

Analysis of hesitancy and motivational factors for COVID-19 vaccination among patients presenting to eye care hospitals – A multicenter questionnaire-based survey

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Purpose: To analyze the hesitancy and motivational factors related to coronavirus disease 2019 (COVID-19) vaccination among patients visiting for eye care. **Methods:** A telephonic survey was conducted using validated questionnaires consisting of 36 questions in five sections from July 1 to July 31, 2021. Patients visiting six tertiary centers and one secondary center of our eye hospitals were interviewed over their phones, and their responses were entered onto the Google forms. The responses were recorded as demographics, health status, awareness about vaccination, factors contributing to hesitancy or acceptance to vaccinate, and general perception about the vaccine. **Results:** A total of 5033 patients were surveyed. The mean age was 49.0 ± 14.2 years. A total of 563 (11.2%) patients gave a history of symptoms or were tested positive for COVID-19; 2225 (44.2%) patients were already COVID-19 vaccinated. Around 2883 (56%) patients were aware of getting infection despite vaccination, and 4092 (81.3%) perceived vaccination should be compulsory. The main reason for vaccination hesitancy was the fear of side effects ($n = 487$, 17.3%). The fear of getting infected was the most common reason for vaccination ($n = 911$, 40.9%). Factors associated with a lower proportion of vaccinated individuals included younger age ($P < 0.001$), female gender ($P < 0.001$), lower education ($P < 0.001$), lower income ($P < 0.001$), and rural residence ($P = 0.33$). **Conclusion:** Creating awareness about the minor side effects and reassurance can allay an individual's fears. The fear associated with the rapid spread of infection and associated mortality needs to be utilized to increase vaccination acceptance. A targeted approach toward groups with poor uptake of vaccination is necessary.

Key words: COVID-19, hesitancy, questionnaire, survey, vaccination

The first case of coronavirus disease 2019 (COVID-19) infection was reported in Wuhan, China, in December 2019. Since then, the infection has rapidly spread worldwide and was labeled a pandemic by the World Health Organization (WHO). The pandemic resulted in high morbidity and mortality, creating panic among the masses. Governments have incorporated various measures globally to safeguard their citizens. Strict guidelines like lockdowns, compulsory masks, frequent hand sanitization, and social distancing have been implemented.

At the community level, people have been encouraged to work from home. Schools and colleges have been shut down, and traditional teaching has been replaced by online classes and e-learning. As of January 2022, amidst the third wave, the total

number of COVID-19 cases in India crossed 3.95 billion and the total number of reported deaths crossed 0.49 million.^[1] From the past experiences, one of the most compelling and proven ways of ending similar pandemics include immunization of the susceptible population at a large scale. The dire need for vaccination provoked many nations to develop the vaccine faster. Vaccination is proven to reduce the incidence of severe disease and adverse outcomes in terms of mortality.^[2] An effective vaccination protects the individual and slows down the community spread by generating herd immunity.^[3] The extensive efforts by the government for mass vaccination were observed in the form of free vaccination from government hospitals and subsidized rates in private hospitals. To date, officially, 0.28 billion people have been vaccinated in India. Though the overall numbers might look impressive, these numbers are from a country with a 1.36 billion population.^[4] Several factors hamper the vaccination drive, but the major ones are the availability and acceptance of the vaccine. So,

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understanding the reasons for both acceptance and hesitancy for vaccination will help end this pandemic. Vaccine hesitancy is one of the significant challenges in health-care delivery. A survey in the USA showed that only 68.57% of respondents were willing to receive the COVID-19 vaccine.^[5] The acceptance of the vaccine among the general population seems questionable due to various factors. The rapid development of the vaccine, uncertainty about long-term protection, need for repeated vaccination due to the emergence of newer COVID-19 genetic variants, and adverse drug reactions post-vaccination are some crucial reasons worldwide for vaccine hesitancy.^[6,7]

After a detailed literature review, we found that an analysis of the patterns of acceptance or resistance toward the approved vaccinations was lacking from a large nation like India. This study surveyed the patients presenting to the eye hospitals to understand their knowledge and attitude toward vaccination, perception of physical and mental health during the pandemic, vaccination status, and willingness for vaccination, and identify the personal or social factors associated with vaccination hesitancy. Additionally, we evaluated the motivational and hesitancy factors among the vaccinated and unvaccinated groups, respectively. This will help understand the target groups and barriers (mental/personal/social), which will assist the government and health authorities in improving vaccination uptake.

Methods

This was a multicentric, cross-sectional, online questionnaire-based survey done across six tertiary eye care centers at Pondicherry, Madurai, Tirunelveli, Coimbatore, Chennai, and Tirupati and one secondary eye care center at Kovilpatti in South India. The study was conducted from July 1 to July 30, 2021, after obtaining ethical approval from the hospital's Institutional Review Board. The study adhered to the tenets of the Declaration of Helsinki. A pre-validated questionnaire [Appendix 1] was uploaded on the Google forms and was administered to the patients turning to the outpatient department. The patients were telephonically surveyed by the local study coordinators, who were formally trained to standardize the questionnaire administration. Patients more than 18 years of age and willing to participate in the study signed the consent form during registration. The patients were then contacted over their phones during the waiting period. Patients not willing to participate, those with hearing problems, presenting with emergency ocular conditions like pain/trauma, systemically unfit patients, pediatric patients, or patients without personal phones were excluded from the study.

The questionnaire consisted of 36 questions in five sections, including the patients' demographics, health status, awareness about vaccination, factors contributing to hesitancy or acceptance to vaccinate, and the general perception about the vaccine. The responses recorded were extracted into Google Excel sheets and coded, and were then extrapolated for statistical analysis.

All statistical analyses were carried out using STATA 14.0 (StataCorp LLC., College Station, TX, USA). Descriptive data were represented as frequency and percentages for categorical parameters. Mean and standard deviations (SDs) were used for continuous parametric data, while median and interquartile ranges (IQRs) were used for nonparametric

data. Parametric statistical tests were used if the data were distributed normally, and nonparametric tests were performed for skewed data. The normality of data was checked using the Shapiro–Wilk test and Box–Whisker plot. The Chi-square test was used to find the association between categorical variables. *P* value ≤ 0.05 was considered statistically significant.

Results

Sociodemographic characteristics

A total of 5033 patients were surveyed, including 992 from Tirunelveli, 932 from Pondicherry, 806 from Madurai, 800 from Chennai, 624 from Coimbatore, 593 from Tirupati, and 286 from Kovilpatti center. The age of the patients ranged from 18 to 93 years, with a mean age (\pm SD) of 49.0 ± 14.2 years. The male: female ratio was 1.1:1. Among the participants, 846 (16.8%) never attended school, 989 (19.6%) had elementary education, 1496 (29.7%) had high school education, and 1702 (33.9%) were either diploma holders, graduates, or postgraduates. There were 2391 (47.5%) urban, 772 (15.3%) semi-urban, and 1870 (37.2%) rural participants. The sociodemographic characteristics of the study population are summarized in Table 1.

Health and COVID-19

Participants were questioned about their physical health perception. A total of 4628 (92%) participants considered themselves physically healthy, and 405 (8%) had negative health perceptions. A total of 2641 (52.5%) reported to be in a relaxed state of mind, 1812 (36%) reported mood swings, and 580 (11.5%) complained of mental stress. The perception of contracting COVID-19 infection was present among 2472 (49.1%) participants, while 2561 (50.9%) felt unlikely to get infected. A total of 563 (11.2%) participants either had symptoms or were tested positive for COVID-19, and 1008 (20%) gave a history of COVID-19 in close family members. The details of health-related questions are presented in Table 2.

Vaccination related responses

A total of 2225 (44.2%) participants were vaccinated against COVID-19. The maximum proportion of vaccinated patients was from Tirupati (72.5%), followed by Coimbatore (50.5%), and the least was from Tirunelveli (34.0%). A total of 2078 (41.3%) patients showed preference toward Covishield (AstraZeneca, Serum Institute of India, Pune, India), followed by 1343 (26.7%) who gave a neutral response and agreed to accept whichever vaccination was available to them. Another 992 (19.7%) preferred Covaxin (Bharat Biotech International Limited, Hyderabad, India). Among the respondents, 3886 (77.2%) felt that the available vaccines against COVID-19 have been sufficiently tested and are safe. A good number of 2883 (56%) participants knew that there is a chance of getting infected despite vaccination, but vaccination will prevent severe disease/negative outcomes. In total, 4012 (80%) participants believed that everyone in the community should get vaccinated to end this pandemic, and 4092 (81.3%) believed that vaccination should be made compulsory by the government authorities. The details of COVID-19 vaccination-related variables have been elaborated in Table 3.

Hesitancy and motivational factors

We found that out of the unvaccinated 2808 people, 727 (25.9%) showed willingness for vaccination. Another 487 (17.3%)

Table 1: Demographic details of patients included in our study

Variables	n (%) (n=5033)
Age	
Mean±SD	49.0±14.2
Median	50
IQR	40-60
Min.-Max.	18-93
Sex	
Male	2667 (53.0)
Female	2366 (47.0)
Level of education	
High school	1496 (29.7)
Elementary	989 (19.6)
Graduate	941 (18.7)
No formal education	846 (16.8)
Diploma	436 (8.7)
Post-graduate	325 (6.5)
Occupation	
Housewife	1274 (25.3)
Laborer	1020 (20.3)
Office work	636 (12.6)
Not employed	499 (9.9)
Businessman	405 (8.1)
Professional	393 (7.8)
Student	173 (3.4)
Others	633 (12.6)
Place of living	
Urban	2391 (47.5)
Rural	1870 (37.2)
Semi-urban	772 (15.3)
Socioeconomic status	
Yearly income <2 lakhs INR	2237 (44.5)
Yearly income 2-5 lakhs INR	955 (18.9)
Yearly income >5 lakhs INR	259 (5.2)
Not willing to disclose	1582 (31.4)
Marital status	
Married	4604 (91.5)
Unmarried	429 (8.5)

IQR=interquartile range, SD=standard deviation

expressed their fear toward vaccination-related side effects, and 373 (13.3%) felt unfit for vaccination either because of systemic comorbidities or recent surgery. Approximately 10.5% ($n = 297$) felt vaccines are not effective in stopping the COVID-19 spread and 5.2% ($n = 145$) felt that there is insufficient information regarding the vaccination. The details of the various vaccination hesitancy factors have been presented in Table 4a.

Among the 2225 vaccinated people, the fear of getting infected or infecting family members was the most common reason for acceptance (40.9%). Another 621 (27.9%) agreed that they believed in the efficacy and safety of vaccination. Details of different motivational factors have been given in Table 4b.

Correlation between various factors and vaccination

We found that the proportion of vaccinated people significantly increased with the educational status and age ($P < 0.001$). Further, among the unvaccinated, the willingness to vaccinate was more among the graduates ($P < 0.001$). There was a significantly higher proportion of males (49.3%) who were vaccinated, compared to females (38.4%) ($P < 0.001$). Participants from rural areas were less vaccinated than those

Table 2: Responses obtained for health-related questions

Variables	n (%) (n=5033)
Physical health status	
Healthy	3768 (74.9)
Very healthy	860 (17.1)
Unhealthy	405 (8.0)
Mental health status	
Relaxed	2641 (52.5)
Mood swings	1812 (36.0)
Stressed	580 (11.5)
Risk perception of getting infected/reinfected	
Unlikely	2561 (50.9)
Likely	1920 (38.1)
Very likely	552 (11.0)
Previous infection with COVID-19	
Not infected	4120 (81.9)
Yes and confirmed	429 (8.5)
Had symptoms, but not confirmed	134 (2.7)
Do not know	350 (6.9)
COVID-19 infection in close relation/family member	
Not infected	3682 (73.2)
Yes and confirmed	826 (16.4)
Had symptoms, but not confirmed	182 (3.6)
Do not know	343 (6.8)
Any severe outcomes/mortality from COVID-19 infection in close family members/friends	
No	4197 (83.4)
Yes	836 (16.6)
Are you vaccinated against COVID-19?	
No	2808 (55.8)
Yes	2225 (44.2)
Do you have vaccination center close to your home?	
Yes	3483 (69.2)
No	1350 (26.8)
Not sure	200 (4.0)
Which vaccine would you prefer for yourself/your family?	
Covishield	2078 (41.3)
Whichever is available	1343 (26.7)
Covaxin	992 (19.7)
Will never get vaccinated	387 (7.7)
Others	155 (3.1)
Sputnik	78 (1.5)
Have you heard about COWIN registration?	
No	3326 (66.1)
Yes	1707 (33.9)
How will you do the COWIN registration?	
Not sure	3147 (62.5)
Self-registration by smartphone or computer	1160 (23.1)
Take help from family/friends	518 (10.3)
E-service support	208 (4.1)
How important do you think COVID-19 vaccination will be for your health status?	
Very important	1445 (28.7)
Important	3206 (63.7)
Not important	382 (7.6)

from urban and semi-urban areas ($P = 0.033$). Despite the vaccination being available free of cost, those with better income had a greater acceptance for vaccination ($P < 0.001$),

Table 3: The different responses obtained regarding COVID-19 vaccine

Statements	Yes n (%)	No n (%)	Don't know n (%)
Do you feel that the vaccine is sufficiently tested and proven to be safe?	3886 (77.2)	680 (13.5)	467 (9.3)
Do you know that in spite of vaccination, people can get infected but are unlikely to get the severe disease?	2833 (56.3)	1380 (27.4)	819 (16.3)
Do you have any bad experience of adverse reaction post-vaccination in family/friends/celebrity?	3642 (72.4)	944 (18.8)	446 (8.9)
Do you think there is sufficient information available to the community?	3773 (75.0)	914 (18.1)	346 (6.9)
Do you think that everyone in the community should be vaccinated to end the pandemic?	4012 (79.7)	702 (13.9)	319 (6.3)
Do you think vaccination for COVID-19 should be made compulsory?	4092 (81.3)	516 (10.3)	425 (8.4)

Table 4a: The common reasons for hesitancy toward vaccine in our study

Hesitancy	n (%) (n=2808)
I am ready to get vaccinated, but waiting for my turn	727 (25.9)
I am afraid of side effects post-vaccination	487 (17.3)
Prior history of vaccine drug-related complication/ others	376 (13.4)
Comorbidities/immunosuppression/I underwent surgery recently	373 (13.3)
I don't believe vaccines are effective to stop COVID-19 spread	294 (10.5)
Insufficient information regarding the vaccine/ nobody in my area is vaccinated	145 (5.2)
I always stay at home, I will not be affected by coronavirus/my family members said not to take the vaccination	114 (4.0)
I recently got positive, so I am waiting for 3 months to be completed	98 (3.5)
Discouraged by family/friends	92 (3.3)
No one to accompany to vaccination center/not aware how to register and where to get vaccinated	44 (1.6)
Pregnant/lactating mother	36 (1.3)
Family members or relatives developed severe reaction or side effects following COVID-19 vaccination	21 (0.7)

Table 4b: The reasons for acceptance of vaccine

Acceptance for vaccination	n (%) (n=2225)
Fear of being infected or infecting my family	911 (40.9)
Belief in the effectiveness and safety of the vaccine	621 (27.9)
Motivated by physician/family/friends	152 (6.8)
Motivated through social media	128 (5.7)
For me, it is compulsory by government/employee	127 (5.7)
Accompanied a family member/friend and got myself vaccinated	49 (2.2)
Saw a close family member/friend suffering from severe COVID-19, who was unvaccinated	33 (1.5)
Others	204 (9.2)

that is, 39.9% of those with an annual income of less than 200,000 INR were vaccinated as against 69.5% with a yearly income of more than 500,000 INR. The proportion of vaccinated

versus non-vaccinated was found to be the highest among the professionals (59.8%), followed by office workers (56.5%), while it was the lowest among housewives (37.8%) followed by laborers (35.5%) [Table 5].

Discussion

Despite vaccination being available for around 4 months before the study, less than half of the study participants were vaccinated. As per the national data, as of July 30, 2021, only 7.3% of the total population was double vaccinated and another 19% received a single dose. This implies that a large proportion of unvaccinated people visit crowded places like hospitals. Since the onset of the COVID-19 pandemic, appropriate personal behaviors like face masks, hand hygiene, and social distancing have been made mandatory. The long-term control of the pandemic hinges on vaccination uptake. The massive leap in developing effective and safe vaccines against COVID-19 within a short period is unprecedented.^[8-10] Despite this massive success, there are factors like availability, acceptance, cost, duration of immunity, effectiveness over mutant strains, and support from the respective governmental bodies, which affect the successful coverage and protection of the population. Vaccine hesitancy can be a limiting step in the global efforts to control the current pandemic.^[11,12] Through recent studies, it has been found that close to 60%–75% immune individuals would be necessary to halt the COVID-19 virus transmission.^[13,14] Keeping this in mind, it becomes imperative to understand the hesitancy factors or barriers that might drive people away from vaccination.

In our study, we interviewed 5033 participants across seven eye care centers. The age of the majority of patients ranged from 46 to 60 years (39.2%), indicating that eye care was most sought by the elderly. This is similar to our experience during the first wave when people over 50 sought eye care the most.^[15] According to WHO, the elderly age group is at maximum risk from the virus, though in the second wave, a shift toward younger age was experienced.^[16] Thus, it is essential to motivate all the age groups to undergo vaccination to prevent severe outcomes.

COVID-19 has come with many uncertainties leading to severe physical and mental health concerns. We found that 4628 (92%) respondents felt physically healthy, while only 2641 (52.5%) felt mentally relaxed. Wang *et al.*,^[17] in their study from China, found that 53.8% of participants reported moderate to severe psychological impact and 16.5% reported moderate to severe depressive symptoms. Thus, it is vital to identify the vulnerable groups and prepare the health-care systems

Table 5: Association between different parameters and status of vaccination

Parameters	Vaccination status, n (%)		Overall (n=5033)	P ^c
	Not vaccinated (n=2808)	Vaccinated (n=2225)		
Age category (years)				<0.001
18-30	395 (61.0)	253 (39.0)	648 (100)	
31-45	785 (60.0)	523 (40.0)	1308 (100)	
46-60	1049 (53.1)	926 (46.9)	1975 (100)	
>60	579 (52.5)	523 (47.5)	1102 (100)	
Gender				<0.001
Male	1351 (50.7)	1316 (49.3)	2667 (100)	
Female	1457 (61.6)	909 (38.4)	2366 (100)	
Annual income				<0.001
Not willing to disclose	1008 (63.7)	574 (36.3)	1582 (100)	
<2 lakhs	1344 (60.1)	893 (39.9)	2237 (100)	
2-5 lakhs	377 (39.5)	578 (60.5)	955 (100)	
>5 lakhs	79 (30.5)	180 (69.5)	259 (100)	
Education				<0.001
Illiterate	549 (64.9)	297 (35.1)	846 (100)	
Elementary	681 (68.9)	308 (31.1)	989 (100)	
High school	794 (53.1)	702 (46.9)	1496 (100)	
Diploma	222 (50.9)	214 (49.1)	436 (100)	
Graduate	437 (46.4)	504 (53.6)	941 (100)	
Post-graduate	125 (38.5)	200 (61.5)	325 (100)	
Residence				0.033
Rural	1077 (57.6)	793 (42.4)	1870 (100)	
Semi-urban	443 (57.4)	329 (42.6)	772 (100)	
Urban	1288 (53.9)	1103 (46.1)	2391 (100)	
COVID-19 infection status				<0.001
Not infected	2154 (58.5)	1528 (41.5)	3682 (100)	
Infected and confirmed	368 (44.5)	458 (55.5)	826 (100)	
Do not know	184 (53.6)	159 (46.4)	343 (100)	
Had symptoms, but not confirmed	102 (56)	80 (44.0)	182 (100)	
Occupation				<0.001
Housewife	793 (62.2)	481 (37.8)	1274 (100)	
Laborer	658 (64.5)	362 (35.5)	1020 (100)	
Office work	277 (43.5)	359 (56.5)	636 (100)	
Not employed	261 (52.3)	238 (47.7)	499 (100)	
Business	216 (53.3)	189 (46.7)	405 (100)	
Professional	158 (40.2)	235 (59.8)	393 (100)	
Student	106 (61.3)	67 (38.7)	633 (100)	
Others	339 (53.5)	294 (46.5)		

COVID-19=coronavirus disease 2019. ^cChi-square test

for early psychological intervention. Health authorities could consider providing psychoeducation through social media like television, radio, or Facebook.

Asefa *et al.*^[18] interviewed waiters and found that 53.4% had high-risk perceptions concerning COVID-19. Another study by Bruin *et al.*^[19] from the USA found that the median perceived risk for COVID-19 infection and fatality was 10% and 5%, respectively. In our study, we found that 2472 (49.1%) respondents felt themselves at risk of acquiring COVID-19 infection. Almost consistent results were seen across all centers, except Kovilpatti, where a steep rise in cases was experienced during the second wave, and 74.1% of patients feared COVID-19 infection [Table 6]. The overall high-risk perceptions in our study could be related to the study period, as it was conducted during the second wave peak in India.

A total of 44.2% of participants reported being vaccinated at the time of the study. We further noted that in the > 60 years

group, 47.5% were vaccinated, followed by 46.9% in the 46–60 years group, 40% in the 31–45 years group, and 39% in the 18–30 years group. Our numbers follow the overall estimates in the country, where 47.2% above 60 and 43.8% above 45 were reported to have received at least a single dose of vaccination.^[20] This could serve as an important indirect indicator that patients presenting for eye care closely resembled the general population. The delayed vaccination approval for 18–40 years could be related to the lesser vaccinated individuals in this group.

A marked preference was seen toward the Oxford–AstraZeneca (Covishield; Serum Institute of India) vaccine, as 2078 (42%) participants expressed willingness to receive the same. This was followed by 1343 (26.7%) participants, who said they would accept any approved vaccine made available to them. Another 992 (20%) preferred Covaxin (Bharat Biotech International Limited). These differences could probably be

Table 6: Demographic and risk factors from different study centers (online only)

Parameters	Study site, n (%)							Overall (n=5033)
	Tirunelveli (n=992)	Pondicherry (n=932)	Madurai (n=806)	Chennai (n=800)	Coimbatore (n=624)	Tirupati (n=593)	Kovilpatti (n=286)	
Age (years)								
18-30	177 (17.8)	124 (13.3)	43 (5.3)	114 (14.3)	94 (15.1)	80 (13.5)	16 (5.6)	648 (12.9)
31-45	283 (28.5)	224 (24.0)	205 (25.4)	206 (25.7)	212 (33.9)	106 (17.9)	72 (25.2)	1308 (26.0)
46-60	277 (27.9)	416 (44.6)	367 (45.5)	306 (38.3)	239 (38.3)	230 (38.8)	140 (48.9)	1975 (39.2)
>60	255 (25.7)	168 (18.0)	191 (23.7)	174 (21.7)	79 (12.7)	177 (29.8)	58 (20.3)	1102 (21.9)
Gender								
Male	460 (46.4)	487 (52.3)	447 (55.5)	409 (51.1)	379 (60.7)	340 (57.3)	145 (50.7)	2667 (53.0)
Female	532 (53.6)	445 (47.7)	359 (44.5)	391 (48.9)	245 (39.3)	253 (42.7)	141 (49.3)	2366 (47.0)
Education								
No formal education	158 (15.9)	162 (17.4)	95 (11.8)	77 (9.6)	84 (13.5)	231 (39.0)	39 (13.6)	846 (16.8)
Elementary	195 (19.7)	142 (15.2)	192 (23.8)	104 (13.0)	167 (26.8)	77 (13.0)	112 (39.2)	989 (19.6)
High school	264 (26.6)	340 (36.5)	298 (37.0)	279 (34.9)	115 (18.4)	133 (22.4)	67 (23.4)	1496 (29.7)
Diploma	126 (12.7)	52 (5.6)	34 (4.2)	95 (11.9)	50 (8.0)	51 (8.6)	28 (9.8)	436 (8.7)
Graduate	174 (17.5)	154 (16.5)	130 (16.1)	233 (29.1)	148 (23.7)	66 (11.1)	36 (12.6)	941 (18.7)
Post-graduate	75 (7.6)	82 (8.8)	57 (7.1)	12 (1.5)	60 (9.6)	35 (5.9)	4 (1.4)	325 (6.5)
Risk perception of getting infected								
Likely	274 (27.6)	439 (47.1)	363 (45.0)	351 (43.9)	96 (15.4)	189 (31.9)	208 (72.7)	1920 (38.1)
Unlikely	465 (46.9)	480 (51.5)	383 (47.5)	391 (48.9)	445 (71.3)	323 (54.4)	74 (25.9)	2561 (50.9)
Very likely	253 (25.5)	13 (1.4)	60 (7.4)	58 (7.2)	83 (13.3)	81 (13.7)	4 (1.4)	552 (11.0)
Vaccination status								
Not vaccinated	655 (66.0)	601 (64.5)	477 (59.2)	458 (57.3)	309 (49.5)	163 (27.5)	145 (50.7)	2808 (55.8)
Vaccinated	337 (34.0)	331 (35.5)	329 (40.8)	342 (42.7)	315 (50.5)	430 (72.5)	141 (49.3)	2225 (44.2)

due to vaccination advocacy through newspapers, television, and social media. People would have heard Covishield more frequently, as this was the first vaccine made available widely in the country.

The Indian government constituted a National Expert Group on Vaccine Administration for COVID-19 (NEGVAC) to coordinate the vaccination drive in India.^[21] There have been massive efforts from the government and high-level coordination at national, state, and district levels for effective collaboration behind effective vaccination drive. We found that 3886 (77%) respondents believed the vaccines to be sufficiently tested and safe. The chance of acquiring infection post-vaccination, but in a milder form, was known to 2833 (56%) participants. A total of 3773 (75%) participants felt that sufficient information had reached the community, and 4012 (79.7%) agreed that vaccination is the way to end this pandemic. Positive responses like these serve as a motivational factor that countries with huge populations like India can effectively control the COVID-19 spread through mass vaccination campaigns.

Among the unvaccinated group, 727 (26%) participants showed willingness for vaccination. The important hesitancy factors noted in our study included fear of side effects following vaccination among 487 (17.3%), prior vaccine-related complication (376 [13.4%]), comorbidities or immunosuppression (373 [13.3%]), and lack of belief in the vaccine efficacy (294 [0.5%]). The reasons for vaccine hesitancy have been studied in various demographic and ethnic groups. Robertson *et al.*^[22] found the most common hesitancy factor as unknown future effects of the vaccine (42.7%). Another study by Dror *et al.*^[23] reported concerns related to quality control and

side effect profiles as the most significant barrier among the Israeli health-care providers and civilians. Another study by Soares *et al.*^[24] found a low confidence in the COVID-19 vaccines and a lack of sufficient information about safety and efficacy as the most critical factors. Thus, overall, the most common hesitancy factors are related to concerns regarding vaccine safety and side effects. Awareness about minor side effects like fever, body aches, and reassurance can allay the psychological fears, thus improving the vaccination uptake. Social media should be utilized “for the vaccination” movement and closely monitored to prevent the spreading of any misinformation.^[25,26]

The most important motivating factor among the vaccinated group was the fear of getting infected/infecting family members (911 [40.9%]). This was followed by belief in safety and efficacy of vaccine (621 [27.9%]) and motivation by physician/family/friends (152 [6.8%]). Robertson *et al.*^[22] found willingness to avoid the infection (54.6%) and want of normal social and family life (12.5%) as the primary motivational factors. Dror *et al.*^[23] in their study from Israel, found that the most significant positive predictor for acceptance of the COVID-19 vaccine was the current influenza vaccination status. Thus, it can be assumed that those who had a greater fear of getting infected were more likely to accept vaccination. Currently, we all fear another deadly wave of COVID-19. It would be in the community’s best interests to drive the vaccination campaign and increase the acceptance rates to achieve herd immunity.

The factors associated with relatively higher vaccination hesitancy included younger age ($P < 0.001$), female gender ($P < 0.001$), lower education ($P < 0.001$), lower income ($P < 0.001$), no previous COVID-19 infection ($P < 0.001$),

housewives and laborers ($P < 0.001$), and rural residence ($P = 0.33$). The initial phase of the vaccination campaign was mainly directed at the older age group due to higher mortality, and consequently, there is a lower proportion of young, vaccinated individuals. Females in rural areas do not venture outside their homes and probably do not feel the need for vaccination. Other probable reasons for hesitancy might include taking care of family members at home or fear of missing serving the family with meals post-vaccination. To add to that, lower education or economic status may result in poor awareness and lower desire for vaccination. Nevertheless, they are part of our community, and herd immunity cannot be achieved by ignoring them. Thus, it is important to proactively target these groups and motivate them to improve acceptance.

The study has a few limitations. First of all, the study participants were patients presenting for eye care and not the general population. Secondly, the vaccination status was self-reported, and no proof check was done. Thirdly, even a single dose of vaccination was considered as status "vaccinated." Further, as this is a questionnaire-based study, certain responses like the mental health status of the respondent are subjective in nature. The strengths of the study lie in the large sample size and the multicentric nature of the study. We believe that our study results can give an insight about the massive efforts of the government in its fight against COVID-19 and, at the same time, provide us an overview of the vaccination status and attitude of patients presenting for eye care toward COVID-19 vaccination.

Conclusion

Our study has important practical implications for public health policy. We found that 44.2% of participants were already vaccinated, and almost a quarter of the unvaccinated group showed a willingness to get vaccinated and were waiting due to unavailability of vaccine. The fear of side effects post-vaccination was the most common hesitancy factor and the fear of getting infected was the most common motivational factor among the study population. We also identified factors such as female gender, younger age, lower income, lesser-educated groups, and rural population to show higher rates of vaccination hesitancy. Vaccine hesitancy is a complex problem, and a targeted approach is needed to increase the uptake. We believe these results will help the public health authorities to organize campaigns to address hesitancy factors among the vulnerable groups. Full endorsement from the government regulatory bodies is likely to increase the confidence of the public related to vaccination.

Consent for publication

The author(s) declare that appropriate written consent has been obtained from the study participants.

Ethical approval statement

Ethical approval was obtained from the institutional review board. Approval number: AEH/PDY/EC/OA/114/2021.

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Conflicts of interest

There are no conflicts of interest.

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Analysis of hesitancy and motivational factors for COVID-19 vaccination among patients presenting to eye care hospitals – A multicenter questionnaire-based survey

Greetings!

As we all know since the start of the COVID-19 pandemic, there have been multiple regulations and restrictions in form of lockdowns laid down by the government to curb the pandemic. While interventions to encourage social distancing and masking have been effective, these have been associated with huge economic and psychological impacts.

Furthermore, there is a strong desire to return to a pre-pandemic normal.

An effective vaccine represents the best COVID-19 control option to return to normal life.

However, an adequate number of people must be vaccinated to control an epidemic like COVID-19. Through this study, we plan to conduct a survey among patients presenting at Aravind Eye Hospitals, to understand the barriers or hesitancy factors among our patients that may prevent people from accessing and receiving the approved vaccines.

So, we would request you to spend a few minutes in answering the questions below. There are 30 questions in 5 sections. For further information, please contact "kirandeep.kaur@aravind.org".

* Required

1. Place of study *

Mark only one oval.

- Madurai
- Coimbatore
- Pondicherry
- Chennai
- Tirunelveli
- Tirupati
- Kovilpatti

2. Age of the patient *

3. Sex *

Mark only one oval.

- Male
- Female
- Other

4. Marital Status *

Mark only one oval.

- Married
- Unmarried

5. Educational Status *

Mark only one oval.

- Illiterate
- Elementary
- High school
- Diploma
- Graduate
- Post Graduate

6. Occupation *

Mark only one oval.

- Student
- Labourer
- Business
- Office work
- Professional
- Housewife Not
- Employed
- Others

7. Place of living *

Mark only one oval.

- Rural
- Semi Urban
- Urban

8. Socio-economic status (Annual Income) *

Mark only one oval.

- < 2 lakhs
- 2-5 lakhs
- > 5 lakhs
- Not willing to disclose

Health Related

9. Do you have any co-morbidities? *

Check all that apply.

- None Diabetes
- Hypertension
- Cardiac
- Asthma/COPD
- Allergy
- Obesity/Hypercholesterolemia Thyroid
- Disease
- Chronic Kidney Disease
- Others

10. Self-perception of own physical health status *

Mark only one oval.

- Unhealthy
- Healthy
- Very Healthy

11. Self-perception of own mental health status *

Mark only one oval.

- Stressed
- Neutral
- Relaxed

12. Risk perception of getting infected *

Mark only one oval.

- Unlikely
- Likely
- Very Likely

13. Previous infection with COVID-19 *

Mark only one oval.

- Do Not Know
- Yes and Confirmed
- Had symptoms, but not confirmedNot
- Infected

14. COVID-19 infection in close relation/close family member *

Mark only one oval.

- Do Not Know
- Yes and Confirmed
- Had symptoms, but not confirmedNot
- Infected

15. Any severe outcomes/mortality from COVID-19 infection in close family members/friends ? *

Mark only one oval.

- Yes
- No

Vaccination related

16. How do you get information related to COVID-19 situation? *

Check all that apply.

- Friends
- Family
- Television
- Newspaper
- Radio
- WhatsApp
- Facebook/YouTube/other social media

17. How do you get information related to vaccination? *

Check all that apply.

- Friends
- Family
- Television
- Newspaper
- Radio
- WhatsApp
- Facebook/ YouTube/ other social media

18. Are you vaccinated against COVID-19? *

Mark only one oval.

- Yes *Skip to question 28*
- No *Skip to question 26*

19. Excluding you, how many total family members are there (staying in same house) above 18 years of age? *

20. Excluding you, how many of them are vaccinated? *

21. Do you have vaccination centre close to your home? *

Mark only one oval.

- Yes
 No
 Not Sure

22. Which vaccine would you prefer for yourself/your family? *

Mark only one oval.

- Covaxin
 Covishield
 Sputnik
 Others
 Whichever is available
 Will never get vaccinated

23. Have you heard about COWIN registration? *

Mark only one oval.

- Yes
 No

24. How will you do the COWIN registration? *

Mark only one oval.

- Self registration by Smartphone/ ComputerTake
 help from family/ friends
 E-service supportNot
 sure

25. How important do you think COVID-19 vaccination will be for your health status? *

Mark only one oval.

- Not Important
- Important
- Very Important

Hesitancy for Vaccination

26. If unvaccinated, are you willing to be vaccinated? *

Mark only one oval.

- Yes
- No
- Maybe

27. What is the main reason, for you not receiving vaccination till now? (Open end *question - Need to select options based on patients response) DO NOT GIVE OPTIONS TO PATIENT HERE (Kindly select most appropriate reasons - DO NOT SELECT ALL THE OPTIONS)

Check all that apply.

- I do not believe vaccines are effective to stop COVID-19 spread I am
- afraid of side-effects post vaccination
- Comorbidities / immunosuppression
- Pregnant/Lactating mother
- Insufficient information regarding the vaccine
- Not aware how to register and where to get vaccinated No
- one to accompany to vaccination centre
- I am willing, but vaccine not available at centre near to my house Prior
- history of vaccine/drug related complication
- Family members or relatives developed severe reaction or side effects following vaccination
- Nobody in my area is vaccinated
- My family members said not to take the vaccination
- I always stay at home, I will not be affected by corona virus Government did
- not make this mandatory so I did not take my vaccine I underwent a surgery
- recently
- I am worried to get infected from the vaccination center I am
- ready to get vaccinated, but waiting for my turn
- Because I got COVID, so waiting for 3 months to undergo vaccination I am
- not willing to reveal the reason
- Others

Skip to question 29

Acceptance for Vaccination

28. What was the main reason that motivated you to get vaccinated? (Open end *question - Need to select options based on patients response) DO NOT GIVE OPTIONS TO PATIENT HERE (Kindly select most appropriate reasons - DO NOT SELECT ALL THE OPTIONS)

Check all that apply.

- Fear of being infected or infecting my family
- Belief in the effectiveness and safety of the vaccine
- Saw a close family member / friend suffering from severe COVID-19, who was non-vaccinated
- Motivated through social media Motivated by
- physician/family/friends
- For me it is compulsory by government/employee
- Accompanied a family member/ friend and got myself vaccinatedLocal
- health authorities
- Others

Statements

29. Do you feel that the vaccine is sufficiently tested and proven to be safe? *

Mark only one oval.

- Yes
- No
- Don't know

30. Do you know that in spite of vaccination, people can get infected but are unlikely to get the severe disease? *

Mark only one oval.

- Yes
- No
- Don't know

31. Do you have any bad experience of adverse reaction post vaccination in family/friends/celebrity? *

Mark only one oval.

- Yes
 No
 Don't know

32. Do you think there is sufficient information available to the community (TV/Newspaper/Social media) about vaccination? *

Mark only one oval.

- Yes
 No
 Don't know

33. Do you think that everyone in the community should be vaccinated to end the pandemic? *

Mark only one oval.

- Yes
 No
 Don't know

34. Do you think vaccination for COVID-19 should be made compulsory? *

Mark only one oval.

- Yes
 No
 Don't know