Original Article

Addressing the Socio-demographic Determinants of COVID-19 Vaccine Hesitancy among the General Population in a Rural Block of Andhra Pradesh, India: A Community Based Cross-sectional Study

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Abstract

Background: Vaccine hesitancy continues to impede the attempts made globally in combating the COVID-19 pandemic. Hence, this study aims to determine the socio-demographic factors associated with COVID-19 vaccine hesitancy among the general population in a rural block of Andhra Pradesh.

Methods: A community based cross-sectional study was conducted among the general population of a rural block in Andhra Pradesh. A total of 210 participants were recruited through multi- stage random sampling technique. Data was collected through semi-structured schedule method. Descriptive statistics was computed to describe the socio-demographic characteristics, and Chi-square test was applied to assess the association between vaccine hesitancy and socio-demographic characteristics of the study participants.

Results: COVID-19 vaccine hesitancy rate among rural population was 45.5%. Statistically significant association was observed between vaccine hesitancy and socio-demographic characteristics like: age between 40-49 years, females, Hindus, illiterates, unemployed, marginal workers, lower middle class and those with two children in their family.

Conclusion: High prevalence of vaccine hesitancy was noted among rural population. Mass media strategies, evidence-based communication, and policy measures will have to be implemented across rural areas with special focus on groups identified with vaccine hesitancy.

Keywords: COVID-19 vaccine, Vaccine hesitancy, Vaccine acceptance

Introduction

The first human cases of COVID-19 were reported by officials in Wuhan city, China, in December 2019.[1] Since then the world is witnessing a major global humanitarian disaster, which has affected all aspects of life across the planet.[2] India

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was one of the world's worst-affected countries due to the COVID-19 pandemic. The pandemic has resulted in a huge impact across societies, with governments worldwide imposing restrictions to prevent the spread of the virus.[3] However, it is recognized that such preventive measures may not be sufficient to halt the spread of COVID-19. [2] In this situation a vaccine is considered to be the most awaiting, cost effective intervention. Currently vaccination prevents 2-3 million deaths a year, and a further 1.5 million could be avoided if global coverage of vaccinations is improved.[4] Hundreds of global Research and Development institutions were engaged in unparalleled speed to develop the vaccine.[5] Every nation is combating the outbreak with vaccination; and the success or failure of any vaccination programme is largely dependent on public behaviour.[6] Antivax groups' statements, conspiracy theories, myths and misperceptions, questions about the speed of vaccine development and long-term side effects, and expert opinion on challenges with the COVID-19 vaccine were proliferating in the national media.[7] In this situation of public health emergency, where vaccines are released in crisis, building vaccine confidence is the main challenge; without such confidence, vaccine hesitancy is natural. In fact WHO had mentioned vaccine hesitancy as one of the top global health threats.[4] Available literature suggests that vaccine hesitancy for COVID-19 varies significantly across the countries from 28 to 76%.[8] WHO defined vaccine hesitancy as a "delay in acceptance or refusal of vaccination despite availability of vaccination services".[4] It is a complex and context specific phenomenon varying across the time, place, and vaccines. It is influenced by factors such as complacency, convenience, and confidence;[9] however, high vaccine coverage is needed to flatten the epidemic curve.[10] Vaccine hesitancy affects not only the individual who is hesitant to take the vaccine, but the whole community, making it tough to reach the level of herd immunity. Understanding the magnitude of vaccine hesitancy, and identifying the key determinants that are responsible for vaccine hesitancy among rural community, may help to address these determinants. It will also contribute to help the policy makers and vaccination programme planners to develop strategies, to improve the uptake of COVID-19 vaccine. Majority (68.84 %) of Indian population resides in rural areas; [11] Among rural population, very few studies have been conducted to understand hesitancy for COVID-19 vaccine at micro level. There are lacuna in research with regard to socio-demographic factors responsible for COVID-19 vaccine hesitancy. Thus, this study was carried out to conduct a comprehensive and systematic appraisal of COVID-19 vaccine hesitancy, in a community based sample of general population, living in a rural block of Andhra Pradesh.

Research Questions

1. What is the extent of vaccine hesitancy for COVID-19 vaccine among general population of a rural block?
2. Is there any association between socio-demographic factors and COVID-19 vaccine hesitancy among rural population?

Research Hypothesis

Among rural population, COVID-19 vaccine hesitancy will be associated with their socio-demographic factors.

Objectives

1. To estimate the prevalence of COVID-19 vaccine hesitancy among the general population of a rural block.
2. To determine the socio-demographic factors associated with COVID-19 vaccine hesitancy.

Materials and Methods

Study design: Community based cross-sectional study

Study setting: Housing unit of study participants living in the selected villages of rural Rajahmundry Block

Study population: All men and women above 18 years of age

Inclusion criteria: Study participants residing in the village at least for a period of 1 year were included in the study.

Exclusion criteria: Seriously ill patients, mentally disabled, those with history of allergic reactions were excluded from the study.

Sample size: By applying the formula, $4pq/ L^2$, the sample size obtained was 189 (p = 13.7%, the prevalence of COVID-19 vaccine hesitancy, [12] and L is allowable error of 5%). Accounting for 10% non-response rate, the final sample size was arrived at 207.

Sampling technique: The participants were recruited in the study through multi-stage random sampling technique; Rajahmundry rural block consists of 9 villages; 5 villages were selected by simple random sampling technique (Lottery method). Each village has 1500 to 4200 households. From each village 42 households were selected again by simple random sampling. Each household has an average size of 5 members; From each household one participant was selected randomly. A total of 210 participants were recruited for the study.

Study period: 3 months (January 2021 to March 2021)

Study tools: Semi-structured schedule with a set of questions

Data collection: The study participants were explained about the purpose of the study, and were assured of the anonymity and confidentiality; Informed consent was taken prior to the interview.

Data analysis: Descriptive statistics was computed to describe the socio-demographic characteristics of the study participants. Chi-square test was applied to assess the association between vaccine hesitancy and socio-demographic factors.

Results

A total of 210 participants were enrolled in the study. Around 10 participants were non-responsive; hence, complete data was collected from 200 participants. An aggregate of 91 (45.5 %) participants showed vaccine hesitancy.

Table 1: Comparison of socio-demographic characteristics between vaccine acceptance and vaccine hesitancy groups

Socio-demographic variables	Vaccine acceptance n=109 (54.5%)	Vaccine hesitancy n=91 (45.5%)	Total n=200	p-Value
Age (years)				
18-29	25 (22.94%)	18 (19.78%)	43 (21.5%)	0.00001
30-39	48 (44.04%)	9 (9.89%)	57 (28.5%)	
40-49	24 (22.01%)	27 (29.67%)	51 (25.5%)	
50-59	7(6.42%)	16 (17.58%)	23 (11.5%)	
>/=60	5 (4.59%)	21 (23.08%)	26 (13%)	
Sex				
Male	77 (70.64%)	19 (20.88%)	96 (48%)	0.00001
Female	32 (29.36%)	72 (79.12%)	104 (52%)	
Religion				
Hindu	106(97.24%)	78 (85.71%)	184 (92%)	0.028
Muslim	1 (0.92 %)	6 (6.59 %)	7 (3.5%)	
Christian	1 (0.92 %)	4 (4.40%)	5 (2.5%)	
Others	1 (0.92 %)	3 (3.30 %)	4 (2%)	
Caste				
OC	35 (32.11%)	34 (37.36%)	69 (34.5%)	0.661
BC	51 (46.79%)	35 (38.46%)	86 (43%)	
SC	18 (16.51%)	16 (17.58%)	34 (17%)	
ST	5 (4.59%)	6 (6.59%)	11 (5.5%)	
Literacy status				
Literate	98 (89.91%)	39 (42.86%)	137 (68.5%)	0.00001
Illiterate	11 (10.09%)	52 (57.14%)	63 (31.5%)	

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Employment status				
Employed	102 (93.58%)	66 (72.53%)	168 (84%)	0.00005
Unemployed	7 (6.42%)	25 (27.47%)	32 (16%)	
Socioeconomic status				
Upper	4 (3.67%)	2 (2.20%)	6 (3%)	0.00001
Upper middle	24 (22.02%)	2 (2.20%)	26 (13%)	
Middle	23 (21.10%)	8 (8.79%)	31 (15.5%)	
Lower middle	38 (34.86%)	44 (48.35%)	82 (41%)	
Lower	20 (18.35%)	35 (38.46%)	55 (27.5%)	
Marital status				
Married	106 (97.25%)	80 (87.91%)	186 (93%)	0.009
Unmarried	3 (2.75%)	11 (12.09%)	14 (7%)	
Head of the family				
Yes	61 (55.96%)	62 (68.13%)	123 (61.5%)	0.078
No	48 (44.04%)	29 (31.87%)	77 (38.5%)	
Type of family				
Nuclear	58 (53.21%)	59 (64.84%)	117 (58.5%)	0.095
Joint	16 (14.68%)	15 (16.48%)	31 (15.5%)	
3-generation	35 (32.11%)	17 (18.68%)	52 (26%)	
Number of children in the family				
No children	1 (0.92%)	4 (4.40%)	5 (2.5%)	0.00001
1 child	8 (7.34%)	7 (7.69%)	15 (7.5%)	
2 children	63 (57.80%)	76 (83.51%)	139 (69.5%)	
3 or more	37 (33.94%)	4 (4.40%)	41 (20.5%)	

Table 1 explains that Chi-square test revealed significant association between vaccine hesitancy and socio-demographic factors of the study participants like: age between 40-49 years, females, Hindus, illiterates, unemployed, lower middle class and those with two children in their family. p-value < 0.05 was considered as statistically significant.

Table 2: Distribution of employed participants according to duration of work

Variables	Frequency	Percentage %
Employed (n=168)		
Main workers (>6 months)	149	88.7 %
Marginal workers (<6 months)	19	11.3 %

Table 2 depicts that out of the total working participants, majority (88.7%) were main workers (engaged in economically productive work for more than 6 months).

Table 3: Comparison of vaccine hesitancy between main workers and marginal workers

Variables	Vaccine acceptance n=102	Vaccine hesitancy n=66	Total n=168	p-Value
Main workers	98(96.08%)	51 (77.27%)	149 (88.7%)	0.0001
Marginal workers	4 (3.92%)	15 (22.73%)	19 (11.3 %)	

Table 3 demonstrates that Chi-square test showed significant association between marginal workers (engaged in economically productive work for less than 6 months) and vaccine hesitancy.

Discussion

The prevalence rate of COVID-19 vaccine hesitancy among rural population was 45.5%. As predicted in research hypothesis, among rural population, there are socio-demographic factors associated with COVID-19 vaccine hesitancy.

In the present study, most (28.5%) of the participants were between 30 to 39 years of age; whereas 13% were above 60 years. In contrast to this finding, Qattan et al., [2] reported that 45.32% of the participants were between 30 to 39 years, and 3.57% were more than 60 years of age. The difference observed was, it was an online cross-sectional survey, conducted to determine the acceptability of a COVID-19 vaccine among healthcare workers, in the Kindom of Saudi Arabia. Among the vaccine hesitancy group (n=91), most of the participants were between 40-49 years. Interestingly, Al-Mohaithef and Padhi found that majority (79.2%) of the respondents who were aged 45 years and above, showed interest to uptake the vaccine if it is available.[5] Malik Sallam reported that age is also an important predictor, as younger adults are less enthusiastic about taking COVID-19 vaccines.[8]

Majority (52%) of the participants were females. This finding is consistent with Khubchandani et al, [7] who reported a majority of 52%. Our results confirmed a higher vaccine hesitancy rate among women than men, which is consistent with previous studies. [8], [13], [14] In general, Indian women are more likely to practice preventive behaviours and avoid risk behaviours; with regard to health, they give high priority to the family members, and low priority to themselves; these might be the possible reasons for their vaccine hesitancy behaviour. In contrast to this finding, Mohamad Ali and Hossain found that vaccine hesitancy was high among males. [15]

In the present study, 92% of the participants were Hindus, as it was the predominant population in the study area. Dissimilar to this finding, a study carried out in Bangladesh, reported that majority (93.2%) were Muslims.[15]

Masthi and Sowmyashree found that 18.6% were illiterates. [16] This finding is in contrast with the present study, where 31.5 % illiteracy was observed. In addition, our study showed significant association between illiteracy and vaccine hesitancy, which is similar to previous research by Khubchandani et al. [7]

Majority (84%) of the study participants were employed. This finding is contradictory to a previous study conducted in United States (47%). [14] Unemployed and marginal workers exhibited vaccine hesitancy, with significant association. Impressively, Dror et al., [17] found unemployment as a positive predictor for vaccination. Short work duration, low economic status, and fear of losing the daily wages might be the possible reasons for vaccine hesitancy among marginal workers.

Most (41%) of the participants belonged to lower middle class and were likely to hesitate vaccine uptake; this finding is in line with previous studies. [7], [18]

Majority (93%) of the participants were married; Previous research by Al-Hanawi et al., [6] revealed that 63.43% were married, which was less compared to the present study. Additionally, it was found that unmarried participants were significantly associated with COVID-19 vaccine hesitancy. In contrary to this finding, Qattan et al., [2] found that unmarried individuals are more willing to accept COVID-19 vaccine rather than married individuals. The reason could be that their study participants were health care workers, and they have more chances of exposure to infection rather than general population.

A study in Tamil Nadu revealed that majority (82.1%) of the participants were from nuclear families. [19] In contrary to this finding, the present study reported that 58% were from nuclear families. The difference could be due to the fact that in previous study, the sample included rural as well as urban communities; and urban communities mostly prefer to be in a nuclear family, rather than joint or three-generation family.

Nearly 70% of the participants responded that they have 2 children in their family. In contrast to this finding, Khubchandani et al., [7] found that majority (53 %) of the respondents have no children at home. The possible reason for the difference could be that

their study investigated a community-based sample of the American adult population, whose children prefer to be independent at an early age, and they stay away from parents. The present study revealed that participants with 2 children were more likely to show vaccine hesitancy. Similar to this finding, previous research also concluded that vaccine hesitancy was higher among those who had children at home. [7] Belief on rumours in social media; and fear of death and family disruption following vaccination, could be the reasons for vaccine hesitancy among adults, who had children at home.

Limitations: First, the study is limited to a particular rural geographical location in Andhra Pradesh; it is not a state-wide representative survey. Second, there is possibility of social desirability bias, as the interviewer was affiliated to the health system.

Conclusion

There is high level of COVID-19 vaccine hesitancy among general population, in a rural block of Andhra Pradesh; and the vaccine hesitancy was associated with socio-demographic characteristics of the participants. Understanding the subgroups of the population, which have high levels of vaccine hesitancy will guide to develop specific targeted interventions, and to design social vaccine, to overcome the vaccine hesitancy.

Recommendations: Effective Behaviour Change Communication campaigns. Mass media strategies, Evidence-based communication, and policy measures will have to be implemented across rural areas, with special attention towards the groups identified with vaccine hesitancy.

Conflicts of interest: Nil

Source of funding: Self

Ethical Clearance: Ethical clearance was obtained from the Institutional Ethics Committee prior to the commencement of the study.

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