

## A Cross Sectional Study of Factors Responsible for COVID-19 Vaccine Hesitancy amongst University Students of Patna

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### Abstract

**Introduction:** Coronavirus is a contagious disease caused by severe acute respiratory syndrome (SARS Cov-2), first known case of which was identified in Wuhan, China in December, 2019. In India, first known case was identified in Kerala on 27th January 2020. Roll out vaccination program was started on 16th January 2021 in India. Vaccine hesitancy refers to delay in acceptance or refusal of vaccines despite availability of vaccine services. Keeping in mind, a college-based study will be conducted amongst University Students of Patna.

**Objectives:** To find out the reasons responsible for vaccine hesitancy. To find out the prevalence of unvaccinated University Students of Patna.

**Methodology:** A google form based cross-sectional study was carried out on population > 18 years of both sexes. Sample was calculated using formula  $4pq/12$ . 276 participants were selected by simple random sampling. IEC approval and informed consent of the participant was taken. Data was collected using predesigned, pre-tested questionnaire. Data analysis will be carried out using epi info software.

**Result:** A total of 276 students participated in the study, with 48.9% were graduates and 51.1% were post-graduates. A majority (64.8%) of students belonged to middle socioeconomic status, with (47.1%) reporting a family monthly income of >INR 50,000. Most (65.6%) of the participants were aware that the COVID-19 virus was circulating in the community; 67.3% of the students were aware that a "COVID-19 vaccine" was being prepared. A large proportion of participants (69.5%) did not have any history of vaccine hesitancy. In bivariate analysis, showed significant association between gender, age and family size with intention to receive COVID-19 vaccine seems ( $p < 0.05$ ).

**Conclusion:** In this study, we found suboptimal levels of willingness to receive COVID-19 vaccines, with nearly one-third not sure or willing to receive a vaccine, indicating high levels of potential vaccine hesitancy. If the COVID-19 vaccine has lower efficacy, governments will have to introduce more strategies to persuade their population to become vaccinated. In addition, since acceptance is associated with perceived risk for COVID-19, it is also important to increase the perceived risk in communities.

**Keywords:** Covid-19, Vaccine hesitancy, Covid-19 Vaccination.

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## Introduction

Coronavirus is a contagious disease caused by severe acute respiratory syndrome (SARS Cov-2), first known case of which was identified in Wuhan, China in December 2019. In India, first known Case was identified in Kerala on 27th January 2020. COVID-19 vaccine was developing to provide acquired immunity against this novel Coronavirus disease. Three types of vaccines have been developed to provide immunity against COVID-19 which are: Messenger RNA vaccines, Protein Subunit Vaccines and Viral Vector Vaccines. [1]

In India, we are having three approved vaccines which are: Covishield, Covaxin and Sputnik V. Vaccine hesitancy refers to delay in acceptance or refusal of vaccines despite availability of vaccine services. Our institute is a tertiary care center, is actively involved in this COVID-19 vaccination drive since day 1 of this roll out programme. [2]

Vaccine development began in several research centers and pharmaceutical companies as soon as SARS-CoV-2 was identified as the causative agent and the first genome sequence was published.

DNA-based vaccines, inactivated, live attenuated, sub-unit, and replicating viral vector-based vaccines are also being developed [3]. It is unclear how effective these vaccines will be. If the COVID-19 vaccine resembles an influenza vaccine, effectiveness could be 50% or lower [4]. People may have strong preferences for a vaccine to be highly effective, and a vaccine with a low effectiveness estimate could impact people's willingness to be vaccinated. It is also possible that individuals will perceive a pandemic vaccine to be less safe based on its newness or perceived lack of testing [5]. Safety perceptions could also influence vaccine acceptance [6].

Vaccine hesitancy was a significant issue even before the COVID-19 pandemic [7]. The WHO considered this phenomenon as one of the top ten threats in global health in 2019. The available evidence seems to show that the intention to get vaccinated against COVID-19 is lower among younger adults and young people [8]. Younger individuals may believe that COVID-19 poses a less serious threat to themselves than to other age groups [9]. To attain complete protection from the COVID-19 viruses, the vaccines need to be widely accepted by all subgroups of the populations, including youth [10].

Given that students could play an essential role in the global vaccination campaign by influencing the vaccination intentions of their families and communities, their perception and acceptance of COVID-19 vaccines, including factors associated with those intentions, need to be investigated. We aim to use the COVID-19 vaccine, and its associated factors to develop promising strategies in vaccine promotion concerning the current COVID-19 pandemic.

### Aims and Objectives:

To find out the reasons responsible for vaccine hesitancy.

To find out the prevalence of unvaccinated university students of Patna.

### Materials and Methods:

#### Study Design and Sample:

A google form based cross-sectional study was conducted on population more than 18 years of age of both sex amongst university students of Patna, Bihar, India. Study period was 3 months. Sample was calculated using formula  $4pq/12$ . 276 participants were selected by simple random sampling. IEC approval and informed consent of the participant was

taken. Data was collected using predesigned, pre-tested questionnaire. Sampling done is Simple Random Sampling.

#### **Inclusion criteria:**

1. Students >18yrs of age
2. Either sex
3. Willing to enroll as participants

#### **Exclusion criteria:**

1. Those who do not give their consent to participate.

#### **Sample size:**

$$N = \frac{4pq}{l^2} \quad (P = 40\%)$$

$$(l = 10\% \text{ of } P)$$

Putting in the values, Sample size = 276 (design Effect 2)

N= sample size

P= prevalence

Q= 1-p

L=precision

#### **Statistical Analysis:**

Data analysis was carried out using epi info software.

Bivariate analysis was conducted between all variables with the dependent variable of interest. Multiple logistic regression analysis was conducted to examine the association between the students receiving the COVID-19 vaccine with their sociodemographic and vaccination behaviors. A  $p < 0.05$  was considered significant. Data were cleaned, coded and entered into Epi Info v.7.0.2 and exported to SPSS V.24.0 for analysis.

#### **Study Questionnaire:**

The questionnaire was informed by a literature review of similar studies [11, 12]. The survey assessed various domains, such as [13] previous immunization behaviors; [14] perception of vaccines; [15] current knowledge about COVID-19 and personal experiences about COVID-19; and [16] sociodemographic characteristics, including age, sex, marital status, educational status, family size and income, social status, religion, caste, and residence.

#### **Results:**

A total of 276 students participated in the study, with 48.9% were graduates and 51.1% were post-graduates. A majority (64.8%) of students belonged to middle socioeconomic status, with (47.1%) reporting a family monthly income of >INR 50,000 (**Table- 1**). Most (65.6%) of the participants were aware that the COVID-19 virus was circulating in the community; 67.3% of the students were aware that a "COVID-19 vaccine" was being prepared. A large proportion of participants (69.5%) did not have any history of vaccine hesitancy (**Table- 2**). In bivariate analysis, showed significant association between gender, age and family size with intention to receive COVID-19 vaccine seems ( $p < 0.05$ ). (**Table-3**). Knowledge about the development of the COVID-19 vaccine, risk perception, trust in the healthcare system, and trust in the domestic vaccine was found to be independently associated with vaccine intention among participants (**Table-4**).

**Table 1: Socio-demographic characteristics of the study participants (N = 276).**

Age (in years)	
18–20	144(52.2%)
≥ 21	132 (47.8%)
Gender	
Male	104 (37.6%)
Female	172 (62.3%)
Highest education	
Undergraduate	135 (48.9%)
Postgraduate	141 (51.1%)
Marital status	
Married	113 (40.9%)
Single	163 (59.0%)
Family size	
Five and below	187 (67.7%)
Six and above	89 (32.2%)
Family income ( INR/month )	
below 10,000	9 (3.2%)
11,000–20,000	36 (13.0%)
21,000–50,000	101 (36.5%)
above 50,000	130 (47.1%)
Social status in the community*	43 (15.5%)
Low	179 (64.8%)
Medium	54 (19.5%)
High	
Place of residence	115 (41.7%)
Urban	161 (58.3%)
Rural	

**Table 2: Descriptive statistics on knowledge, risk perception, trust on the healthcare system, and perception toward domestic COVID-19 vaccine among the study participants (N = 276).**

Variables	n ( % )
Exposed to COVID-19 cases	
No	170 (61.5%)
Yes	106 (38.4%)
Awareness about COVID-19	
No/not sure	95 (34.4%)
yes	181 (65.6)
Awareness about development of COVID-19 vaccines	
No/not sure	90 (32.6%)
Yes	186 (67.3%)
History of vaccine hesitancy	
Yes	84 (30.4%)
No	192 (69.5%)
Risk perception	

Yes	99 (35.8%)
No	177 (64.1%)
Trust in the healthcare system	
No	118 (42.7%)
Yes	158 (57.2%)
Trust in domestic vaccines	
No	97 (35.1%)
Yes	179 (64.8%)

**Table 3: Bivariate analysis between sociodemographics and intention to receive COVID-19 vaccines among the study participants (N = 276).**

Variables	Intention to receive COVID-19 vaccines		P value
	No/not sure (n = 117)	Yes (n = 159)	
Age (in years)			0.05
18–20	79 (67.5%)	96 (60.4%)	
<20	38 (32.5%)	63 (39.6%)	
Gender			0.01
Male	56 (47.8%)	61 (38.3%)	
Female	61 (52.1%)	98 (61.6%)	
Marital status			0.02
Married	40 (34.1%)	78 (49.0%)	
Single	77 (65.8%)	81 (50.9%)	
Highest education			0.15
Undergraduate	67 (57.3%)	71 (44.6%)	
Postgraduate	50 (42.7%)	88 (55.3%)	
Social status in the community			0.77
Low	12 (10.2%)	22 (13.8%)	
Medium	93 (79.4%)	86 (54.8%)	
High	12 (10.2%)	51 (32.0%)	
Family income (INR/month)			0.68
below 10,000	8 (13.08%)	17 (10.6%)	
11,000–20,000	10 (16.46%)	33 (20.7%)	
21000–50,000	42 (32.07%)	41 (25.7%)	
above 50000	57 (38.40%)	60 (37.7%)	
Family size			0.02
Five and below	80 (76.79%)	99 (62.2%)	
Six and above	37 (23.21%)	60 (37.7%)	
Place of residence			0.76
Urban	55 (48.52%)	71 (44.6%)	
Rural	62 (51.48%)	88 (55.4%)	

**Table 4: Bivariate analysis between vaccine behaviour, risk perception, and intention to receive COVID-19 vaccines among the study participants (N = 276).**

Variables	Intention to receive COVID-19 vaccines		P value
	No/not sure (n=117)	Yes (n=159)	
Exposed to COVID-19 cases			0.81
No	173 (73.00%)	300 (71.77%)	
Yes	64 (27.00%)	118 (28.23%)	
Awareness about COVID-19			0.1
No/Not sure	20 (8.44%)	23 (5.50%)	
Yes	217 (91.56%)	395 (94.50%)	
Awareness about development of COVID-19 vaccines			0.1
No/Not sure	36 (15.19%)	34 (8.13%)	
Yes	201 (84.81%)	384 (91.87%)	
History of vaccine hesitancy			0.3
No	36 (15.19%)	76 (18.18%)	
Yes	201 (84.81%)	342 (81.82%)	
Risk perception			0.2
No	92 (38.82%)	127 (30.38%)	
Yes	145 (61.18%)	291 (69.62%)	
Trust in the healthcare system			0.0
No	131 (55.27%)	101 (24.16%)	
Yes	106 (44.73%)	317 (75.84%)	
Trust in domestic vaccines			0.0
No	126 (53.16%)	162 (38.76%)	
Yes	111 (46.84%)	256 (61.24%)	

**Discussion:**

Studies on COVID-19 in India have described the effect of COVID-19 on medical education [17], the relationship between COVID-19 and the suicidal tendency among healthcare professionals and students [18, 19] and COVID-19-related anxiety among students [20, 21]. However, none have reported uptake of COVID-19 vaccine among students,

especially those in the healthcare sector. This study is one of the first studies that examined the willingness of hypothetical vaccine for COVID-19 among students of Patna, Bihar, India.

Univariate variation among demographically defined groups was least

among those with lower education and income levels. Future vaccine communication strategies should consider the level of health, scientific and general literacy in subpopulations, identify locally trusted sources of information [22] and go beyond simply pronouncing those vaccines are safe and effective. Strategies to build vaccine literacy and acceptance should directly address community-specific concerns or misconceptions, address historic issues breeding distrust and be sensitive to religious or philosophical Beliefs [23]. Researchers have identified promising interventions for building confidence and reducing vaccine hesitancy in different contexts [24, 25], but translating this evidence into large-scale vaccination campaigns will require particular awareness of and attention to existing public perceptions and felt needs.

Most of the surveys about vaccine acceptance and hesitancy were distributed before vaccines were approved and therefore reflect intent to get a vaccine once it became available.

A systematic review of 126 studies published between January and October of 2020, found regional acceptance in the U.S. ranging from 38% in the northeast to 49% in the west [26]. The authors noted that, of the many demographic variables across the studies, a college education seemed to create the largest differences in vaccine intention (42% for those without a college education, 62% for those with a college education, and 75% among postgraduates). These estimates were similar to our findings in unvaccinated students; undergraduates were less eager (48%) than master's (66.7%) and doctoral/postdoctoral students (77.2%) to receive the vaccine. Although overall vaccine acceptance was higher among students in our study, there were similarities for age, sex, residence, and race ethnicity groups.

Vaccine acceptability surveys among students have been more prevalent in other countries, where acceptance is variable. For example, in a study of students in Saudi Arabia (n = 407), 49% had either received or were registered to receive the vaccine, and 90% of unvaccinated and unregistered students were eager to receive the vaccine [27].

Studies have shown that adverse events and poor vaccine efficacy could be possible reasons for vaccination hesitancy among medical students [28]. Students are considered as trusted influencers and ambassadors for vaccine promotion [29]. Vaccine hesitancy among students, especially those in the healthcare sector, and other priority groups has potentially negative consequences to themselves and may influence vaccine acceptance among the general population [30,31].

### Conclusion:

In this study, we found suboptimal levels of willingness to receive COVID-19 vaccines, with nearly one-third not sure or willing to receive a vaccine, indicating high levels of potential vaccine hesitancy. If the

COVID-19 vaccine has lower efficacy, governments will have to introduce more strategies to persuade their population to become vaccinated. In addition, since acceptance is associated with perceived risk for COVID-19, it is also important to increase the perceived risk in communities.

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