions come into play. Health-care providers are cited as the most important source for vaccine information by VHPs, and provider recommendation for vaccination is crucial for improving vaccine uptake. Hence, we aim to study among Indian health-care professionals having children <18 years of age, the prevalence of parental hesitancy for pediatric COVID-19 vaccine and to assess their knowledge, attitude, beliefs, and perceptions about pediatric COVID-19 vaccine.

Methods: An observational, cross-sectional study was conducted across India through a web-based questionnaire amongst health-care professionals having children less than 18 years of age by Snowball sampling technique. Descriptive statistics were used to study the demographic profile, the prevalence of vaccine hesitancy, and individual factors. Correlations between the datasets were obtained using regression analysis and significance level using the Chi-square test.

Results: The prevalence of COVID-19 vaccine hesitancy for children in Indian health-care professionals is 3.3%. The most important source of information was the internet and social media. The majority of the participants knew about the vaccine and its side effects (p=0.00) and believed in the usefulness of the vaccine in preventing infection (p=0.008) and in reducing severity (p=0.009). All these factors lead to better vaccine acceptance.

Conclusion: These data show that vaccine acceptance has improved over time and thus HCWs can aid in reducing vaccine hesitancy.

Keywords: Vaccination hesitancy, Parents, COVID-19 vaccine, Health personnel, Knowledge, Attitude, Perception.

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INTRODUCTION

We witnessed sparing of no age group in this COVID-19 pandemic. There is evidence of morbidity and mortality in children [1,2], and a paradigm is suggestive of pediatric vaccination reducing community transmission and preventing adult disease [3]. The psychosocial impact of COVID-19 on children could also be allayed by a pediatric vaccine.

However, "Vaccine Hesitant Parents" (VHPs) may act as barriers to vaccination in this population. Their knowledge, attitude, beliefs, and perceptions come into play. These are further affected by factors such as complacency, confidence, and convenience [4,5]. Health-care providers are consistently cited as the most important resource for vaccine information by VHPs, and provider recommendation for vaccination is crucial for improving vaccine uptake [6].

Children of health-care professionals are specifically associated with increased risk of exposure to COVID-19 and assessment of vaccine hesitancy in this population can prove to be pivotal. Health-care professionals are known to be essential promoters of vaccine acceptance and them being convinced of the vaccine's safety and efficacy is deemed important. Their conviction can translate into a strong recommendation for the entire population [7].

METHODS

All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. All procedures involving human subjects were approved by the Institutional Ethics Committee (EC/OA-91/2021) dated June 12, 2021.

An observational, cross-sectional study was conducted through a web-based questionnaire among health-care professionals having children <18 years of age across India between June 15, 2021, and July 15, 2021. The choice to participate in the study was optional and electronic consent was taken before filling out the questionnaire. The questionnaire was self-designed through mutual discussion and agreement after consulting a lot of studies done in the past on vaccine hesitancy for other pediatric vaccines.

"Snowball Sampling Technique" was used to circulate the Google Forms link to contacts of the investigators through WhatsApp messaging application and E-mail. The responses were encrypted to ensure the protection of privacy. Those who had difficulty comprehending the questionnaire were excluded from the study.

A self-devised questionnaire comprising questions focusing on the sociodemographic characteristics of people, self-reported beliefs, and knowledge about COVID-19 infection and vaccine, attitudes toward vaccination, and source of information regarding pediatric vaccine was used. The questionnaire was validated by renowned faculties of the Department of Psychiatry of our institute.

Those who wanted to vaccinate their children were considered "Vaccine Acceptors" and those who wanted to delay the vaccination or refused to give their child COVID-19 vaccine were classified under "Vaccine Hesitancy." The prevalence of individual factors was found for each group and factors contributing to acceptance and hesitancy were assessed.

Descriptive statistics were used to study the demographic profile, the prevalence of vaccine hesitancy, and individual factors. Correlations

between the datasets were obtained using regression analysis and significance level using the Chi-square test.

RESULTS

A total of 240 responses were obtained after taking consent. Out of these, 132 responses were from Maharashtra, that from North India (including states of J&K, Himachal Pradesh, Punjab, Haryana, Delhi, Rajasthan, Uttar Pradesh, and Uttarakhand) were 32, from East and Northeast India (including Bihar, Jharkhand, Orissa, West Bengal, Sikkim, and the seven sisters) were 17, South India (Karnataka, Kerala, Andhra Pradesh, Telangana, and Tamil Nadu) were 52, and from West and Central India excluding Maharashtra were 7. Participants responded to the question "Will you vaccinate your child with COVID-19 vaccine whenever it is made available" as "Definitely yes without a doubt" (n=169, 70.4%), "Probably yes and have significant concerns" (n=63, 26.3%), "Prefer to delay" (n=8, 3.3%), and "No" (n=0).

The prevalence of "Vaccine Hesitancy" among health-care professionals for vaccinating their children with the COVID-19 vaccine is 3.3%.

Various sociodemographic details of the participants are given in Table 1.

As we can see from Table 1, a statistically significant association was found between vaccine hesitancy and marital status (p=0.03, regression coefficient=0.29).

Health-care professionals who had taken the COVID-19 vaccine themselves were also associated with vaccine acceptance for their children at a statistically significant level (p=0.000).

Two health-care professionals had a history of psychiatric illness but both did not exhibit any vaccine hesitancy for their children.

No significant associations were found between vaccine hesitancy and other demographic variables.

Knowledge

From Table 2, we can see that a significant association was found between knowledge about pediatric vaccines under trial and vaccine acceptance (p=0.03, regression coefficient=1.9), that is, those who knew about vaccines were 1.9 times more likely to accept than those who did not know.

Beliefs and perception

From Table 3, a significant association was found between vaccine acceptance and the perception of health-care professionals about the usefulness of the COVID-19 vaccine in the prevention and reduction of the severity of infection (p=0.009, Expβ=6.12 and p=0.008, Expβ=4.6, respectively).

The perception of increased risk to the child for COVID-19 infection due to one's profession was associated with parental vaccine acceptance among health-care professionals to a significant degree (p=0.013, Expβ=5.8).

Beliefs about the vaccine affecting female fertility and it is being contraindicated during menstruation was also found to be significantly associated with vaccine hesitancy (p=0.04 and p=0.02, Expβ=2.9).

Health care workers' perception of the trustworthiness of the vaccine industry/pharmaceutical companies and their indigeneity was also found to be accountable for vaccine hesitancy (p= 0.01, Expβ=2.1).

Attitude

Parameters depicting the attitude of health-care professionals toward pediatric COVID-19 vaccine are shown in Table 4.

In Table 4, we can see that vaccine acceptance has a significant correlation with attitude toward vaccine safety and efficacy (p=0.00, Expβ=4.3), the importance for the community at large (p=0.00, Expβ=2.5), the protection offered by the vaccine (p=0.00, Expβ=1.1), reliability of the information received from government resources (p=0.01, Expβ=0.9), and repudiation of vaccine policy (p=0.00, Expβ=13.9).

DISCUSSION

The study found the prevalence rate of COVID-19 vaccine hesitancy for children among parents who are health-care professionals to be 3.3%. A cross-sectional survey by Singhania *et al*. (2021) at PGI, Chandigarh, on acceptance of the COVID-19 vaccine among health-care personnel during the initial phase of vaccination, found the COVID-19 vaccine hesitancy rate for adults to be 20.7% [8]. These data show that

Table 1: Demographic details and details related to COVID-19 vaccine of study population

Parameter	N=240	Total number/ percentage	Frequency in vaccine acceptors/ percentage	Frequency in vaccine hesitators/ percentage	p value*
Sex	Male	104 (43.3)	100 (96.1)	4 (3.9)	0.69
	Female	136 (56.6)	132 (97)	4 (3)	
Occupation	Doctors	201 (83.7)	196 (97.5)	5 (2.5)	0.09
	Nursing professional	39 ((16.3)	36 (92.3)	3 (7.7)	
Marital status	Married	231 (96.2)	224 (96.9)	7 (3.1)	0.03
	Widowed	4 (1.6)	4 (100)	0	
	Single parent	3 (1.2)	2 (66.6)	1 (33.3)	
	Separated	2 (0.8)	2 (100)	0	
	Divorced	0			
Type of family	Nuclear	115 (47.9)	110 (95.6)	5 (4.4)	0.40
	Joint	125 (52.1)	122 (97.6)	3 (2.4)	
COVID-19 vaccination status of self	Yes	221 (92)	217 (90.4)	4 (9.6)	0.000
	No	19 (8)	15 (78.9)	4 (21.1)	
History of severe adverse reaction after taking vaccine	Yes	14 (5.8)	14 (100)	0	0.6
	No	207 (94.2)	203 (98)	4 (2)	
History of COVID-19 infection after taking vaccine	Yes	23 (9.5)	22 (95.6)	1 (4.4)	0.33
	No	198 (90.5)	195 (98.4)	3 (1.6)	
A history of psychiatric illness	Yes	2 (0.9)	2 (100) q	0	0.79
	No	238 (99.1)	230 (96.6)	8 (3.4)	

*Value to be considered significant if it is <0.05

Table 2: Assessment of knowledge of HCWS regarding pediatric COVID-19 vaccine

Parameter	n=240	Total number of responses (%)	Frequency in vaccine acceptors (%)	Frequency in vaccine hesitators (%)	p value*
Awareness regarding different vaccines available in India	Yes	228 (95)	221 (97)	7 (3)	0.32
	No, don't know	12 (5)	11 (91.6)	1 (8.4)	
Knowledge about pediatric vaccine under trial	Yes	215 (89.5)	208 (96.7)	7 (3.3)	0.03
	No, don't know	25 (10.5)	24 (96)	1 (4)	
Common side effects of the vaccine	Yes	240 (100)	232 (96.6)	8 (3.4)	
	No, don't know	0	0	0	
Rare side effects of vaccine	Yes	212 (88.3)	205 (96.6)	7 (3.4)	0.94
	No, don't know	28 (11.6)	27 (96.4)	1 (3.6)	
Contraindications to vaccine	Yes	214 (89)	207 (96.7)	7 (3.3)	0.87
	No, don't know	26 (11)	25 (96)	1 (4)	

*Value to be considered significant if it is <0.05

Table 3: Assessment of beliefs/perceptions of HCWs regarding COVID-19 infection and pediatric COVID-19 vaccine

Parameter	N=240	Total number of responses (%)	Frequency in vaccine acceptors (%)	Frequency in vaccine hesitators (%)	p value*
Fatality of COVID-19 infection	Can be fatal in any child or only in those with comorbidities	162 (67.5)	155 (95.6)	7 (4.4)	0.21
	Can't be fatal or not sure	78 (22.5)	77 (98.7)	1 (1.3)	
Chances of infection post-vaccination	Yes	208 (86.6)	200 (96)	8 (4)	1.2
	No, not sure	32 (13.4)	32 (100)	0	
Usefulness of vaccine in preventing infection	Yes	183 (76.2)	180 (98.3)	3 (1.7)	0.009
	No, not sure	57 (23.8)	52 (91.2)	5 (7.8)	
Usefulness of vaccine in reducing severity of infection	Yes	228 (95)	222 (97.3)	6 (2.7)	0.008
	No, not sure	12 (5)	10 (83.3)	2 (16.7)	
Increased risk to child because of one's profession	Yes	227 (94.5)	221 (97.3)	6 (2.3)	0.013
	No, not sure	13 (5.5)	11 (84.6)	2 (15.4)	
Herd immunity	Yes, not sure	32 (13.3)	31 (96.8)	1 (3.2)	0.94
	No	208 (86.6)	201 (96.6)	7 (3.4)	
Prior COVID-19 infection is protective against reinfection	Yes, not sure	96 (40)	92 (96)	4 (4)	0.55
	No	144 (60)	140 (97.2)	4 (2.8)	
Vaccine to be avoided in presence of comorbidities	Yes, not sure	149 (62)	143 (95.9)	6 (4.1)	0.44
	No	91 (38)	89 (97.8)	2 (8.2)	
Vaccine affects fertility	Yes, not sure	51 (21)	47 (92)	4 (8)	0.04
	No	189 (79)	185 (97.8)	4 (2.2)	
Vaccine contraindicated while menstruating	Yes, not sure	47 (19.5)	43 (91.4)	4 (8.6)	0.02
	No	193 (80.5)	189 (98)	4 (2)	
Trusted pharmaceuticals	Indian	49 (20.4)	46 (93.8)	3 (6.2)	0.01
	Foreign	10 (4.1)	8 (80)	2 (20)	
	Either of the two	178 (74.1)	175 (98.3)	3 (1.6)	
	None	3 (1.2)	3 (100)	0	

*Value to be considered significant if it is <0.05

acceptance of the vaccine has improved over time and more HCWs want to vaccinate their children, which can help us spread awareness and positivity about the vaccine and successfully vaccinate our pediatric population like in other countries. A study done by Abram Wagner *et al*. (2021) in Chandigarh, India, showed >97% acceptance in mothers for by and large all childhood vaccines [9], but there are no studies so far for the COVID-19 vaccine. Other countries have found higher hesitancy for pediatric COVID-19 vaccine – 33% in the US (Alfieri, 2021) [10], 25% in Poland (Babicki, 2021) [11], and so on. This difference might be because of the difference in the study population, regional differences, and governmental policies for the vaccine.

Participants who had vaccinated themselves showed a significant relation to pediatric vaccine acceptance (p=0.00) and this principally reflects their support for the vaccination program. Similar results were reported in a survey done in China (Spencer, 2021). No significant associations were found with other demographic variables, though a few studies have reported them, and the data are variable (Alfieri, 2021) [10].

The most important source of information for people regarding pediatric vaccine was the internet/social media and television (34.3%) [10-12], and the pediatrician (32.2%) [13], hence, these sources may be used to enhance people's knowledge for better acceptance of the vaccine (Alfieri, 2021; Babicki, 2021; Fisher, 2021; Temsah, 2021).

Knowledge

Approximately 90% of the participants were aware of the vaccine being under trial for children, which has significantly contributed to more

Table 4: Assessment of attitude of HCWs toward pediatric COVID-19 vaccine

Parameter	N=240	Total number of responses (%)	Frequency in vaccine acceptors (%)	Frequency in vaccine hesitators (%)	p value*
Vaccine important for children	Yes	232 (96.6)	225 (97)	7 (3)	0.14
	No, not sure	8 (3.4)	7 (87.5)	1 (12.5)	
Vaccine safe in children	Yes	156 (65)	156 (100)	0	0.000
	No, not sure	84 (35)	76 (90.4)	8 (9.6)	
Vaccine effective in children	Yes	189 (78.7)	187 (99)	2 (1)	0.000
	No, not sure	51 (21.3)	45 (88.2)	6 (11.8)	
Pediatric vaccine important for community at large	Yes	220 (91.6)	215 (97.7)	5 (2.3)	0.002
	No, not sure	20 (8.4)	17 (85)	3 (15)	
Information received regarding vaccines from government is reliable	Yes	181 (75.4)	178 (98.3)	3 (1.7)	0.011
	No, not sure	59 (24.6)	54 (91.5)	5 (8.5)	
Vaccine is protective against disease	Yes	224 (93.3)	219 (97.7)	5 (2.3)	0.000
	No, not sure	16 (6.7)	13 (81.5)	3 (18.5)	
Concern about side effects of vaccine in children	Yes	183 (76.2)	175 (95.6)	8 (4.4)	0.10
	No, not sure	57 (23.8)	57 (100)	0	
Vaccination to be avoided if allergic to other vaccines	Yes	193 (80.4)	187 (96.8)	6 (3.2)	0.695
	No, not sure	47 (19.6)	45 (95.7)	2 (4.3)	
Vaccinating because of peer pressure	Yes	55 (23)	54 (98)	1 (2)	0.47
	No, not sure	185 (77)	178 (96.2)	7 (3.8)	
Favor the vaccination policy	Yes	219 (91.2)	215 (98)	4 (2)	0.000
	No, not sure	21 (7.8)	17 (81)	4 (19)	
Recommend vaccine to others	Yes	223 (93)	219 (98.2)	4 (1.8)	0.000
	No, not sure	17 (7)	13 (76.4)	4 (23.6)	

*Value to be considered significant if it is <0.05

acceptance (p=0.03). Awareness regarding vaccines, their common and rare side effects, their benefits, and the various contraindications help people make the decision. Similar results were replicated in the study conducted by Huynh *et al*. (2021) in Vietnam for the adult vaccine [14]. Another study in UAE (Temsah, 2021) on pediatric COVID-19 vaccine hesitancy in parents found inadequate safety information and worry for side effects as the most important cause of vaccine hesitancy [12]. Hence, improving knowledge about the various aspects of infection and vaccine among the masses can help in promoting more acceptance, and doctors themselves play a very crucial role in this.

Beliefs

About 76% of the participants believe in the usefulness of the vaccine in preventing COVID-19 infection in their kids and 95% believe in the reduction of severity of infection, both the factors have contributed significantly (p= 0.008 and 0.009, respectively) to the vaccine acceptance (Babicki, 2021) [11]. Furthermore, 94.5% of the participants feel that their children are at increased risk because of their profession and therefore want to vaccinate them (p=0.13).

Around 20% of the participants believe the vaccine affects the fertility of females and is to be contraindicated during menstruation, all of which have contributed significantly to vaccine hesitancy (p=0.04 and 0.02, respectively). The concept is very debatable with different studies showing different results, yet many studies suggest that the vaccine should be given to pregnant women. More detailed studies are required for corroboration and dissemination of adequate information. The majority of people are willing to give a vaccine belonging to either Indian or foreign pharmaceutical companies.

About 22.5% of the participants perceived infection to be non-fatal in pediatric population, 86% believed that there are chances of infection even after giving the vaccine, 13% believed in herd immunity, 40% believed in protection against reinfection if the child has had a prior infection, and 62% perceived that vaccination should be avoided in the presence of any comorbidities. All these factors contributed to vaccine hesitancy, though none significantly. These areas need to be tackled and sufficient awareness has to be generated to encourage more vaccine acceptance amongst the populace. The concept of herd immunity is very controversial, and for this reason, it warrants more extensive research.

Attitude

Various barriers to the vaccination program found in our study were limited availability (73%), lack of information about the safety and effectiveness of the vaccine (67.5%), and fear of complications (69.2%). This is in keeping with the study (Altulahi, 2021) conducted in Saudi Arabia [15].

The majority of people showed a positive attitude toward vaccinating their kids. About 65% of the participants were positive about the safety of the vaccine in children, 79% about its effectiveness, 93.3% about its protective power, and 91.6% believed that it was important for the community at large. About 75.4% agreed on the reliability of the information received from government sources about the vaccine and 91% favor the vaccination policy and are willing to motivate people further. All these factors had a significant impact on increased vaccine acceptance and these could be further enhanced to decrease hesitancy. Many studies have found the vaccine to be safe, immunogenic, and efficacious (Choi, 2021; Moss, 2021; Walter, 2022) [16-18].

About 76% of people were concerned about the side effects of the COVID-19 vaccine in children, 80% felt that the vaccine needs to be avoided if the child is allergic to other vaccines, and 23% of participants felt that peer pressure might lead them to vaccinate their children, but none of these factors has remarkably contributed to vaccine hesitancy, yet these areas are to be kept in mind and there should be a provision of additional information to debunk myths. A study in the UK (Paul, 2021) found mistrust of vaccine and concerns about side effects as the most important aspect of negative public attitude (Paul, 2021) [19].

CONCLUSION

It can safely be said that the benefits of vaccinating children are beyond the apparent and direct health benefits. It might decrease the community transmission and reduce the need for mitigation measures in schools, eventually minimizing the disruption in education and

promoting the overall well-being of children. Hence, a national-level strategy is required to achieve these targets and to vaccinate all the children of our country which doctors may aid by reducing vaccine hesitancy among the masses.

Strengths and limitations

Our study is one of the first studies to understand parental hesitancy for pediatric COVID-19 vaccine in India, which can further help us recognize the factors responsible for the same and thus combat the forthcoming waves of COVID-19 infection effectively. Most of the studies have been done for vaccination in adults and there is a dearth of literature on vaccination in children globally. The study was done on health-care professionals as they are one of the most important sources of information for the people. Snowball sampling through an online platform could limit the representativeness of the sample and generalizability to the entire population but it provides a template for similar research in other populations. Self-reported information may have led to information bias and those who were willing to vaccinate their children were also more willing to fill the form.

AUTHORS' CONTRIBUTIONS

Himanshi: Contributed to formulating the question, designing the study, carrying it out, analyzing the data, and writing the article. Dr. Kranti S. Kadam: Contributed to formulating the question, designing the study, carrying it out, and proofreading. Dr. Parul U. Uttarwar: Contributed to formulation of the question, designing the study, carrying it out, and writing the article.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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