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### **Knowledge, Attitude, Perception and Hesitancy towards Covid-19 Vaccine among Arts and Science College Students in Coimbatore city, India.**

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#### **ABSTRACT**

Global vaccination coverage was an important agenda to recover the recent pandemic COVID-19. Although India had launched one of the world's largest vaccination drives to inoculate its vast population. However, myths and misconceptions around vaccination is still persist. Thus, it has become crucial to examine the knowledge, attitude, and hesitancy towards the vaccine. An online cross-sectional survey was conducted among arts and science college students of Coimbatore city, south India. The study subjects included the arts and science college students aged above 18 years and who were willing to participate in the study. Total of 390 students participated. This purpose of the study is to interpret vaccine hesitancy by assessing the knowledge, attitude and perceptions regarding the COVID -19 infection and Covid -19 vaccine. It was a questionnaire-based cross-sectional study using a semi-structured, self-administered questionnaire which was used to assess the socio-demographic profile, knowledge, attitude, perception regarding COVID-19 infection and also to know the reasons behind Covid -19 vaccine hesitancy. Of these, 390 students 165(42.4%) were male and 225 (56.7%) were female, with a mean (SD) age of  $19.6 \pm 1.8$  years. The mean score for knowledge, attitude and perception items were calculated and students who scored above the mean score in knowledge, attitude and perception were considered to have good knowledge, positive attitude and good perception regarding Covid-19 vaccine. Around 60% of students had good knowledge, 65% of students had positive attitude and 64% of them had good perception. The vaccine acceptance rate was 65%. The major reason for vaccine hesitancy was fear for side effects. The chi-square test was performed; there was a statistically significant association between attitude, perception and vaccine hesitancy. In conclusion, hesitation regarding COVID-19 vaccination may hinder vaccination intake among the arts and science college students. The findings from this study aided the COVID-19 vaccination plan for college students and educational campaigns through webinars about the vaccine's importance were designed to increase students acceptance, boost trust and vaccine intake

**KEYWORDS:** COVID-19 Vaccine, Students, Hesitancy, Knowledge, Attitude

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## **INTRODUCTION**

The World Health Organization on March 11, 2020, has declared the novel coronavirus (COVID-19) outbreak a global pandemic<sup>1</sup>. The Covid 19 pandemic has affected the aspects of human life; especially it has put a bad impact on Education System. Globally billion of students had been affected by the closure of schools and higher education institutions in response to the COVID-19 pandemic. It was not safe to open the higher educational institutions all over the world without implementation of vaccination programme for students. As COVID-19 has highly infectious nature and general susceptibility, government of India has implemented phase wise vaccination programme to prevent the spread of disease and to reduce the vaccine preventable deaths.

In India, the first phase COVID-19 vaccination programme was launched on 16th January 2021 for healthcare and frontline workers and followed by the senior citizens above 60 years<sup>2</sup>. The second phase vaccination programme rolls out for the age group above 45 years. The disastrous second wave ascribed to mutated COVID-19 virus, which resulted in higher mortalities in population less than 45 years of age as compared to the first wave, created an alarming situation in the country<sup>3</sup>. Thus, 18-45 years population was identified as third priority group for vaccination on 1<sup>st</sup> May 2021 and consequently vaccination was initiated for the younger population<sup>4</sup>.

The success of COVID-19 vaccination program will largely depend on people's acceptance of the vaccine<sup>5</sup>. In a study conducted in India, a significant proportion of eligible candidates have not turned up for their second dose of vaccine<sup>6</sup>. Despite immense efforts made to develop a safe and effective vaccine, people are hesitant to accept the vaccine<sup>7</sup>.

The vaccine's acceptance is influenced by multiple factors such as their knowledge and perception on the perceived likelihood of the COVID-19 spread, perceived safety of vaccine, logistics, perceived efficacy of the vaccine and perceived risk etc. Vaccine hesitancy is a recurring challenge and a roadblock in achieving the goal of universal healthcare. Rumours and conspiracy theories also can contribute to vaccine hesitancy. The surveillance conducted worldwide identified 637 rumors and conspiracy theories related to COVID-19 vaccine. These items included news articles, social media narratives, online reports and blogs. Of all the items 13% (82/637), were reported in India<sup>8</sup>

The goal of this study was to assess COVID-19 vaccine hesitancy in Coimbatore city's (South India) student population, as well as the reasons for hesitancy to take the vaccination. This online survey

study was conducted during the disastrous second wave and third phase vaccination drive. Thus it has become crucial to examine the knowledge, attitude, perception and hesitancy towards Covid -19 vaccine among young college students and to plan for webinars regarding the Covid -19 vaccine to improve the vaccine acceptance.

## **MATERIALS AND METHODS**

A cross-sectional online survey was conducted among undergraduate and postgraduate students of arts and Science Colleges in Coimbatore city, South India. The survey was conducted from 2<sup>nd</sup> May to 15<sup>th</sup> June prior to the vaccination awareness webinar conducted for the students to increase the willingness to take vaccine. Due to limitations in doing face-to-face data collection during the current active COVID-19 outbreak, online survey methodology was used. The questionnaire used in this study was developed based on literature review<sup>9,10</sup> and discussion within the research team.. A pilot study was done with 30 participants to assess the clarity of questionnaire and no significant modifications were required. Reliability analysis was done from the pilot study by calculating Cronbach's alpha score which was around 0.77. We followed the convenience sampling technique. Morgan's Table determined the minimum required respondents were 384 for this perception-based study (95% Confidence Interval (CI)<sup>11</sup>. Approval from the Institutional Ethics Committee was obtained before the commencement of the study.

A total of 390 students participated in the online survey .The inclusion criteria of participants were students of arts and science colleges aged 18 years and above who was providing consent to participate in the study were eligible to participate. The survey was conducted following the Checklist for Reporting Results of Internet ESurveys(CHERRIES) guidelines<sup>12</sup>.

### ***Study tool***

The self-reported questionnaire containing informed consent along with five sections such as socio-demographics, knowledge, attitudes, perceptions and reasons for hesitancy section was created. And link was shared with the faculty of various colleges were through social media such as WhatsApp and Emails.

The socio – demographic section collected the information about age, sex, educational status, residence and also collected the individuals sources of information and information seeking behaviour on Covid-19 vaccine. The knowledge section consisted of structured questions regarding the symptoms,

contagiousness of Covid-19, precautions to be followed and awareness about Indian government's initiative to provide vaccine at free of cost. The knowledge section comprised of 10 items with three possible responses (Yes, No, Don't know) the 'yes' response was coded as 1, 'No' response was coded as 0 while 'Don't know' was coded as 0.5. The total score was obtained by summing the raw scores of each item and ranged from 0-10 with the higher score indicating the greater level of knowledge towards the Covid-19 infection and Covid-19 vaccine.

The attitude section contained 6 items the pandemic concerns, vaccine safety and effectiveness, hesitation to pursue the vaccine and the reasons for hesitancy towards the vaccine. There sponse of each item was shown on a three-point Likert scale (i.e. Disagree, neutral, and Agree) the positive attitude was coded as 1, the negative attitude was coded as 0 while neutral was coded as 0.5 . The total score was arrived at by summing the raw scores of the six items ranging from 0 to 6, with the higher score indicating more positive attitude toward the COVID19 vaccine. The students who reported hesitancy towards Covid -19 vaccine were asked to select the reasons behind their hesitation.

The perception section consisted of 5 items with responses Yes, No and Not sure (coded as 1,0and 0.5 respectively).the total score was arrived at by summing the raw scores of 5 items ranging from 0 to 5 with the higher score indication good perception toward the Covid-19 vaccine.

### ***Statistical analysis***

The data were entered into an MS Excel spreadsheet, coded appropriately, and then analysed in SPSS version 21.0. The frequency and percentages were used to represent categorical data. For classified variables, Pearson's Chi-square test was employed to assess the relationship between variables. The mean score for knowledge, attitude and perception was calculated. The score above the mean knowledge score was considered as good knowledge score and less than mean score as poor knowledge. The attitude score above the mean score was considered as positive attitude and scores below the mean sore was considered as negative attitude. In the same way perception score above the mean perception score considered as good perception and scores below the mean score as poor perception.

## **RESULTS**

A total of 390 students were recruited from six Arts and Science colleges of Coimbatore city. The sociodemographic characteristics of the participants are summarized in Table 1. Among the 390 students 165 (42.4%) were male and 225 (57.6%) were female, with a mean age of  $19.6 \pm 1.8$  years, ranging from

18 to 27 years. Among the participants 333 (85.3%) were undergraduate students and 57 (14.7%) were postgraduate students. Most of the study participants that are 82.3% of students were from city and 17.1% of the students were from rural areas. Majority of the students ( 93.4% )who keep them updated about the knowledge on COVID 19 vaccine used various sources of information. Most of the students used the television, newspaper and radio(46.7%), social media like You tube , Facebook etc (83.3%), WHO updates, Indian ministry of health and family welfare updates (28.3%) and 15% used CO-WIN, Arogyasetu apps to keep them updated about of COVID-19 spread and COVID-19 vaccine information.

**Table: 1 Socio- demographic details of the students with frequency and percentage**

Socio- demographic variables	Frequency(%)
<b>Sex</b>	
Male	165(42.4%)
Female	225(57.6%)
<b>Age</b>	
18-20	325(83.5%)
21and above	65(16.5%)
<b>Education</b>	
Undergraduate	333(85.3%)
Postgraduate	57(14.7%)
<b>Residence</b>	
City	324(82.9%)
Rural	66(17.1%)
<b>Are you regularly following the news about Covid 19 vaccination?</b>	
<b>Yes</b>	364(93.4%)
<b>No</b>	26(6.6%)
<b>Source of information about Covid 19 vaccine (multiple responses possible)</b>	
1.TV , News Papers, Radio	182(46.7%)
2.Social Media	325(83.3%)
3.WHO and Indian Ministry Of Health And Family Welfare Updates	110(28.3%)
4.CO-WIN, AROGYA SETU APPS	59(15%)

### ***Knowledge towards the Covid-19 vaccine***

The distribution of each knowledge item about Covid-19 infection and Covid -19 vaccine is presented in Table 2.The study participants have sufficient knowledge of Covid -19 and the mean±SD score was 6.99±1.4 out of 10 . Among them 320(82.1%) had correct knowledge about corono virus spread, 258(66.2%) thought it is good to avoid alcohol intake before and after vaccination, 248(63.6%) knew that it is beneficial to take Covid -19 vaccine even after being infected with Covid -19, 290(74.2%) were aware that Covid -19 can be acquired after full vaccination , 300(77%) participants were aware that precautionary measures has to be followed even after the vaccination and 330(84.8%) participant knew that government of India provides vaccine free of cost to all

citizens. Only 110(28.1%) thought Covid -19 vaccine is safe for pregnant women and breastfeeding mothers and only 209(53.7%) were sure that Covid -19 vaccine do not cause infertility. Regarding vaccination during menstruation, 142(36.5%) participants answered ‘no’ for vaccination and 170(43.7%) were not sure about taking vaccination during menstruation.

**Table:2 Knowledge about COVID-19 and COVID 19 vaccines among arts and science college students in Coimbatore City, India.**

Items	Yes	No	I don't know
Is COVID-19 highly contagious than other coronaviruses?	275(70.5%)	99(25.3%)	16(4.2%)
The coronavirus is spread through respiratory droplets from an infected person through Sneezing and coughing, touching the objects used by others and hand shakes	320(82.1%)	22(5.7%)	48(12.2%)
Are vaccines safe for pregnant women and breastfeeding mothers?	110(28.1%)	129(33.2%)	151(38.7%)
Can people consume alcohol before or after being vaccinated?	17(4.6%)	258(66.2%)	106(27.2%)
Can vaccine shots be taken during menstruation?	77(19.8%)	142(36.5%)	170(43.7%)
Does vaccine lead to infertility?	32(8.3%)	209(53.7%)	140(36%)
I am already infected by Covid-19, so I won't benefit from the vaccine.	47(12%)	248(63.6%)	95(24.4%)
Can Covid 19 be acquired after full vaccination?	290(74.2%)	74(18.9%)	26(6.9%)
Once I get the vaccine, I won't have to wear a mask or worry about social distancing.	77(19.8%)	300(77%)	13(3.2%)_
Do you know that vaccination is done free of cost in our country?	330(84.8%)	60(15.2%)	-

### ***Attitude towards the Covid-19 vaccine***

The distribution of each attitude item about Covid -19 vaccine is presented in Table 3. The mean score of attitudes was 4.5±1.4 out of 6. Among the 390 study participants 253(65%) had positive attitude and rest of the 137(35%) had negative attitude. More than half of the participants (64%) were concerned about the present Covid-19 situation, but only 21.7% of students agreed that Covid-19 vaccine were safe and effective. Among the students around 70% of students agreed to motivate the family and neighbours to take vaccine and also 80% of believed that vaccination will help to stop the pandemic. 68.7% students were willing to take vaccine as soon as it's available. Among the study participants 254(65%) of the students did not have any hesitation to take vaccine and 136(35%) had hesitancy to take vaccine.

**Table:3 Attitudes towards COVID-19 vaccines among arts and science college students in Coimbatore City, India**

Items	Agree	Neutral	Disagree
Are you concerned about the current Covid situations?	250(64.1%)	46(11.9%)	94(24%)
Is vaccination safe and effective?	85(21.7%)	161(41.4%)	144(36.9%)
My family members and neighbours should take the vaccine, and I should aware and motivate them to take vaccine.	271(69.6%)	99(25.4%)	20(5%)
COVID 19 vaccination will help us to stop the pandemic.	314(80.6%)	22(5.6%)	54(13.8%)
I need to take the vaccine as soon as its available for students above 18 years	268(68.7%)	27(6.9%)	95(24.4%)
Do you have hesitation to take vaccination for Covid 19	136(35%)	-	254(65%)

The students who had hesitancy asked about the reasons for Covid -19 vaccines hesitancy. Among the 137 students who reported hesitancy 90% of the students were hesitated due to fear of side effects and 30.2% of students had doubt in efficacy and 31.5% of the students gave reason as lack of information about vaccine.(Table 4)

**Table 4:Reasons for hesitancy towards Covid -19 vaccine(n=137)**

Statements	Hesitatedn(%)
Fear of side effects	124(90.7)
Doubt in efficacy	42(30.2)
Lack of information about vaccine	43(31.5)

### ***Perceptions towards the Covid-19 vaccine***

The distribution of each perceptions item about Covid-19 vaccine is presented in Table 5. The Mean±SD score of perception is 3.95± 1.4 and majority of study participants 248 (63.5%) had good perception score. Among the study participants only 160(41%) of them perceived that Covid-19 vaccine do not worsen the pre-existing health condition and 61(15.6%) of students perceived that Covid -19 vaccine worsen the pre-existing medical condition and 169(43.4%) of students were not sure about it. Overall majority of the students had positive perception about vaccine containing microchips, vaccine will alter a person’s DNA, need of vaccination even being infected by Covid -19 and also about the safety of Covid-19 vaccination.

**Table 5: Perception towards COVID-19 vaccine among arts and science college students in Coimbatore City, India**

Items	Yes	No	Not sure
Do you think that Covid 19 vaccine can worsen the pre-existing health condition?	61(15.6%)	160(41%)	169(43.4%)
They contain microchips or any form of tracking device.	32(8.3%)	240(61.7%)	117(30%)
Covid vaccination will alter a person's DNA.	18(4.6%)	314(80.6%)	58(14.8%)
I don't need the vaccine if I already have recovered from Covid in the past	52(13.4%)	293(75.1%)	45(11.5%)
Covid vaccine is not safe because it was developed quickly with inappropriate testing	33(8.3%)	316(81.1%)	41(10.6%)

The association between gender, age, education, knowledge, attitude, perception and vaccine hesitancy is presented in Table 6. There is no significant association between gender, age, education and vaccine hesitancy. Among the 390 students 232(60%) students had good knowledge about vaccination. In spite of good knowledge out of 232 students 90 students were hesitant to take vaccine. Another interesting finding is among 158 students who had poor knowledge only 47 students had hesitation and 111 did not have hesitation to take Covid-19 vaccine. So there is no statistically significant association between knowledge and vaccine hesitancy. Among the 253 students who had positive attitude 239 students did not have hesitancy and 14 students had hesitancy towards Covid-19 vaccine. There is statistically significant association between attitude and vaccine hesitancy. Among the total 390 students, 248 had good perception and 142 had poor perception. From the 248 students with good perception 54 had Covid-19 vaccine hesitancy and 194 students did not have Covid-19 vaccine hesitancy. From the 142 students with poor perception 83 students had Covid-19 vaccine hesitancy and 59 students did not have Covid-19 vaccine hesitancy. . There is statistically significant association between perception and vaccine hesitancy.



**Table :6 Association between socio demographic variables ,knowledge, attitude, perception and vaccine hesitancy**

	Hesitancy to COVID-19 Vaccine		X <sup>2</sup>	p-value
	YES	NO		
<b>Gender</b>				
Male	55 (57.54) [0.11]	110 (107.46) [0.06]	0.29	.58
female	81 (78.46) [0.08]	144 (146.54) [0.04]		
<b>Age</b>				
18-20	65 (63.39) [0.04]	116 (117.61) [0.02]	0.37	.53
21 and above	11(12.61)[0.21]	25 (23.39) [0.11]		
<b>Education</b>				
Undergraduate	120 (116.12) [0.13]	213 (216.88) [0.07]	1.35	.24
Post graduate	16 (19.88) [0.76]	41 (37.12) [0.40]		
<b>Residence</b>				
City	113 (112.98) [0.00]	211 (211.02) [0.00]	0	.99
Rural	23 (23.02) [0.00]	43 (42.98) [0.00]		
<b>Knowledge</b>				
Good	90 (81.50) [0.89]	142 (150.50) [0.48]	3.37	.066
Poor	47 (55.50) [1.30]	111 (102.50) [0.71]		
<b>Attitude</b>				
Positive	14 (88.45) [62.67]	239 (164.55) [33.69]	275.60	< .00001**
Negative	122 (47.55) [116.58]	14 (88.45) [62.67]		
<b>Perception</b>				
Good	54 (87.12) [12.59]83	194 (160.88) [6.82]	53.30	< .00001**
Poor	(49.88) [21.99]	59 (92.12) [11.91]		

\*\*Significant P-value at the P<.000 level

The study participants were divided into two groups as hesitancy group and no hesitancy group. The student’s t-test was performed to compare the knowledge, attitude, and perception scores between the two groups. The hesitancy group had statically significant lower scores in knowledge, attitude and perception.The results of student t-test are presented in Table 7.

**Table 7: Comparison of knowledge, attitude and perception scores between students with Covid-19 vaccine hesitancy and students without hesitancy**

Variables	Hesitancy (Mean±SD)	No hesitancy (Mean±SD)	t-value (Mean±SD)	p-value
Knowledge	6.43±1.2	7.3±1.4	-4.41513	< .00001**
Attitude	2.98±1.0	5.35±0.7	-18.9666	< .00001**
Perception	3.46±1.0	4.22±0.8	-6.07199	< .00001**

\*\*Significant P-value at the P<.000 level

## **DISCUSSIONS**

The success of COVID-19 vaccination drive depends on the acceptance of the vaccine among students. It was crucial to determine the vaccine hesitancy and acceptance rate which helped to focus on the webinar conducted for students for inoculation against myths and misconception on Covid-19 vaccination.

In the present cross-sectional online survey revealed that out of the 390 study subjects, 254(65%) did not have hesitation to be vaccinated and 136(35%) had hesitancy to be vaccinated. Even though 364 (93.4%) students self-reported that they keep them updated on COVID-19 infection and COVID -19 vaccine, 35% of students hesitated to take vaccine. The social media was reported as the major source of information and where lot of myths and misconceptions were present; this may be one of the underlying causes for vaccine hesitancy.

The acceptance rate of our study is 65%. A similar study conducted among university students including medical students in Bangladesh reported acceptance rate as 75%<sup>13</sup>, which was higher than the acceptance rate of our study. And acceptance rate of 73% is reported in a study conducted among Bulgarian medical university undergraduates<sup>14</sup>. The significantly higher acceptance rate among Bangladesh university students<sup>13</sup> and Bulgarian medical university students<sup>14</sup>; in comparison with our study, could be explained with the medical background and related knowledge and as well as with the university educational activities and vaccination campaigns.

In the present study the major reason for vaccine hesitancy was fear of side effects followed by doubt of efficacy and lack of information about vaccine. A significant number of subjects with good knowledge score had vaccine hesitancy. Fear of side effects was the major reason for their vaccine hesitancy and they did not doubt the vaccine efficacy.

Overall 60% of students had good knowledge, 65% of the students had positive attitude and 64% of the students had good perception. The present study showed that there is a significant association between negative attitude, poor perception and vaccine hesitancy. But there is no statistically association between knowledge and vaccine hesitancy.

In conclusion, one third of the participants were hesitant to take Covid-19 vaccination and the major reason for hesitation was fear of side effects. During the Covid -19 pandemic social media was the hub of misleading information. The main source of Covid -19 news in our study was social media. So

conducting webinars to inoculate the myths and misconceptions and to increase the vaccine adherence among students is important. Developing strategies to decrease public hesitation and increase trust is vital for implementing vaccination programs.

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