

ACCEPTANCE OF COVID-19 VACCINATION AMONG STUDENTS OF HEALTH SCIENCES
CHITTOOR ANDHRA PRADESH INDIADEVIKA P JEERAGYAL^{1*}, BHARATESH DEVENDRA BASTI², SRINIVASA B³

¹Department of Community Medicine, Apollo Institute of Medical Sciences and Research, Chittoor, Andhra Pradesh, India. ²Department of Community medicine, MNR Medical College and Hospital, Fasalwadi, Sangareddy, Telangana, India. ³Department of Pharmacology, Apollo Institute of Medical Sciences and Research, Chittoor, Andhra Pradesh, India.

*Corresponding author: Dr Devika P Jeeragyal; Email: devikapes12@gmail.com

Received: 16 June 2017, Revised and Accepted: 04 August 2023

ABSTRACT

Objectives: To understand the overall perception of acceptance of COVID-19 vaccination if it is given free of cost by the Government of India.

Methods: A cross-sectional study was done at Apollo Medical College in Chittoor district, Andhra Pradesh. A study was undertaken among students of different courses, like medical students, nursing students, physiotherapy students, and medical skill students, who are currently studying in this college. After getting written informed consent, a pretested questionnaire was used to collect the data. Analysis was done using SPSS software.

Results: Out of 1115 students, 883 responded. 75% of students are willing to take the COVID vaccine. 85% of students are ready to take the vaccine if their head of institution insists them to take. Probability of vaccine non acceptance is higher in lower age group students. Students in the age group of 18–23 are 4.77 times higher risk of not accepting the vaccine compared to students above 23 years.

Conclusion: 21–23-year-old age group students are more likely to accept vaccination than lower age group students. MBBS students are less likely to accept than other health-care students.

Keywords: Covid-19, Vaccination, Acceptance, Medical students, Health sciences.

© 2023 The Authors. Published by Innovare Academic Sciences Pvt Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>) DOI: <http://dx.doi.org/10.22159/ajpcr.2023v16i10.48768>. Journal homepage: <https://innovareacademics.in/journals/index.php/ajpcr>

INTRODUCTION

The Coronavirus, detected first in Wuhan city, China, has spread to the entire world, infecting millions of people, killing lacks of people, and also slowing down the world's economy. On March 12, 2020, the World Health Organization (WHO) declared it as a pandemic [1,2]. There is no specific antiviral therapy for COVID-19. Hence, it became mandatory to develop a vaccine at the earliest possible time and immunize the community. The measures taken to control the spread of COVID-19, like social distancing, wearing masks, repeated hand washing, and avoiding mass gatherings, could slow down the spread but are not sufficient to halt it. The COVID-19 pandemic will not be stopped until the herd immunity is developed. Herd immunity can be achieved either by infection or by Vaccination[3-5]. Vaccination is the only successful and cost-effective method of intervention against COVID-19 [6,7]. Research on vaccines is in progress worldwide. After the development of a safe and effective vaccine and the government is ready to supply it free of cost, if the community may not accept it, then it will be an obstacle to achieve community immunity. In 2015, the WHO Strategic Advisory Group of Experts on Immunization defined vaccine hesitancy or refusal of vaccine despite its availability can delay in preventive measures [8-10]. Another most important example is Nigeria, which boycotted the polio vaccination in 2003–2004, leading to the resurgence of the diseases and still affecting the polio eradication. To accept the vaccine, the public should know about its safety and effectiveness [11]. The government in general and the health personnel in particular are educating the public to accept the vaccine, but the medical and paramedical students will have easy accessibility to their family members, relatives, and friends. In this context, these young students can play a vital role in creating awareness regarding vaccination. Hence, this study was done to assess the acceptance of vaccines by the students of health and medical sciences. The objective of the study was to understand factors influencing the acceptance of COVID-19 vaccination among various health-care students and

to assess the faith of students in government-assisted COVID-19 vaccination.

METHODS

A cross-sectional study was conducted to assess the acceptance of vaccines by students of health sciences at Apollo Medical College if safe and effective vaccines are provided by the government, free of cost. Institutional ethical committee (No.FR011/IEC/AIMSR/2022) permission was taken. The study was done from September 20th to September 30, 2020. Students who are enrolled in college and have been studying for the past one year were included in this study. Students who are not willing to participate and have been irregular for the past one year were excluded. Apollo Medical College has a medical college, a nursing college, a physiotherapy college, and medical skill. Students lists from the attendance register were prepared after obtaining permission from the principal of courses. The number of medical students involved in the study was 483; and other courses combined were 391. The total number of students in health sciences at Apollo is 874.

A self-administered close-ended questionnaire was prepared based on previous studies and frameworks to assess the acceptance of vaccines. Questionnaires were on sociodemographic factors regarding acceptance of vaccines and trust in the government for vaccines. A pilot study was done to pre-test the questionnaire on 30 students from other colleges, and the questionnaire was revised and finalized according to the feedback. Then further analysis for content reliability, consistency, and reliability was carried out for each questionnaire.

The orientation of each question and the purpose of the study were briefed to students and faculties. With the help of the faculty of the nursing college, the physiotherapy college, and the medical skill course students, information was collected and distributed through the Google form for online data collection. For MBBS students, a Google Form was

kept in the class group with the help of class representatives. A reminder was made through WhatsApp as well. Out of total 1115 students, 883 were responded. Incomplete and invalid questionnaires were excluded.

Self-reported questions were assessed on a three-point likert scale. Questions were on acceptance of the vaccine, trust in the government regarding the information, safety, and effectiveness of the vaccine, and history of COVID infection in the family. Respondents who accept the vaccine if it is safe, effective, and provided freely by the government are classified as "agree group" and respondents not willing to accept the vaccine are classified as "disagree group" and respondents with no opinion are classified as "neutral group".

Statistical analysis

Descriptive statistics (frequency, percentage) were calculated for the sample demographic characteristics. A logistic regression model was employed to identify determinants of participants' acceptance of the COVID-19 vaccine. The significance of the crude odds ratio (OR) from univariate analyses and the adjusted OR (aOR) in multivariate analyses

was assessed at $\alpha=0.05$. All analyses were performed using SPSS software.

RESULTS

The following are significant on univariate analysis:

- Overall, 75.1% of health science students from various courses accept the COVID-19 vaccination, as shown in Table 1.
- Students with an age group of more than 23 years (93%) are more likely to accept vaccination than students in lower age group, as shown in Table 1.
- There was no significant difference (74% in Hinduism vs. 78.7% in other religions; $p>0.05$) in vaccine acceptance among students of different religions, as shown in Table 1.
- MBBS students are relatively less likely to accept vaccination than other health care students, as shown in Table 1 ($p<0.05$) and Fig. 1.
- Final-year health science students are more likely to accept the vaccination than their juniors, as shown in Table 1 ($p<0.0001$) and Fig. 2.

Table 1: Study characteristics in relation to vaccine acceptance

Characteristic	Vaccine acceptance				Chi square value
	Yes (%)	Neutral (%)	No (%)	Total (%)	p-value
Age (years)					
18-20	351 (76.2%)	26 (5.6%)	84 (18.2%)	461 (52.2%)	10.103<0.05
21-23	265 (71.6%)	24 (6.5%)	81 (21.9%)	370 (42.2%)	
>23	40 (93.0%)	1 (2.3%)	2 (4.7%)	43 (4.9%)	
Total	656 (75.1%)	51 (5.8%)	167 (19.1%)	874 (100)	
Religion					
Hindu	501 (74%)	44 (6.5%)	132 (19.5%)	677 (77.5%)	2.954>0.05
Others	155 (78.7%)	7 (3.6%)	35 (17.8%)	197 (22.5%)	
Total	656 (75.1%)	51 (5.8%)	167 (19.1%)	874 (100%)	
Type of Family					
Nuclear	464 (73.1%)	42 (6.6%)	129 (20.3%)	635 (72.7%)	5.407>0.05
Others	192 (80.3%)	9 (3.8%)	38 (15.9%)	239 (27.3%)	
Total	656 (75.1%)	51 (5.8%)	167 (19.1%)	874 (100%)	
Socioeconomic status					
Low	46 (80.7%)	3 (5.3%)	8 (14%)	57 (6.5%)	6.178>0.05
Middle	434 (74.2%)	41 (7%)	110 (18.8%)	585 (66.9%)	
High	176 (75.9%)	7 (3%)	49 (21.1%)	232 (26.6%)	
Total	656 (75.1%)	51 (5.8%)	167 (19.1%)	874 (100%)	
Death of family member					
Yes	38 (86.3%)	1 (2.3%)	5 (11.4%)	44 (5%)	3.251>0.05
No	618 (74.5%)	50 (6%)	162 (19.5%)	830 (95%)	
Total	656 (75.1%)	51 (5.8%)	167 (19.1%)	874 (100%)	
Marital status					
Married	24 (86.3%)	3 (2.3%)	2 (11.4%)	29 (3.3%)	3.623>0.05
Unmarried	632 (74.8%)	48 (5.7%)	165 (19.5%)	845 (96.7%)	
Total	656 (75.1%)	51 (5.8%)	167 (19.1%)	874 (100%)	
Locality					
Urban	295 (75.4%)	25 (6.4%)	71 (18.2%)	391 (44.7%)	0.726>0.05
Rural	361 (74.7%)	26 (5.4%)	96 (19.9%)	483 (55.3%)	
Total	656 (75.1%)	51 (5.8%)	167 (19.1%)	874 (100%)	
Gender					
Male	231 (75.3%)	16 (5.2%)	60 (19.5%)	307 (35.1%)	0.365>0.05
Female	425 (75.1%)	35 (6.2%)	107 (18.9%)	567 (64.9%)	
Total	656 (75.1%)	51 (5.8%)	167 (19.1%)	874 (100)	
Any of the family members suffered from Covid					
Yes	153 (82.7%)	8 (4.3%)	24 (13%)	185 (21.2%)	7.368<0.05
No	503 (73%)	43 (6.2%)	143 (20.8%)	689 (78.8%)	
Total	656 (75.1%)	51 (5.8%)	167 (19.1%)	874 (100%)	
Field of study					
MBBS	356 (73.7%)	22 (4.6%)	105 (21.7%)	483 (55.3%)	7.209<0.05
Others	300 (76.7%)	29 (7.4%)	62 (15.9%)	391 (44.7%)	
Total	656 (75.1%)	51 (5.8%)	167 (19.1%)	874 (100%)	
Year of study					
First	210 (78.9%)	7 (2.6%)	49 (18.4%)	266 (30.4%)	27.969<0.0001
Second	200 (71.6%)	24 (6.5%)	49 (21.9%)	273 (31.2%)	
Third	172 (69.4%)	12 (4.8%)	64 (25.8%)	248 (28.4%)	
Final	74 (85.1%)	8 (9.2%)	5 (5.7%)	87 (10%)	
Total	656 (75.1%)	51 (5.8%)	167 (19.1%)	874 (100%)	

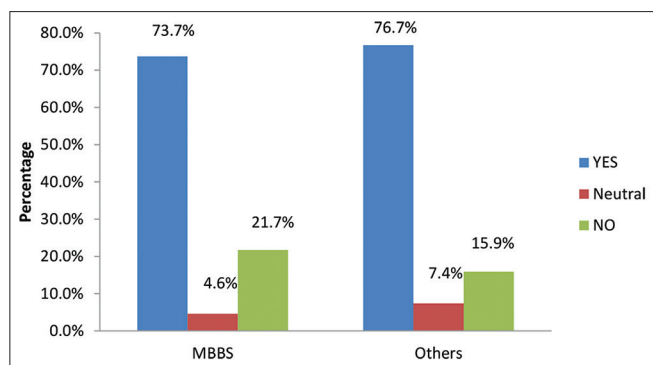


Fig. 1: Vaccine acceptance by students of various disciplines of health care

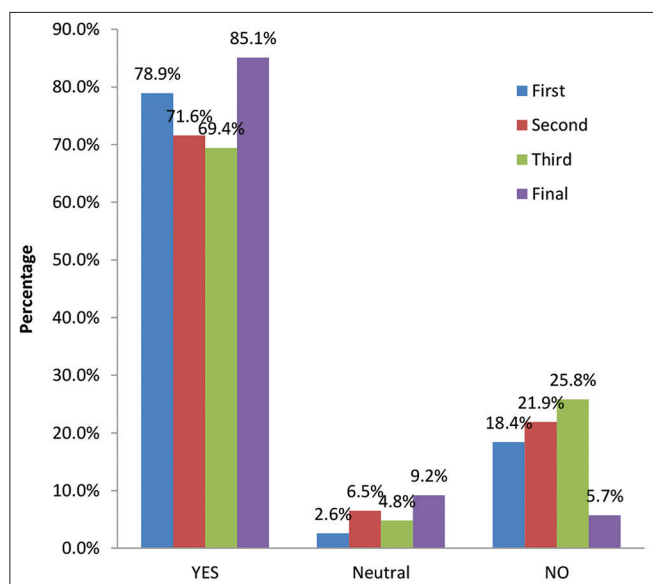


Fig. 2: Year of study of various health science students with vaccine acceptance

For regression analysis, the neutral acceptors were eliminated for comparison. Only the vaccine acceptors and non-acceptors were used for logistic regression analysis. The forward stepwise likelihood ratio method was used. Model fitness was tested using the Hosmer-Lemeshow goodness of fit test. Those with $p < 0.05$ were considered significant for odds ratio estimates.

- Students whose family members are affected are more likely to accept the vaccination (aOR=1.669), as shown in Table 2.
- Students who had trust in the government were more likely to accept vaccination (aOR=2.128), as shown in Table 2 and Fig. 3.

DISCUSSION

In this study, students aged between 18–20 years were 458 (52%), 20–23 years old were 368 (42.35%), and older than 23 years were 4%. Female participants were more (64.78%) compared to male participants (35.225). First-year students were 260, second-year students were 269, and third-year students were 244, constituting about 89% of the participants from different courses. Remaining in the fourth-year. Most of the subjects belong to MBBS 510 (59.305), followed by nursing students 223 (25.93%), physiotherapy 45 students, and medical skill students were 82. 55% reside in urban areas and 45% in rural area. Most of them belong to Hindus (77.51%), followed by Christians (12.34%) and Muslims (10.15%).

Almost 96% of the students were unmarried, and 77.55% of the students belong to nuclear families, followed by joint families (20%)

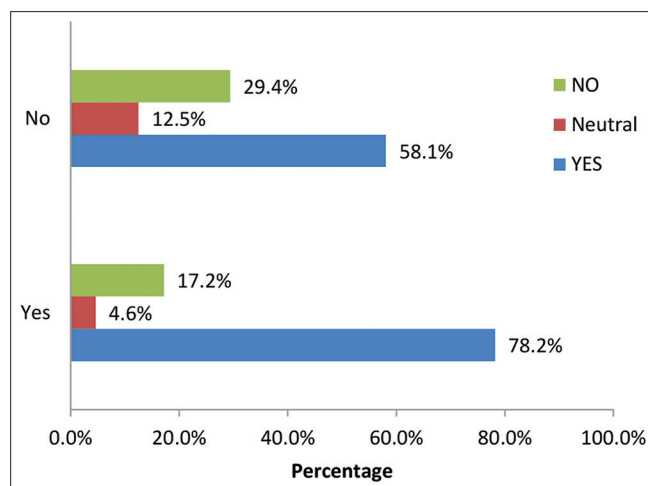


Fig. 3: Trust on government by health care students with vaccine acceptance

Table 2: Logistic regression model using forward Stepwise Likelihood ratio method

	B	S.E.	Wald	p value	Odds ratio
Step 1 ^a					
Trust the Government (1)	0.833	0.217	14.684	0.000	2.300
Constant	-1.514	0.098	238.485	0.000	0.220
Step 2 ^b					
Year of study			13.507	0.004	
Year of study (1)	1.242	0.490	6.421	0.011	3.464
Year of study (2)	1.280	0.491	6.806	0.009	3.596
Year of study (3)	1.661	0.487	11.646	0.001	5.263
Trust the Government (1)	0.788	0.221	12.778	0.000	2.199
Constant	-2.816	0.466	36.583	0.000	0.060
Step 3 ^c					
Year of study			13.090	0.004	
Year of study (1)	1.186	0.492	5.820	0.016	3.273
Year of study (2)	1.260	0.491	6.578	0.010	3.526
Year of study (3)	1.624	0.488	11.091	0.001	5.072
Family Members suffered from Covid (1)	0.512	0.244	4.414	0.036	1.669
Trust the Government (1)	0.755	0.221	11.636	0.001	2.128
Constant	-3.192	0.503	40.213	0.000	0.041

Odds Ratio: 5.072, Vaccine acceptance is higher in 3rd year students, Odds Ratio: 1.669, Vaccine acceptance is higher in family members suffering from covid infection, Odds Ratio: 2.128; p value: 0.001; Vaccine acceptance is higher among students who trust the government

and extended families (6.81%). In this study, 67% belong to the middle class and 21% to the upper middle class. To increase the coverage of vaccination, acceptance of the vaccine is very crucial, which in turn depends upon the information they will get regarding the vaccine's safety and efficacy. This study shows that 74.68% of the students are completely agreeing with vaccination and 5% are completely disagreeing; 19% did not express their opinion, while only approximately 20% of medical students accepted the vaccination study done by Zuryat *et al.* [12]. Similar results were found in the study done by Solis Arce *et al.* [13]. Vaccine acceptance averaged 80.3%, ranging between 66.5% and 96.6% with a median of 78%, but if the head of the institute institution advocates to vaccinate, 85.66% of the students agree to vaccinate. We observed that more male students accepted to get vaccinated compared to female students in our study. Similar results were found in the study done by Zintel *et al.* [14],

students said that they don't advise vaccination for anyone. Most of them responded that they will seek information regarding the safety and effectiveness of the vaccine through both government officials and health personnel. The most common reason for non-acceptance of vaccines is regarding their effectiveness and safety; the same findings were found in the study done by Mulligan *et al.* [15]. Students who are accepting vaccinations are advising their family members and friends to take the vaccination. Similar findings were found in the study done by Kumari *et al.* [16]. In this study, 75.9% of the students who belong to higher socioeconomic groups are accepting the vaccine compared to lower socioeconomic status students; similar results were found in the study done by Kumari *et al.* About 726 (84.81%) students have faith in the government for vaccination, and 15% do not have faith in the government 174 students (20.14%) had the COVID infection in their families, and 44 died due to COVID (5.06) in their families. In this study, factors associated with non-acceptance of the vaccine are female students, age below 18 years, trust in the government, history of COVID infection in the family, and religion. As the age of the student advances above 23, non-acceptance of COVID vaccination increases by 5.29 times more than the students between the age group of 18-23. Similar results were found in the study done by El-Elimat *et al.* [17]. Students who do not have trust in the government are at the risk (2.9 times) of disagreeing with the vaccine compared to those who have trust in government. 21.90% of students between the age group of 21-23 are not willing to accept the vaccine; similar results were found in the study done by Reiter *et al.* [18]. So there are many factors that influence the acceptance of vaccines, like faith in and trust in the government, the safety and efficacy of the vaccine, and different sociodemographic determinants. Similar findings were seen in the study done by Peretti-Watel *et al.* [19]. Then, those who have not had a history of COVID infection in their family are 1.89 times more at risk of not accepting the vaccine compared to those who had the infection in their family. Hindus and Christians are 1.86 times more at risk of disagreeing with the vaccine compared to Muslims. The only limitation of our study is that it involved a very small sample size in the age group of more than 23 years of health sciences students to justify that vaccination acceptance is greater than other age group of students.

CONCLUSION

There are three factors that affecting vaccine acceptance. If they are younger than 23 years old, there is a high chance of not accepting the vaccine. That is, if they are in the age group of 18-20, they are 3.8 times at higher risk of not accepting the vaccine, and if they are between 21 and 23 years older, their chances of disagreeing the vaccine are 4.7 times higher compared to those students who are above 23 years old. Another factor is that people who don't trust the government will not accept the vaccine. They are 2.8 times more at risk of not accepting the vaccine compare to those who will trust the government. Non-Muslims have an almost two times higher risk of not accepting the vaccine compared to students of the Muslim religion.

ACKNOWLEDGMENT

We thank the head of the Department of Community Medicine and Pharmacology and the statistician for their respective contribution to our study and we also thank the dean of our institution for granting permission to conduct the study in the institution.

AUTHORS' CONTRIBUTION

Dr. Devika P Jeeragyal: Concept and design of study, Acquisition of data, Analysis and Interpretation of data, Drafting or revising the manuscript, Dr. Bharatesh Devendra Basti: Statistics. Dr. Srinivasa B: Analysis and Interpretation of data, Drafting or revising the manuscript, Editing and formatting the manuscript as per the requirement of journal guidelines. Dr. Deepika Korimerla: Data collection.

CONFLICT OF INTEREST

None declared.

SOURCES OF FUNDING

None declared.

REFERENCES

- Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect Dis* 2020;20:533-4. doi: 10.1016/S1473-3099(20)30120-1, PMID 32087114
- Johns Hopkins University and Medicine. Coronavirus Resource Center: COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE). United States: Johns Hopkins University (JHU); 2020. Available from: <https://coronavirus.jhu.edu/map.html> [Last accessed on 2020 Jun 29].
- Sanche S, Lin YT, Xu C, Romero-Severson E, Hengartner N, Ke R. High contagiousness and rapid spread of severe acute respiratory syndrome coronavirus 2. *Emerg Infect Dis* 2020;26:1470-7. doi: 10.3201/eid2607.200282, PMID 32255761
- Dubé E, MacDonald NE. Chapter 26. Vaccine Acceptance: Barriers, Perceived Risks, Benefits, and Irrational Beliefs in the Vaccine. 2nd ed. Cambridge, MA: Academic Press; 2016. p. 507-52.
- WHO. Report of the Sage Working Group on Vaccine Hesitancy. Geneva: World Health Organization; 2014.
- Lurie N, Saville M, Hatchett R, Halton J. Developing Covid-19 vaccines at pandemic speed. *N Engl J Med* 2020;382:1969-73. doi: 10.1056/NEJMp2005630, PMID 32227757
- Yang Y, Peng F, Wang R, Yange M, Guan K, Jiang T, *et al.* The deadly coronaviruses: The 2003 SARS pandemic and the 2020 novel coronavirus epidemic in China. *J Autoimmun* 2020;109:102434. doi: 10.1016/j.jaut.2020.102434, PMID 32143990
- MacDonald NE. SAGE Working Group on Vaccine Hesitancy. Vaccine hesitancy: Definition, scope and determinants. *Vaccine* 2015;33:4161-4. doi: 10.1016/j.vaccine.2015.04.036, PMID 25896383
- Larson HJ, Jarrett C, Eckersberger E, Smith DM, Paterson P. Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: A systematic review of published literature, 2007-2012. *Vaccine* 2014;32:2150-9. doi: 10.1016/j.vaccine.2014.01.081, PMID 24598724
- Lane S, MacDonald NE, Marti M, Dumolard L. Vaccine hesitancy around the globe: Analysis of three years of WHO/UNICEF joint reporting form data-2015-2017. *Vaccine* 2018;36:3861-7. doi: 10.1016/j.vaccine.2018.03.063, PMID 29605516
- Bavel JJ, Baicker K, Boggio PS, Capraro V, Cichocka A, Cikara M, *et al.* Using social and behavioural science to support COVID-19 pandemic response. *Nat Hum Behav* 2020;4:460-71. doi: 10.1038/s41562-020-0884-z, PMID 32355299
- Zuryat A, Mehwish M, Tauseef N, Sameena F, Shaheena R, Mohd A. Perception and attitude of medical and dental students towards Covid-19 and its vaccination in A medical and dental college of India. *Res J Pharm Technol* 2022;15:5172-6.
- Solís Arce JS, Warren SS, Meriggi NF, Scacco A, McMurphy N, Voors M, *et al.* COVID-19 vaccine acceptance and hesitancy in low-and middle-income countries. *Nat Med* 2021;27:1385-94. doi: 10.1038/s41591-021-01454-y, PMID 34272499
- Zintel S, Flock C, Arbogast AL, Forster A, von Wagner C, Sieverding M. Gender differences in the intention to get vaccinated against COVID-19: A systematic review and meta-analysis. *J Public Health* 2022;31:1-25.
- Mulligan MJ, Lyke KE, Kitchin N, Absalon J, Gurtman A, Lockhart S, *et al.* Phase I/II study of COVID-19 RNA vaccine BNT162b1 in adults. *Nature* 2020;586:589-93. doi: 10.1038/s41586-020-2639-4, PMID 32785213
- Kumari A, Ranjan P, Chopra S, Kaur D, Kaur T, Upadhyay AD, *et al.* Knowledge, barriers and facilitators regarding COVID-19 vaccine and vaccination programme among the general population: A cross-sectional survey from one thousand two hundred and forty-nine participants. *Diabetes Metab Syndr* 2021;15:987-92. doi: 10.1016/j.dsx.2021.04.015, PMID 33984818
- El-Elimat T, AbuAlSamen MM, Almomani BA, Al-Sawalha NA, Alali FQ. Acceptance and attitudes toward COVID-19 vaccines: A cross-sectional study from Jordan. *PLoS One* 2021;16:1-15.
- Reiter PL, Pennell ML, Katz ML. Acceptability of a COVID-19 vaccine among adults in the United States: how many people would get vaccinated? *Vaccine* 2020;38:6500-7. doi: 10.1016/j.vaccine.2020.08.043, PMID 32863069
- Peretti-Watel P, Larson HJ, Ward JK, Schulz WS, Verger P. Vaccine hesitancy: Clarifying a theoretical framework for an ambiguous notion. *PLoS Curr* 2015;7:1-11. doi: 10.1371/currents.outbreaks.6844c80f9f5b273f34c91f71b7f7c289