HHS Public Access

Author manuscript

J Acquir Immune Defic Syndr. Author manuscript; available in PMC 2022 December 15.

Published in final edited form as:

J Acquir Immune Defic Syndr. 2021 December 15; 88(5): 421–425. doi:10.1097/QAI.0000000000002803.

COVID-19 vaccine hesitancy among PLWH in South India: Implications for vaccination campaigns

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Abstract

Background: The global effort to end the SARS-CoV-2 pandemic will depend on our ability to achieve a high uptake of the highly efficacious vaccines in all countries. India recently experienced an unprecedented transmission surge, likely fueled by a premature reopening, the highly transmissible delta variant, and low vaccination rates. Indian media have reported high degrees of vaccine hesitancy, which could interfere with efforts to prevent future surges, making it crucial to better understand the reasons for such reluctance in vulnerable populations, such as people living with HIV (PLWH).

Methods: We conducted telephone interviews with 438 PLWH who were participants in a longitudinal cohort, designed to examine and validate novel ART adherence measures. Interviews were conducted in January and February, 2021 and covered COVID-19 related questions on confidence in vaccine safety and efficacy, worries of vaccine side effects, trust in COVID-19 information from specific sources, and intent to get vaccinated.

Results: Over one-third of participants (38.4%, n=168) met our definition of "vaccine hesitant" by reporting being either unlikely to get vaccinated at all or wanting to wait. Vaccine hesitancy was associated with lack of confidence in vaccine safety, concerns about side effects and efficacy, as well as distrust in common sources of vaccine-related information.

Discussion: These results highlight several challenges for vaccination efforts. Campaigns may benefit from using trusted sources, including ART center staff, providing clear information about safety and efficacy and emphasizing the role of vaccines in preventing severe disease, hospitalizations and death, as well as the reduction of forward transmission to unvaccinated household members.

Keywords

COVID-19; vaccine hesitancy; India; HIV; distrust

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Introduction:

The global effort to end the SARS-CoV-2 pandemic has resulted in the development of multiple highly efficacious vaccines[1] at an unprecedented speed. Despite an at times rocky roll-out, several high-income countries are soon likely to find themselves in a situation in which supply exceeds demand. However, we are also seeing the consequences of vaccine inequities as well as of the inconsistent use of multiple non-pharmaceutical prevention strategies. Between May and July of 2021, India, with a <10% vaccination rate of their population, experienced an enormous second COVID-19 surge, after reopening and allowing large rallies and religious festivals in the presence of the delta variant which is significantly more transmissible than both the wildtype virus and the formerly dominant alpha variant that was responsible for the surge in the UK and elsewhere during the winter of 2021.[2–5] While we must work hard to provide access to those who are willing to get vaccinated with one of the effective and safe COVID-19 vaccines, public health must also turn to the "vaccine hesitant" and address concerns in various subpopulations who are reluctant to get a COVID-19 vaccine.

The reasons for vaccine hesitancy with a COVID-19 vaccine might differ from those with past vaccination campaigns[6–9] and include the newness of mRNA technology, used in several of the vaccines; the recent reports of rare blood clots following vaccination with the adenovirus-based vaccines, two of which are currently provided by the Indian government. All of these issues have been magnified by social and other media,[6] and led to an unprecedented politicization of this particular pandemic, not only in the US, but on social media globally. However, entrenched reasons, such as distrust among marginalized communities of the medical system, and a failure to use community partners for community-based messaging,[7] may also be playing a role.

Given the importance of vaccination to reduce COVID-19 related severe disease, human suffering, hospitalizations and deaths, as well as the risk of further variants, and to protect those not yet eligible for vaccination, it is crucial that we develop evidence-based vaccination uptake campaigns. To accomplish this, we need to better understand the factors that are driving hesitancy in different subpopulations, including people living with HIV (PLWH) who may be vulnerable to severe disease outcomes.

PLWH globally, including in India, have been targets of stigma, leading to fear of status disclosure as well as delays in treatment seeking, with multiple adverse physical and mental health consequences.[10–14] Recent research shows that this stigma may also have acted as an additional barrier to HIV management during the COVID-19 pandemic, e.g. by forcing them to disclose their HIV status in order to obtain permission to travel to the clinic despite COVID-related travel restrictions.[15–19] PLWH, especially those with multiple comorbidities[20] and those with CD4 counts <200 copies/mL,[21] are more at risk of severe outcomes with COVID-19 than those living without HIV, making vaccination of this subpopulation even more crucial.

India is estimated to have 2,348,000 PLWH[22], with the southern state of Karnataka having the third highest number of cases (269,000). Since the implementation of the government

"test and treat" model, it is estimated that 80% of PLWH are linked to care[23] and that 75% remain in care after 12 months.[24] On March 1st, 2021 India's COVID-19 vaccine roll-out opened to people 45+ with underlying medical conditions, which included HIV. On May 1st, 2021 vaccinations opened to the whole population, but uptake was initially slow, due to a combination of supply and hesitancy. It is now important for vaccine promotion programs to understand the various factors that may be associated with hesitancy in this vulnerable population, to help protect its members during the current and future surges.

Methods:

Procedures:

The sample used in these analyses was recruited as part of a cohort study in the South Indian state of Karnataka that was designed to evaluate the validity of multiple HIV medication adherence measures. Eligibility criteria for the cohort included being 18 years or older, diagnosed with HIV and taking antiretroviral medication, speaking English or Kannada (the local language), living within 100km of one of our study offices, and being willing to be followed for two years, according to the study protocol. The vaccine related questions reported here were part of a series of COVID-19-related questions which were administered to all cohort participants (n=526 at baseline) who were available to speak via phone interviews between Jan 18 and Feb 19, 2021 (n=438). While the vaccine roll-out had started at this time, PLWH who were 45 or older became eligible on March 1, 2021, none of our cohort participants were eligible at the time of their interviews.

Measures:

The development of vaccine-related questions and response options followed the same protocol as our adherence-related cohort questionnaire items and scales. New items on behaviors and intentions as well as on barriers and facilitators were generated by examining COVID-related reports in media, and through focus group discussions with study staff and former study participants. All questions were subsequently pilot tested with ten former study participants to ensure acceptability and comprehension, before they were finalized.

Demographic information (age, gender, years of education, household income) was collected during the baseline cohort interview.

Participants were asked 1) if they had heard of the development of a COVID vaccine, 2) how likely it was they would get vaccinated when given the opportunity (4-pt response scale, ranging from "extremely unlikely" to "extremely likely"), 3) when they would prefer to get vaccinated, once eligible (ranging from "ASAP [as soon as possible]" to "Never"), 4) their level of confidence in the vaccine's safety and efficacy (4-pt response scale, ranging from "very confident" to "not at all confident"), 5) level of worry about vaccine side effects (4-pt response scale, ranging from "very worried" to "not at all worried"), and 6) level of trust in COVID-related information from the following sources a) their doctor, b) news media and c) the government (4-pt response scale, ranging from "trust completely" to "do not trust at all"). A distrust index (range 0–3) was created by summing the number of the three sources

that they trusted only “some” or “not at all.” We also asked about their own testing history and if they knew anyone who had died of COVID-19.

A vaccine hesitancy variable was constructed based on participants’ responses to questions 2 and 3 above. Specifically, we defined participants as “vaccine hesitant” when any of the following responses were provided: participants reported being “extremely unlikely” or “unlikely” to get vaccinated, they stated that they were “likely” to get vaccinated but wanted to wait at least a few months before receiving the vaccine, or they responded that they “extremely likely” to get vaccinated but wanted to wait at least a year. All other vaccine-related variables were dichotomized by splitting their 4-point response scales mid-way.

Analyses:

One- and two-way tabulations were used to describe the categorical variables, both for the sample as a whole, and by vaccine hesitancy status. Mean and SD were used to describe age. Chi-square and t-test were used, respectively, to assess differences between the two vaccine hesitancy groups for categorical and continuous variables. Those variables with a p-value of <.20 were subsequently added to a multiple logistic regression model with vaccine hesitancy as the outcome, to determine which variables maintained an independent association with the outcome. Analyses were performed in Stata 16.1. Permissions to modify our interview protocol to a phone-based one and to add these supplemental questions were obtained from the IRB at St John’s Medical College and the University of California, San Francisco.

Results:

About half of this sample of PLWH was female (51.6%), had at least 10 years of education (50.5%) and a household income over 10,000 Indian Rupees (130 USD). The average age was about 40. Thirty-one percent (n=137) reported having been tested for COVID-19, of which n=5 were positive (Table 1).

Virtually all participants (95.2%, n=417) reported that they had heard about the development of a vaccine against COVID-19, with the majority stating that they would be either “extremely likely” (31.1%) or “likely” (53%) to get vaccinated, while 9.1% reported being “unlikely” and 6.8% being “extremely unlikely” to do so. When asked about when they would like to receive the vaccine, only 46.1% of the participants stated that they would want the vaccine as soon as possible, and nearly as many individuals stating that they preferred to wait either a few weeks (11.6%), a few months (24.7%), or at least a year (3.7%). The remaining participants (13.9%) stated that they “never” wanted to receive the vaccine. Over one-third of the sample (38.4%, n=168) thus met our definition of “vaccine hesitant.”

As shown in Table 1, bivariate comparisons of vaccine hesitant vs non-hesitant participants, showed that vaccine hesitant participants were more likely to be female (58.9% vs 47%, p=.015), were more worried about vaccine side effects (61.3% vs 37.8%, p<.001), had little to no confidence in the safety (45.8% vs 15.2%, p<.001) and efficacy (45.8% vs 15.9%, p<.001) of the vaccine, and were more likely to be mistrusting of vaccine-related information from doctors, news media and the government (39.9%, 84.5% and 63.7% vs. 20%, 61.1%, and 45.2%, respectively, all p<.001). Multiple logistic regression (Table 2)

showed all the vaccine-related variables remained independently associated with vaccine hesitancy, while the association with gender became only marginally significant. Participants who did not know anyone who died of COVID-19 were more than twice as likely to be vaccine hesitant than those who did know someone who had died.

Discussion:

The results show that while the majority of participants in this cohort of PLWH expressed willingness to be vaccinated when given an opportunity, almost 40% could be classified as "vaccine hesitant." Their reluctance to be vaccinated right away was associated with lack of confidence in vaccine safety, concerns about side effects and efficacy, as well as distrust in many of the common sources of vaccine-related information. Notably, the odds of a participant being classified as hesitant increased by 26% for each additional source of information they mistrusted. As in many other areas of health behavior intent, personal experience also seemed to matter, with people who did not know anyone who had died of COVID-19 being twice as likely to be hesitant as those who did know someone who had died as a result of this infection.

These results highlight several challenges for vaccination efforts. For a substantial proportion of vaccine hesitant individuals, their responses appear to involve a desire to "wait and see," rather than an outright refusal, even once the vaccines were made available. Further research is needed to fully understand the reasons for this stance, so that they can be addressed by public health professionals, but these data suggest that concerns about side effects may be a primary driver. Nearly two-thirds of vaccine hesitant individuals endorsed concerns about side effects whereas a little more than one-third of non-hesitant participants did so.

These concerns about vaccine safety, side effects and efficacy may be at least partly an unintended consequence of the initial rapid vaccine roll-out which was not accompanied with concurrent effective and nuanced public health messaging, as well as misinformation spread through social media.[25–27] Future health messages need to address the safety profile of vaccines in a transparent fashion and also present the risks in context of the COVID-19 pandemic. While there are some adverse events such as blood clots, these are extremely rare, e.g. compared to the Astra-Zeneca "Covishield" vaccine, the risk of cerebral venous thrombosis (CVT) from COVID 19 is almost 8-fold,[28] yet the former has been greatly amplified in social media. Messaging by public health authorities and media also needs to emphasize the role of vaccines in preventing severe disease, hospitalizations and death as well as the reduction of forward transmission to elderly household members.

The data also point to substantial concerns with trust from the usual sources of information. Participants who were vaccine hesitant were less trusting of doctors, news media, and governments than those who were not hesitant, but the overall level of mistrust across both groups was high. Over two-thirds of participants said that they do not trust news media and over 50% were distrusting of the government. This represents a substantive challenge under any circumstance, but especially so in the midst of a pandemic. While misinformation from social media can undoubtedly contribute by sowing doubt, some of the mistrust, at

least in the context of COVID, may arise from rapidly shifting guidance and inconsistent messaging from government and public health officials. In some cases, such challenges may be due in part to the lack of meaningful involvement by behavioral scientists in vaccine roll out programs. Behavioral scientists are likely better able to understand the role of HIV stigma, discrimination, and anxiety and to communicate effectively with vaccine hesitant and vulnerable populations than officials who are not familiar with data on factors involved in health behavior change. Their involvement is sorely needed, not just in India, but in the global effort to increase uptake of these highly effective vaccines.[29] Given the fact that cohort participants receive their HIV care at local government-run ART centers, they are more likely to trust vaccine-related information provided by the staff working in these clinics. In addition, the perception of HIV stigma and discrimination linked to HIV status disclosure is less likely to occur in the ART center setting than in other medical settings, including general vaccination clinics, making them a useful place to provide correct information and dispel myths. This may also be true for other global settings with designated HIV clinics and a high burden of HIV stigma and discrimination.

Acknowledgements

We gratefully acknowledge the staff at the Karnataka ART Centres for referring the study participants to us as well as the Tel-Me-Box study staff for their hard work and dedication to the welfare of the study participants, under very challenging conditions. Finally, we are grateful to the many study participants who so generously shared their time and thoughts with us during the pandemic.

Sources of support:

NIMH grant 1R01MH109310

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Table 1:

Sample characteristics by vaccine hesitancy status

	All (n=438)		Hesitant (n=168)		Non-hesitant (n=270)		
	n	%	n	%	n	%	*p*-value[a]
Female gender	226	51.6	99	58.9	127	47.0	.015
≥ 10 years of education	221	50.5	91	54.2	130	48.1	.221
Household income > 10,000 Indian Rupees	230	52.5	89	53.0	141	52.2	.878
Age: mean (SD)	39.5	(8.8)	39.3	(9.4)	39.6	(8.5)	.748
Tested for COVID-19	137	31.3	51	30.4	86	31.9	.743
Very/somewhat worried vaccine side effects	205	46.8	103	61.3	102	37.8	<.001
Little/no confidence vaccine is safe	118	26.9	77	45.8	41	15.2	<.001
Little/no confidence vaccine protects against COVID-19	120	27.4	77	45.8	43	15.9	<.001
Not at all/somewhat trust my doctor re. vaccine	121	27.6	67	39.9	54	20.0	<.001
Not at all/somewhat trust news media re. vaccine	307	70.1	142	84.5	165	61.1	<.001
Not at all/somewhat trust government re. vaccine	229	52.3	107	63.7	122	45.2	<.001
Number of distrusted sources on vaccine info							<.001
3	106	24.2	61	36.3	45	16.7	
2	116	26.5	47	28.0	69	25.6	
1	107	24.4	39	23.2	68	25.2	
0	109	24.9	21	12.5	88	32.6	
Did not know anyone who died of COVID-19	389	88.8	155	92.3	234	86.7	.071

[a]Based on chi-square test for all variables except age; for age, based on t-test

Table 2:

Multiple logistic regression of vaccine hesitancy correlates

	AOR	95% CI	*p*-value
Very/somewhat worried vaccine side effects	2.20	1.43 – 3.39	<.001
Little/no confidence vaccine is safe	2.08	1.10 – 3.93	.024
Little/no confidence vaccine protects against COVID-19	2.05	1.08 – 3.87	.028
Number of distrusted sources on vaccine info	1.26	1.01 – 1.57	.043
Not knowing anyone who died of COVID-19	2.17	1.04 – 4.51	.038
Female gender	1.47	0.95 – 2.25	.082

AOR, Adjusted Odds Ratio; CI, Confidence Interval