

Knowledge, Attitude and Practice towards COVID-19 Vaccination among Medical Students in a Tertiary Care Hospital of Southern India

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ABSTRACT

Introduction: Coronavirus Disease-2019 (COVID-19) vaccination plays an important role in controlling the current pandemic. This may have an impact on other healthcare workers in understanding the importance of COVID-19 vaccination.

Aim: To assess the Knowledge, Attitude and Practice (KAP) towards COVID-19 vaccination among medical students in a tertiary care hospital, Southern India.

Materials and Methods: This was an observational cross-sectional questionnaire based study done in Mahatma Gandhi Medical College and Research Institute, Puducherry, India, from April 2021 to September 2021. The study evaluated KAP on COVID-19 vaccination amongst medical students. After the content validity of the questionnaire, a google form was created and circulated among the I, II, III, IV year students and interns, which was assessed by a scoring system for KAP. The results of the qualitative variables were tabulated as frequency and

percentages. The statistical analysis was done using JASP software and the correlation between KAP was calculated using Spearman's Correlation.

Results: A total of 400 participants were included in the study. Their mean±SD age was 20.3±1.3 years. The second and third-year students actively participated in the study. Adequate knowledge was observed in 33% of the medical students, moderately adequate knowledge in 61% and minimum knowledge in 6% students. Spearman's correlation between KAP showed a significant p-value (p-value <0.001).

Conclusion: The majority of the medical students opined that their main source of information was social media. This indicates that social media campaigns had helped them gain adequate knowledge about vaccination. This knowledge might help them encourage their relatives and friends to get vaccinated against COVID-19, which will in turn help in breaking the chain of this pandemic.

Keywords: Coronavirus disease-2019, India, Pandemic, Puducherry, Questionnaire

INTRODUCTION

The current COVID-19 pandemic is an increasingly important cause of morbidity and mortality worldwide especially in elderly and those with co-morbid conditions. COVID-19 also caused significant economic burden at the healthcare system. So, the safe and effective vaccine is in-need of the current situation. By the end of 2020, there are few vaccines which were undergoing all three vaccine trials and some vaccines were given emergency approval for vaccination. It is necessary to know about the knowledge and attitude of community towards such interventions [1]. This helps us to understand the acceptance or denial of COVID-19 vaccination among general public and to know their view on such good practices [2]. The vaccination also helps in providing herd immunity to large proportion of population. This is better than infection immunity since the mortality is a concern in such cases [3]. For herd immunity to be effective at least half of the population should have got vaccinated. But there are problems of vaccine hesitancy which results in very low acceptance rate of vaccination.

In a study in China, it was found that only 25% of healthcare workers who are at risk group received the H1N1 vaccination during the pandemic [4]. The development of vaccine for the mutant virus is challenging, time consuming and has to undergo various phases of potency, efficacy and safety for all the age groups and to the vulnerable population. For a successful immunisation program, the most important criteria is the acceptability of vaccine since most of the vaccines approved, had undergone clinical trials for less than a year and the complete published data on its long-term safety and efficacy are not available. Studies on KAP among

medical students on COVID-19 vaccination are not available, hence this study was planned to evaluate the same [5].

But there are many antivaccine movements and false beliefs among the healthcare professionals about getting vaccination especially those with co-morbid conditions. Some of them are of the opinion that getting vaccinated will worsen their co-morbidities [6]. The acceptance of COVID-19 vaccine depends on various socio-demographic characteristics like age, medical training, year of study. So, this study was undertaken to know the current KAP towards COVID-19 vaccination among the medical students who are budding doctors in the community. To best of our knowledge, this was the first survey study on current KAP towards COVID-19 vaccination among medical students from Southern India. This proposed study aimed at understanding the knowledge and perception of vaccination and also to know the impact of the attitude in this group which might get tied up with other group of population to follow the practice of vaccination. The result of this study might be used as a guide to focus on a valuable group to be deeply educated upon the importance of getting vaccinated.

MATERIALS AND METHODS

Present study was an observational cross-sectional questionnaire based study done in Mahatma Gandhi Medical College and Research Institute, Puducherry, India. The study was conducted in the Department of Microbiology for a period of six months from April 2021 to September 2021. This study was designed to evaluate the KAP of COVID-19 vaccination among medical students in a tertiary

care hospital. The study was carried out after getting approval from Institute Ethics Committee (MGMCRI/IRC/17/2021/04/IHEC/05).

Inclusion criteria: The students who gave consent for the study and voluntarily participated in the study were included.

Exclusion criteria: The students who do not give consent for the study were excluded.

Sample size calculation: Considering of 95% confidence interval, 80% of power and 10% of relative precision with assumption of 50% of knowledge in target population, the sample size calculated was 400.

Formation of questionnaire: The questionnaire was framed in English language and the content validity was confirmed by Senior Professors from various departments. The number of questions under each section were knowledge=17, Attitude=7 and Practice=6. The questions were mostly close-ended except two questions from knowledge (Q.No.8,9) and one from attitude (Q.No.21) which has both open and closed-ended questions. After making the corrections suggested during validation, a google form was created which had participant's consent form that gave detailed information of the study. This helped the students for their voluntary participation in the study. The students who gave consent were included in the study. It was followed by general information of the participants. The study participants included I, II, III, IV year medical students and Interns.

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 0.87. After the reliability analysis score was satisfactory, the predesigned validated questionnaire was sent via WhatsApp to all the medical students. The google forms were disseminated to individual students through their class representative via their batch WhatsApp group. The form contained the questions to assess their KAP regarding the COVID-19 vaccination. There was no time restriction on answering the questionnaire but the number of google form responses per participant was restricted to one. The participants were sent reminders once a week via WhatsApp for four weeks. At the end of the google form, the principle investigator's contact details were mentioned in case of any queries.

Knowledge was assessed by using yes or no type of questions. Knowledge questionnaire was based on the current knowledge about available vaccines in India and their indications, contraindications, dosage, side-effects, etc. Each correct answer was scored with one point and an aggregate score was calculated from 0-15. Higher scores indicated better knowledge of the students. Attitude questions included the acceptance of minor side-effects of vaccine, recommendation to others, hindrance factors for vaccination. The responses were recorded in five-point Likert type scale ranging from 1 to 5 with 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree. The participants responses were noted at the end of the study and the excel sheet was downloaded which contained information and responses of all participants.

STATISTICAL ANALYSIS

The results of qualitative variables were tabulated as frequency and percentages. The statistical analysis was done using JASP software version 0.8.6. The p-value was determined for individual questions in the questionnaire using Chi-square test. The correlation between KAP was calculated using Spearman's Correlation. Adequacy of knowledge was determined based on the significant p-value (<0.001 and <0.05). The cut-off taken for grading knowledge is >75% for adequate, 50-75% for moderate and <50% as inadequate knowledge. For attitude >50% as positive and <50% as negative attitude, for practice $\geq 66.7\%$ is taken as good, 33.3-66.7 as fair and <33.3% as poor practice.

RESULTS

A total of 400 participants were included in the study after excluding those who did not consent to be a part of the study. The mean \pm SD age of the study participants were 20.3 \pm 1.3 years with minimum age of 17 and maximum age 25. Majority of them were females 219 (54.8%) while males were 181 (45.2%). The second-year 122 (30.5%) and third year 247 (61.8%) students actively participated in the study compared to other phases. Most of them belonged to Pondicherry 253 (63.2%) followed by other states n=130 [Table/Fig-1].

| Demographic details | Frequency | Percentage | |
|---------------------|-------------|------------|------|
| Age (years) | 17-19 | 86 | 21.5 |
| | 20-22 | 299 | 74.8 |
| | 23-25 | 15 | 3.7 |
| Gender | Male | 181 | 45.2 |
| | Female | 219 | 54.8 |
| Year | I | 25 | 6.3 |
| | II | 122 | 30.5 |
| | III | 247 | 61.8 |
| | IV | 5 | 1.2 |
| | V | 1 | 0.2 |
| Native | Tamil Nadu | 17 | 4.3 |
| | Pondicherry | 253 | 63.2 |
| | *Others | 130 | 32.5 |

[Table/Fig-1]: Demographic characteristics of study participants.

*Hyderabad-7, Kerala-13, Uttar Pradesh-4, Maharashtra-3, Andhra Pradesh-11, Bangalore-4, Jharkhand-4, Telangana-3, Manipur-1, New Delhi-3, Rajasthan-3, Bihar-4, Tripura-1, Patna-1, Mumbai-2, Madhya Pradesh-1, Karnataka-3, West Bengal-1, Chatisgarh-1, Kolkata-1, Haryana-1, Odisha-2, Assam-1, Others- Not specified the native

Knowledge on COVID-19 Vaccination

Among the 17 knowledge related questions to the students, it was observed that most of the students answered 11 questions correctly which indicated an adequate knowledge on vaccination. There was a significant difference in p-value in knowledge between the students, $p < 0.05$ was noticed in questions- 1, 2, 4, 5, 6, 7, 8, 9, 11, 12, 13, and 14 [Table/Fig-2]. [Table/Fig-3-5] shows the level of KAP among medical students.

| Question | Options | Number and Percentage of each response N (%) | Significant-S, Not Significant-NS | Highest response |
|---|---------------------------|--|-----------------------------------|-----------------------|
| 1. What was your major source of information regarding COVID-19 vaccines? | A. Social media | 199 (49.75) | S (0.003) | Social media (49.75%) |
| | B. Newspaper | 59 (14.75) | | |
| | C. Friends and colleagues | 31 (7.75) | | |
| | D. Medical Faculty | 44 (11) | | |
| | E. Scientific websites | 29 (7.25) | | |
| | F. Family members | 38 (9.5) | | |
| | G. Others | 0 | | |

| | | | | |
|--|--|-------------|------------|---|
| 2. Which are the COVID vaccines manufactured in India? (Multiple answers possible) | A. Moderna | 4 (1) | S (<0.001) | 65% correct answer |
| | B. Covaxin | 369 (90) | | |
| | C. Sputnik | 6 (1.5) | | |
| | D. Covishield | 312 (76.1) | | |
| | E. Pfizer | 16 (3.9) | | |
| 3. Current vaccines in India is recommended for children. Is the statement True or False? | A. True | 80 (20) | NS (0.32) | 80% correct answer |
| | B. False | 320 (80) | | |
| 4. The immunity generated by vaccination will be life long | A. Strongly agree | 11 (2.75) | S (0.02) | 38% neutral f/b 32.25%-disagree |
| | B. Agree | 68 (17) | | |
| | C. Neutral | 152 (38) | | |
| | D. Disagree | 129 (32.25) | | |
| | E. Strongly disagree | 40 (10) | | |
| 5. Single dose of COVID-19 vaccine gives complete protection against infection | A. Strongly agree | 12 (3) | S (0.003) | 46.5%-disagree 30.75%-Strongly disagree |
| | B. Agree | 23 (5.75) | | |
| | C. Neutral | 56 (14) | | |
| | D. Disagree | 186 (46.5) | | |
| | E. Strongly disagree | 123 (30.75) | | |
| 6. A person who has already recovered from COVID infection can receive COVID vaccination | A. Strongly agree | 82 (20.5) | S (0.001) | 57.25%-Agree |
| | B. Agree | 229 (57.25) | | |
| | C. Neutral | 60 (15) | | |
| | D. Disagree | 26 (6.5) | | |
| | E. Strongly disagree | 3 (0.75) | | |
| 7. We need to follow preventive measures like social distancing, hand washing, and wearing mask even after vaccination | A. Yes | 394 (98.5) | S (0.002) | 98.5% correct answer |
| | B. No | 6 (1.5) | | |
| | C. No idea | 0 | | |
| 8. Contraindication(s) for COVID vaccine is/are (Multiple answer possible) | A. Pregnancy and lactation | 232 (56.6) | S (0.001) | 30%-correct answer |
| | B. Hypertension | 124 (30.2) | | |
| | C. Cardiac disease | 122 (29.8) | | |
| | D. Diabetes | 95 (23.2) | | |
| | E. None of the above | 95 (23.2) | | |
| | F. Others | 15 (3.1) | | |
| 9. Most frequent question which comes to your mind when you think of the COVID-19 vaccination | A. Which vaccine is more protective? | 93 (23.25) | S (0.009) | Serious adverse effects-44.5% Which vaccine protective-23.2% |
| | B. Will I have serious adverse effects after vaccination? | 178 (44.5) | | |
| | C. Can a Post COVID-19 infected individual take the vaccine? | 18 (4.5) | | |
| | D. How long will I be protected after vaccination? | 83 (20.75) | | |
| | E. Is it mandatory to take COVID vaccine? | 22 (5.5) | | |
| | F. Others | 6 (1.5) | | |
| 10. Antibody testing is recommended before vaccination to look for natural antibodies | A. Yes | 254 (63.5) | NS (0.37) | 63.5% wrong answer |
| | B. No | 146 (36.5) | | |
| 11. Select the correct statement regarding the two doses of COVID vaccination | A. An individual can take the second dose of vaccine prepared by a different manufacturer, but has mechanism of action similar to that of first dose vaccine | 33 (8.25) | S (0.001) | 74.25% correct answer |
| | B. An individual should take both doses prepared by same manufacture | 297(74.25) | | |
| | C. An individual can take both doses from different manufacturers having different mechanisms of action | 16 (4) | | |
| | D. All are true statements | 54 (13.5) | | |
| 12. Do you agree with the statement 'I may get COVID infection even after vaccination'? | A. Yes | 317 (79.25) | S (0.003) | 79.25% correct answer |
| | B. No | 83 (20.75) | | |

| | | | | | |
|---|---|--------------------|-----------------------|---|---|
| 13. Which target population do you think is in urgent need for COVID-19 vaccination in India? | A. Healthcare workers | 198 (49.5) | S (<0.001) | 49.5%-Healthcare Worker (HCW), 25.5%-Elderly, 8.75%-Frontline Workers (FLW) | |
| | B. Elderly people | 102 (25.5) | | | |
| | C. Politicians | 5 (1.25) | | | |
| | D. Students | 12 (3) | | | |
| | E. Medically vulnerable groups/ patients with serious medical conditions | 48 (12) | | | |
| | F. Frontline workers | 35 (8.75) | | | |
| 14. Should the COVID-19 vaccination certificate be made mandatory for international travellers? | A. Yes | 338 (84.5) | S (0.002) | 84.5% correct answer | |
| | B. No | 22 (5.5) | | | |
| | C. May be | 40 (10) | | | |
| 15. Motivation and advice from colleagues and friends for vaccination is effective | A. Yes | 340 (85) | - | 85% correct answer | |
| | B. No | 60 (15) | | | |
| 16. Do you have a H/O allergy to any of the previous vaccines received? | A. Yes | 44 (11) | - | 89% -no | |
| | B. No | 356 (89) | | | |
| 17. If allergic, do you fear taking COVID vaccination? (Optional) | A. Yes | 70 (18.8) | - | 64.5%-no, 18.8%-yes, 16.6%-may be | |
| | B. No | 240 (64.5) | | | |
| | C. May be | 62 (16.6) | | | |
| Attitude | | | | | |
| 18. Rate your confidence level of the information provided on various COVID-19 vaccines | | Fully trust | Somewhat trust | No trust | S (0.001) More trust on scientist. Rest all somewhat or no trust |
| | Scientists and doctors | 317 (79.25) | 83 (20.75) | 0 | |
| | News paper | 66 (16.5) | 289 (72.25) | 45 (11.25) | |
| | Social media | 25 (6.25) | 249 (62.25) | 126 (31.5) | |
| General public | 30 (7.5) | 218 (54.5) | 152 (38) | | |
| 19. Minor side-effects of the vaccine are possible and acceptable | A. Strongly agree | 90 (22.5) | - | Agree-59.25% | |
| | B. Agree | 237 (59.25) | | | |
| | C. Neutral | 65 (16.25) | | | |
| | D. Disagree | 5 (1.25) | | | |
| | E. Strongly disagree | 3 (0.75) | | | |
| 20. I will recommend vaccination to my family and friends | A. Strongly agree | 88 (22) | S (0.035) | Agree f/b neutral | |
| | B. Agree | 203 (50.75) | | | |
| | C. Neutral | 97 (24.25) | | | |
| | D. Disagree | 8 (2) | | | |
| | E. Strongly disagree | 4 (1) | | | |
| 21. What is the main inhibiting factor according to you in getting vaccinated for COVID-19? | A. Doubtful management of adverse events following immunisation at vaccination site | 104 (26) | - | 34.5%- severe AE, F/B Doubtful management | |
| | B. Higher incidence of getting minor side-effect risk | 80 (20) | | | |
| | C. Risk of severe adverse effects | 138 (34.5) | | | |
| | D. Complete data on efficacy is not available (in public domain) | 74 (18.5) | | | |
| | E. Others | 4 (1) | | | |
| 22. Which type of immunity do you prefer? | A. Natural immunity | 198 (49.5) | - | 49.5%-vaccine immunity | |
| | B. Vaccine immunity | 129 (32.25) | | | |
| | C. Herd immunity | 73 (18.25) | | | |
| 23. How much do you worry about major long term side effects of COVID vaccine? | A. Very much | 123 (30.75) | - | 30%-very much/less | |
| | B. Less | 125 (31.25) | | | |
| | C. Least | 58 (14.5) | | | |
| | D. Not much | 80 (20) | | | |
| | E. No worry | 14 (3.5) | | | |
| 24. Does your religious beliefs hinder you from getting vaccinated? | A. Yes | 21 (5.25) | - | 94.75%-no | |
| | B. No | 379 (94.75) | | | |
| Practice | | | | | |
| 25. Are you participating in any vaccine trial? | A. Yes | 60 (15) | NS (0.015) | 85%-no | |
| | B. No | 340 (85) | | | |
| 26. If given a choice, which COVID-19 vaccine will you prefer? | A. Whole cell inactivated vaccine | 136 (34) | - | 40.5%-Live attenuated vaccine, f/b 34%-Whole cell inactivated vaccine | |
| | B. Live attenuated vaccine | 162 (40.5) | | | |
| | C. mRNA vaccine | 71 (17.75) | | | |

| | | | | |
|---|-------------------------|-------------|------------|------------------|
| | D. Vector based vaccine | 31 (7.75) | | |
| 27. How eager are you to get vaccinated for COVID-19? | A. Eager | 129 (32.25) | NS (0.023) | 41.75%-not eager |
| | B. Not eager | 167 (41.75) | | |
| | C. Unsure | 104 (26) | | |
| 28. Have you motivated any of your relatives, friends or neighbours to get COVID vaccination? | A. Yes | 239 (59.75) | - | 59.75%-yes |
| | B. No | 161 (40.25) | | |
| 29. Have any of your relatives, friends or neighbours who were immunised, develop major side-effects? | A. Yes | 102 (25.5) | - | 74.5%-no |
| | B. No | 298 (74.5) | | |
| 30. Have you physically visited any of the COVID-19 vaccination sites? | A. Yes | 146 (36.5) | NS (0.032) | 63.5%-no |
| | B. No | 254 (63.5) | NS (0.026) | |

[Table/Fig-2]: Questionnaire on Knowledge, Attitude and Practice.

Q17- optional question. So all students would not have answered, Q15,16,17,19,21-24,26,28,29-p-value cannot be calculated

| Knowledge | Frequency | Percentage |
|------------|-----------|------------|
| Inadequate | 24 | 6 |
| Moderate | 244 | 61 |
| Adequate | 132 | 33 |
| Total | 400 | 100 |

[Table/Fig-3]: Level of knowledge.

| Attitude | Frequency | Percentage |
|----------|-----------|------------|
| Negative | 148 | 37 |
| Positive | 252 | 63 |
| Total | 400 | 100 |

[Table/Fig-4]: Level of attitude.

| Practice | Frequency | Percentage |
|----------|-----------|------------|
| Good | 132 | 33 |
| Fair | 196 | 49 |
| Poor | 72 | 18 |
| Total | 400 | 100 |

[Table/Fig-5]: Level of practice.

Attitude and Practice on COVID-19 Vaccination

Overall, 7 questions were asked on attitude and there was a positive attitude among students to 5 questions which was actually a strength to vaccination campaign. This positive attitude had led to good practices among the students. Here too there was a significant difference in p-value between students. This was observed with questions- 18, and 20 [Table/Fig-2].

Level of Knowledge and Attitude

[Table/Fig-6] shows a significant correlation between KAP among medical students using Spearman's Correlation.

| KAP | Spearman's correlation | p-value |
|-----------------------|------------------------|---------|
| Knowledge Vs Attitude | 0.235 | <0.001 |
| Attitude Vs Practice | 0.439 | <0.001 |
| Knowledge Vs practice | 0.447 | <0.001 |

[Table/Fig-6]: Correlation table.
p-value <0.05 considered significant

DISCUSSION

In the current scenario of pandemic, social media campaign on COVID-19 vaccination had played an important role in creating awareness among the public about the importance of vaccination. In present study, there was no significant difference in knowledge level between the medical students in question numbers 3 and 10 stated in [Table/Fig-2] because of successful social media vaccination campaign. This shows an adequate knowledge of medical students on mass vaccination against COVID-19. This basic knowledge

helps the future doctors in encouraging their peers and relatives for vaccination.

On the other hand, there was a significant difference in p-value (<0.05) for question numbers 1,2,4,8,11,12,13,14. These questions are based on scientific evidence about vaccination. So, there is a knowledge gap since the social media vaccination campaign does not cover the scientific part and it requires deep knowledge and understanding of the subject. This was very well understood from their answers at different levels.

The main source of information in present study was social media (49.75%) and newspaper (14.75%). This explains the social media campaigns had reached the students very well and this trust will help in gaining adequate knowledge about vaccination. There are similar studies which shows social media (67%) and television (56%) as an important source of information [7]. Present study showed that the level of knowledge is adequate in 33% of the medical students.

In present study, only 32.25% of students were eager to get vaccinated. Despite, low willingness to get vaccinated, the students were accepting of minor side-effects of the vaccines. This positive attitude was due to the adequate knowledge about vaccination. This will lead to a good practice of increasing the eagerness in getting vaccine among the students. The acceptance of vaccine was found to be 71% in the survey done globally which included 19 countries [8], when compared to survey done in China (91%) [9], France (76%) [10], Saudi Arabia (64%) [11], United States (57%) [12]. Present study showed 72.75% of medical students will recommend the vaccine to family and friends in contrast to a study by Al-Marshoudi S et al., where 59.3% of Omanians will recommend vaccination to peer groups [7].

There are few doubts and barriers among students in getting vaccination on account of serious adverse effects. Nearly 34% of them had inhibition for getting vaccination due to this concerns. In a survey conducted in China, 47% of the people wanted to delay vaccination until the safety is confirmed [9], 34% were not sure of getting vaccinated related to safety concern among US adults [12] and nearly 55% of people in Europe were hesitant to get vaccinated due to doubtful side-effects of vaccine [13]. The other concerns about vaccine are choice of vaccine and the vaccine efficacy which was commonly seen in other studies too [14,15]. The main reason for these concerns were due to several myths about vaccines like development of autism, infertility etc. Knowing the reason for vaccine hesitancy will help us in getting rid of their wrong perception and helping them to voluntarily accept the vaccine. More knowledge on vaccine safety will increase the vaccine acceptance among the medical students.

Most of the students (63.5%) have not visited the vaccination site. However, senior students and interns have had the opportunity to do rotation duty in vaccination sites (36%). This explains the significant difference among the medical students of different years of study. This

study was a first of its kind study from Southern India assessing the various attributes of KAP regarding COVID-19 vaccination among medical students.

Limitation(s)

Though the sample size was adequate, authors were not able to cover medical students on a large scale from the medical colleges all over Pondicherry. In future, if we are able to collaborate with other medical institutes in our state, then we will have state-wise idea about the KAP of medical students towards vaccination.

CONCLUSION(S)

In this current pandemic only 32.25% of the medical students were eager to get vaccination. The vaccine hesitancy to multiple barriers has to be removed and the future doctors should be given more information about the importance of COVID-19 vaccines and increase their compliance towards it. This will help them in creating awareness among the public which may increase the public acceptance of COVID-19 vaccination, which may in turn break the chain of COVID-19 transmission.

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