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Original Research Article

The association of age, gender, education and employment status with potential acceptance of a COVID-19 vaccine in Southern Kerala, India

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ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) pandemic has affected most the countries causing a devastating influence on world health and economics since its appearance. The accelerated development of the COVID-19 vaccine has become vital, and early data suggests that it is both, safe and efficacious. However, the acceptance of the COVID-19 vaccine depends on several socio-demographic characteristics as well as people's knowledge and misconceptions. The objective of current study was to access the associations of age, gender, and level of education with vaccine acceptance, from a random sample of 525 participants selected from Kerala, India.
Methods: This is a cross-sectional study conducted by analyzing the data collected through a self-administered questionnaire that was shared online and directly across southern Kerala from January 2021 to June 2021. The survey questionnaire consisted of demographic characteristics of the respondents and queries pertaining to knowledge and acceptance of the COVID-19 vaccine.
Results: The results of the study showed that the respondents showed a good level of knowledge and acceptance. We conducted this study to understand the attitudes towards COVID-19 vaccines and hesitancy to accept it based on age, gender and educational classification. The age group 18-38 has highest rate of acceptance. A higher rate of acceptance among males and people with higher educational qualification.
Conclusions: This research results can be actively used in population segmentation into groups based on their attitudes and this understanding which can be used to develop targeted behavior change communication in improving vaccine acceptance campaigns.

Keywords: COVID-19 vaccine, Vaccine acceptance, Age, Gender, Education

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a potential current health crisis across the globe. It is caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2).[1] The World Health Organization declared COVID-19 as a global pandemic on March 11, 2020.[2] Each wave of this pandemic have a devastating influence on world health and economics since its emergence.[3] Despite the use of different NPI's have helped to slow down the spread, it is resurfacing again as societies and economies have reopened.[3] The development of SARS-CoV-2 vaccination is the only way to shut off the pandemic. COVID-19 vaccination has the potential to produce herd immunity in populations, lowering disease incidence, preventing transmission and lessen the disease's social and economic toll.[4] COVID-19, vaccination is the most effective and safest method for

combating this pandemic. COVID-19 Vaccine reduce the risk of infection by sensitizing immune system to identify and fight the viruses. To develop a safe and effective vaccine against COVID-19, we need to consider several things about the SARS-CoV-2 and the immune response against the natural infection and the vaccine.

Emergency use authorization, (EUA) is a method to ensure the availability and use of vaccine during emergencies of pandemic situation. The vaccines are approved temporarily for emergency use. For getting the emergency use authorization, its benefits should outweigh the risk after obtaining all the safety data from phase I and phase II. Manufacturing facility for large scale production should be ensured for production without delay once the product is approved. [5] In India, vaccination started in phase on 16 Jan 2021. Initially, Healthcare Workers (HCWs) were vaccinated in initial stages with either Covishield or Covaxin vaccine. The two main vaccines that are available in India are Covishield and Covaxin.

COVID-19 vaccine acceptance

The unequaled COVID-19 disease has significant physical, mental, social, emotional and economic implications. Various preventive strategies have been implicated with the objective to curtail the spread of coronavirus, but have yielded limited success in preventing COVID-19 infection, and the second wave of the disease has shocked the world. The currently proposed vaccination program against COVID-19 seems promising in providing protection against the virus.[6] In addition to the efficacy of the vaccines, their uptake rate is also important to the effectiveness of preventing the spread of COVID-19 in the future, as it needs to achieve certain levels to create herd immunity among the population.[7] Factors that affect the attitude towards acceptance of vaccination include complacency, convenience and confidence. Complacency denotes the low perception of the disease risk; hence, vaccination was deemed unnecessary. Confidence refers to the trust in vaccination safety, effectiveness, besides the competence of the healthcare systems. Convenience entails the availability, affordability and delivery of vaccines in a comfortable context.[8] Therefore, it is necessary to understand the COVID-19 vaccination acceptance among the population. The assessment of barriers to acceptance will help to implement interventions to enhance the acceptance among population.

Barriers in acceptance of COVID-19 vaccine

Vaccine hesitancy: vaccines have been a successful measure of disease prevention for decades. However, vaccine hesitancy and refusal are significant concerns globally, prompting the world health organization (WHO) to declare this uncertainty among the top 10 health threats in 2019.[2] Based on the strategic advisory group of experts on immunization (SAGE), vaccine hesitancy is the term used to describe: "delay in acceptance or refusal of vaccination despite availability of vaccination services".[1-8] Vaccine hesitancy poses threats to the success of the COVID-19 vaccination drive. The acceptance and hesitancy are largely determined by people's knowledge, attitude, practices and concerns regarding the safety, efficacy, risks and benefits associated with COVID-19 vaccination and participation in the COVID-19 vaccination program is also dependent on local socio-demographic and cultural correlates. The vaccine hesitancy could lead to refusal or delay of vaccination, may eventually cause a reduction in coverage rate of the vaccine and affect its effectiveness. Unfortunately, a significant proportion of eligible candidates are not turning up to get their dose of vaccine, which indicates hesitancy among people to participate in the COVID-19 vaccination program. The complex nature of motives behind vaccine hesitancy can be analyzed using the epidemiologic triad of environment, agent and the host factors. Environment factors include public health policies, social factors and the messages spread by the media. The agent (vaccine and disease) factors involve the perception of vaccine safety and effectiveness, besides the perceived susceptibility to the disease. The host factors are dependent on knowledge, previous experience, educational and income levels.[1-8]

Governments, public health officials and advocacy groups must be prepared to address hesitancy and build vaccine literacy so that the public will accept immunization when appropriate. The hesitancy can vary by time, place, vaccine, subgroup and person, it is not surprising that no simple strategy to effectively address hesitancy in all its incarnations has been found. For example, vaccine information campaigns focused on facts have had only limited impact on hesitancy as risk perception and vaccine decision-making are often intuitive, made at the unconscious level and more influenced by emotions and beliefs than facts. Despite in account of failed attempts to decrease hesitancy through facts and myths busting campaigns, there are evidence-based strategies that can address hesitancy factors and increase vaccine acceptance. While many interventions have been tested to address one or more of the barriers to vaccine acceptance, three points must be emphasized. First, vaccine acceptance does not mean hesitancy is not present. Secondly, tailored multipronged strategies are more effective than single interventions across a broad population. Thirdly, what must not be lost in the focus on strategies to increase vaccine acceptance, is the importance of respect with empathy for different perspectives on immunization whether the conversation takes place in a public debate, one on one in a clinic, at a private social event or online. This overview provides a simplified mind map for addressing vaccine hesitancy in its many incarnations- detection, diagnosis and tailored intervention in order to improve vaccine acceptance at the population and individual patient levels.[2]

A few studies have been conducted worldwide to identify the factors associated with COVID-19 vaccine acceptance

among the general population. From which it was found that age, sex, education level, occupation, perceived risks of infection and previous uptake of influenza vaccination were associated with the intention to uptake of COVID-19 vaccine.[9] A systematic review of studies examining the confidence and receptivity for COVID-19 vaccines noted several important findings related to lower acceptance of vaccine including: fear of side effects, safety, effectiveness, belief that it is unnecessary, inadequate information, unknown duration of immunity, and general anti-vaccination belief.

Objectives

The objective of this study was to access the associations of age, gender, and level of education with vaccine acceptance in Kerala. This is a cross-sectional study conducted in a random sample of 525 participants from Kerala, India.

METHODS

This is a cross sectional study conducted in Kerala. 96% of eligible population vaccinated with a single dose till March 21. 82% of eligible population vaccinated with double dose till March 21. The sample size was determined as 525 using the formula;

$$n = Z2P(1-P)d2$$

Where n is the sample size, Z is the statistic corresponding to level of confidence, P is expected prevalence (that can be obtained from same studies or a pilot study conducted by the researchers), and d is precision (corresponding to effect size). The level of confidence usually aimed for is 95%.

The study duration was six months (January 2021- June 2021). The study was conducted in 525 people. The inclusion criteria were people above age category 18. The exclusion criteria's were people below age category 18 and pregnant and lactating women. Data was collected using a pre-designed structured questionnaire which has been validated. Participants were asked to fill a prepared Google form. The questionnaire was designed to assess knowledge and acceptance of COVID-19 vaccine. The data analysis was done using Microsoft excel-2010 version and results were presented in tabular and graphical form as frequency and percentage.

Study variables

Socio-demographic variables are age, gender, education, occupation and barriers for acceptance of vaccine.

RESULTS

Among the study population, 84% (439) were willing to take vaccine, while 16% (86) were not according to the graph, it can be concluded that the age category of 78-98 have the least rate of vaccine acceptance of 8% of total acceptance.

Table 1: Distribution of Total COVID-19 vaccine acceptance among study population.

Response	N	%
Yes	439	84
No	86	16
Total	525	100

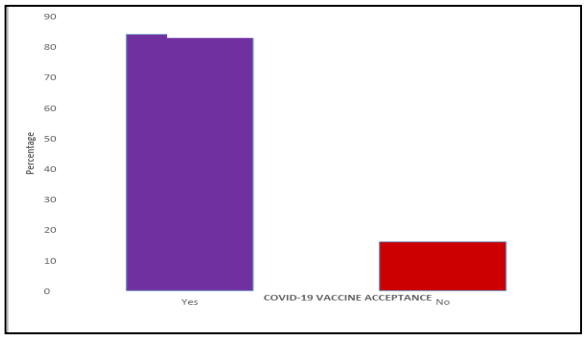

Figure 1: Distribution of COVID-19 vaccine acceptance among study population.

The age category 58-78 has 12% of total acceptance. The age group 18-38 has 54% and the acceptance of group 38-58 was found to be 26%. The above table reveals that out of 525 subjects, 229 which comprises of 44% of total responders are males and 296 (56%) responders are females.

Table 2: Distribution of age group.

Age group (years)	N	%
18-38	128	24.4
38-58	135	25.7
58-78	136	25.9
78-98	126	24
Total	525	100

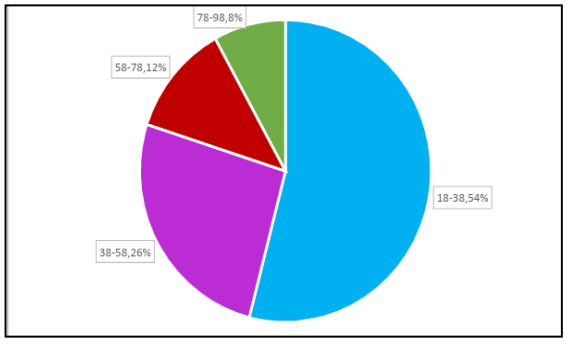

Figure 2: Distribution of acceptance based on age group.

The above graph illustrates that higher acceptance rate of 55% (240) in males and 45% (199) in females. Among the study population, 6% of participants were having

primary education, 29% have secondary education and 34%, 31% of population has UG and PG qualification respectively.

Table 3: Distribution of gender.

Gender	N	%
Male	229	44
Female	296	56
Total	525	100

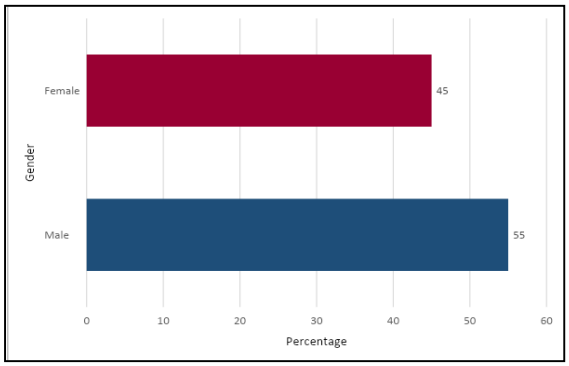

Figure 3: Distribution of acceptance based on gender.

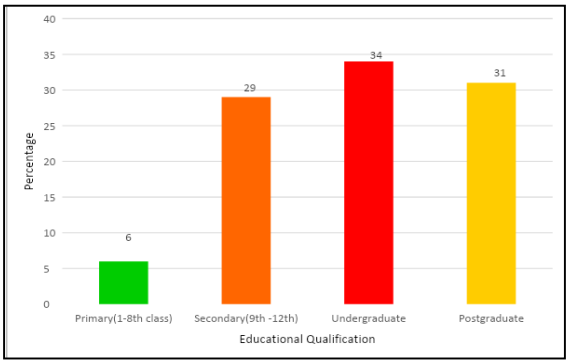

Figure 4: Distribution of educational qualification.

Table 4: Distribution of employment status.

Employment status	N	%
Employed	278	53
Student	82	16
Unemployed	165	31
Total	525	100

Table 5: Distribution of acceptance based on employment status.

Employment status	N	%
Employed	235	54
Student	72	16
Unemployed	132	30
Total	439	100

Highest rate of acceptance was found to be in postgraduates (35%) and undergraduate (31%). The responders with 29% of vaccine acceptance was found to be in people with secondary education (9-12 std). A very low acceptance rate of 5% was found within people having primary education (5%). According to this study, half of the total acceptance (54%) was found to be in employed people. 30% and 16% of total acceptances were unemployed people and students respectively.

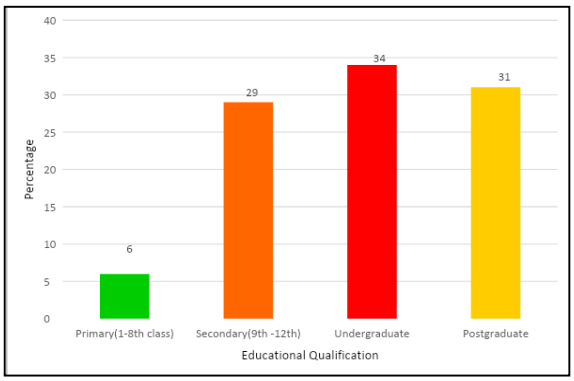

Figure 4: Distribution of educational qualification.

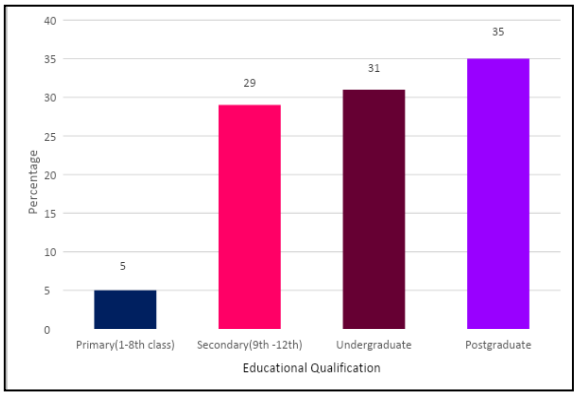

Figure 5: Distribution of acceptance based on educational qualification.

DISCUSSION

Since the beginning of 2020, the world has witnessed a catastrophe in the form of COVID-19. The global population has been anxiously waiting for a potential vaccine for more than a year to curb the pandemic. The key strategy to prevent the further progression and worsening of the scenario is an efficient vaccination program. COVID -19 vaccination has become the game changer as the world strike back with force to fight against a serious health crisis. The study aims at assessment of public knowledge and acceptance of COVID-19 vaccine. Major vaccines that were approved for emergency use in India are Covishield and Covaxin during the initial phases of vaccination drive. Vaccine hesitancy remains a significant barrier for the compliance and success of vaccination program. This study also involves a counselling section to improve acceptance by addressing hesitancy factors. This study was conducted

during the initial phase of vaccination drive from January to June. The study population consists of 525 participants.

Regarding total vaccine acceptance among study population the total acceptance of COVID -19 vaccine during first phase of the vaccination drive was found to be 83.75%. Among the 525 participants, 86 (16%) were not willing to take the vaccine. As an impact of counselling 76 (88%) out of 86 agreed to accept vaccine. According to a cross-sectional study among the general public of south India reported an acceptance rate of 69% among its population. Another study reported 77% acceptance in Chhattisgrah, 76% each in Odisha, Uttarakhand, Madhya Pradesh, Jharkand, 75% each in Bihar and Uttar Pradesh, 74% each in Himachal Pradesh and Rajasthan, 72% in Maharastra,70% each in Delhi, Assam, Telengana. 69% in Manipur, 68% each in Karnataka and Gujarat, 67% in Andhra Pradesh, 66 and 63% respectively in Haryana and Jammu Kashmir, 59% and 58% respectively in Punjab and Tamil Nadu. In general, the data are supporting each other showing higher rates of acceptance in Kerala. It was also found that most of the states was showing a higher rate of acceptance above 50% in India.

Regarding age group, according to an online survey conducted for creating public awareness and acceptance of COVID-19 vaccine 74% of acceptance was found in the age category 18-29, 25% in the age category 30-49. 0.3% in above 59 age.[2] Similar to this results in this study shows the age category of 78-89 have the least rate of vaccine acceptance of 8% of total acceptance. The age categories of 58-78 have 12% of total acceptance. The age group 38-58 have 26% and the highest acceptance was found to be in the age category 18-38 (54%). The data on acceptance of vaccine based on age category are complementary to each other. Regarding gender-based acceptance of vaccine many studies reports that vaccine acceptance varies with gender. Research conducted by Bhargava et al concluded that 65.5% of male and 34.5% of females were willing to accept the vaccine.[15] In our study finding, the results indicate higher acceptance rate of 55% in males followed by 45% in females. Higher rate of acceptance was found among males than females. Regarding the impact of educational status on vaccine acceptance several studies reported that educational qualifications of general population have an impact on vaccine acceptance. According to the study conducted by Bhargava et al it was found that participants with postgraduation educational status showed higher acceptance rate of 59.7%, whereas undergraduate showed acceptance of 57.7%.[15] According to the results from our study highest rate of acceptance was found to be in postgraduates (35%) and undergraduate (31%). The responders with 29% of vaccine acceptance were found to be in people with secondary education (9-12 std). Least acceptance was found in people having primary education with acceptance rate of 5%. Regarding influence of occupational status on vaccine acceptance studies reported that occupation status of general public had an influence on the subject acceptance of the COVID -19 vaccine. The study by Bhargava et al reported that subjects with self-employment showed 64.5% acceptance of acceptance rate whereas non-employed showed 57.62% of acceptance.[11-15] According to our study results "employed" participants showed 54% acceptance rate and "unemployed" subjects have 30% acceptance while 16% is acceptance among students.

Limitations

The study limitations are, the responses were collected from the individuals of only from southern districts of Kerala. The responses from other parts of the state could be analyzed if the study would have been conducted across Kerala. We collected the data only during the first phase of the vaccination drive, but the prevailing situation in Kerala might have caused some changes in the perceptions regarding COVID-19 vaccination among the general public.

CONCLUSION

This study highlights that 84% of the participants in southern Kerala demonstrated their willingness to receive the COVID-19 vaccine. This can be considered as a positive sign in controlling the spread of the ongoing COVID-19 pandemic. Although an efficient and safe COVID-19 Vaccine is critical for managing and ending the pandemic, it is also critical to ensure that the vaccine is widely accepted. The rapid development of the COVID-19 Vaccine might have contributed to the emergence of concerns among the general population that could affect the public acceptance of the vaccine. This study identified the concerns and misconceptions among the participants regarding the potential acceptance of COVID-19 Vaccine. This study found that the concerns regarding the vaccine side effects acted as a key barrier to vaccine acceptance. Through this study, we were able to address the barriers that contributed to vaccine hesitancy and our counselling transformed the unfavourable perceptions of the majority of those who expressed hesitancy regarding vaccine uptake. This study also identified people's most-trusted information sources about COVID-19 vaccines that could help in the dissemination of a multifaceted intervention to enhance vaccine acceptance. Moreover, we expect that the finding of this study could help the government, public health agencies, and awareness organizations tackle vaccine hesitancy and to enhance acceptance of the COVID-19 vaccine.

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Conflict of interest: None declared

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

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