

Original Research Article

Awareness, perceptions, and attitude towards COVID-19 vaccine among 18-44 years old adults in India: a cross-sectional study

Kumar Pushkar, Suraj Kapoor, Prabhakar Teli, Rajesh Sahu*, Saurabh Bobdey, S. K. Kaushik

Department of Community Medicine, Armed Forces Medical College, Pune, India

Received: 01 August 2021

Accepted: 07 September 2021

*Correspondence:

Dr. Rajesh Sahu,

E-mail: drrajeshshau79@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: The coronavirus disease 2019 (COVID-19) vaccines currently represent an effective and the only effective weapon to effectively combat the Pandemic. Thus, it is especially important to judge the awareness and perception of general population about the study. With this aim, the study was conducted at a vaccination centre among registered adults aged 18-44 years getting the first dose of vaccination to assess knowledge, perceptions about COVID 19 vaccine.

Methods: A descriptive cross-sectional study was conducted from 15 June 21 to 25 June 21 among 612 adults aged 18-44 years adults registered for the first dose of vaccination (COVISHIELD Vaccine) at the vaccination centre of tertiary care hospital in Western Maharashtra.

Results: A total of 612 study participants aged 18-44 participated. On assessing awareness, perceptions, attitudes towards the COVID-19 vaccine, most of them liked to prefer COVISHIELD (83.7%) over COVAXIN (12.3%). More than one-third liked to have a second dose at 4–6-week interval, with a similar number favouring 6–8-week interval. On assessing the KAP score mean KAP score (\pm SD) was 18 ± 4.5 out of 35.

Conclusions: This study highlights that overall awareness and perceptions of the study population was good. However, there was inadequate knowledge about certain key aspects of COVID-19 vaccination like contra-indications, duration after which protection starts after inoculation. The findings suggest immediate health education programs, risk communication, should be done effectively to curb, vaccine hesitancy and misinformation.

Keywords: COVID-19 vaccine, Awareness, Perceptions, Attitudes, 18-44 years

INTRODUCTION

The Coronavirus disease 2019 (COVID-19), which is caused by a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has continued to adversely affect almost the entire globe.¹ To date, although some clinically significant treatments have been urgently approved by Food drug administration (FDA) and World Health Organization (WHO), the number of deaths with a significantly high DALY remains the matter of concern across the world.² In this context, it is hoped that the COVID-19 pandemic will be controlled after the

availability of safe and effective vaccines, like vaccines that played a role in arresting or eradicating previous infectious diseases such as polio, smallpox, influenza pandemic, and so on in the twentieth century.^{3,4}

The Russian COVID-19 vaccine SputnikV was the first vaccine to be registered in the World. In India, the vaccination drive using COVISHIELD and COVAXIN was started on January 2021 in phased manner. As on July 2021 India have administered over 387 million doses overall, including first and second doses of currently approved vaccines.

Vaccinations is one of the most important public health tools for reducing the spread and harm caused by various infectious agents existing throughout the globe.⁵ Moreover, the COVID-19 vaccines currently represent an effective and the only effective weapon to effectively combat the Pandemic. However, the higher reproductive number of the new variants of concern such as delta, the herd immunity threshold required to be achieved through natural infection/ vaccination has been estimated to be increased. It is estimated that a novel COVID-19 vaccine will be needed to be taken by at least 55% of the population to provide herd immunity, with estimation reaching as high as 85% depending on country and dominant variant of SARS-Cov-2 in the country/region.^{6,7} Achieving these needed vaccination levels is a public health challenge, as per well-documented evidence of vaccine hesitancy across the world, which is often fuelled by online and offline misinformation surrounding the importance, safety, or effectiveness of the vaccines.⁸⁻¹¹

Moreover, various campaigns initiated by anti vaccinationists powered by the new technology and short span of vaccine development with false, and sometimes deceptive translations feed the conspiracy beliefs of some people in the community. Misrepresentation, spreading through multiple channels, could have significant effects on the acceptance of a COVID-19 vaccine, even in populations where vaccine hesitancy is not an issue.¹²

Byrne et al found that attitudes, beliefs, and emotions related to the COVID-19 disease and vaccine influence the intention to receive the vaccination.¹³

Thus, it is imperative to explore the community's knowledge and attitude toward the COVID-19 vaccination drive.¹⁴ This will easily identify factors influencing vaccine uncertainty or acceptance, and hence it will help to deeply recognize the aspects that impact the community in accepting vaccines.¹⁵

Second wave of pandemic in India has instilled fear and increased vaccine eagerness specially among the new group of beneficiaries of 18-44 years of age, as per revised policy of vaccination by Government of India. Registered adults for vaccination might also have certain misbeliefs, perceptions about the COVID-19 vaccine which may influence their compliance to take a second dose. Moreover, attitudes, perceptions of study participants towards the COVID-19 vaccine may reflect the perceptions and attitudes of the community at large. In addition, people's knowledge, attitudes, and perceptions towards COVID-19 are crucial for Government and policymakers to address all barriers to vaccine distribution. Study participants age group was the most recent group of beneficiaries to be offered COVID-19 vaccination by government of India. They are most vulnerable, largest, and most active age group on social media, whose belief and perception about vaccination will have a large role to play in India's successful

vaccination campaign. With this aim, the study was conducted at a vaccination centre among registered adults aged 18-44 years getting the first dose of vaccination to assess knowledge, perceptions about COVID 19 vaccine.

METHODS

Study design, population, and sampling methods

A descriptive cross-sectional study was conducted from 15 June 21 to 25 June 21 among 612 adults aged 18-44 years adults registered for the first dose of vaccination (COVISHIELD Vaccine) at the vaccination centre of tertiary care hospital in Western Maharashtra. A questionnaire was designed to assess general awareness, knowledge, and perception of the study population just before COVID -19 vaccination at the vaccination centre of the tertiary care centre in Western Maharashtra. The study was given institutional ethical clearance and data was analysed in aggregated and anonymized form.

Sampling technique and sample size

All registered adults aged 18-44 years and appearing for the first dose of vaccination and willing to give consent at the vaccination site were included in the study using convenience sampling. As there is no prior similar study focusing on KAP among registered adults of this age group for COVID-19 vaccination in India, we made the best assumption (p) for the present study would be 50%. Assuming a 10% non-response rate, a minimum sample size of 424 participants was estimated. Our study exceeded this estimate.

Questionnaire and data collection

A structured, questionnaire was formulated using the available literature, fact sheets, and information leaflets on COVID-19 vaccines developed by WHO, CDC, and National guidelines. The first part comprised questions regarding personal demographic information, such as age, gender, education level. The second part aimed at evaluating knowledge, perceptions, and attitudes of study participants about the COVID-19 vaccine. The data was collected at the vaccination centre through in person interview by trained paramedical staff using a google form. All participants were informed that their participation was voluntary and completed the consent form before taking part in the study.

Scoring criteria

For assessing KAP score set of questions without any ambiguity were selected, and a score ranging from 0 to least and 5 to most appropriate response, was given. The maximum KAP score considered was 35. Scores greater than 17 and above were taken as good, score less than equal to 17 were considered as poor.

Statistical analysis

The data from the Google forms were downloaded in MS Excel. The data was cleaned and coded. The data was analysed using IBM Statistical Package for Social Sciences (SPSS) version 23.0. The Categorical variables were summarized using frequency, proportions, and ratios while the Chi-square test was used to determine the association between study variables. p-values < 0.05 was considered statistically significant.

RESULTS

A total of 612 study participants aged 18-44 participated in the study. About one-fifth of study participants were Male. A total of 236 participants (40%) were graduates while 186(30%) study participants were educated up to intermediate level (Table 1).

Table 1: Socio-demographic characteristics among 18-44 years old COVID-19 vaccine beneficiaries (N=612).

Description	N (%)
Age	
18-24	135 (22.1)
25-30	175 (28.6)
31-35	114 (18.7)
36-44	188 (29.6)
Gender	
Male	133 (21.7)
Female	479 (78.3)
Education	
Primary/High School	107 (16.8)
Intermediate	186 (30.4)
Graduate	236 (38.6)
Postgraduate/Professional	83 (13.6)

On assessing awareness, perceptions, attitudes towards the COVID-19 vaccine, most of them liked to prefer COVISHIELD (83.7%) over COVAXIN (12.3%). More than one-third liked to have a second dose at 4–6-week interval, with a similar number favouring 6–8-week interval.

However, only 70 (11.4%) study participants liked to have a second dose at an interval of 12-16 weeks. About half of the study participants felt that there are no issues regarding vaccine safety despite being developed over a short period. A similar number agreed when asked about whether there is less chance of severe disease post-vaccination. About three-fourths of study participants responded positively regarding the effectiveness of vaccines against mutants, with most of them (75%) favouring COVISHIELD over COVAXIN against mutants. More than half of the study participants agreed that vaccines would be safe for the paediatric age group. About 60% of study participants responded positively when asked about whether the vaccine should be given to lactating or pregnant women. A total of 411 (67%) study participants agreed that vaccines should be given during menses. About 6% of study participants felt that vaccines can cause infertility or impotency, while about 15% of study participants felt that it can alter DNA. (Table 2) On assessing the KAP score mean KAP score (\pm SD) was 18 ± 4.5 out of 35 (Table 3). Only 227(37%) responded correctly about the duration after which vaccine will provide protection starting from the day of inoculation (Figure 8).

There was a significant association between age groups and KAP score, with the 18-24 age group performing the best and the 30-35 age group performing the worst among the age groups ($p < 0.01$) (Table 4). Similarly, there was a significant association between Education level and KAP score, with as the education level increases, KAP score also increased.

Table 2: Awareness /attitudes/perceptions about COVID-19 vaccine among 18-44 years old beneficiaries (n=612).

Description	N (%)	N (%)	N (%)
Which vaccine is better in your opinion?	COVISHIELD	COVAXIN	Other
	512 (83.7)	78 (12.7)	22 (3.6)
Do you think because of vaccination you may be tested positive	May be	No	Yes
	174 (27.4)	219 (35.8)	219 (35.8)
Which vaccine do you think works better against mutants?	COVISHIELD	COVAXIN	Other
	459 (75)	116 (19)	37 (6)
Do you think because of vaccination you may be tested positive	May be	No	Yes
	174 (27.4)	219 (35.8)	219 (35.8)
Do you think there is less chance of getting severe disease after vaccination?	May be	No	Yes
	129 (21.1)	158 (25.8)	325 (53.1)
Do you think pregnant ladies should be vaccinated?	May be	No	Yes
	124 (20.3)	250 (40.8)	238 (38.9)
Should vaccine be given during menses?	May be	No	Yes
	73 (11.9)	128 (20.9)	411 (67.2)
The vaccine might alter your DNA	May be	No	Yes
	72 (11.8)	511 (83.5)	29 (4.7)

Continued.

Description	N (%)		N (%)		N (%)
Do you think the vaccine works against recent mutants/ variants?	Likely	Neither likely nor unlikely	Unlikely	Highly likely	Very unlikely
	268 (43.8)	90 (14.7)	38 (6.2)	210 (34.3)	06 (1%)
Vaccines can cause infertility or impotency.	Likely	Neither likely nor unlikely	Unlikely	Highly likely	Very unlikely
	25 (04.1)	87 (14.2)	245 (40)	13 (2.1)	242 (39.5%)
According to you are available vaccines safe for the paediatric age group?	Agree	Disagree	Neutral	Strongly agree	Strongly Disagree
	206 (33.7)	74 (12.1)	130 (21.2)	167 (25)	37 (6%)
What do you think ideal interval between vaccines	4-6 weeks	6-8 weeks		8-12 weeks	12-16 weeks
	204 (33.3)	187 (30.6)		151 (24.7)	70 (11.4)

Table 3: KAP score (out of 35) N=612.

Mean±SD	18.83±4.589
Range	32-7=25
Good KAP Score	361 (58%)
Poor KAP Score	251 (42%)

Table 4: Association between socio-demographic characteristics and KAP score(N=612).

	Good KAP Score n (%)	Poor KAP Score n (%)	χ ²	P value
Gender				
Male	80 (22.16)	53 (21.1)	0.095	0.758
Female	281 (77.90)	198 (78.8)		
Age (in years)				
18-24	86 (23.8)	49 (24.1)	10.57	0.014
25-30	107 (29.6)	62 (30.3)		
31-35	52 (14.4)	21 (10.2)		
36-44	116 (32.1)	72 (35.2)		
Education				
Primary and High School	60 (15.5)	47 (20.7)	12.27	0.006
Intermediate	114 (29.5)	72 (31.8)		
Graduate	148 (38.3)	88 (38.9)		
Postgraduate/Professional	64 (16.5)	19 (8.4)		

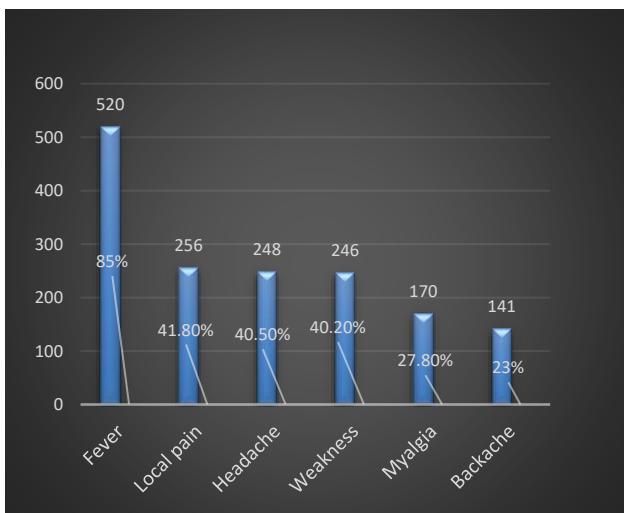


Figure 1: Anticipated side effects of COVID-19 vaccine among 18-44 years old beneficiaries (N=612).

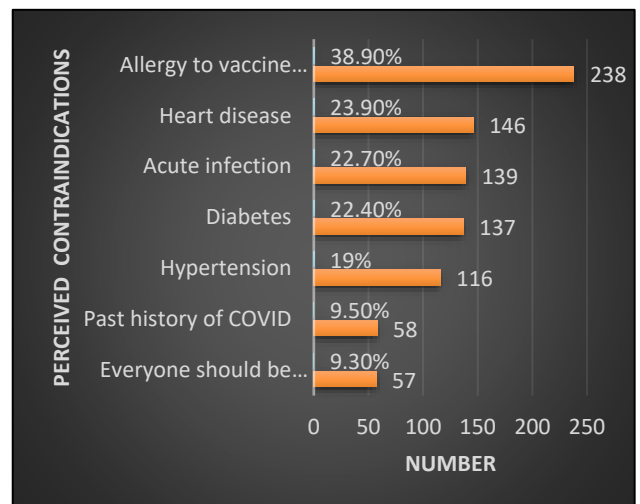


Figure 2: Contraindications perceived among 18-44 years old COVID-19 vaccine beneficiaries.

Figure 1 highlights the anticipated side effects of COVID-19 vaccines. Most participants (85%) anticipated fever as a side effect, followed by local pain (41%). About 40% of study participants correctly identified allergy to vaccine constituents being contraindication, however about one-fifth of participants felt comorbidities like diabetes, hypertension, and heart disease is contraindicated to the vaccine (Figures 2-8) provides key perspectives of study participants about the COVID vaccine.

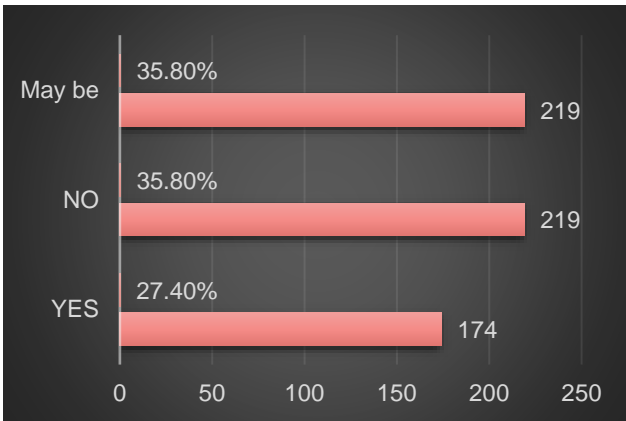


Figure 3: Due to vaccination you might be tested positive.

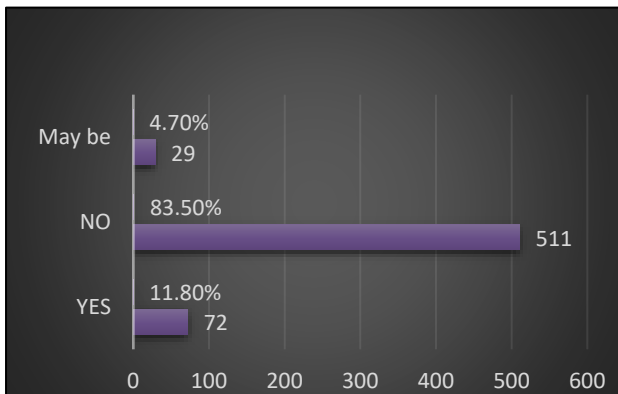


Figure 4: Vaccination might alter your DNA.

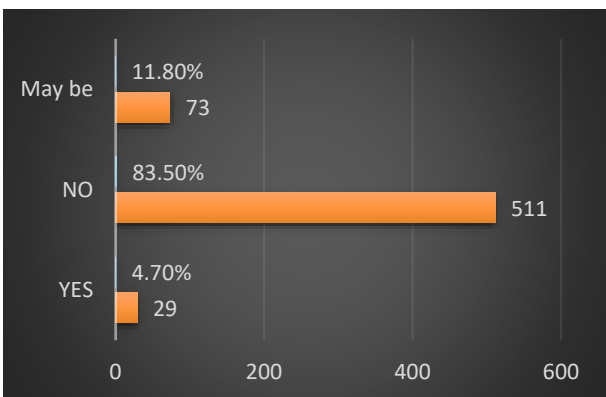


Figure 5: Should vaccination be given during menses?

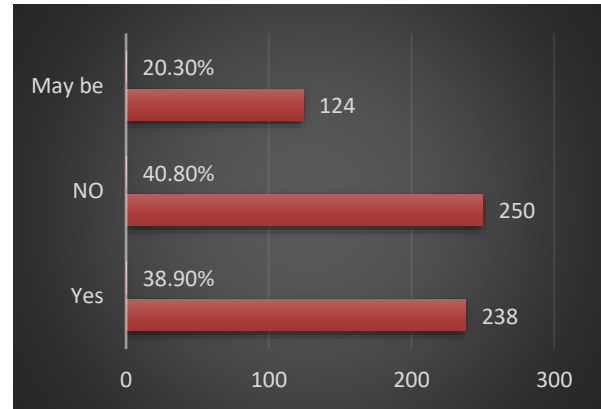


Figure 6: Should vaccine be given to pregnant ladies.

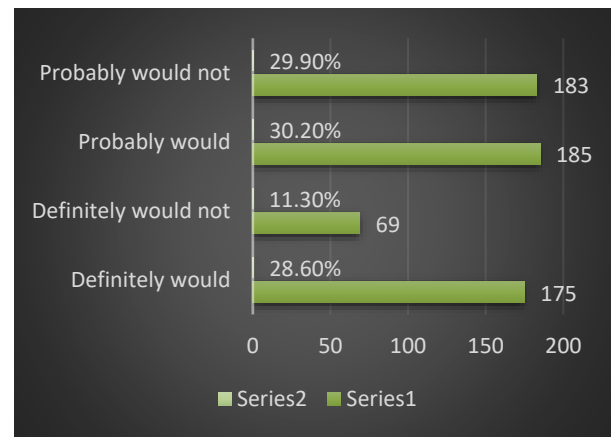


Figure 7: Should lactating women be vaccinated?

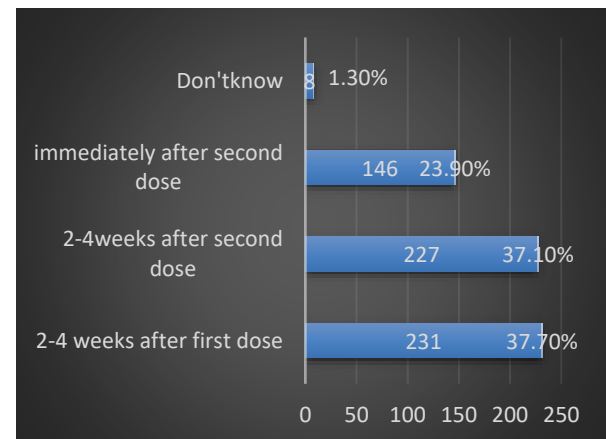


Figure 8: Duration after which you would likely to be protected.

DISCUSSION

This is one of the first study among age group of 18-44 years of age in India, highlighting the awareness, perceptions, and attitude towards COVID-19 vaccine, in this socially and physically active age group. This study highlights that overall awareness and perceptions of the study population was good with more than half of the

study participants were having good KAP score. Most of the study participants were aware about the importance of vaccine and its anticipated side effects. Moreover, more than half agreed that similar vaccination drive should be started for Paediatric age group as well.

Vaccination can be considered among the most successful triumphs of science; nevertheless, vaccine hesitancy continues to thrive.¹⁶ The ongoing COVID-19 pandemic represents a state of worry, apprehension, and insecurity, which is considered a suitable environment for conspiracies to propagate in the communities.¹⁷⁻²¹ A global survey of potential COVID-19 vaccine acceptance shows that 48% of their study population were confused about the COVID-19 vaccinations and remained uncertain about whether they would have the vaccination.²² Moreover, the competition for COVID-19 vaccine development and progress against the spread and disastrous effects of the disease is ongoing.²³ Conspiracy theories have infiltrated many aspects of the COVID-19 pandemic, such as the novel virus origin and the misconceptions about the potential vaccines.²⁴

Although there are numerous vaccination services in India, the complete novelty of the COVID-19 vaccination roll-out poses questions about the distribution and acceptance of vaccines in this country. It also poses questions about the general population's knowledge, attitudes, and perceptions towards the COVID-19 vaccine and vaccination rollout. Our study revealed that a lot of the study participants were not aware of certain key issues like contraindication of vaccines, with one-fifth of the study participants perceived wrongly that vaccines should not be administered to patients having diabetes, hypertension, and heart disease. Knowledge was also lacking when asked about after what duration the protection after vaccination starts with less than 50% giving correct response.

The knowledge, attitudes, and practices (KAP) of the local population towards the COVID-19 vaccine is vital to understand the epidemiological undercurrents of disease control, and the effectiveness, compliance, and success of the vaccination program. Although the virus is driving the pandemic but the media including social media has also led to infodemics, causing incorrect information among the beneficiaries. Having correct KAP about vaccines in the beneficiary population specially of the 18-44 years of age group is a major determinant of success of vaccination programme for any country/ region including India. This study revealed one of the major domains in which the beneficiaries had misinformation on COVID-19 vaccination were incorrect contraindication of pregnancy, menstruation, and lactation, which is likely to hinder vaccine acceptance among this group of vulnerable population.

In our study, about 60% of our study participants were having good KAP scores. This is in the line with a similar study conducted in Bangladesh Knowledge regarding

COVID-19 vaccinations was not significant in terms of participants' gender.²⁵ This finding is comparable with other studies in the United States demonstrating no significant gender differences in knowledge regarding COVID-19.^{26,27}

Our study revealed a significant association between Education level and KAP score. Similar situations were found in other earlier studies, illustrating that individual with a higher educational background showed more knowledge regarding COVID-19.^{27,28} As expected, study participants with higher educational levels had a higher rate of vaccine acceptance, which might be related to their lower inclination towards belief in conspiracies. It may be the case that more educated people are more informed and apprehensive about their health and well-being, through access to more information sources, and become more involved in life events that could impact them, such as COVID-19 vaccinations.²⁹

Murphy et al concluded that having confidence in the safety of vaccines is associated with a significantly higher intention of accepting the vaccine, indicating the need for educational and communication strategies aiming to increase trust among people with higher levels of vaccine scepticism.^{30,31} Our study revealed most of study participants were aware of anticipated side effects following vaccination (Figure 1).

There is an imperative need to counter the growing wave of COVID-19 vaccine misinformation by taking more pre-emptive acts via inoculation messages, especially around the medical consensus on security and effectiveness, and by unveiling and defanging the manipulation techniques used to dupe people with vaccine-related misinformation.³²

Luckily, research in other perspectives shows that although the constant impact of propaganda aggravates vaccine hesitancy, "therapeutic" inoculation can still offer protection even when people have already been exposed to a myth.³³⁻³⁵ We believe that these efforts, communicated on a national scale through reliable information sources can help build societal resistance against vaccine propaganda.

Limitations

Firstly, it was a cross-sectional study, so the causality cannot be attributed to the findings. In this respect, a longitudinal study is important. Secondly, the study used a convenience sampling as it was conducted at a vaccination centre. Thirdly, the study population is likely to have self-selection bias reporting for the vaccination and thus may not represent the KAP of the population at large from which these subjects came.

CONCLUSION

The present study revealed inadequate knowledge about certain key aspects of COVID-19 vaccination like

indications and contra-indications, duration after which protection starts after inoculation, use of covid appropriate behaviours after inoculation. The findings suggest immediate health education programs, risk communication, and more correct information should be distributed and advertised by respective health authorities.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Kim M, Lee JY, Park JS, Kim HA, Hyun M, Suh Y-S, et al. Lessons from a COVID-19 hospital, Republic of Korea. *Bull World Health Organ*. 2020;98(12):842-8.
- Organization WH. Therapeutics and COVID-19: LIVING GUIDELINE. World Health Organization; 2020. Available at: <https://www.jstor.org/stable/resrep28000>. Accessed on 21 June 2021.
- Khubchandani J, Sharma S, Price JH, Wiblehauser MJ, Sharma M, Webb FJ. COVID-19 Vaccination Hesitancy in the United States: A Rapid National Assessment. *J Community Health*. 2021;46(2):270-7.
- Acceptability of Vaccination Against COVID-19 Among Healthcare Workers in the Democratic Republic of the Congo. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7605960/>. Accessed on 27 June 2021.
- Simply put: Vaccination saves lives. *PNAS*. Available at: <https://www.pnas.org/content/114/16/4031.short>. Accessed on 22 June 2021.
- Kwok KO, Lai F, Wei WI, Wong SYS, Tang JWT. Herd immunity – estimating the level required to halt the COVID-19 epidemics in affected countries. *J Infect*. 2020;80(6):e32-3.
- 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(7):1470-7.
- de Figueiredo A, Simas C, Karafillakis E, Paterson P, Larson HJ. Mapping global trends in vaccine confidence and investigating barriers to vaccine uptake: a large-scale retrospective temporal modelling study. *The Lancet*. 2020;396(10255):898-908.
- Communication and miscommunication of risk: understanding UK parents' attitudes to combined MMR vaccination. *The BMJ*. Available at: <https://www.bmj.com/content/327/7417/725.short>. Accessed on 3 July 2021.
- Burki T. Vaccine misinformation and social media. *Lancet Digit Health*. 2019;1(6):e258-9.
- Public Health and Economic Consequences of Vaccine Hesitancy for Measles in the United States. *Infectious Diseases*. *JAMA Pediatrics*. *JAMA Network*. Available at: <https://jamanetwork.com/journals/jamapediatrics/article-abstract/2643169>. Accessed on 3 July 2021.
- Al-Marshoudi S, Al-Balushi H, Al-Wahaibi A, Al-Khalili S, Al-Maani A, Al-Farsi N, et al. Knowledge, Attitudes, and Practices (KAP) toward the COVID-19 Vaccine in Oman: A Pre-Campaign Cross-Sectional Study. *Vaccines*. 2021;9(6):602.
- Trends, patterns and psychological influences on COVID-19 vaccination intention: findings from a large prospective community cohort study in England and Wales (Virus Watch). *medRxiv*. Available at: <https://www.medrxiv.org/content/10.1101/2021.03.22.21254130v1.full>. Accessed on 27 June 2021.
- WHO-2019-nCoV-SAGE_Framework-Allocation_and_prioritization-2020.1-eng.pdf. Available at: https://apps.who.int/iris/bitstream/handle/10665/334299/WHO-2019-nCoV-SAGE_Framework-Allocation_and_prioritization-2020.1-eng.pdf. Accessed on 27 June 2021.
- Mannan DKA, Farhana KM. Knowledge, Attitude and Acceptance of a COVID-19 Vaccine: A Global Cross-Sectional Study [Internet]. Rochester, NY: Social Science Research Network. Report No.: ID 3763373. Available at: <https://papers.ssrn.com/abstract=3763373>. Accessed on 27 June 2021.
- The contribution of vaccination to global health: past, present and future. *Philosophical Transactions of the Royal Society B: Biological Sciences*. Available at: <https://royalsocietypublishing.org/doi/full/10.1098/rstb.2013.0433>. Accessed on 3 July 2021.
- Romer D, Jamieson KH. Conspiracy theories as barriers to controlling the spread of COVID-19 in the U.S. *Soc Sci Med*. 2020;263:113356.
- Sallam M, Dababseh D, Yaseen A, Al-Haidar A, Ababneh NA, Bakri FG, et al. Conspiracy Beliefs Are Associated with Lower Knowledge and Higher Anxiety Levels Regarding COVID-19 among Students at the University of Jordan. *Int J Environ Res Public Health*. 2020;17(14):4915.
- COVID-19 misinformation: Mere harmless delusions or much more? A knowledge and attitude cross-sectional study among the general public residing in Jordan. Available at: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0243264>. Accessed on 3 July 2021.
- Xiong J, Lipsitz O, Nasri F, Lui LMW, Gill H, Phan L, et al. Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *J Affect Disord*. 2020;277:55-64.
- The epic battle against coronavirus misinformation and conspiracy theories. - Document - Gale OneFile: Health and Medicine. Available at: <https://go.gale.com/ps/i.do?id=GALE%7CA625089934&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=00280836&p=HRCA&sw=w&userGroupName=anon%7E6710fdd4>. Accessed on 3 July 2021.

22. A global survey of potential acceptance of a COVID-19 vaccine. *Nature Medicine*. Available at: <https://www.nature.com/articles/s41591-020-1124-9>. Accessed on 2 July 2021.
23. Chan EY-Y, Cheng CK-Y, Tam GC-H, Huang Z, Lee PY. Willingness of future A/H7N9 influenza vaccine uptake: A cross-sectional study of Hong Kong community. *Vaccine*. 2015;33(38):4737-40.
24. Khan YH, Mallhi TH, Alotaibi NH, Alzarea AI, Alanazi AS, Tanveer N, et al. Threat of COVID-19 Vaccine Hesitancy in Pakistan: The Need for Measures to Neutralize Misleading Narratives. *Am J Trop Med Hyg*. 2020;103(2):603-4.
25. Islam MS, Siddique AB, Akter R, Tasnim R, Sujun MSH, Ward PR, et al. Knowledge, attitudes and perceptions towards COVID-19 vaccinations: a cross-sectional community survey in Bangladesh. medRxiv. 2021.
26. COVID-19 vaccination intent, perceptions, and reasons for not vaccinating among groups prioritized for early vaccination — United States, September and December 2020 - Nguyen - 2021 - *American Journal of Transplantation*, Wiley Online Library. Available at: <https://onlinelibrary.wiley.com/doi/full/10.1111/ajt.16560>. Accessed on 4 July 2021.
27. Szilagyi PG, Thomas K, Shah MD, Vizueta N, Cui Y, Vangala S, et al. National Trends in the US Public's Likelihood of Getting a COVID-19 Vaccine—April 1 to December 8, 2020. *JAMA*. 2021;325(4):396-8.
28. ul Haq N, Hassali MA, Shafie AA, Saleem F, Farooqui M, Aljadhey H. A cross sectional assessment of knowledge, attitude and practice towards Hepatitis B among healthy population of Quetta, Pakistan. *BMC Public Health*. 2012;12(1):692.
29. Wouters OJ, Shadlen KC, Salcher-Konrad M, Pollard AJ, Larson HJ, Teerawattananon Y, et al. Challenges in ensuring global access to COVID-19 vaccines: production, affordability, allocation, and deployment. *The Lancet*. 2021;397(10278):1023-34.
30. Murphy J, Vallières F, Bentall RP, Shevlin M, McBride O, Hartman TK, et al. Psychological characteristics associated with COVID-19 vaccine hesitancy and resistance in Ireland and the United Kingdom. *Nat Commun*. 2021;12(1):29.
31. Detoc M, Bruel S, Frappe P, Tardy B, Botelho-Nevers E, Gagneux-Brunon A. Intention to participate in a COVID-19 vaccine clinical trial and to get vaccinated against COVID-19 in France during the pandemic. *Vaccine*. 2020;38(45):7002-6.
32. Linden S van der, Dixon G, Clarke C, Cook J. Inoculating against COVID-19 vaccine misinformation. *EclinicalMedicine*. Available at: [https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370\(21\)00052-3/abstract](https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(21)00052-3/abstract). Accessed on 3 July 2021.
33. Inoculating the Public against Misinformation about Climate Change - van der Linden - 2017 - *Global Challenges*, Wiley Online Library. Available at: <https://onlinelibrary.wiley.com/doi/full/10.1002/gch.2.201600008>. Accessed on 3 July 2021.
34. Maertens R, Roozenbeek J, Basol M, van der Linden S. Long-term effectiveness of inoculation against misinformation: Three longitudinal experiments. *J Exp Psychol Appl*. 2021;27(1):1-16.
35. Cook J, Lewandowsky S, Ecker UKH. Neutralizing misinformation through inoculation: Exposing misleading argumentation techniques reduces their influence. *Plos One*. 2017;12(5):e0175799.

Cite this article as: Pushkar K, Sahu R, Kapoor S, Teli P, Bobdey S, Kaushikez SK. Awareness, perceptions, and attitude towards COVID-19 vaccine among 18-44 years old adults in India: a cross-sectional study. *Int J Community Med Public Health* 2022;9:704-11.