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Perception and Attitude of Indian Population towards COVID-19 Vaccines

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ABSTRACT:
Background: COVID-19 hit the world all of a sudden and leaving with no scope but to develop vaccine in the shortest possible time. Scientist across the globe did an exceptional job and developed vaccines. Vaccination is always considered as a precautionary measure against any disease. However, willingness to get vaccinated is individual and voluntary in nature. Willingness is dependent on factors like vaccine safety and side effects, which is a result of many yearsinvested in the process and testing of vaccine development**.**
Methodology: The study aimed to investigate the knowledge, awareness, perception and attitude of Indian population in the age bracket 18-45 years towards Covid-19 vaccines. An online, self-administered, cross-sectional survey was conductedusing a Google online survey platform and the responses obtained were analysed statistically.
Results: Out of 609 responses received, 87% were willing to take the Covid-19 vaccine. Gender, age, education level, family size, having or not having children at home had no significant impact on the respondents‟ willingness to take the Covid-19 vaccine. Though, urban population (83%) and respondents with annual household income >5 lacs (62%) were statistically more willing to take the vaccine Respondents with a medical history were statistically less likely to take the vaccine (10%) However, previous infection with Covid-19 had no impact on their willingness toward the vaccine. . Majority believed that vaccine is good for protection of self, family and the entire community as it will help developing herd immunity to combat the spread of Covid-19, besides make them immune to the virus. Among the hesitant group, the respondents‟ concern about the vaccine side was the most common reason for their hesitancy to take the vaccine, followed by their belief that Covid-19 vaccines would be ineffective against the virus and its mutants. The major source of knowledge regarding Covid-19 vaccines was mass media followed by internet and then Newspaper or News apps.
Outcome/Conclusion: This study is, perhaps, the first-of-its-kind study, conducted among Indian population in the 18-45 age bracket. Results of the present study will help Indian government devise better vaccine-promoting strategies among the hesitant populations of India, by addressing the key-barriers and influencers, utilizing the sources of information prevalent among Indian population.
KEYWORDS: COVID-19, vaccine, willingness, awareness, hesitancy, Indian population, 18 to 45 years

INTRODUCTION

The deadliest pandemic since World War II, the COVID-19 pandemic, has impacted the globe severely. There is no treatment available and maintaining Covid appropriate behaviour seemed to be the only measure to curtail the growth of virus. However, it wasn‟t enough and a need for vaccination emerged as a preventive measure. Scientists across the world worked on the development of vaccines and came up with successful results after different stages of clinical trials. No doubt, India emerged as one of the leading countries in the development of Covid-19 vaccine in the least possible time.

India‟s tryst with the second wave of Covid-19during April-May 2021 led to imposition of partial/complete lockdown in most parts of the country. In today‟s time, all over the country one of the widespread discussionsis prevention of COVID-19 through vaccine. However, there is complete confusion among the people about the vaccine. There is no single reliable source of information. Multiple sources create myths with no clarification. Greater reach to social media has created its own pros and cons.

In India, government has already started rolling out Covid-19 vaccination; the first category to receive the vaccine were the healthcare and frontline workers, persons above 60 years of age and those with some health issues that makes them more prone to Covid-19 infection. It was observed that during first phase of vaccination in India, people had positive attitude and perception towards Covid-19 vaccine. However, in due course of time, significant decline was noted in the level of acceptance for vaccine. Perception for vaccination is dynamic in nature and changes with time due to new developments and research results coming every day (Wang et al 2021).Kumari et al(2021) found that "*There is a scope for improvement in people's knowledge regarding COVID-19 vaccine and the vaccination programme by addressing the barriers and facilitators which can improve the participants' turnover at vaccination centres*." Loomba et al(2021) concluded that "*Some socio-demographic groups are differentially impacted by exposure to misinformation. It was shown that scientific-sounding misinformation is more strongly associated with declines in vaccination intent*." Praveen et al (2021) concluded that "*Indian government need to focus especially on addressing the fear of vaccines before implementing the process of mass vaccination*." Chou and Budenz(2020) stated that "*Acknowledging fears, anger, and other negative emotions while emphasizing the stringent safety and efficacy standards of COVID-19 vaccine development process and fostering individuals' self-efficacy through vaccination may help to increase vaccine confidence*."

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During the COVID-19 pandemic, people followed multiple information sources to gain information about the disease. Any misleading information can affect peoples‟ acceptance or refusal for COVID-19 vaccines. Therefore, it becomes more important to publishclear and precise information about the safety and side effects of vaccinesso as to reduce the hesitant population. Thus, the present study is aimed at understanding Indian population‟s perspective toward Covid-19 vaccination.

RESEARCH METHODOLOGY

Indian Government has started vaccination roll-out for 18-45 years of age group from 1stMay, 2021. The aim of the study is to know the initial perception of people in this age group to COVID-19 vaccine based on their awareness level. Furthermore, it sought to understand the current and post vaccination behaviour (attitude) of the respondents. Covid-19 was used as a short hand notation for Coronavirus Disease SARS-CoV-2 infection-2019 throughout the study for better comprehension of the general population.

For the current study, an e-survey was conducted by preparing a questionnaire on Google survey tool (Google Forms)to gather primary data. A shareable link was generated and floated on WhatsApp and various other social media groups, widely used by most age groups. Direct emails were also sent to the researchers‟ contacts and participants were requested to pass on the questionnaire further to their contacts or acquaintances. The data was collected online, as a precautionary mean of maintaining social distancing, during the ongoing second wave of pandemic in India. Convenience sampling method was used to collect the data as the respondents did not belong to any specific framework. The researchers tried to approach anyone with in the age bracket of 18 -45 years, irrespective of gender, education level, socio-economic background, profession and family size. Participants were clearly informed about the purpose of the study, assured about the confidentiality of the information provided by them. Filling up the form was totally voluntary, that itself meant consent from the respondents.

The questionnaire prepared for the study was divided into four broad sections. The first section sought information related to the socio-demographics of the respondents. The second section focussed on their awareness level of various vaccines available in India. It also included a question asking their source of information regarding Covid-19 vaccines *(How you came to know about Covid-19 vaccines first?)* with some possible options: Mass media (Radio, TV), Social media (Facebook, Twitter, etc.), Internet, Newspaper/News App, family members and relatives, Friends and neighbours. Third section focussed on the respondents‟ willingness/acceptance for covid-19 vaccine with direct questions: *Will you get vaccinated with Covid related vaccines when your turn comes?* and *Have you got registered for the vaccination drive? etc.* In the fourth section, attitude-based questions were asked to assess the level of hesitancy or willingness of respondents to get vaccinated. Responses in the fourth section were rated on a 5 -point Likert scale (Likert 1932) from 1 „strongly disagree‟ to 5 „strongly agree‟.

Statistical analysis was carried out using Microsoft Excel 2019 and SPSS version 22 (Chicago, IL, USA). Microsoft Excel was used for data cleaning, editing, sorting and coding. Final excel file was imported to SPSS software for further analysis. Descriptive analysis (i.e. frequency, percentage, mean, standard deviation) was performed, followed by t-test to determine significant relations of the mean awareness, perception and attitude scores with socio-demographic information. All tests were two-tailed and p-values less than 0.05 were accepted as statistically significant.

RESULTS

The questionnaire generated a total of 609 responses from North India that comprised postgraduate and graduate students, university teachers and other professionals plus household workers in the age bracket 18-45 years.The data collected was tabulated in the form of google excel sheet and processed by editing, wherein the incomplete responses were eliminated and specific codes assigned to specific responses, and analysed statistically.The respondents were categorized into groups based on certain factors viz. Younger age group (below 21 years) and older age group (above 21years of age), Male and Female (on the basis of gender), Small family size (less than or equal to 4 members) and large family size (greater than or equal to 5 members), Having children at home and not having children at home, Urban and rural (on the basis of place of residence), Postgraduate andGraduate/below (level of education), Suffering from chronic/long term physical/mental health condition or not, Previous infection/hospitalization with Covid-19 or not. These groups helped understanding the association of various demographic factors with the respondents‟ knowledge, awareness and attitude toward Covid-19 vaccines.

Out of a total of 609 respondents, slightly more than half of the respondents were female (54.6%).About half of the respondents (48%) were below 21 years of age, out of which 43% were males and 55% females. 306 respondents were above 21 years of age, with 47% males and 53% females. Majority of our respondents were graduates (54.8%), followed by postgraduates (34.48%).The largest income group (35.6%) of our study was people with 5 to 15 lacs per annum as their household income.Majority of the participants were urban dwellers (81%).More than half of the participants belonged to small family size (less than or equal to 4 members, 52.8%) while 47.12% had families with ≥5 members.Little less than half of the respondents had children (<18 years of age) at home (47.9%). For ease of understanding, all three vaccines were taken together as one.

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Socio-demographic factor		N	%
Age	**21 years and below**	292	47.9
	Above 21 years	316	51.9
Gender	**Male**	276	45.3
	Female	333	54.7
Education level	**Postgraduate**	210	34.5
	Graduate and below	399	65.5
Annual household income	**5 lacs and below**	248	40.7
	Above 5 lacs	361	59.3
Residence	**Rural**	116	19.0
	Urban	493	81.0
Family size	**upto 4 members**	322	52.9
	5 and above	287	47.1
Children	**Yes**	292	47.9
	No	317	52.1

Here N=count, % = percentage

Table 1. Socio-demographic characteristics of the respondents

It was observed that out of the total population, 87%were willing to take the Covid-19 vaccine while 13% were unwilling or had not yet decided at the time of study. Gender, age, education level, family size, having or not having children at home had no statistically significant impact on the respondents" willingness to take the Covid-19 vaccine. However, urban population was statistically more willing (83%) to take the vaccine while rural population was more likely to be aversive (33%) to take the vaccine. Also, respondents with annual household income >5 lacs (62%) were statistically more willing to take the vaccine, while those with lower income were more unlikely (58%) to take the vaccine. At the same time, respondents who had a history of chronic physical/mental health condition were statistically less likely to take the vaccine (10%) while those with no such health condition were more likely to take the vaccine (95%).However, previous infection with Covid-19 had no impact on their willingness toward the vaccine.

		Willingness to take vaccine			
		Yes		No	
		N	%	N	%
Age Groups	21 years and below	249	47%	44	56%
	Above 21 years	282	53%	34	44%
GENDER	Male	239	45%	37	47%
	Female	292	55%	41	53%
With or without Child	No Children	276	52%	41	53%
	One or more children	255	48%	37	47%
Adults in the house	3 or less	184	35%	24	31%
	More than 3	347	65%	54	69%
Level of education	Post Graduate	189	36%	21	27%
	Graduate and below	342	64%	57	73%
Annual Household Income	5 lakhs or less	203	38%	45	58%*
	More than 5 Lakhs	328	62%*	33	42%
Residence	Rural	90	17%	26	33%*
	Urban	441	83%*	52	67%
Do you have any chronic/long term physical/mental health condition?	Yes	25	5%	8	10%*
	No	506	95%*	70	90%
Family size of the household	Less than or equal to 4 members	284	53%	37	47%
	More than 4 members	247	47%	41	53%

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Have you ever tested positive for the COVID-19 infection?	Yes	125	24%	17	22%
	No	406	76%	61	78%
Have you ever been hospitalized for the COVID-19 Infection?	Yes	4	1%	2	3%
	No	527	99%	76	97%

***=significant results based on two-sided tests with significance level 0.05**
Here N=count, % = percentage

Table 2.Comparison of sociodemographic variables of the respondents with willingness to take Covid-19 vaccine

Regarding awareness of the Covid-19 vaccine, out of total 609 respondents, 98.2% were aware of Covid-19 vaccines which is significantly higher than the unaware ones (1.8%). Both male and female belonging to all age groups and having all education levels were equally aware of the Covid-19 vaccines. Awareness levels were significantly higher (at p<0.05%) among higher income group people (60%) and urban population (82%) and people with no children at home (53%). While unawareness was significantly more prevalent (at p<0.05%) among lower income group (73%) and ruralpopulation(55%) and those with children at home (82%).

Socio-demographic factor	**Awareness of Vaccine**	**Aware of vaccine**	**Unaware of vaccine**
Age groups	21 years and below	97%	3%
	Above 21 years	99%	1%
Gender	Male	98%	2%
	Female	98%	2%
Children	No	99%*	1%
	Yes	97%	3%*
Family size	Less than 4		
	5 or more		
Level of education	Post Graduate	99%	1%
	Graduate and below	98%	2%
Annual Household Income	5 lakhs or less	97%	3%*
	More than 5 Lakhs	99%*	1%
Residence	Rural	95%	5%*
	Urban	99%*	1%
If any chronic/long term physical/mental health condition	Yes	94%	6%
	No	98%	2%
If previous COVID-19 infection	Yes	99%	1%
	No	98%	2%
If ever been hospitalized for the COVID-19 Infection	Yes	100%	0%
	No	98%	2%

*=significant results based on two-sided tests with significance level .05.

Table 3. Comparison of sociodemographic variables of the respondents with awareness of Covid-19 vaccine

Further, the respondents‟ relative dependence on various sources of knowledge about the Covid-19 vaccine is depicted in Figure 1. As can be seen from the graph, the major source of knowledge wasmass media followed by internet and then Newspaper or News apps.

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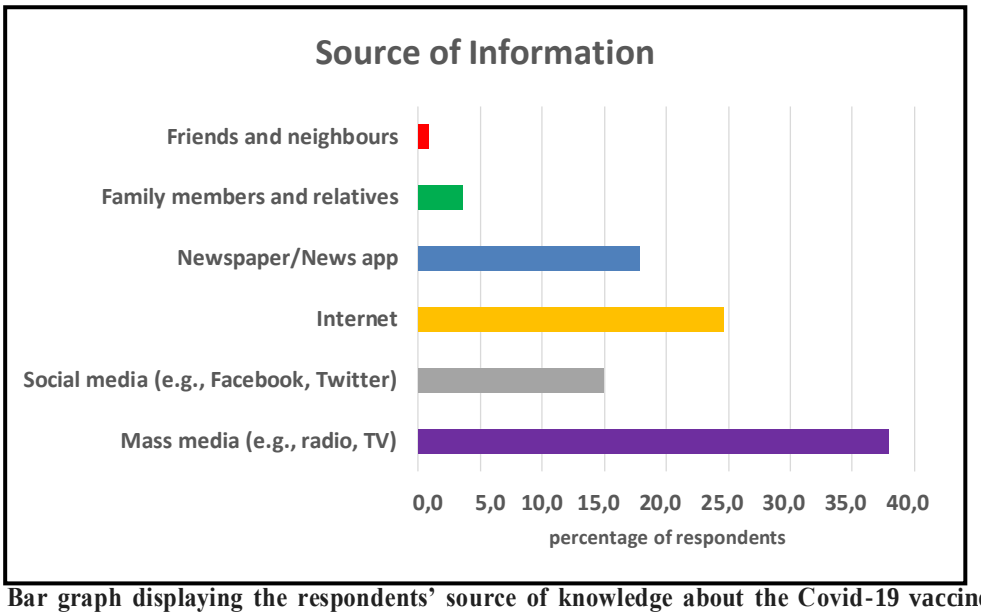

Figure 1. Bar graph displaying the respondents' source of knowledge about the Covid-19 vaccine for the question *"How you came to know about COVID-19 vaccines first?"*

Among the respondents who were willing to take the vaccine, the major drawing factor was – that the vaccine is good for protection of self, family and the entire community as it will help developing herd immunity to combat the spread of Covid-19 (mean 4.56±0.85) and making them immune to the virus (mean 4.02±1.19). Though respondentsalso wished to get vaccinated because it was compulsory in their workplace (mean 2.78±1.37) or because government will soon make Covid-19 vaccination compulsory (mean 2.81±1.28).

Factor	Mean	Std. Deviation
It is good for protection of self / family / the entire community through herd immunity	4.56	.85
I have heard that Government will soon make the vaccine mandatory	2.81	1.28
Getting vaccinated is compulsory in my office/workplace	2.78	1.37
The vaccine will make me immune to Covid	4.02	1.18

Table 4. Reasons for the willingness to get vaccinated

On the other hand, among the hesitant group, the respondents" concern about the vaccine side- effects (mean 3.85±0.86) was the most common reason for their hesitancy to take the vaccine, followed by their belief that Covid-19 vaccines would be ineffective against the virus and its mutants (mean 2.73±0.99). Also, respondents were of the view that in case the scale of the pandemic gets very low, they would not need to take the vaccine shot (mean 2.73±1.20).

Factor	Mean	Std. Deviation
Covid vaccines are ineffective against Covid and its mutants	2.73	0.99
I am concerned about the vaccine side effects (fever, headache, nausea, allergy)	3.85	0.87
The vaccine is only a way of government's commercial profiteering, so i will not take it	2.41	1.16
I don't want to go out, so if someone comes to my place to vaccinate me only then i will get the vaccine	2.37	1.17
I think I am immune/not at risk to Covid-19	2.21	1.14
I am religious and God will protect me	2.15	1.38
When everyone will get vaccinated, I don't need vaccine anyways	1.95	1.02
I am afraid of needles	2.17	1.26
It depends on the scale of the pandemic at the time of the vaccine. If very low, I may not need it	2.73	1.20

Table 5. Reasons for hesitancy to get vaccinated

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Among people who had already registered for the countrywide vaccination drive being started by the Government of India (GoI), males (57%), older age group (57%), people with no children at home (55%) and people with annual household income >5 lacs (60%) and urban population (52%) were significantly higher, till the time of this study. Education level and previous infection with Covid-19 had no significant impact on their registration for vaccination drive.

Have you registered yourself for the vaccine drive starting May 2021?					
Socio-demographic factor		**Yes**		**No**	
		N	**%**	**N**	**%**
Age Groups	21 years and below	116	40%	171	60%*
	Above 21 years	176	57%*	135	43%
Gender	Male	154	57%*	117	43%
	Female	138	42%	189	58%
Children	No	170	55%*	137	45%
	Yes	122	42%	169	58%*
Education	Postgraduate	111	53%	97	47%
	Graduate and below	181	46%	209	54%
Residence	Rural	40	35%	252	52%*
	Urban	73	65%*	233	48%
Annual Household income	5Lacs or less	79	33%	162	67%
	above 5 lacs	213	60%*	144	40%
Ever tested positive for Covid-19?	Yes	60	43%	79	57%
	No	232	51%	227	49%

Here N=count, % = percentage

Table 6. Comparison of sociodemographic variables of the respondents with registration for the Covid-19 vaccine.

DISCUSSION

As the covid-19 pandemic is spreading fast globally, newer and effective vaccines are being developed. While the distribution of vaccines is underway, it becomes important to examine community acceptance of Covid-19 vaccinations, because that is an effective measure to combat the deadly coronavirus from further spreading, beside social distancing and wearing masks (Xiao et al 2020). One of the pioneer countries for developing Covid-19 vaccine,India rolled-out first vaccine on 16th January 2021 and Manish Kumar, a sanitation worker (34-year-old) at All India Institute of Medical Sciences (AIIMS), Delhi was the first recipient of Covid-19 vaccine *Covaxin* developed by Bharat Biotech, India. Other vaccines being manufactured in India is the AstraZeneca vaccine, *Covishield* while the Russian vaccine, *Sputnik V* is also underway. India has now started vaccine roll-out for population between 18-45 years of age. But still there is great controversy regarding vaccination among general public in India.As per our knowledge, this is the first study of its kind in Indian context.

In our study, only 1.8% people (between the age 18-45 years) were reluctant to take the vaccine. This percentage is lower than the one reported in most other studies viz. 2.2% in India (Bhartiya et al 2021), 20% in Bangladesh (AkifulHaqueet al 2021), 14% in UK (Paul et al 2020), 20.2% in Canada (Ogilvie et al 2021).A global study found that vaccine acceptance rates varied from nearly 88.6% in China to less than 55% in Russia(Lazarus et al 2020). Another global survey done by ORB International and the Vaccine Confidence Project (London School of Hygiene & Tropical Medicine) in 32 countries revealed that vaccine acceptance was highest in Vietnam (98%), India (91%), and lowest in Serbia (38%) (Wouters et al 2021). A similar study done in China (Lin et al 2020) and Bangladesh (AkifulHaqueet al 2021) reported that over half of their participants were willing to take the vaccination. Although a low proportion of people are hesitant to take the vaccine but this is also worrisome, because these are the ones who become potential leads to further spread of the disease (Xiao et al 2020, Wouters et al 2021).

The findings reflect a large number of socio-demographic factors influencing the awareness, attitude and perception toward Covid-19 vaccinations. Socio-economic factors were associated with attitude towards Covid-19 vaccine, with urban population and those with annual household income >5 lacs more willing to take the vaccine while rural population and those with lower income i.e. lower socio-economic group was more unlikely to take the vaccine. This is consistent with the prior work done in India (Kumari et al 2021), UK (Paul et al 2021),Japan (Machida et al 2021), China (Lin et al 2021), Bangladesh (AkifulHaqueet al 2021). The fact that individuals of lower socio-

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economic status were hesitant to take the vaccine might further escalate the existing inequalities in exposure to and experience of Covid-19 in India. Also, people with no history of chronic disease were more willing to take the vaccine. These results are consistent with the studies done in Oman (Al-Marshoudi et al 2021). Gender, age, education level, family size, having children at home were unrelated to the respondents‟ willingness to take the Covid-19 vaccine, in our study. Though there are contrasting reports of gender-biased acceptance toward Covid-19 vaccines viz. more positive attitude of females in Bangladesh (AkifulHaqueet al 2021), while more ofmales inOman (Al-Marshoudi et al 2021), Jordan (El-Elimat et al 2021) and China (Wang et al 2021). Highly educated people were more likely to receive the vaccine in Bangladesh (AkifulHaqueet al 2021) and in Canada (Ogilvie et al 2021) while less willingness of postgraduates to receive the vaccine was reported in India (Bhartiya et al 2021) and in Oman (Al-Marshoudi et al 2021).

Our results suggest that the largest attitudinal barrier to receiving a Covid-19 vaccine among this age bracketis concern about the safety aspects and effectiveness of vaccines toward mutant strains, at large. People also believed that if the level of pandemic goes too low, they might not need to get vaccinated.On the other hand, the major drawing factor for vaccine acceptance was usefulness of vaccine in developing herd immunity to combat the spread of Covid-19 and developing immunity against the virus, in line with studies done in India (Kumari et al 2021), Bangladesh (AkifulHaqueet al 2021). Concern about vaccine safety and side effects was also a major retarding factor in studies done by Paul et al (2020) in UK, Ogilvie et al (2021) in Canada, El-Elimat et al (2021) in Jordan, UAE, Al-Marshoudi et al (2021) in Oman and Wang et al (2021) in a repeat cross-sectional survey in China. This indicates that increased assurance regarding vaccine side effects and vaccine safety would make people more likely to take the vaccine, and increase the chances of vaccine acceptance, as supported by a study conducted in 19 countries by Lazarus et al (2021) where 71.5% of responders reported that they would take a vaccine that is proven safe and effective.

Willingness to get vaccinated can also be gauged from the respondents‟ tendency to get registered at Government of India (GoI) websites dedicated to Covid-19 vaccination drives. Registration was done by more male respondents, older age group, those with no children at home, ones with higher income group and urban population. Education level and previous infection with Covid-19 had no significant impact on their registration for vaccination drive.So, there was partial effect of socio-economic status here too.No previous work on this aspect could be found in literature survey.

Findings from the present study showed a high impact of socio-economic status on the respondents‟ level of awareness as well. Higher income group and urban population were more aware about Covid-19 vaccines than the lower income group and rural population. Though gender, age and education levels had no impact on awareness of Covid-19 vaccines. This is in agreement with previous studies carried out in Bangladesh (AkifulHaqueet al 2020) who reported that people with higher levels of education, nuclear families, from upper socio-economic strata and living in urban areas were more aware of the Covid-19 vaccines while gender had nothing to do with awareness.Kumari et al (2021) found an overall low awareness regrading Covid-19 vaccines among their sample population in India. This might be because of the fact that more educated people seek more information about the developments going on in the field of science and are more calculative about the pros and cons of the same. At the same time, they are more concerned about their health and well-being.

In order to implement a successful vaccination-to-all program in India, it is imperative for the government and policy makers to understand Indian population‟s awareness and perception toward the vaccines. Understanding the most common and most trusted source of information will help the policy makers find directions of disseminating future Covid-19 vaccination information and campaigning in India. Our research findings reveal that the main source of knowledge about Covid-19 vaccines was mass media, which is also supported by previous studies viz. Kumari et al (2021) found that news from healthcare workers, government agencies, family and friends, news from TV/radioand social media platforms were most trusted sources of information among Indian sample they studied;Healthcare providers, pharmaceutical companies‟ reports followed by government agencies and social media in Jordan (El-Elimat et al 2021) and Healthcare providers, social media followed by television in Oman (Al-Marshoudi et al 2021) were considered the most trusted source of information.

Though the present studies might not give a comprehensive view of the knowledge, perception and attitude of Indian population between 18 to 45 years of age towards Covid-19 vaccine, since the data is not a national representative. Also, vaccine perception keeps on changing with time and experience from one‟s surroundings.

Our findings do suggest a need for vaccine-promoting initiatives by Government of India among people of low socio-economic and rural background, hesitant for Covid-19 vaccine.Promoting public health campaigns, incentivising the vaccine and including those who are already vaccinated may help in motivating reluctant individuals for vaccination (Xiao et al 2020).Interventional education programs withsome religious/community backing might help in overcoming this hesitancy.Making the vaccine free or available at subsidized rates by the GoI could help in enhancing vaccine acceptance among the people belonging to lower SES and rural background. Also, “robust pharmacovigilance systems alongside compensation schemes for severe adverse events” might help build confidence in vaccine safety (Wouters et al 2021).

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