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ORIGINAL ARTICLE

Assessment of Knowledge, Attitude & Perception towards COVID-19 Vaccine among the rural and urban population of Navi Mumbai: An Alarming Scenario

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ABSTRACT

Objective: To assess the knowledge, attitude, and perception towards COVID-19 vaccination among rural and urban areas. To study and analyze any socio-demographic barriers and economic factors affecting the immunization program. **Methodology:** A cross-sectional comparative study was conducted between the urban and rural populations with the help of pre-designed and pre-structured questionnaires. Data were collected from 205 subjects from the urban population with the help of Google form and 242 subjects from the rural population through an interview. **Results:** 97.1% of the urban population were aware of the Arogya Setu app of which 80% were using it while 87.6% of the rural population were not aware of the Arogya Setu app. 60.3% of the rural population had the perception that the Covid-19 vaccine can be eradicated without the vaccine whereas 77.1% of the urban population had the opposite perception. **Conclusion:** Most of the urban population had good knowledge about the Covid 19 vaccine with a positive attitude of accepting the vaccine as the most important preventive measure of prevention and control of the Covid 19 pandemic as compared to the rural population.

Key Words: Covid 19 Vaccine, Urban Population, Rural Population, Vaccine hesitancy, Knowledge, Attitude, Perception

Introduction

Corona virus disease (COVID-19) is a deadly disease that continues to affect many countries in the world. This is caused by the new corona virus strain SARS-CoV-2 which has become a serious public health concern worldwide[1]. The World Health Organization (WHO) declared the COVID-19 outbreak as a pandemic on 11 March 2020.[2] Millions of lives are saved every year as vaccines help in training and preparing the body's natural defenses. The immune system helps to recognize and fight the virus in question and also the bacteria they target. And thus, a safe and effective vaccine for Corona virus disease 2019 (COVID-19), has been on the wish list of healthcare agencies across the globe [(3).] The most effective strategy to protect the population from COVID-19, since SARS-CoV-2 is a highly contagious virus and affects populations widely and globally is the administration of a COVID-19 vaccine.

The launch of the COVID-19 vaccine has been an accelerated program, with the vaccine going to market merely nine months after the discovery of the virus. While some early data suggest the safety and efficacy of the approved vaccines, long-term efficacy and any long-term side effects are largely unknown [(4)].

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The knowledge and acceptability of the newly launched vaccine is an extremely important parameter to be studied since the vaccine coverage rate among the population is essential for a successful immunization program. Understandably, the acceptance of the new vaccine remains uncertain by both healthcare experts and the public at large. In addition, with a strong anti-vaccine movement, multiple pseudo-scientific conspiracy theories have flooded the media reports. It is for these reasons that vaccine hesitancy may become an important challenge in the immunization campaign against COVID- 19 [(5)] and thus it is important to understand the current views of the population to bust various myths and impart correct information where necessary. In order to implement the most effective vaccination strategy in India and achieve a compliance rate of 100%, this study is done to assess community knowledge, attitudes, and perceptions about COVID-19 vaccinations in order to help the Government and policymakers to address all barriers to vaccine distribution and administration.

Aims & Objective :

1. To assess the knowledge, attitude, and perception towards COVID-19 vaccination among rural and urban areas
2. To study and analyze any socio-demographic barriers and economic factors affecting the immunization program.
3. To identify myths and misbelieves towards COVID-19 vaccination.

Methodology

Study design: A cross-sectional comparative study

Study population: Urban and rural population

Inclusion & exclusion criteria :

1. Inclusion criteria :

- Voluntary participation
- Subjects above the age of 18 years
- Indian citizen
- Good internet access

2. Exclusion criteria :

Mentally unstable and debilitated individuals above 18 years.

Sample size:

The sample size was calculated using the following equation: With reference available on this topic, Prevalence (P) is taken as 40%. Therefore, Q= (100-P=60%) , Confidence interval of the study =95% , therefore Z=1.96, at the level of significance , L=5% , therefore formula of sample size estimation is :

$$N = Z (2) PQ/L (2)$$

$$= 1.96 \times 1.96 \times 40 \times 60 / 5 \times 5 = 368.7 = 369$$

Therefore, total sample size need to study is = N (N x 10%) (considering 10% as non-response rate)

$$= 369 + 36 = 405$$

Study duration: April 2021 - June 2021 (3 Months)

Ethical considerations - Permission from the Institutional Ethics Committee is obtained before conducting the study. All information regarding the study subject is kept confidential.

Data collection :

1. Urban population: A semi-structured and self-reported questionnaire containing informed consent was designed and incorporated into Google Forms and circulated among the urban population.
2. Rural population: An interview was taken by the research investigator using a semi-structured and pre designed questionnaire.

Tools for Data collection: All participants in the study were administered a semi-structured and self-reported questionnaire, after informed consent. The study participants were offered the questionnaire in one of three languages: English, Hindi, and Marathi. The questionnaire had questions designed to elicit the following information: demographic details, information related to knowledge, attitudes, and perception regarding Covid- 19.

Data Analysis - SPSS Statistical package was used for data entry & analysis. Percentage and Chi-square are used to find association between knowledge and socio-demographic characteristics of participants of the study.

Results

Socio-demographic profile of study subjects:

A total of 242 subjects from rural areas and 205 subjects from urban areas were enrolled for the study. On an average 50 % to 53% male and 47% to 50% females are formed of the study group from urban & rural areas. The literacy was seen to be higher in the urban population with 69.7% graduates of which 42.9% were professionally qualified. The rural population showed 29.7% illiteracy where half of the population (51.2%) were shop owners by profession. The nuclear type of families (64% to 67%) was seen in urban & rural areas (Table-1).

Table- 1: Demographic profile of study subjects

Demographic Profile		**Urban (205)**		**Rural (242)**		**'P' value**
Age Group	18 -25 yrs	60	29.2	90	37.1	P>0.05
	26- 45 yrs	70	34.1	77	31.8	
	46 - 65 yrs	75	36.6	75	31.1	
Sex	Female	95	46.3	123	50.8	P>0.05
	Male	110	53.7	119	49.2	
Marital status	Married	123	60	145	59.9	P>0.05
	Unmarried	82	40	97	40.1	
Education	Illiterate	1	0.5	72	29.7	P<0.05
	Middle school	1	0.5	32	13.3	
	High school	11	5.9	70	28.6	
	Graduate or Diploma	143	69.7	67	28.0	
	Professional degree	49	23.9	1	0.4	

Contd. ……./.Table-1

Demographic Profile		**Urban (205)**		**Rural (242)**		**'P' value**
Family type	Nuclear	138	67.3	155	64.0	P>0.05
	Joint	67	32.7	87	36.0	
Occupation	Professional	88	42.9	0	0.0	P<0.05
	Semi-professional	45	22	1	0.4	
	Semi-skilled	4	2	22	9.1	
	Shop owners, clerks	17	8.3	124	51.2	
	Skilled worker	7	3.4	0	0.0	
	Still studying	30	14.6	25	10.3	
	Unemployed	13	6.3	15	6.2	
	Unskilled workers	1	0.5	55	22.8	
Monthly income (Rs.)	<2,640	10	4.9	1	0.4	P<0.05
	2,641 -7,886	2	1.0	1	0.4	
	7,887 - 13,160	7	3.4	22	9.1	
	13,161 - 19,758	6	2.9	1	0.4	
	19,759 - 26,354	14	6.8	101	41.7	
	26,355 - 52,733	44	21.5	115	47.5	
	>52,734	122	59.9	1	0.4	
Have you received all necessary vaccines in your lifetime?	No	0	0.0	5	2.4	P> 0.05
	Yes	205	100	237	97.6	

Knowledge about Covid 19 vaccine among study population in urban & rural areas: The knowledge was assessed and compared between the urban and rural populations regarding the COVID-19 vaccine. 94.2% of the urban population were aware that the Covid-19 vaccine is available in India as 36.1% reported hearing it through the mode of mass media. On the contrary, 62.8% of the rural population did not know about the covid-19 vaccine. Out of the 36.7% who were aware of the vaccine, the source of information was through family & friends (22.8%) & Mass Media (13.2%). While 85.4% of the urban population reported that they knew the effectiveness of the vaccine, 76.9% of the rural population did not know at all. A significantly high number of (71.3%) rural population reported that people with strong immune systems would not get infected. 97.1% of the urban population were aware of the Arogya Setu app of which only 80% were using while 87.6% of the rural population were not aware of the Arogya Setu app. Out of the 12.4% of the rural population aware of the app, only 10.4% were using it. A lack of knowledge of the procedure to register was also reported in the rural population where only 0.9% knew the process while 86.3% did not know (Table 2 and 3).

Table- 2: Knowledge about vaccine among study subjects in rural & urban areas

Category		Urban (205)		Rural (242)		'P' value
Do you know about the Covid-19 vaccine?	Yes	199	97.0	89	36.7	P>0.00001
	No	3	1.5	152	62.8	
	Don't know	3	1.5	1	0.5	
Is there a vaccine available for covid-19 in India?	Yes	193	94.2	89	36.7	P<0.00001
	No	5	2.4	152	62.8	
	Don't know	7	3.4	1	0.5	
If "yes", where did you hear it?	Family members & relatives	16	7.8	55	22.8	P<0.00001
	Internet	33	16.1	1	0.5	
	Mass media	74	36.1	32	13.2	
	Newspaper	22	10.7	1	0.5	
	Social media	48	23.4	1	0.5	
Do you know about the effectiveness of Covid-19 vaccine?	Yes	175	85.4	11	4.5	P<0.00001
	No	17	7.3	45	18.6	
	Don't know	15	7.3	186	76.9	
Is it dangerous to use an overdose of the vaccine?	Yes	117	57.1	27	11.2	P<0.00001
	No	11	5.4	1	0.4	
	Don't know	77	37.6	214	88.4	
Does vaccination increase an allergic reaction?	Yes	49	23.9	17	7.0	P<0.00001
	No	69	33.7	1	0.4	
	Don't know	87	42.4	224	92.6	

Table-3 : Knowledge about online registration of Covid vaccine among study subjects in rural & urban area.

Knowledge about online registration of Covid Vaccine		Urban		Rural		P- value
		No.	%	No.	%	
Those with strong immune systems cannot get infected?	Yes	83	40.5	172	71.3	P< 0.00001
	No	80	39.0	1	0.41	
	Don't know	42	25.0	69	28.5	
Are you aware of the Arogya Setu app?	Yes	199	97.1	30	12.4	P< 0.00001
	No	6	2.9	212	87.4	
Are you using the Arogya Setu app?	Yes	164	80.0	25	10.4	P< 0.00001
	No	41	20.0	217	89.6	
For vaccine administration, registration on www.covid.in is essential?	Yes	164	80.0	2	0.9	P< 0.00001
	No	40	19.5	31	12.8	
	Don't know	1	0.5	209	86.3	
Is this service useful?	Yes	194	94.6	1	0.4	P< 0.00001
	No	10	4.9	1	0.4	
	Don't know	1	0.5	240	99.2	

Attitude of study participants about Covid vaccine in urban and rural areas: Where 67.8% of the urban population were believed the vaccine is safe, 70.2% of the rural populations were not sure. The rural population showed a higher percentage of "Not sure" in many sections pertaining to the essentiality and safety of the vaccine. The urban population reported a positive attitude towards getting vaccinated even if they had the COVID-19 disease as 64.9% reported a "Yes". Both the groups reported of the vaccine having side effects as urban population suggested of only 2.7% and rural being, 49.6%. The most common side effects suggested by both groups were fever, headache, and local injection site tenderness. A positive attitude was seen in both the groups in terms of following and maintaining appropriate precautions. (Table 4)

Table-4: Attitude about vaccine among study subjects in rural and urban area

Attitude about Vaccine	Urban area			Rural area			P value
	Yes	No	Not sure	Yes	No	Not sure	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	
The newly discovered Covid-19 vaccine is safe	139 (57.8)	7 (3.4)	59 (28.8)	20 (8.2)	52 (21.2)	170 (70.2)	P<0.00001
The newly discovered covid-19 vaccine is essential for us	162 (79.0)	10 (4.9)	33 (16.1)	98 (40.5)	1 (0.4)	142 (59.1)	P<0.00001
I will take covid-19 vaccine even if had the covid-19 disease	133 (64.9)	41 (20.1)	31 (15.1)	1 (0.4)	82 (33.9)	159 (65.7)	P<0.00001
I will still get covid-19 infection after getting vaccinated	109 (53.2)	29 (14.1)	67 (2.7)	60 (4.8)	72 (29.7)	110 (45.5)	P<0.00001
I prefer medicines instead of Covid-19 vaccine	52 (25.4)	135 (65.9)	18 (9.8)	105 (43.3)	45 (18.5)	137 (56.6)	P<0.00001
Do you think Covid-19 vaccine will have side effects?	108 (52.7	41 (20.0)	56 (27.3)	120 (49.6)	80 (33.1)	42 (17.3)	P<0.00001
Do you think everyone should maintain appropriate precautions (social distancing masks) after getting vaccinated?	199 (97.0	6 (3.0)	0 (0.0)	160 (66.1)	15 (6.1)	67 (7.6)	P<0.00001

Perception regarding Covid 19 Vaccine in study participants of Urban & Rural areas: 60.3% of the rural population had the perception that the covid-19 disease can be eradicated without the vaccine whereas 77.1% of the urban population had the opposite perception. The urban population reported that the age group of >45 years with co-morbidities while the rural population reported that the age group of 30-45 years should be vaccinated first. Both the groups strongly reported that the vaccine should be free of cost. Only 18.5% of the urban populations were not willing to take the vaccine while 81.5% were willing to take the vaccine. In the rural population, 53.3% of people were not willing to take the vaccine. The reason for not taking the vaccine in both groups was common in that they did not know the outcome of the vaccine and were scared of the side effects. A choice of the vaccine was the Covishield vaccine for both the groups as more than 75% of both the populations reported choosing Covishield over Covaxin (Table 5). There was no association found between socio-demographic factors and the knowledge about Covid vaccine except the type family. Joint families in urban & rural areas had better knowledge than nuclear family (Table 6).

Table-5 : Knowledge about Covid 19 vaccine side effects

Knowledge about Covid 19 Vaccine side effects		Urban area		Rural Area	
		No.	%	No.	%
What side effects do you think COVID-19 vaccine would have?	Fever	125	61.0	175	72.3
	Fatigue	10	4.8	2	0.8
	Headache	7	3.4	25	10.3
	Chills	2	1.0	0	0.0
	Nausea	6	2.9	0	0.0
	Local injection site tenderness	55	26.8	40	16.5

Table-6: Perception about Covid 19 vaccine among study subjects in rural & urban area

Category		Urban area		Rural area		P value
		Yes	No	Yes	No	
COVD-19 Pandemic can be eradicated without the vaccine?	**Yes**	44	21.5	146	60.3	P<0.05
	No	160	77.1	24	10	
	Not sure	1	0.4	72	29.7	
According to you, who should get vaccinated?	>18 years	59	28.8	52	21.5	P<0.05
	>20-30 years	20	9.8	1	0.4	
	30-45 years	30	14.6	127	52.6	
	>45 with co-morbidities	65	31.7	60	24.8	
	>45 without co- morbidities	31	15.1	1	0.4	
According to you, who should get priority for vaccination?	Healthcare workers	152	74.1	73	30.2	P<0.05
	Essential services workers	30	14.6	1	0.4	
	Lactating mothers	2	1.0	1	0.4	
	Elderly	20	9.8	166	68.5	
	Children	1	0.5	1	0.4	
Do you think the Covid-19 vaccine should be free of cost?	Yes	179	87.3	241	99.6	P<0.05
	No	26	12.7	1	0.5	
Are you willing to take the vaccine?	Yes	167	81.5	113	46.7	P<0.05
	No	38	18.5	129	53.3	
If "NO", then why?	Don't know the outcome	22	57.9	78	69.9	P<0.05
	Side effects	09	26.4	1	0.4	
	Pain	6	15.7	12	5.0	
	New vaccine	1	0.4	22	9.1	
Which vaccine would you prefer?	Covishield Vaccine	175	85.3	160	66.1	P<0.05
	Covaxin Vaccine	30	14.6	82	33.8	

Discussion

In order to halt the ongoing pandemic, the COVID-19 vaccine is considered to be an ideal solution to the problem. The COVID-19 Pandemic has witnessed several healthcare agencies adopting unprecedented infection prevention and control measures and fast-tracking the vaccine approvals to control the spread of the disease. The latter is the primary key to stop the escalating rise of COVID-19 and is the strategy of the hour. In India, vaccine hesitancy remains a critical situation since its launch. The knowledge, attitudes, and perception (KAP) of the COVID-19 vaccine between the rural and urban population is critical to understand with regards to the epidemiological dynamics of disease prevention control, adaptation &success of the vaccination program.

In our study, 97 % of the urban population & 36.7 % of the rural population were aware of the Covid 19 vaccine & its availability in India. The sources of information in urban areas were mostly mass media (36.1%), social media (23.4%), and Internet (16.1%) respectively, whereas in rural area source of information were friends & relatives (22.8%) and Mass Media (13.2%). In contrast to our study, a study conducted in West India [(4)] found that more than half of the participants belong to the age group of 40 to 60 yrs, housewife, unemployed, white collar & blue-collar workers were unaware about Covid 19 vaccine & source of information were Radio and news channel (40.96%), social media (43.16%) and friends and Family (51%)[(6).] This may be due to that our study was conducted during mid-2021. From Jan 2020, the Indian Government has invested extensive efforts & interventions to disseminate the knowledge of Covid 19 prevention & control through mass media with the involvement of all voluntary health workers, NSS & NGOs. Our study revealed that the knowledge regarding Covid vaccine in terms of its effectiveness (4.5%), its side effects (11.2%), allergic reaction (7.0%), the essentiality of vaccine for prevention of Covid 19 disease (40.5%), and willingness to take vaccine (46.7%) was low in a rural area as compared to urban area. In an urban area, the knowledge was comparatively good about Covid vaccine's effectiveness (85.4%), its side effects (57.1%), allergic reaction (23.9), the essentiality of vaccine for prevention of Covid 19 disease (79%), and willingness to take vaccine (81.5%). The difference is statistically significant, this means that even after one and a half year of Covid 19 pandemic, still in rural areas information about Covid 19 prevention and control measures are not adequately reached and there is need of more focused community-based interventions like "***My family my responsibility***", Corona free village Campaign with involvement and participation of Community people for preventive measures of Covid 19 disease.

In our study, 97.1% of the urban populations were aware of the Aarogya Setu app and 80% of the populations were practically using it whereas, only 12.4% of the rural population were aware of the Arogya Setu app & 10% of the rural population were using it. A similar result was found in a study conducted in Kerala[7], 97.6% of medical students and technology university students were aware of the Aarogya Setu app and 10.3 % of students downloaded the app. Overall 82% of the rural& urban population of Kerala were aware of the Aarogya Setu app and only 22 % had downloaded it & only 9% population found it effective[8]. In this study, the urban population had a positive attitude about Covid vaccines safety (67.8%), its essentiality to mankind (79.0%), willing to take the vaccine even if after Covid 19 infection (53.2%) and maintaining Social distance to prevent Covid 19 infection (97.0%) which was significantly different than Rural Population ($p<0.05$). A similar result was revealed in a cross-sectional web-based survey conducted on adults across India, there is an overall positive attitude of people towards the vaccine, as the majority of them are willing to take vaccine (83.6%) and in contrast to our study, the overall level of knowledge was low as almost half of the participant did not know about the Covid 19 vaccine [6, 4].

Most of the urban (81.5%) populations in our study were willing to take the Covid vaccine as compared to the rural (46.7%) population. The reason for not taking the Covid vaccine was the outcome of the vaccine was not clear (57.9 % in urban areas, 69.9% in rural areas), and fear about side effects of the vaccine (26.4 % in urban areas, 0.4% in rural areas). 46.9% of the urban population reported that the Covid vaccine should be given to a person above 45 yrs and or

with co-morbidity as a priority basis. Most all the study participants (urban & rural areas) felt that Covid 19 vaccine should be available free of cost to all populations. A similar result was reported by Sharun et al via an online self-administer questionnaire and nearly 85%were planning to get the COVID-19 vaccine once it is available for use in the market[9]. The most important reason for vaccine hesitancy was seen to be fear of side effects. In a survey by the IPSOS, authors found that the rate of vaccine acceptance was 87% among the Indian population[10, 11] and most cross-sectional studies across the globe have revealed similar responses.

Conclusion

As our study was the snapshot assessment of Knowledge, attitude, and perception of urban & rural population about the Covid 19 vaccine, most of the urban population had good knowledge about Covid 19 vaccine with a positive attitude of accepting vaccine as the most important preventive measures of Covid 19 pandemic prevention and control as compared to the rural population. More multicentric studies should be conducted throughout India to assess the association between the Sociodemographic profile and Covid 19 vaccine uptake.

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