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Vaccine Hesitancy among Caregivers of Children Attending Immunization Clinic at Gwalior in Central India

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Abstract

Background: Even though majority of parents vaccinate their children, vaccine hesitancy (VH) has grown in popularity. It is unclear how this vaccination reluctance culture came to be and how it affects parents' decisions regarding immunization schedule.

Objectives: The present study was conducted to identify the socio-economic and demographic subgroups and to explore the reasons of vaccine hesitancy among caregivers of children attending immunization clinic.

Methods: The present cross-sectional study was conducted at the immunization clinic of a tertiary care center at GR Medical College, Gwalior, MP, India. In the present study, 450 caregivers were included and the socio-economic status, vaccine hesitancy (VH) and reasons for VH were assessed. Statistical tests like Chi square test and Logistic regression were applied. Frequency, percentage, odds ratio (OR) with their respective 95% confidence interval were calculated and p value <0.05 was considered as statistically significant.

Results: In total, vaccine hesitancy was observed among the 103 (22.9%) caregivers. Occupation of father [business (26.09%), others like farmer/daily wage worker (35.90%)], socio-economic status of the family [middle class (33.02%), lower middle class (35.59%)], SC-ST caste category (31.25%), illiterate mother (46.67%), illiterate father (40.0%) were found to be significantly related to VH. Illiterate mothers were about four times at higher risk [OR: 4.247; 95% CI: 1.459-12.365] as compared to highly educated (graduate and above) mothers. Caregivers visiting for fourth vaccination (38.04%) of their children were found to have high VH. Sickness of the child (40.8%) was reported to be the most common reason for VH followed by, No caregiver available to accompany the child (16.5%), Lack of awareness of vaccination schedule (16.5%), Forgot date (15.5%) and reluctance (10.7%).

Conclusion: The vaccine hesitancy was prevalent among the caregivers. To ensure full immunization for the children, it is vital to raise awareness among newlywed couples and pregnant women.

Keywords: Child, Delay, Hesitancy, Routine immunization, Vaccination

Introduction

Vaccination is a cost-effective measure to significantly reduce childhood morbidity, mortality, and disease outbreaks. Vaccine hesitancy is a crucial issue that has to be addressed because effective control of diseases that can be prevented by vaccination typically involves ongoing maintenance of exceptionally high rates of on-time immunization. A wide range of strategies at the individual, provider, health system, and national levels are necessary to address the multiple and complex causes of vaccination reluctance.[1] The creation of successful community-based interventions can be guided by identifying socio-cultural factors that affect vaccine decision-making in populations most at risk for high rates of reluctance. In order to prevent the resurgence of diseases that can be prevented by vaccination, ongoing attention must be paid to this issue given its tremendous impact on public health.[2] Addressing vaccine hesitancy is not a simple task, as a multitude of factors can potentially influence a person's decision to seek out or accept vaccination for themselves or their child.[3,4] As hesitancy is not uniform across a population, it has variations in the subgroups. These hesitant subgroups may be linked by geography, culture, socioeconomic and/or other factors.[5] The WHO Strategic Advisory Group of Experts on Immunization (SAGE) working group on Vaccine Hesitancy (VH) concluded that vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite availability of vaccination services. Vaccine hesitancy is complex and context specific, varying across time, place and vaccines. It is influenced by factors such as complacency, convenience and confidence. The Working Group retained the term 'vaccine' rather than 'vaccination' hesitancy, although the latter more correctly implies the broader range of immunization concerns, as vaccine hesitancy is the more commonly used term. While high levels of hesitancy lead to low vaccine demand, low levels of hesitancy do not necessarily mean high vaccine demand. The Vaccine Hesitancy Determinants Matrix displays the factors influencing the behavioral decision to accept, delay or reject some or all vaccines under three categories: contextual, individual and group, and vaccine/vaccination-specific influences.[3,6]

Thus the specific factors leading to hesitancy in the subgroup need to be identified so that the most appropriate intervention options can be applied and evaluated for effectiveness. Interventions will differ by subgroup, context, setting, vaccine(s), time, and resources. Therefore, the present study was conducted to identify association of demographic and socio-economic characteristics with the vaccine hesitancy and to know the reasons for the vaccine hesitancy among caregivers.

Materials and Methods

This hospital-based cross-sectional study was conducted at the immunization clinic of Madhav Dispensary of JA group of Hospitals of GR Medical College, Gwalior in Madhya Pradesh state of India. A predesigned, pretested, structured interview-based questionnaire was used for data collection from all the caregivers of children 6 to 59 month of age who attended the immunization clinic between periods of November 2019 to June 2021. By considering a 5% absolute error and 95% confidence interval, the sample was calculated by using formula N =4PQ/L2, where P is the proportion of vaccine hesitancy among caregivers in Gwalior = 50%, L = Absolute error =5%, considering a non- response rate of 10%.

By using the above formula, the minimum sample size for the study was calculated as 440 which was upwardly adjusted to 450. Caregivers of the children visiting the immunization clinic at a tertiary care hospital, Gwalior (MP), who provided consent to participate in the study were included. Seriously ill and debilitated children were excluded from the study. For the selection of the cases, purposive sampling was adopted. To fulfill the objective i.e. reasons of vaccine hesitancy among caregivers of children, the caregivers who were visiting the clinic for the vaccination of their children were purposely selected from the Immunization Clinic. One caregiver among every five caregivers visiting was randomly selected for the present study. Ethical permission was taken from the Institutional Ethical Committee of GR Medical College, Gwalior (MP) before starting the study (D.No: 284/IEC-GRMC/2019; Dated 01/05/2020). The participants were explained about the study purpose and any additional queries if present were clarified. Data were entered in MS Excel sheets and analysis was done using IBM Statistical Package for the Social Sciences (SPSS, Armonk, NY: IBM Corp) version 22. The graphical representation of data was done using figures and tables. The descriptive representation of data was done in the form of numbers and percentages and to determine the association, Chi Square test / Fisher Exact test was applied. Logistic regression was applied to assess the risk of VH among the caregivers in terms of Odds ratio (OR) with their respective 95% confidence interval. p value <0.05 was considered as statistically significant.

Results

In the present study, 450 caregivers of children were included. The mean birth weight of the children recorded was 2.78±0.55 kg. Majority of children were males i.e., 278 (61.8%) while 172 (38.2%) were females. Most of the children belonged to the general category i.e., 240 (53.3%) followed by OBC category i.e., 130 (28.9%), while the rest 80 (17.8%) belonged to the SC & ST category. In the present study, majority of children were Hindus i.e., 407 (90.4%), 35 (8%) were Muslims, and the remaining 7 (2%) were others which included Sikhs, Christians. Distribution of the type of family was about same i.e. joint families i.e., 240 (53.3%), followed by nuclear families i.e., 210 (46.7%). In the present study, vaccine hesitancy was observed among 22.9% (103) of caregivers while it was not noted among 77.1% (347) of caregivers (Figure 1).

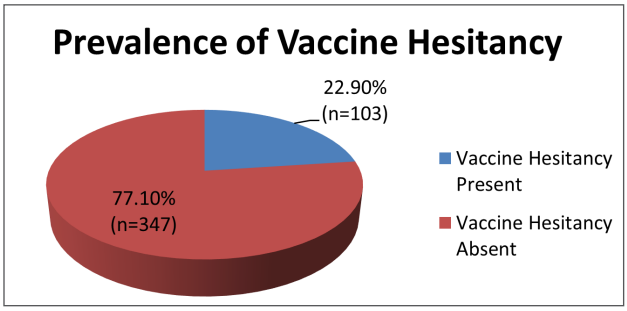

Figure 1: Prevalence of vaccine hesitancy

Table 1 shows that caste category, religion, education of mother, education of father, occupation of father, socio-economic status, visit for immunization were observed as significant risk factors for vaccine hesitancy. As compared with the SC/ST caste category, a significant lower risk was found for the general [OR: 0.467; 95% CI: 0.262-0.832] and OBC caste categories [OR: 0.843; 95% CI: 0.458-1.549]. Compared with the other religions (Christian & Sikhs), Muslims were at lower risk for the vaccine hesitancy [OR: 0.121; 95% CI: 0.021-0.712]. Illiterate mothers were about four times at higher risk [OR: 4.247; 95% CI: 1.459-12.365] as compared to highly educated (graduate and above) mothers. Illiterate (40.0%) and elementary educated (37.21%) fathers were at higher risk for vaccine hesitancy as compared to highly educated (graduate and above) fathers. In terms of employment, fathers who were unemployed, students, farmers, daily wage workers etc. were at higher risk for vaccine hesitancy compared to fathers having any job, either private [OR: 0.381; 95% CI: 0.211-0.687] or government [OR: 0.439; 95% CI: 0.215-0.899]. Middle class (33.02%) and lower middle class (35.59%) were found to have higher VH. Caregivers who came for fourth vaccination (38.04%) for their children were found to have high VH.

Table 1: Univariate analysis showing association of vaccine hesitancy with socio-economic and demographic variables

Characteristics		Frequency (n=450) (%)	VH Present (n=103) (%)	VH Absent (n=347) (%)	Chi Square / p value	OR (95% CI)
Gender	Male	278 (61.78)	58 (20.86)	220 (79.14)	1.691/0.193	0.744 (0.476-1.163)
	Female	172 (38.22)	45 (26.16)	127 (73.84)		1
Category	Others	240 (53.33)	42 (17.50)	198 (82.50)	8.817/0.012*	0.467 (0.262-0.832)
	OBC	130 (28.89)	36 (27.69)	94 (72.31)		0.843 (0.458-1.549)
	SC & ST	80 (17.78)	25 (31.25)	55 (68.75)		1
Religion	Hindu	407 (90.44)	94 (23.10)	313 (76.90)	6.315/0.042*	0.225 (0.049-1.024)
	Muslim	36 (8.00)	5 (13.89)	31 (86.11)		0.121 (0.021-0.712)
	Others (Sikh, Christian)	7 (1.56)	4 (57.14)	3 (42.86)		1
Place of Residence	Urban	436 (96.89)	99 (22.71)	337 (77.29)	0.264/0.607	0.734 (0.225-2.392)
	Rural	14 (3.11)	4 (28.57)	10 (71.43)		1

Education of Mother	Illiterate	15 (3.33)	7 (46.67)	8 (53.33)	17.943/ 0.0004*	4.247 (1.459-12.365)
	Elementary Education	69 (15.33)	26 (37.68)	43 (62.32)		2.935 (1.624-5.303)
	Middle to Intermediate	126 (28.00)	29 (23.02)	97 (76.98)		1.451 (0.851-2.475)
	College and Above	240 (53.33)	41 (17.08)	199 (82.92)		1
Education of Father	Illiterate	20 (4.44)	8 (40.0)	12 (60.0)	18.596/ 0.0003*	3.439 (1.329-8.903)
	Elementary Education	43 (9.56)	16 (37.21)	27 (62.79)		3.506 (1.522-6.142)
	Middle to Intermediate	116 (25.78)	35 (30.17)	81 (69.83)		2.229 (1.337-3.717)
	College and Above	271 (60.22)	44 (16.24)	227 (83.76)		1
Occupation of Father	Business	92 (20.44)	24 (26.09)	68 (73.91)	11.631/ 0.009*	0.630 (0.327-1.215)
	Private job	199 (44.22)	35 (17.59)	164 (82.41)		0.381 (0.211-0.687)
	Government job	81 (18.00)	16 (19.75)	65 (80.25)		0.439 (0.215-0.899)
	Others	78 (17.33)	28 (35.90)	50 (64.10)		1
Type of Family	Nuclear	210 (46.67)	53 (25.24)	157 (74.76)	1.231/ 0.267	1.283 (0.826-1.993)
	Joint	240 (53.33)	50 (20.83)	190 (79.17)		1
Socio economic Status	Upper Class	103 (22.89)	12 (11.65)	91 (88.35)	20.332/ 0.000*	0.659 (0.071-6.131)
	Upper Middle Class	176 (39.11)	34 (19.32)	142 (80.68)		1.197 (0.135-10.585)
	Middle Class	106 (23.56)	35 (33.02)	71 (66.98)		2.465 (0.277-21.911)
	Lower Middle Class	59 (13.11)	21 (35.59)	38 (64.41)		2.763 (0.302-25.244)
	Lower	6 (1.33)	1 (16.67)	5 (83.33)		1
Visit	First	4 (0.89)	1 (25.0)	3 (75.0)	16.822/ 0.002*	1.754 (0.175-17.609)
	Second	120 (26.67)	23 (19.17)	97 (80.33)		1.247 (0.659-2.358)
	Third	90 (20.00)	22 (24.44)	68 (75.56)		1.702 (0.883-3.278)
	Fourth	92 (20.44)	35 (38.04)	57 (61.96)		3.230 (1.750-5.964)
	Fifth	144 (32.00)	23 (15.97)	121 (84.03)		1

*p value significant at 5% level of significance

Sickness of child (40.8%) was found to be the most common reason for VH followed by, No caregiver available to accompany the child (16.5%), Lack of awareness of vaccination schedule (16.5%), Forgot date (15.5%) and reluctance (10.7%) (Table 2).

Table 2: Reasons for vaccine hesitancy for routine immunization starting at six weeks of age

Reasons for Vaccine Hesitancy	Frequency	Percentage
Unaware	17	16.5
Forgot Date	16	15.5
Reluctant	11	10.7
Sickness of child	42	40.8
No caregiver available to accompany the child	17	16.5
Total	103	100

In the case of Hepatitis-B vaccine (birth dose), out of 450 caregivers, vaccine hesitancy was observed in 26 (5.8%) caregivers, while in the case of BCG vaccine and OPV vaccine (zero dose), vaccine hesitancy was observed in 10 (2.2%) caregivers. For Hepatitis B, 14 (53.8%) caregivers were unaware of the vaccine, while 12 (46.2%) demonstrated VH due to sickness of child. For BCG & OPV vaccines, vaccine hesitancy was among 10 caregivers due to sickness of the child (Figure 2).

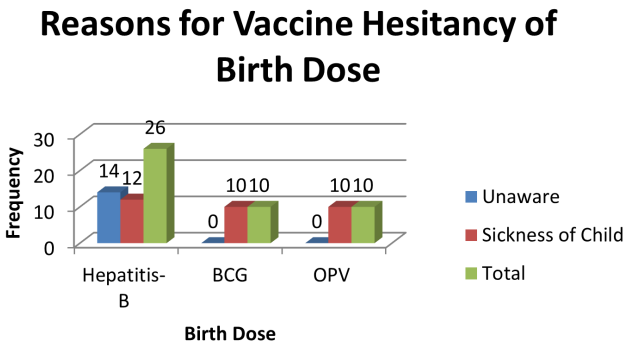

Figure 2: Reasons for vaccine hesitancy of birth dose

Discussion

This study was a hospital-based cross-sectional study conducted for a period of 20 months starting from November 2019 to June 2021 among 450 caregivers attending the immunization clinic at a tertiary care hospital in Gwalior. This study was conducted to assess vaccine hesitancy among caregivers. Vaccines are safe and effective in preventing fatal and disabling infectious diseases.

In this study, it was observed that vaccine hesitancy was present among 103 (22.9%) caregivers. Sikder R *et al*. also found that vaccine hesitancy was present among 29% of the participants in their study.[7] Sahoo SS et al. observed VH among 9.18% of the participants.[8] Higher vaccine hesitancy was reported by Dasgupta *et al*. (83%), Barman D *et al*. (83.6%), while Agarwal Anil K *et al*., Dube E *et al*., Wagner *et al*., reported vaccine hesitancy among 19.7%, 16.1%, and 10%, respectively which were lower than the present study.[9-13]

The gender of the child was not found as a significant predictor for vaccine hesitancy in the present study. This observation was supported by studies of Dasgupta *et al*. and Barman D *et al*.[9,10] The proportion of vaccine hesitancy was marginally higher in female children. This probably is due to the attitude of families giving more care towards the male child as compared to female child.

Poor education of the caregivers was found to be a significant predictor for risk of VH in the present study. Sikder R *et al*. also found mothers having higher education to be less hesitant (21.7%) whereas mothers with lower education were more hesitant (29.6%).[7] Sahoo *et al*. also found that VH was more prevalent among uneducated mothers (16.7%) and uneducated fathers (25%).8 Similar findings were also observed by Barman *et al*.,[10] Sharma *et al*.,[14] and Naeem *et al*.[15] Education status of mothers has been negatively associated with immunization of the children. This may be possible because for an illiterate mother, it could be difficult to understand the timing of vaccination provided to children, lack of knowledge and awareness regarding immunization. The educated mothers are much aware of the importance of vaccination and remember the dates for timely vaccination.

In the nuclear families, vaccine hesitancy was more as compared to joint families (25.24% vs 20.83%). Sikder R *et al*. (2020) also found that vaccine hesitancy was more in nuclear families (31.9%).[7] There are more caregivers in a joint family as compared with the nuclear families. So any member in a joint family can handle timely vaccination of the children when spouse is busy with household chores, work, any other activity or when they were sick.

Vaccine hesitancy was significantly associated with socioeconomic status. In the present study, lower-middle class and middle class socioeconomic status showed a

higher likelihood for vaccine hesitancy as compared to upper class and upper-middle class. Sikder R *et al*. (2020) also found caregivers of socio-economic class I, II, III to be more hesitant (35.4%).[7] This is probably owing to the respondents' overall higher levels of education, improved socioeconomic standing, and higher levels of awareness. It was found that VH was lower in urban area residents, probably due to the availability and accessibility of clinics, hospitals, and improved socioeconomic status.

In this study, sickness of the child was the main reason for the presence of vaccine hesitancy (40.8%), followed by lack of awareness of vaccination schedule (16.5%) and unavailability of caregivers to accompany the child (16.5%). About 15.5% caregivers said that they forgot the date of vaccination, while 11 (10.7%) caregivers were reluctant. Similar observations like lack of awareness, forgetfulness, and reluctance to vaccinate were the reasons cited by previous studies conducted by Sikder R *et al*., Dasgupta *et al*., Agarwal Anil K *et al*.[7,9,11] Sikder R *et al*.,[7] and Dasgupta *et al*.[9] observed that being reluctant to vaccinate was the most common reason for vaccine hesitancy present in 26.2% and 26.1%, respectively. Dasgupta et al. found sickness of a child as the reason reported by 18.0% of the participants.[9] Agarwal AK *et al*.[11] also spotted sickness of a child (34.3%) as a main reason of the vaccine hesitancy as similar to the present study.

From a societal standpoint, a decrease in vaccine hesitancy is significantly influenced by immunization providers' education and training regarding the advantages of vaccines and recommended practices, which they must properly convey to parents and other caregivers. Physicians, Gynecologists and Pediatricians should counsel regarding the significance of childhood vaccinations to their patients and the caregiver. Other front-line healthcare professionals can also carefully describe any adverse effects that may occur while also allaying worries and assuaging concerns about vaccine safety. Also, they must combat the abundance of false information about vaccines that is spread on social media sites.[8,16]

Limitation

This was a hospital based cross-sectional study conducted among the caregivers who attended the immunization clinic. So the results of the study may have been influenced by the selection bias.

Conclusion

In the present study, SC & ST caste category, Christian and Sikh religion, illiterate and primary educated mothers and fathers, fathers with an occupation other than job or business (unemployed, students, farmer, daily wage workers etc.), caregivers belonging to middle and lower middle class were found as the subgroups that were more prone to VH. The study shows that vaccination reluctance is a preventable issue even in tertiary care settings with nearly universal coverage. The study findings provide a clear understanding of caregivers' vaccine reluctance since they show how knowledge and attitudes significantly influence immunization practice. In order to promote vaccination confidence and maintain long-term advantages of the national immunization program, policy makers must address the issues raised by this vaccine choice and plan and implement public health solutions.

Conflict of Interest

Nil

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Nil

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