

Perception, acceptance, and adverse effects of COVID-19 vaccines: Insights from Indian population

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ABSTRACT

Background: Vaccination has been pivotal in eradicating numerous infectious diseases. Nonetheless, concerns about the safety and side effects of the COVID-19 vaccine persist. This study aimed to gauge the perceptions and experiences of the Indian population concerning COVID-19 vaccination. **Methods:** This study was a cross-sectional survey of 313 participants aged 18 and above from diverse regions in India. Data was sourced using an electronic questionnaire disseminated via Google Forms. The survey evaluated demographics, vaccine awareness, attitudes, and side effects post-vaccination with Covishield and Covaxin. **Results:** 22.6% of participants exhibited vaccine hesitancy; however, 78.3% believed the advantages superseded the risks. Most participants (81.5%) were aware of vaccine side effects. Most of the Indian respondents (97.1%) accepted the COVID-19 vaccine. Post-vaccination, 27.9% experienced adverse effects such as fever, headache, malaise, dizziness, and pain at the local site. Only 1.3% necessitated hospitalization. **Conclusion:** Our study underscores the dichotomy between vaccine apprehensions and real-world experiences. Although concerns surrounding vaccine safety were prevalent, the majority of the Indian respondents (97.1%) accepted the COVID-19 vaccine, with most experiencing only transient, mild side effects. While 22.6% initially exhibited hesitancy, primarily due to misinformation, the actual experience post-vaccination was largely positive. To further address hesitancy, streamlined vaccine awareness campaigns emphasizing the safety and efficacy of vaccination are essential.

Keywords: Acceptance, adverse effects, concerns, COVID-19 vaccination, hesitancy, safety

Introduction

Vaccines have played a revolutionary role in eradicating several infectious diseases since long times. In many countries, diseases, like smallpox, plague, and polio, have been completely

eradicated, saving millions of lives. Vaccines are commercially prepared biological materials containing killed or attenuated microorganisms or immunoglobulins against antigens.^[1] While vaccines are generally believed to be beneficial and harmless, they can evoke an immunological response that may lead to mild to severe hypersensitivity reactions.^[1]

With the emergence of the COVID-19 pandemic in late 2019, countries implemented quarantine and lockdown measures, highlighting the need for vaccines. Pharmaceutical companies

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developed vaccines such as AstraZeneca (Covishield), Covaxin, Pfizer, and Moderna. In India, the vaccination drive included Covishield and Covaxin. However, concerns regarding adverse effects led to initial reluctance among some individuals. This study aims to investigate the perception and experience of the Indian population regarding COVID-19 vaccination, addressing concerns and understanding about adverse effects.

Methods

Study design

The study was a community-based cross-sectional survey conducted by the Department of Biochemistry after obtaining ethical permission from the Institute's Ethics Committee. A predesigned questionnaire was used to collect data from the Indian population residing in different parts of India, including Bathinda, Jodhpur, Delhi, Raebareli, and Bangalore. The questionnaire aimed to gather information related to demographic variables, awareness and attitudes about vaccines and their side effects, and people's experiences after taking the COVID-19 vaccine in relation to its side effects.

Data collection

The questionnaire was distributed electronically through Google Forms to as many people as possible using the social media application WhatsApp. Only individuals aged 18 years and above were included in the study, as COVID-19 vaccination in India was initially being implemented only for adults. A total of 313 individuals responded to the questionnaire.

Data analysis

The responses obtained from the study group were analyzed in terms of frequencies and percentages. The sociodemographic data collected included information on participants' gender, age, education, residential place, and current vaccination status. The study also assessed responses related to participants' awareness and attitudes related to vaccines and their side effects, information related to any past episode of COVID-19 infection or seasonal flu or allergies, and their experience after taking the vaccine in relation to its side effects. Data was analyzed with the help of Microsoft Excel.

Results

The study's sociodemographic data, presented in Table 1, indicated a slight female dominance among vaccine recipients at 55.6%, with males at 44.4%. A significant portion, 33.9%, were young adults aged 18–20 years, followed by 17.9% between 21–30 years, and 23% from 31–40 years. This suggests 74.8% of those vaccinated were aged 18–40. A smaller fraction, 1.6%, were above 60 years. In terms of education, 40.9% were either graduates or in the process and 38.9% were postgraduates or pursuing it, culminating in 79.8% at the collegiate level. Contrastingly, 18.5% had education only up to the school level, and a mere 1.6% held or were pursuing doctoral degrees. The

Table 1: Demographic data of study participants (n=313)

Demographic parameters	Frequency (n)	%
Gender		
Male	174	44.4
Female	139	55.6
Age groups		
18–20 years	106	33.9
21–30 years	56	17.9
31–40 years	72	23.0
41–50 years	40	12.8
51–60 years	34	10.9
>60 years	5	1.6
Highest education		
Primary schooling (≤ 5 grade)	5	1.6
Up to senior secondary schooling (6 th –12 th grade)	53	16.9
Graduates and undergraduates	128	40.9
Postgraduation completed and pursuing	122	38.9
Doctorate	5	1.6
Residence		
Rural	58	18.5
Urban	255	81.5
Are you vaccinated with COVID-19 vaccine?		
Yes	304	97.1
Covishield	246	80.9
Covaxin	58	19.1
No	9	2.9

majority, 81.5%, lived in urban regions, whereas 18.5% came from rural areas. The overwhelming majority, 97.1%, were vaccinated: 80.9% with Covishield and 19.1% with Covaxin, leaving 2.9% unvaccinated.

Shifting the focus to vaccine perceptions and experiences, as described in Table 2, 22.6% expressed initial hesitancy, yet a dominant 76% had no reservations. Most participants, 78.3%, felt the vaccine's benefits outweighed potential risks, and 81.5% acknowledged possible side effects. Before vaccination, 10.9% had experienced COVID-19, and 5.1% had received a flu vaccine in the past year. Around 11.2% reported allergies to past vaccines, drugs, or certain foods. Notably, 70% felt adequately informed about vaccine-related adverse effects. Of those vaccinated, 27.9% experienced side effects within 30 min, yet a reassuring 72% reported none. By 72 h post-vaccination, adverse reactions rose to 67.7%, with 1.3% requiring short hospital stays under 48 h. Approximately 32.2% reported no side effects from 30 min up to 72 h post-vaccination.

Regarding participants' primary concerns, Figure 1 delineates that imminent severe side effects and unpredicted future reactions were top worries at 31.9% and 32.9%, respectively. Other concerns revolved around vaccine efficacy, dwindling COVID-19 cases, potential counterfeit vaccines, and commercial profiteering motives. Figure 2 presents the side effects participants feared the most. The most common were concerns about severe reactions leading to hospitalization (25.9%), followed by injection site pain, allergic responses, neurological complications, and general discomfort like malaise and joint

Table 2: Responses of the participant’s awareness related to vaccines and their side effects, drug, and allergic history

Question	Yes (frequency <i>n</i> and % out of total participants 313)	No (frequency <i>n</i> and % out of total participants 313)	Others
Were you hesitant before taking COVID-19 vaccination?	71 (22.6%)	238 (76.0%)	No response (4)
Do you think that vaccine benefits, in general, are larger than their risks?	245 (78.3%)	47 (15.0%)	No response (21)
Are you aware of the side effects of COVID-19 vaccines	255 (81.5%)	52 (16.6%)	No response (6)
Did you suffer from COVID-19 infection before vaccination?	34 (10.9%)	272 (86.9%)	Not sure, were not tested (7)
Have you ever been vaccinated for seasonal flu earlier within last one year?	16 (5.1%)	286 (91.4%)	No response (11)
Have you ever had any history of allergy to any vaccine/drug/Food component?	35 (11.2%)	271 (86.8%)	No response (7)
Did you experience any adverse reactions within 30 min post-vaccination?	85/304 (27.9%)	219/304 (72.1%)	Not vaccinated (9)
Did you experience any adverse reactions between 30 min to 72 h post-vaccination?	206/304 (67.7%)	98/304 (32.2%)	Not vaccinated (9)
If yes, did you need to hospitalize and specify its duration?	4/304 (1.3%)	(<48 h)	

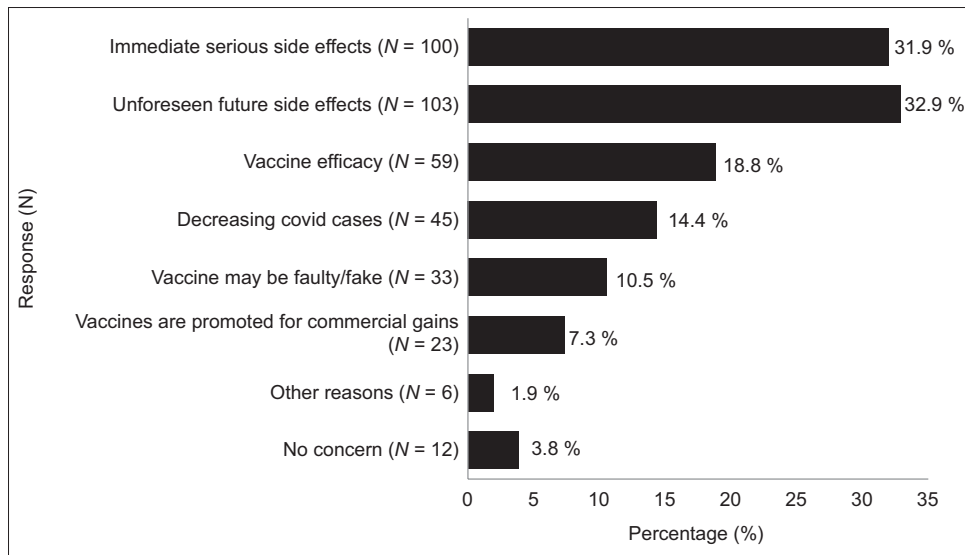


Figure 1: Describe the concerns before taking COVID-19 vaccination

pain. Immediate post-vaccination data, as depicted in Figure 3, revealed that most (72.1%) experienced no side effects, but some reported fever, headache, malaise, dizziness, and pain at the local site. From 30 min to 72 h after vaccination, Figure 4 showed that about 32.6% of participants reported no side effects while others reported fever as the most common complaint (47.3%), followed by malaise (28.6%) and headache (27.0%).

Lastly, as mentioned in Table 3, misinformation via social media and a general lack of scientific understanding were identified as primary catalysts for vaccine rumors. Participants felt that the government could bolster the vaccination drive through enhanced awareness campaigns underscoring vaccine efficacy and safety. For most, healthcare providers and social media remained the principal channels for vaccine-related information.

Discussion

The present study sheds light on the sociodemographic characteristics and perceptions of participants regarding

COVID-19 vaccines. Notably, a majority of the respondents were females, with the dominant age bracket being 18–40 years. Despite the increased prevalence of COVID-19 in older age groups, only 1.6% of participants belonged to this category. The high literacy rate among participants, with 79.8% having attained at least undergraduate-level education, was paired with a predominant urban residency. Interestingly, 97.1% of respondents were vaccinated, reflecting a favorable response toward vaccination drives. Of these, the dominance of Covishield users (80.9%) over Covaxin might be attributed to its wider availability in India, paralleling prior distribution trends.

Hesitancy toward vaccines is a critical area of investigation in vaccination drives. Encouragingly, in our cohort, a significant 76% of participants expressed no reservations, while 78.3% believed that the vaccines’ benefits eclipsed potential risks. These findings align with those of Samantaray *et al.*,^[2] who reported that 63.2% of participants harbored no concerns regarding side effects. This hesitancy rate is within the wide spectrum (10.6–65%) observed across various Indian studies.^[3-7]

Table 3: Participants' responses regarding vaccine-related rumors, their source of information related to vaccination, and how the government could increase the vaccination drive			
Question	Response	Frequency (n)	%
What do you think are the reasons for the vaccination-related rumors in the country	Misinformation communicated through social media	178	56.9
	Lack of scientific temperament	146	46.6
	Lack of faith in modern medicine	124	39.6
	Religious reasons	84	26.8
	Misinformation communicated through friends	24	7.7
How the government can increase the vaccination drive?	By advertising that vaccination is a social responsibility	139	44.4
	Penalizing people spreading misinformation	98	31.3
	Providing free vaccine	130	41.5
	Providing awareness regarding the efficacy and safety of vaccines	179	57.2
	Government should not interrupt	10	3.2
	Compulsory vaccination policy	116	37.1
How did you know about the benefits of vaccinations	Internet and social media	154	49.2
	TV	84	26.8
	Government advertisement	83	26.5
	Healthcare providers	161	51.4
	Friends	57	18.2
	Research articles and newspapers	3	0.9

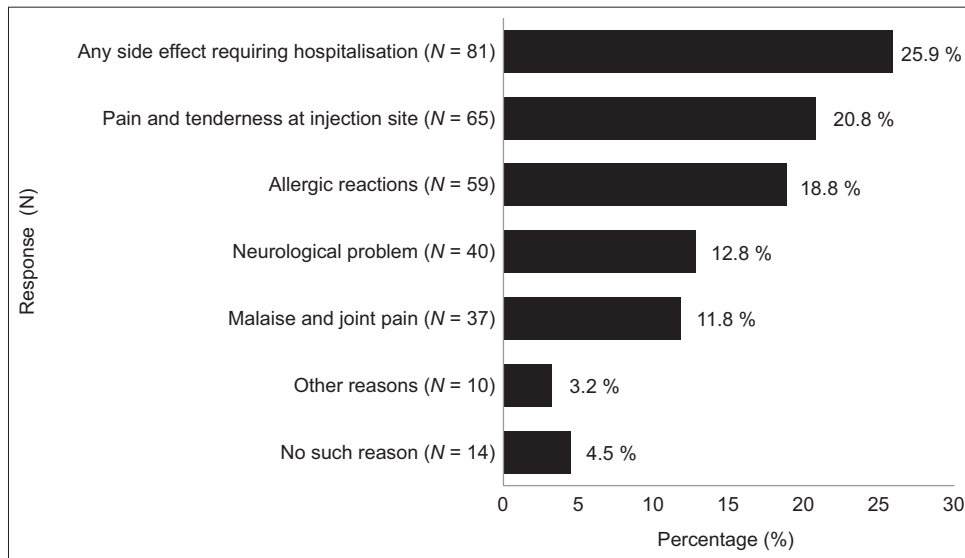


Figure 2: Describe the adverse effect of vaccination that worried the most

Adverse reactions to vaccines, while expected, vary in severity and prevalence. In our cohort, awareness of potential side effects was high at 81.5%. A noteworthy 11.2% indicated prior allergic reactions, emphasizing the importance of preliminary medical evaluations. The concern surrounding vaccine cross-reactions, highlighted in a study by Domnich *et al.*,^[8] was also reflected in our data, with 5.1% having previously received a seasonal flu vaccine. Although anticipated adverse reactions were diverse [Figure 2], real-world data revealed that only 1.4% required hospitalization post-vaccination, mirroring findings from recent literature.^[9-11]

The discrepancy between anticipated and experienced adverse reactions was profound. While 31.9% feared immediate severe side effects, only 27.9% reported adverse reactions within

30 min of vaccination. Most of these were mild and manageable, such as fever, headache, and malaise. The incidence of adverse reactions between 30 min and 72 h post-vaccination was 67.7%, predominantly constituting mild symptoms. This pattern of side effects is congruent with global literature, although rates can vary.^[12-16] The anticipation of long-term side effects, expressed by 32.9% of participants, remains an area warranting further research.

Our findings highlight the general safety profile of the Covishield and Covaxin vaccines, characterized by primarily mild adverse reactions. During the vaccination campaign, myriad concerns surfaced, many rooted in misinformation and skepticism. Our data [Table 3] underscores the role of social media in propagating misinformation, a sentiment echoed by Islam

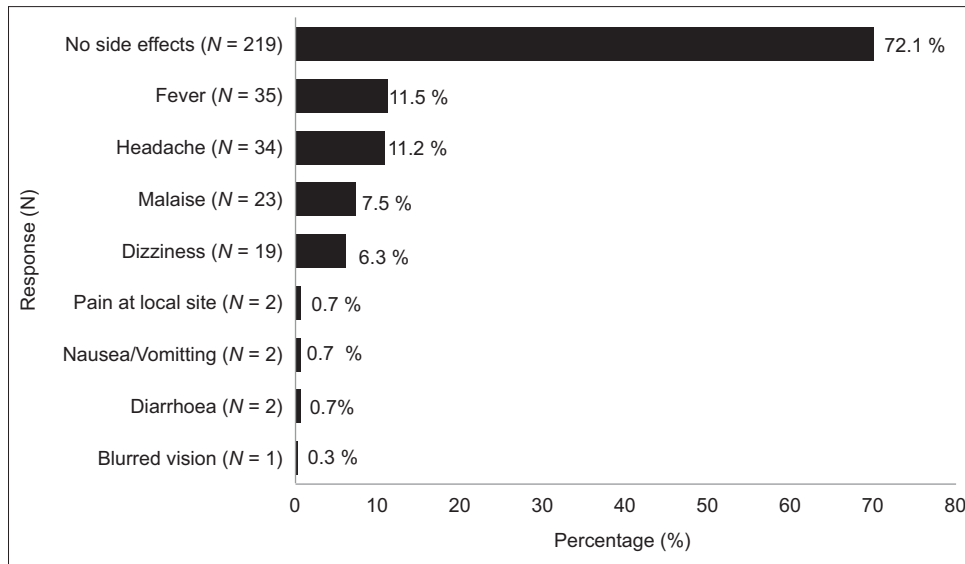


Figure 3: Depicts the adverse reactions developed within 30 min post-vaccination

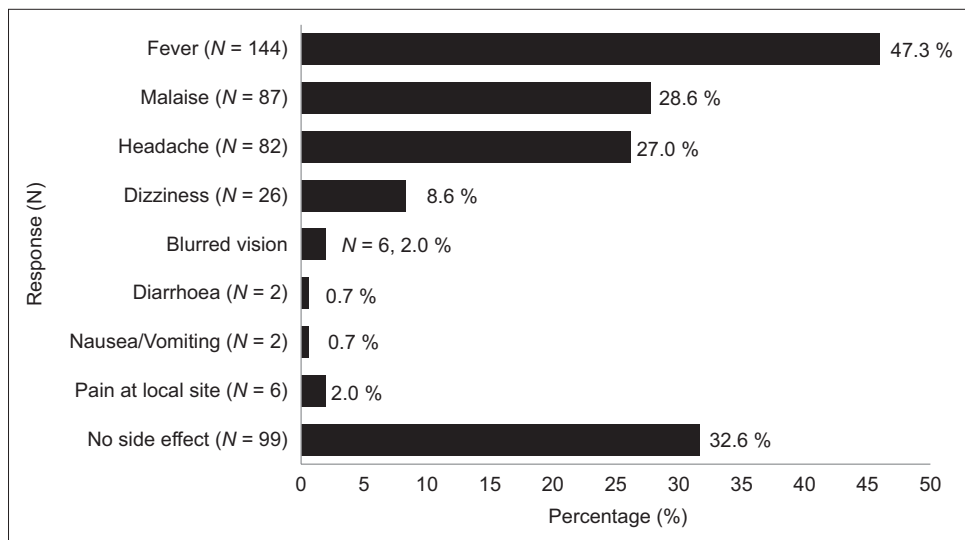


Figure 4: Depicts the adverse reactions developed within 72 h post-vaccination

et al.^[17] The significance of effective health communication, as demonstrated by Ferrara *et al.*,^[18] is pivotal, with our study identifying healthcare providers as primary sources of credible vaccine information.

Conclusion

This study underscores the dichotomy between vaccine apprehensions and real-world experiences. Although concerns surrounding vaccine safety were prevalent, the majority of the Indian respondents (97.1%) accepted the COVID-19 vaccine, with most experiencing only transient, mild side effects. While 22.6% initially exhibited hesitancy, primarily due to misinformation, the actual experience post-vaccination was largely positive. To further address hesitancy, streamlined vaccine awareness campaigns emphasizing the safety and efficacy of vaccination are essential.

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Authors contribution

Dr. Rajani Kumawat designed the study, collected the data, analyzed the data, prepared the results, and wrote the manuscript. Dr. Archana Nimesh analyzed the data, prepared the results, and wrote the manuscript. Dr. Ram Niwas Jalandra designed the study, collected the data, analyzed the data, and critically reviewed the manuscript. Dr. Sandeep Agrawal and Dr. Srinivas H collected the data and critically reviewed the manuscript. Dr. Ashok Kumar Ahirwar critically reviewed the manuscript.

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Conflicts of interest

There are no conflicts of interest.

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