

Access this article online
Quick Response Code:

Website: www.jehp.net
DOI: 10.4103/jehp.jehp_792_21

COVID-19 vaccine hesitancy and influence of professional medical guidance

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Abstract:

BACKGROUND: Vaccine hesitancy presents a major challenge during the COVID-19 pandemic. It is crucial to address the factors contributing to vaccine hesitancy necessary to control the associated morbidity and mortality. This study aimed to investigate the impact of professional medical guidance on the likelihood of receiving the COVID-19 vaccine in immigrants of USA and Canada.

MATERIALS AND METHODS: A total of 92 immigrants in the USA and Canada who predominantly spoke Malayalam were recruited using social media platforms. An online survey was administered investigating participants' confidence in receiving the COVID-19 vaccine. Following, a short webinar was conducted by a medical professional explaining the efficacy and safety of the vaccine. A postwebinar survey was immediately given assessing the confidence and likelihood of receiving the vaccine. SPSS was used to generate descriptive statistics and Pearson Chi-square analysis where appropriate.

RESULTS: Results revealed that participants who attended the webinar reported greater confidence in receiving the COVID-19 vaccine. There was a statistically significant difference between pre- and postwebinar confidence scores for the COVID-19 vaccine, $\chi^2 (12, n = 80) = 43.34, P < 0.01$.

CONCLUSION: Results from the current study demonstrate the successful delivery of professional medical guidance to the general public through online small-group sessions to help address the misconceptions surrounding the COVID-19 vaccine and combat vaccine hesitancy among vulnerable populations. Future studies should focus on interventions addressing vaccine hesitancy in larger and diverse populations and analyze other barriers to vaccination.

Keywords:

Coronavirus, COVID-19, health care, mRNA vaccines, vaccine hesitancy

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Received: 29-06-2021

Accepted: 04-07-2021

Published: 28-04-2022

Introduction

Vaccine hesitancy is defined as a delay in the acceptance or refusal of vaccination even in the presence of available vaccination services.^[1] Vaccine hesitancy is reportedly one of the top global threats according to the WHO and is not a novel phenomenon in developed countries such as the USA and Canada.^[2] There are several reasons for vaccine hesitancy including anti-vax group statements, myths and conspiracy theories, misinformation about vaccine side effects, speed of vaccine development, and general

disbelief in the existence of viruses like COVID-19.^[3]

With increasing COVID-19 vaccinations will we then be able to achieve herd immunity necessary to block transmission and reduce the socioeconomic burden of the disease.^[4] One study investing 5000 American adults showed that almost one-third (31%) of participants had no intention of receiving the COVID-19 vaccine.^[5] While another study of 991 American adults revealed that approximately 58% of participants expressed interest in the vaccine, 32% were unsure, and 11% had no intention of being vaccinated.^[6]

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How to cite this article: Nair G, Venkatesan K, Nair A, Firoz IN, Haroon NN. COVID-19 vaccine hesitancy and influence of professional medical guidance. *J Edu Health Promot* 2022;11:112.

The above data illustrate that vaccine hesitancy is a major factor in increased morbidity and mortality rates, along with socioeconomic distress. The distribution of accurate information, equal health-care access and opportunities across ethnicities, and a strong patient–physician bond can help alleviate this burden. In the present study, we investigate the reasons for COVID-19 vaccine hesitancy in Canadian immigrants and the impact of professional medical guidance through online platforms, on the likelihood of receiving the COVID-19 vaccine.

Materials and Methods

Study design and setting

This cross-sectional study was conducted between 2020 and 2021 using online questionnaires assessing participants regarding their perceptions and likelihood of receiving the COVID-19 vaccine.

Study participants and sampling

A total of 91 immigrants in Canada or the USA who predominantly spoke Malayalam were invited to take part in this study. Copies of the surveys are in Appendix.

Data collection tool and technique

Google Forms and Zoom were used to distribute the survey/webinar due to their rising popularity throughout the pandemic. Participants were required to fill out an online multi-item survey regarding their views and likelihood of receiving the COVID-19 vaccine. Following this, the participants attended a short webinar conducted by an expert medical professional from their community, regarding the safety and efficacy of COVID-19 vaccines. Immediately after the webinar, participants filled out another survey assessing if their views and perceptions had changed based on the webinar. The prewebinar questionnaire consisted of nine questions about demographics (i.e., age, gender, first language) and reasons for or against receiving the COVID-19 vaccine. The postwebinar questionnaire consisted of 10 questions inquiring about the confidence in receiving the vaccine, reasons for attending the webinar, and likelihood of recommending the webinar to others. The surveys and webinars were conducted in English. IBM SPSS version 27.0.1.0 from Stanford, California, U.S.A was used for data calculation and analysis.

Ethical consideration

The procedures followed here were in accordance with the ethical standards. This research has been approved by the Ethical Community of the Department of Endocrinology and Internal Medicine, Northern Ontario School of Medicine, Sudbury. Privacy and anonymity were informed to participants at the beginning of the survey while ensuring that their data would be used solely for research purposes.

Informed consent was assumed upon completion of the survey.

Results

Vaccine awareness (prewebinar) survey

There were 91 participants (male = 58, female = 33) who took the prewebinar survey. The age of participants was as follows: 18–30 years ($n = 9$), 31–50 years ($n = 59$), 51–65 ($n = 21$), and above 65 years of age ($n = 2$). Participants who reported their area of residence lived in Ontario ($n = 53$), Quebec ($n = 2$), Ottawa ($n = 1$), and Philadelphia ($n = 9$). In terms of willingness to vaccinate, 49.50% of participants reported an interest in vaccination once it becomes available. However, 18.90% reported that they were not willing to take the COVID-19 vaccine and 27.40% of participants were unsure if they wanted to be vaccinated or not. Refer to Figure 1.

With regard to reasons for receiving the vaccine, 18.9% of participants reported confidence in the FDA regulatory review process, 15.8% reported a commitment towards taking the vaccine to stop the pandemic, 5.3% reported confidence about mRNA technology in vaccine development, 2.1% reported sufficient education by public health authorities about vaccine safety, and 7.4% reported two or more of the above reasons [Figure 2a].

Reasons reported against taking the vaccine included potential risk of infertility (2.10%), permanent DNA repair by mRNA (2.10%), allergic reactions (3.20%), hasty development of the vaccine (12.60%), and preference to wait another 3 months before making a decision (6.30%) [Figure 2b]. Confidence in receiving the COVID-19 vaccine (prior and after the webinar) was reported on a scale from 1 (not confident at all) to 5 (very confident) [Figure 3a and b].

A Chi-square cross-tab analysis was performed between participants who have received the flu vaccine and those who were willing to receive the COVID-19 vaccine. Results revealed that 57.70% of participants who had

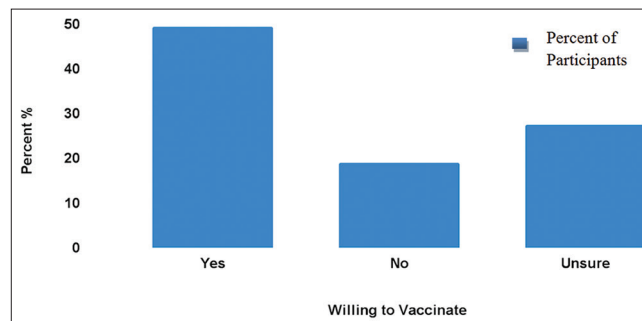


Figure 1: Interest in receiving the COVID-19 vaccine

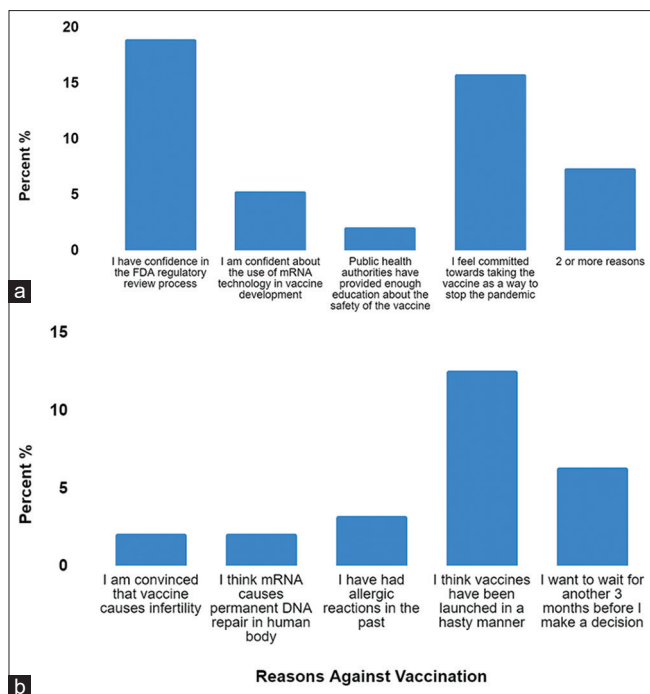


Figure 2: (a) Reasons for receiving the COVID-19 vaccine. (b) Reasons against receiving the COVID-19 vaccine

already taken the flu vaccine were likely to receive the COVID-19 vaccine, and 43.6% of participants who had not taken the flu vaccine were likely to receive the COVID-19 vaccine [Table 1]. This finding was not statistically significant, $\chi^2 (2, n = 91) = 1.78, P > 0.05$.

Vaccine readiness (postwebinar) survey

Due to attrition, 82 participants participated in the survey immediately after the webinar (male = 58, female = 33). Age categories of participants are as follows: 18–30 years ($n = 9$), 31–50 years ($n = 59$), 51–65 years ($n = 21$), and above 65 years ($n = 2$). Confidence scores were scaled from 1 (no confidence at all), 2 (somewhat confident), 3 (neutral), 4 (quite confident) to 5 (very confident).

Cross-tab Chi-square analyses were conducted between “confidence scores in the COVID-19 vaccine before the webinar” and the “confidence scores in the COVID-19 vaccine after the webinar.” Results revealed a statistically significant difference between pre- and postwebinar confidence scores for the COVID-19 vaccine, $\chi^2 (12, n = 80) = 43.34, P < 0.01$.

After *post hoc* analyses were conducted, there was a statistically nonsignificant increase in confidence scores for participants who reported to “somewhat confident in the vaccine before the webinar” and “very confident in the vaccine after the webinar,” $\chi^2 (1, n = 80) = 3.61, P > 0.05$. Similar observations were seen in participants who reported to be “quite confident in the vaccine before

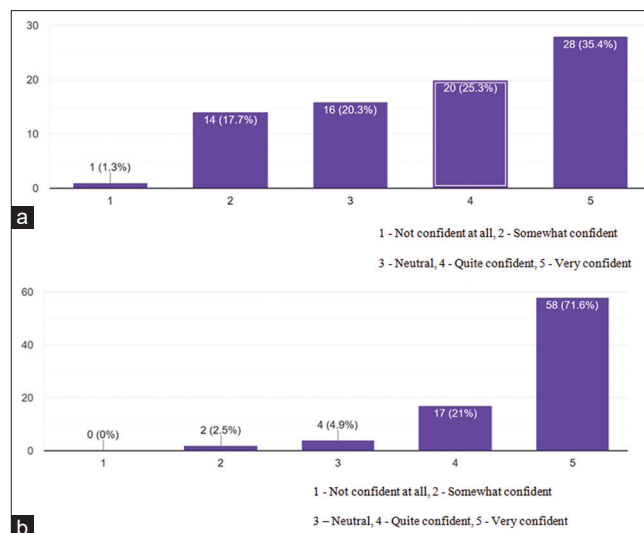


Figure 3: (a) Confidence scores in receiving the COVID-19 vaccine prior to attending the webinar. (b) Confidence in the COVID-19 vaccine after attending the webinar

Table 1: Cross-tabulation between participants who have received the flu vaccine and willingness to receive the COVID-19 vaccine

Flu vaccine	Willing to receive the COVID-19 vaccine (percentage of participants)		
	Yes	No	Unsure
Yes	57.7	17.3	25.0
No	43.6	23.1	33.3

the webinar” and “very confident in the vaccine after the webinar,” $\chi^2 (1, n = 80) = 0.16, P > 0.05$.

There was a statistically significant increase in confidence scores from before and after the webinar. Specifically, there was an increase in scores from “not at all confident in the vaccine prior to the webinar” to “neutral confidence scores in the vaccine after the webinar” ($\chi^2 [1, n = 80] = 15.21, P < 0.01$), “very confident in the vaccine prior to the webinar” and “very confident in the vaccine after the webinar” ($\chi^2 [1, n = 80] = 14.44, P < 0.01$), “very confident in the vaccine prior to the webinar” and “quite confident in the vaccine after the webinar” ($\chi^2 [12, n = 80] = 43.34, P < 0.05$), and “somewhat confident in the vaccine prior to the webinar” and “somewhat confident in the vaccine after the webinar” ($\chi^2 [1, n = 80] = 9.61, P < 0.05$) [Table 2].

In general, 75.30% of participants were very likely to recommend the webinar to others followed by 14.8% of participants who were somewhat likely to recommend the webinar [Figure 4a]. Cross-tab Chi-square analyses and subsequent *post hoc* analyses were conducted between confidence scores in the vaccine after the webinar and the scores of the likelihood of recommending the webinar to others. Results revealed a statistically significant association between scores of “very likely

to recommend the webinar” and “very confident in the vaccine after the webinar” ($\chi^2 [1, n = 82] = 14.44, P < 0.01$), “neutral confidence” scores and “somewhat likely to recommend the webinar” ($\chi^2 [1, n = 82] = 18.49, P < 0.01$), “very confident in the vaccine” and “somewhat likely to recommend the webinar” ($\chi^2 [1, n = 82] = 9.61, P < 0.05$), and “somewhat confident in the vaccine after the webinar” and “somewhat unlikely to recommend the webinar” ($\chi^2 [1, n = 82] = 19.36, P < 0.01$) [Table 3]. About 88.9% of participants reported sufficient time for interaction during the webinar [Figure 4b].

Discussion

This study investigated the influence of professional medical guidance on the perception of the COVID-19 vaccine in immigrants in the USA and Canada. The results illustrate that professional medical guidance delivered directly through small group sessions increases confidence in receiving the COVID-19 vaccine. This is in part attributed to the clarification of any misconceptions and doubts surrounding the efficacy and side effects of the vaccine. Participants also expressed confidence in receiving information directly through experts from their community sharing similar cultural, language, and ethnic backgrounds.

Vaccine hesitancy is not a novel phenomenon and has been observed in developed countries including the USA. A prominent example of vaccine hesitancy involves the measles vaccine which has been one of the causes of the 30% increase in measles cases globally.^[7] This has been attributed to the false claim that the measles, mumps, and rubella (MMR) vaccine cause autism in children. This notion has been debunked by several scientists and epidemiological studies since autism is a neurodevelopmental disorder with a strong genetic component developing before the first year of life when the MMR vaccine is administered. Despite the strong scientific evidence, parents are still hesitant to accept MMR vaccination for their children.^[8]

Another reason for vaccine hesitancy is observed in ethnic minority groups. A study by Khubchandani *et al.* investigated vaccine hesitancy in the U. S population through reliable questionnaires in over 1000 participants from various ethnic, socioeconomic, and educational backgrounds. Results revealed vaccine hesitancy

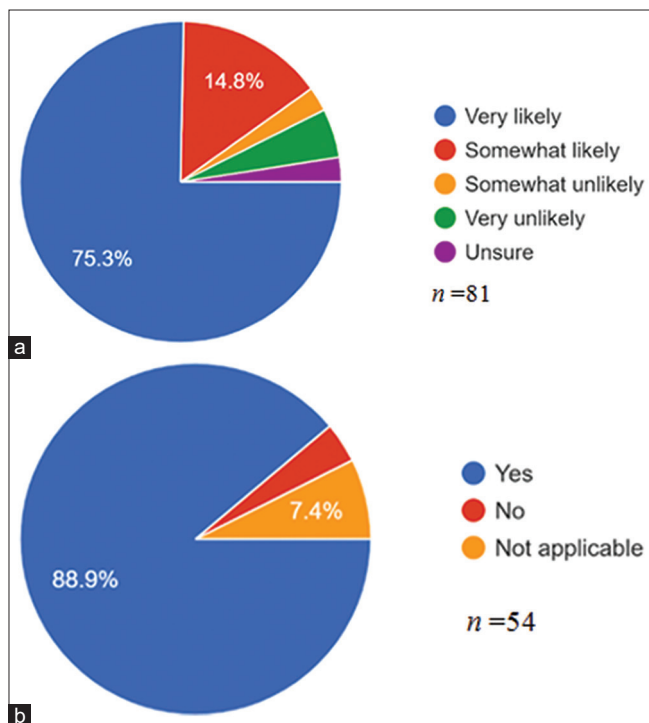


Figure 4: (a) Likelihood of recommendation of webinar to others with COVID-19 vaccine hesitancy. (b) Sufficient time for audience interaction

Table 2: Cross-tabulation between confidence scores in the COVID-19 vaccine before and after the webinar

Confidence in the vaccine prior to the webinar	Confidence in the vaccine after the webinar (percentage of participants)				Total
	Somewhat confident (2)	Neutral (3)	Quite confident (4)	Very confident (5)	
Not confident at all (1)	0.00	100.00**	0.00	0.00	100
Somewhat confident (2)	14.30*	7.10	28.60	50.00	100
Neutral (3)	0.00	12.50	43.80	43.80	100
Quite confident (4)	0.00	3.40	25.00	75.00	100
Very confident (5)	2.50	6.30	20.00*	71.30**	100

*P<0.05, **P<0.01

Table 3: Cross-tabulation of confidence scores in the COVID-19 vaccine after the webinar and recommendation of webinar to others

Confidence in vaccine after the webinar	Recommendation of webinar (percentage of participants)				
	Very likely	Somewhat likely	Somewhat unlikely	Very unlikely	Unsure
Somewhat confident (2)	-	50.00	50.00**	-	-
Neutral (3)	20.00	80.00**	-	-	-
Quite confident (4)	58.80	17.60	5.90	11.80	5.90
Very confident (5)	86.20**	6.90*	-	5.20	1.70

*P<0.05, **P<0.01

highest among African Americans, Hispanics, those with children, rural dwellers, and residence in the northeastern US.^[3] This pattern can be explained by lower health-care access in minor ethnic groups, poor health outcomes in COVID-19 infections among minority groups, health-care-related mistrust, lower participation of minority groups in clinical trials, and lower vaccine awareness. Those who reported more likely to receive the COVID-19 vaccine were individuals from a Hispanic background, higher socioeconomic status, and higher perceived likelihood of being infected with COVID-19.^[3] Similar results have been observed in other countries as well.^[9,10]

A strength of the current study includes the use of virtual platforms (i.e., zoom) to interact with participants. This allowed participants living at a distance to communicate and interact directly with a health-care professional and clarify any doubts they had surrounding the COVID-19 vaccine. Virtual tools provide easier access to reach individuals from all over the world and provide valuable information in assessing vaccine hesitancy in a time-sensitive and financially viable manner. Future studies should focus on assessing vaccine hesitancy in a more diverse and larger population to investigate if similar results are discovered. Furthermore, prospective studies may also address other variables, such as income and education, and their relation to vaccine hesitancy. This study is novel as it addresses COVID-19 vaccine hesitancy in immigrants in the U. S. A and Canada, while prior literature has addressed vaccine hesitancy in other populations such as ethnic minority groups, health-care workers, and the general public. Since immigrants comprise the vast majority of the population, investigating their reasons for vaccine hesitancy can help identify barriers and alleviate vaccine hesitancy.^[11]

Limitations and recommendations

In terms of limitations of our study, we do think that the results may have been partly skewed due to other variables not studied, such as access to the vaccine, confirmation bias, socioeconomic status, and education level. Individuals from higher socioeconomic status and education levels are more likely to have more faith in science, access to the vaccine, and have greater confidence in receiving it compared to individuals who do not have access to the vaccine and/or are from a lower socioeconomic class/lower education. Another limitation of our study is the small sample size. We believe that more promising results can be delivered if this study was carried out in a larger sample size increasing its power.

To address vaccine hesitancy, we recommend incorporating vaccine education in the curriculum of prospective health-care workers to alleviate vaccine

hesitancy.^[12,13] Furthermore, small virtual group sessions conducted by physicians can help to clear the misinformation surrounding the vaccine which will motivate faster vaccine acceptance. Thus, physicians should be encouraged to conduct such initiatives. Employers, policymakers, and the government should aim to incentivize this initiative for physicians to get protected time for health promotion.

Conclusion

Vaccine hesitancy represents a crucial challenge during the COVID-19 pandemic as it can lead to an increase in morbidity, mortality, and delayed recovery to normalcy. A major cause of vaccine hesitancy is misinformation. Hence, proper medical advice from medical professionals is essential in addressing any misconceptions and doubts given the false news surrounding the vaccine.

Results from the current study demonstrate the importance of targeted professional medical guidance in addressing vaccine hesitancy. Informative webinar sessions involving small groups and facilitating direct interactions with medical professionals should be incorporated as a major public health tool to combat vaccine hesitancy. The sooner we incorporate this in medical practice, the more likely individuals will receive the vaccine, alleviating the disease burden. Nevertheless, prospective studies should focus on addressing barriers in vaccine hesitancy in larger and diverse sample sizes, and investigate other variables that may contribute to vaccine hesitancy.

Acknowledgments and ethical moral code

We are grateful to all the participants who have volunteered for this project. All authors confirm that all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Appendix

Vaccine Awareness (prewebinar) Survey

COVID-Vaccine awareness survey (Two minutes)

We are trying to understand the perspective of immigrant families about the COVID-19 vaccine development and rollout. Data will be encrypted and utilized to generate awareness and also to address specific concerns. Thanks, Dr. Nisha Nigil

* Required



1. Please enter the name of the city where you reside

2. Age range *

Mark only one oval.

18-30

31-50

51-65

>65

3. Gender *

Mark only one oval.

Male

Female

Other

Do not wish to disclose

4. What is your first language? *

5. Are you planning to take the COVID vaccine when it is available? *

Mark only one oval.

Yes

No

Not sure yet

6. If answered "Yes", what is your reason? *

Check all that apply.

I have confidence in the FDA regulatory review process

I am confident about the use of mRNA technology in vaccine development

Public health authorities have provided enough education about the safety of the vaccine

I feel committed towards taking the vaccine as a way to stop the pandemic

7. If answered "No", what is your reason? *

Check all that apply.

I am convinced that vaccine causes infertility

I think mRNA causes permanent DNA repair in human body

I have had allergic reactions in the past

I think vaccines have been launched in a hasty manner

I want to wait for another 3 months before I make a decision

I am pregnant

I am taking immunosuppressive medications

I want to avoid taking the vaccine due to religious/faith based reasons

8. Have you taken flu vaccine in the past? *

Mark only one oval.

Yes

No

9. Name one concern you have about vaccine research, safety and rollout process *

Vaccine Readiness (postwebinar) Survey

COVID Vaccine readiness survey

We welcome you to complete this short survey after having listened to the mRNA vaccine webinar. Data will be anonymous. We are not collecting email id or personal details. Survey results will be sent for publication in a peer reviewed journal. Regards, Dr. Nisha Nigil and Govind Nair.

* Required

1. Age group *

Mark only one oval.

18-35

36-50

51-65

>65

2. Gender *

Mark only one oval.

Female

Male

Prefer not to say

Other: _____

3. Were you ready to get vaccine before attending the webinar? *

Mark only one oval.

YES

No