

Original Research Article

Beliefs regarding SARS-COV-2 vaccine in patients with transfusion-dependent thalassemia

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ABSTRACT

Background: SARS-CoV-2 vaccination drive generated varying responses in the general public. This study aimed to assess the vaccination acceptance amongst patients with thalassemia and to elucidate their beliefs regarding SARS-CoV-2 vaccines.

Methods: A prospective observational study was done involving thalassemia patients above the age of 18 years in the thalassemia day care center of our hospital.

Results: The study assessed 145 patients with a male to female ratio of 1.5:1 and a mean age of 25.6±6 years. Seventy-six (52.4%) of the study population had already been vaccinated with the first dose, 25.5% (n=37) were willing to get vaccinated, however, 22% were vaccine-hesitant. Vaccine hesitancy was 25.5% in males compared to 16.9% in females. The fear of adverse effects to the vaccine is a major deterrent to the vaccination. Patients considered themselves at high risk of COVID-19 disease and adverse effects of the SARS-CoV-2 vaccine.

Conclusions: Vaccine hesitancy was observed in 22% of patients. A significantly higher proportion of these patients considered vaccines unsafe and ineffective. Public sharing of safety and efficacy data may help in improving trust in the vaccine.

Keywords: SARS-CoV-2, Transfusion dependent thalassemia, Vaccine acceptance, Vaccine hesitancy

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is caused by a novel coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The World Health Organization (WHO) declared the COVID-19 outbreak as a public health emergency of international concern on January 30, 2020. There have been more than 440 million confirmed cases and more than 5.97 million deaths due to COVID-19 till 4 March 2022.¹ To combat the COVID-19 pandemic, a vaccination drive was initiated worldwide and 10,585,766,316 vaccine doses have been administered so far.² As a part of this initiative, India started the world's largest vaccination program on January 16, 2021, in a phased manner and a

total of 1,78,83,79,249 Indians have been vaccinated as of 5 March 2022 (Figure 1).³

COVID-19 vaccines were approved and developed very quickly and it led to the population having doubts about the safety and efficacy of these vaccines. Vaccine hesitancy is the tendency to delay or refuse vaccination when it is available.⁴ It is a highly variable and complex entity resulting from various environmental, vaccine-specific, and host-specific factors.⁵ Data suggests a high prevalence of vaccine hesitancy in the Indian population ranging from 20%-40%.^{6,7}

Thalassemia is an inherited disorder where the genes coding for globin chains of hemoglobin are affected.

There are about 100,000 beta-thalassemia patients in India.⁸ Thalassemia patients have co-morbidities like cardiac complications and diabetes that make them high risk for developing severe COVID-19 infection.^{9,10} Patients have to visit hospitals frequently for their blood transfusion which makes them susceptible to contracting the infection. Thus, vaccine acceptance towards COVID-19 vaccines becomes significant in thalassemia patients to decrease the risk of developing severe COVID-19 disease. This study aims to find out the various factors that could lead to vaccine hesitancy amongst thalassemia patients.

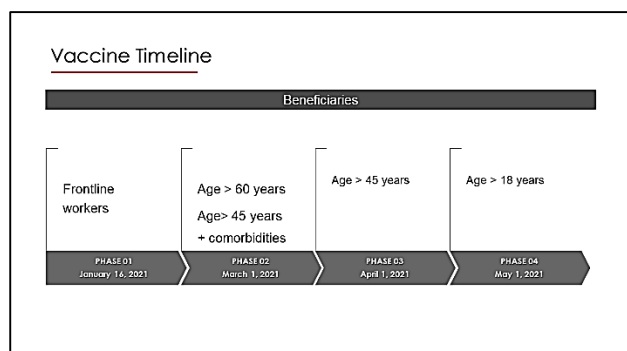


Figure 1: Vaccine timeline.

Objectives

To evaluate the proportion of thalassemia patients vaccinated against SARS-CoV-2; to assess beliefs regarding SARS-CoV-2 vaccines in patients with thalassemia and to elucidate factors that influence vaccine hesitancy in patients with thalassemia.

METHODS

This was a cross-sectional survey done in the Thalassemia Day Care Centre (TDCC) of our hospital from 1st June to 31st July 2021. Total 145 transfusion-dependent thalassemia patients older than 18 years of age registered with the center were included in the study. Approval for the project was taken from the Institutional Ethics Committee. A consent in the vernacular language of the patient was taken before enrolling them in the study. A study questionnaire was prepared and administered to the participants on their scheduled visit for transfusion. The study questionnaire assessed the demographic details of the patient, SARS-CoV-2 vaccination details of the patient, knowledge regarding thalassemia, SARS-CoV-2 and SARS-CoV-2 vaccines, and reasons for vaccine hesitancy. Patients who were either not sure of vaccination or those who refused to get vaccinated were labeled as vaccine-hesitant. The reasons for vaccine hesitancy were assessed on 19 points. The responses were recorded as yes, no, maybe, and do not wish to answer. Questions on the effect of underlying thalassemia on COVID-19 disease and its vaccination were also included. The patients were split into 3 groups

for assessment of their responses. Group A included patients who were vaccinated with the first dose, group B included patients who were willing for vaccination, and group C included those who were hesitant to the vaccination program. Data was described in terms of range; mean±standard deviation (\pm SD), median, frequencies (number of cases), and relative frequencies (percentages) as appropriate. For comparing categorical data, Chi-square (χ^2) was performed and an exact test was used when the expected frequency is less than 5. A probability value (p value) less than 0.05 was considered statistically significant. The patients who did not wish to answer a particular question were removed from analysis for that question. All statistical calculations were done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

RESULTS

In the present study, 145 patients were surveyed with a mean age of 25.6 ± 6 years and a male to female ratio of 1.5:1. At the time of the survey, 52.4% ($n=76$) of the study population had already been vaccinated with the first dose, 25.5% ($n=37$) were willing to get vaccinated, however, 22% were vaccine-hesitant (13.1% were not sure if they would get the vaccine and 9% were not willing to get vaccinated). Vaccine hesitancy was 25.5% in males compared to 16.9% in females. Awareness regarding the available vaccines was higher in the vaccinated group (97.4%) compared to the unvaccinated patients (85.5%). Amongst the unvaccinated patients, Covishield was the most preferred (58%) vaccine followed by Covaxin (17.4%) and Sputnik (13%) while 11.6% of patients wanted some other vaccine that was not available in the country. The preference for the vaccines was largely dependent on their perceived safety (37.7%) and effectiveness (20.3%) while 27.6% preferred a particular vaccine as their other family members were already vaccinated with the same. Thirty-eight (55%) patients were steadfast in their choice of the vaccine while 31 (44.9%) were ready to take the alternate vaccine if the vaccine of their choice was not available.

The perception of the patients who considered the vaccine to be safe was significantly different amongst the three categories of patients ($p=0.0001$), i.e., 86.8% in the vaccinated group (group A) 70.3% in the group that was willing to get vaccinated (group B) while 37.5% in the group not willing to get vaccinated or not sure about getting vaccinated (group C). A significantly higher percentage of patients in group A believed that the vaccine was effective in preventing SARS-CoV-2 infection as well as moderate to severe COVID-19 as compared to the two other groups (Table 1). The majority of the cohort (56.6%) believed that the vaccines have serious side effects. Nearly one-third of the unvaccinated patients thought that the vaccine has serious side effects as compared to 18.4% of vaccinated patients who thought the same. Fever was the most commonly feared side

effect reported by 119 (82%) patients. It was followed by weakness (46.9%), blood clots (15.8%), and nausea (17.9%). These perceptions were similar amongst the vaccinated and unvaccinated groups. Sixty-three patients (43.4%) thought that the vaccines had been subjected to rigorous standards of safety trials as compared to 21 patients (14.5%) who considered it otherwise and 36 patients (24.8%) who were not sure about this. Many

patients (34.5%) reported having decreased trust in the vaccines after knowing of vaccinated patients developing SARS-CoV-2 infection. A significantly higher proportion of patients (37.5%) in group C believed that the vaccination may introduce the virus into their body and lead to infection instead of immunity ($p=0.000$) as compared to groups A and B (Table 1).

Table 1: Vaccine related factors leading to vaccine hesitancy.

Reasons	Group A			Group B			Group C			P value
	Agree	Disagree	Uncertain	Agree	Disagree	Uncertain	Agree	Disagree	Uncertain	
The vaccine is safe	86.8	1.3	10.5	70.3	2.7	27	37.5	15.6	40.6	0.0001
The vaccine is effective in preventing Covid-19	61.8	5.3	30.3	51.4	10.8	37.8	28.1	25.0	37.5	0.013
The vaccine is effective in preventing moderate to severe Covid-19	64.5	7.9	25.0	43.2	10.8	43.2	34.4	15.6	37.5	0.031
Vaccine has serious side effects	18.4	53.9	22.4	29.7	37.8	32.4	31.3	25.0	34.4	0.07
I know of people who have been infected post vaccination and this has decreased my trust towards vaccine	23.7	52.6	17.1	37.8	40.5	16.2	56.3	25.0	9.4	0.052
I believe that the Covid-19 vaccines were subjected to rigorous amounts of safety trials	46.1	13.2	27.6	40.5	18.9	27.0	40.6	12.5	15.6	0.320
Vaccination may introduce virus into your body and lead to infection instead of immunity	14.5	68.4	15.8	24.3	29.7	37.8	37.5	31.3	25.0	0.000
I would prefer a nasal vaccine, if possible as it would be painless	35.5	48.7	11.8	29.7	37.8	27.0	31.3	37.5	9.4	0.019

The efforts of the Indian government in providing the good quality vaccine at the appropriate time were lauded by 62.1% of the patients. This belief was significantly higher in group A (69.7%) compared to group B (64.9%) and group C (40.6%) ($p=0.003$). Amongst the 145 patients surveyed, 121 wanted the vaccine to be provided free of cost but 24 patients were ready to get vaccinated

as an out-of-pocket expenditure. Registering on the COWIN portal developed by the government for vaccination was found to be easy in a significantly higher proportion of vaccinated patients compared to group C (34.4%) and group B (37.8%) ($p=0.041$). The role of social media in motivating the general public for getting vaccinated was appreciated by 54.5% of patients. This

perception was highest in the group willing to get vaccinated (70.3%) as compared to 48.6% in group A and 50% in group C (p=0.015). Fifty-five patients (37.9%) reported that they were motivated by health care

professionals for vaccination, 76 (52.4%) were motivated by their friends or family members, 30 (20.7%) were motivated by social media, 2 (1.4%) were motivated by religious leaders (Table 2).

Table 2: Environmental factors leading to vaccine hesitancy.

Reasons	Group A			Group B			Group C			P value
	Agree	Disagree	Uncertain	Agree	Disagree	Uncertain	Agree	Disagree	Uncertain	
The government is providing the best possible vaccine	69.7	10.5	17.1	64.9	5.4	24.3	40.6	34.4	12.5	0.003
Vaccine should be available free of cost	84.2	3.9	9.2	83.8	8.1	8.1	81.3	3.1	9.4	0.725
I will take vaccine from a private hospital	42.1	30.3	25.0	43.2	31.6	21.6	43.8	21.9	21.9	0.382
I consider registering on COWIN portal easy	63.2	14.5	15.8	37.8	24.3	29.7	34.3	25.0	21.9	0.041
I believe that the news and social media has greatly impacted the vaccination drive	48.7	27.6	19.7	70.3	5.4	21.6	50.0	12.5	21.9	0.015

Table 3: Host related factors leading to vaccine hesitancy.

Reasons	Group A			Group B			Group C			P value
	Agree	Disagree	Uncertain	Agree	Disagree	Uncertain	Agree	Disagree	Uncertain	
Vaccination site is far away from where you live	6.6	89.5	2.6	27.0	51.4	16.2	31.3	59.4	3.1	0.000
I will have to wait in long queues for vaccination	31.6	64.5	3.9	51.4	32.4	8.1	43.8	25.0	18.8	0.000
I might catch SARS-CoV-2 infection at vaccination site	31.6	31.6	30.3	37.8	18.9	18.9	28.1	15.6	31.3	0.048
I would prefer a door-to-door administration of vaccine	60.5	28.9	10.5	64.9	21.6	10.8	40.6	34.4	9.4	0.011

Table 4: Perception regarding COVID-19 in thalassemia.

Reasons	Group A			Group B			Group C			P value
	Agree	Disagree	Uncertain	Agree	Disagree	Uncertain	Agree	Disagree	Uncertain	
I am at risk for Covid-19 infection due to my thalassemia	43.4	39.5	15.8	54.1	10.8	32.4	34.4	31.3	31.3	0.048
Covid-19 vaccine is not safe for me due to thalassemia	18.4	69.7	10.5	21.6	43.2	35.1	37.5	37.5	21.9	0.005

A significantly higher proportion of the vaccine-hesitant population felt that the vaccination sites are far away and they will have to wait in long queues for vaccination. A significantly higher proportion of patients in group A (31.6%) compared to 18.9% in group B and 15.6% in group C were not afraid of contracting SARS-CoV-2 at the vaccination site (p=0.048). The majority of patients

(57.2%) preferred having a door-to-door vaccination. However, about 60% of the vaccine-hesitant population refused vaccination even through a door-to-door vaccination campaign (Table 3).

Underlying thalassemia was considered to be a risk factor for developing severe SARS-CoV-2 infection in 44.1% of

patients. This belief was significantly higher ($p=0.048$) in group B (50.1%) compared to the vaccinated group (43.4%) and group C (34.4%). The vaccine-hesitant population demonstrated a greater fear of adverse effects of the vaccine due to the underlying chronic disease as compared to the other 2 groups (Table 4).

DISCUSSION

This study involving 145 TDT patients demonstrated vaccine hesitancy in 22% of participants. Similar trends were pointed out by other studies.^{6,7} The vaccine hesitancy was higher in males as compared to females. Though in another study done by Alqudeimat et al a significantly higher willingness for vaccination was reported amongst the male patients as compared to the female patients in Kuwait.¹¹ In our center, females constitute only one-third of the total patients and have a high socio-economic stratum. This may have translated to a high vaccine acceptance in females compared to males in our study.

Awareness regarding vaccination was present in a large fraction of our cohort as in other studies. However, this increased awareness did not convert to increased vaccine acceptance.^{12,13} Amongst the three available vaccines, Covishield was most preferred and the patients quoted safety, effectiveness, and their family members being vaccinated with Covishield as the reasons for their preference.

When the reasons for vaccine hesitancy were explored, it revealed that significantly higher vaccine-hesitant patients were doubtful regarding the safety and efficacy of the vaccine. Several other studies conclude the concern regarding safety and efficacy as one of the most important reasons for vaccine hesitancy.^{12,14-20} Also, 34.5% of the total surveyed population was doubtful of the efficacy of vaccines after hearing of people getting infected even after vaccination. A study was done amongst medical students across 22 states and union territories of India showed that 10.6% of them are vaccine-hesitant despite increased risk perception.²⁰

Fear of adverse effects was so rampant that there were reports of people fleeing their villages to avoid vaccination.²¹ In a study by Alwi et al vaccine hesitancy due to fear of side effects was reported by 95.8% of the population.¹⁵ A robust adverse event reporting system in India could play a major role in clearly notifying the general public about the adverse events that occur after the SARS-CoV-2 vaccination so that any fake claims of vaccine-related side effects do not arise.

A major proportion of our cohort trusted the Indian government in providing effective vaccines. The concept of national pride in developing vaccines in India was also capitalized to promote the vaccination drive in a joint venture by Facebook and UNICEF.²²

Another major finding for vaccine hesitancy was the unwillingness of the individuals to visit far-off places and the fear of having to wait for long hours to get vaccinated. The majority of the surveyed population preferred door-to-door vaccination because it would decrease their hassle to reach the vaccination sites. Also, 28.1% of the vaccine-hesitant population feared contracting the infection at vaccination sites. The majority of the vaccine-hesitant population (62.2%) considered using the COWIN portal, developed by the Indian government for registration of the vaccination as difficult. There was no clear preference on the mode of delivery of vaccine in the body with an almost equal proportion of the population opting for both nasal and injectable routes. The sources of motivation for vaccination as revealed by our study population were healthcare professionals, family, and friends, social media, religious leaders, etc. This reflects the interplay of social, cultural, and religious ways that can be used to motivate people as these factors are likely to shape their perception.¹³

Nearly 44% of the surveyed population considered themselves to be at high risk of developing severe COVID-19 infection due to underlying thalassemia. The study done by Karimi et al reported higher mortality from COVID-19 in patients with thalassemia in Iran.⁹ The belief that COVID-19 vaccines were not safe for them due to thalassemia was significantly higher in the vaccine-hesitant population.

This study has some limitations. The study involved TDT patients registered in a private setting with the majority of them being urban dwellers and having good social media connectivity. Thus, vaccine hesitancy in thalassemia patients in rural settings may be different.

CONCLUSION

SARS-CoV-2 vaccination is the most effective means to prevent the spread of COVID-19 infection. Acceptance of COVID-19 vaccination has challenges in transfusion-dependent thalassemia patients just like the general population. Vaccine hesitancy is a complex entity affected by various factors. About 22% of our thalassemia patients are vaccine-hesitant. Concerns regarding the safety and efficacy of vaccines are the major deterrents of vaccine acceptance. Vaccine hesitancy stems from the interplay of demographic, social, and cultural factors. Behavior change is difficult but well-planned interventions can help us in bringing change in public behavior. Awareness campaigns by the Government, healthcare workers, and sharing of data about adverse effects by the regulatory authorities could help in building trust towards SARS-CoV-2 vaccines.

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