RESEARCH ARTICLE

Assessment of factors influencing vaccine hesitancy for coronavirus disease-19 vaccines among the population of National Capital Region, India

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ABSTRACT

Background: Acceptance of vaccine for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) among general population is the most important step in combating coronavirus disease 2019 (COVID-19). In India, there is a lack of studies that recorded and assess the factors affecting the motivation of general public toward vaccination against COVID-19. Aim and Objective: The aim of this study was to assess the acceptance and/or hesitancy about the COVID-19 vaccine and the association of various demographic indicators in the population of the National Capital Region, India. Material and Methods: Cross-sectional study was conducted between March 15, 2021 and April 15, 2021, using pre-validated questionnaire containing 20 items. Data obtained was analyzed using the Microsoft excel platform using descriptive statistics. Results: Majority of 438 (45.5%) participants in our study agreed that the COVID-19 vaccine is important for their health. In this study, 323 participants said “yes,” 179 said “No,” 201 (20.9%) said “May be” regarding the key question about opinion of getting COVID-19 vaccination. About 395 (40.9%) agreed that they have concerns about the serious adverse effects of COVID-19 vaccines. A considerable portion of 316 (32.89%) of participants also thought newer vaccines carry more risks. Substantial population 286 (29.6%) also thinks the current COVID-19 vaccines are not useful against all existing variants of the CoV-2 virus. Conclusion: Vaccine hesitancy in this study reflects the concerns about the serious adverse effects, exposure to unreliable information, and probes towards vaccine infectiveness. Dissemination of the evidence-based information about the necessity, effectiveness, and safety of COVID-19 vaccines is required to enable the general population to make the right informed decision.

KEY WORDS: Coronavirus Disease-19; Vaccine Hesitancy; Severe Acute Respiratory Syndrome Coronavirus-2, Adverse Effects

INTRODUCTION

Vaccination is one of the most successful public health interventions of modern medicine. The world has seen the eradication of two major infections, smallpox, and rinderpest. Global coverage of vaccination against many important infectious diseases of childhood has been enhanced dramatically in the past few decades.[1] Vaccines play an important role for population immunity as well as preventing severe disease. The world is currently rolling under the grasp of coronavirus disease-2019 (COVID-19) pandemic. Severe acute respiratory syndrome coronavirus (SARS-CoV-2), the virus responsible for the COVID-19 infection, is considered highly contagious by a number of experts. As of August 2021, COVID-19 infection has claimed more than 4.23 million lives.[2]
Initial studies on COVID spread established it as a close contact droplet infection. This has resulted in the adoption of COVID appropriate measures viz. face mask, hand hygiene, social distancing, cough/sneeze etiquettes as an effective measure to contain the spread of the disease. Many governments across the world have adopted a strategy of “Lockdown” to minimize and prevent the rapid spread of infection. These stringent pandemic curbing measures impacts the general population affecting routine immunization for other infectious diseases. Rapidly rising repeated waves of infections with increasing morbidity and mortality numbers along with flood of ever increasing “infodemic” resulted by use of social media apps such as WhatsApp, Twitter and Facebook are associated with spread anxiety and fear about the COVID-19 pandemic among the population.

Following the emergency use authorization of couple of COVID-19 vaccines in the western world, the Indian authority subject expert committee of the Central Drugs Standard Control Organization met on 1st and 2nd January 2021 and made recommendations in respect of the proposal for Restricted Emergency Approval of two COVID-19 virus vaccines of M/s Serum Institute of India and M/s Bharat Biotech. The ChAdOx1 nCoV-19 vaccine (AZD1222-COVISHIELD™) was developed at Oxford University and consists of a replication-deficient chimpanzee adenoviral vector ChAdOx1, containing the SARS-CoV-2 structural surface glycoprotein antigen (spike protein; nCoV-19) gene. M/s Bharat Biotech has developed a Whole Virion Inactivated Corona Virus Vaccine (COVAXIN™) in collaboration with ICMR and NIV (Pune), from where they received the virus seed strains. This vaccine is developed on Vero cell platform, which has well-established track record of safety and efficacy in the country and globally.

The World Health Organization defines vaccine hesitancy as a “delay in acceptance or refusal of vaccines despite availability of vaccination services.” Vaccine hesitancy is said to be present when vaccine acceptance in a specific setting is lower than would be expected, given the availability of vaccine services. Thus vaccine hesitancy is a socio-behavioral phenomenon—which is vaccine and context-specific and measured against an expectation of reaching a specific vaccination coverage goal, given the immunization services available. With the explosion of information on the internet and social media, there is growing concern that vaccine hesitancy and the presence of anti-vaccination factors will dampen the uptake of a COVID-19 vaccines. There are many cited reasons for vaccine hesitancy viz. doubtful unreliable information, doubtful effectiveness, fear of needles, fear of serious adverse reactions, etc. There are many studies available for vaccine hesitancy about childhood vaccines, but literature is lacking regarding evidence about vaccine hesitancy present in COVID-19 vaccines. The current study intends to explore the above-mentioned factors and to assess the prevalence of COVID-19 vaccine hesitancy and the association of various demographic indicators among the population of National Capital Region (NCR), Delhi.

**Aim and Objective**

To assess vaccine hesitancy about COVID-19 vaccine among the population of NCR, India.

To study the association of various demographic indicators and Vaccine hesitancy in population of NCR, India.

**MATERIALS AND METHODS**

**Study Design**

The current cross-sectional study was designed to obtain data by means of a physical questionnaire distribution (in English and Hindi), which was conducted between March 15, 2021 and April 15, 2021, and targeted the residents in NCR- Delhi.

The eligibility criteria included age more than or equal to 18 years, current residence NCR, Delhi, and an ability to read and understand English or Hindi. Each participant was given the maximum period of 7 days to answer the form, after which no submission was accepted. Responses submitted by participants <18 years old and non-residents of NCR Delhi were excluded from the study.

**Study Instrument**

The pre-validated questionnaire was distributed as physical forms in English and Hindi asking about the voluntary participation in the study and submission of responses.

The questionnaire comprised two sections with a total of 20 items. The first section on demographics and the experience with COVID-19 included questions on the following: name, age, gender, residence in NCR, educational level, annual income (not mandatory), occupation, health care worker, and/or comorbidities in a family member. The section also included perception about getting vaccinated for COVID-19 and any reasons for not doing so.

The second section comprised ten items that assessed Likert scale based responses about perception and attitude towards vaccine acceptance as well as hesitancy. The questionnaire was formulated based on the guidelines given by the WHO in report titled, “report of the sage working group on vaccine hesitancy.”

**Statistical Analysis**

Data obtained was analyzed using the Microsoft excel platform using descriptive statistics. Data was encrypted using password protection provided by Microsoft Excel platform2007® to ensure participant data protection.
Statement of Informed Consent and Ethical Considerations

This study was approved by the Institutional Ethics Committee-School of Medical Sciences and Research, Sharda University. (Decision Number: Ref.No.SU/SMS and R/76/A/2021/52, Decision Date: 11.03.2021). Participation in the study was voluntary, and informed consent was included in the introductory section of the physical questionnaire. All collected data were treated with confidentiality.

RESULTS

The questionnaire was distributed to total of 1200 people in Delhi NCR out of which 964 people responded positively in the set span of total of 7 days, at the end of given period the filled questionnaire submission was stopped. Among the responded participants 642 (66.5%) were males and 322 (33.5%) were female. Majority of respondents 401 (41.6%) had income range of 5–10 lakh Indian rupees (INR) followed by 369 (38.3%) respondents having up to 5 lakh INR annual income [Table 1]. A major number of respondents in our study 434 (41.5%) had good education of graduation and above [Figure 1], around 363 (37.6%) were self-employed and 193 (20.1%) worked in private jobs [Figure 2]. A key question about opinion of getting COVID-19 vaccination was answered by all respondents of which 323 (33.5%) said “yes,” 179 (18.5%) said “No,” 201 (20.9%) said “May be” and 261 (27.1%) opined they needed further information to take the vaccination decision [Figure 3].

The respondents who opined “No” or “May be” for the key question of “intent of vaccination” were further probed for their decision for confusion regarding the decision, among these 323 (33.5%) said they heard about safety issues of vaccine in media or social media, 249 (25.8%) cited reason of fear of needles, 294 (30.4%) were unsure of finding the reliable information and 187 (19.3%) thought the vaccine is not effective [Table 1]. We also enquired about senior citizen (>60 years) in family, health care worker(s) in the family, and any family member with existing co-morbidities. Among the participants-about 559 (58.0%) said there is a senior citizen in their family and 65 (6.7%) respondents had a health care worker in the family, about 629 (65.3%) participants notified about co-morbidity such as diabetes, hypertension, or asthma in the family [Table 1].

A separate section in our study was dedicated to assess the perception of vaccine acceptance and attitude towards vaccine hesitancy using Likert scale based responses [Figure 4]. Amongst the key questions, majority 438 (45.5%) participants in our study agreed that COVID-19 vaccine is important for their health. Almost similar number of participating population 414 (42.9%) felt COVID-19 vaccine can protect them against the corona virus disease. About 395 (40.9%) agreed that they have concerns about serious adverse effects of COVID-19 vaccines. A considerable portion 316 (32.89%) of participants also thought newer vaccines carry more risks. Majority respondents 390 (40.4%) in this study strongly disagree for the statement that “COVID-19 infection is decreasing so there is no need of vaccines.” Substantial population 286 (29.6%) also thinks the current COVID-19 vaccines are not useful against all existing variants of CoV-2 virus.

Table 1: Demographic parameters, family data, and reasons for vaccine hesitancy

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th>n (%) (Total n = 964)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>642 (66.5)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>322 (33.5)</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Yearly income</td>
<td>0 to 5 Lakh</td>
<td>369 (38.3)</td>
</tr>
<tr>
<td></td>
<td>5 to 10 Lakh</td>
<td>401 (41.6)</td>
</tr>
<tr>
<td></td>
<td>10 to 15 Lakh</td>
<td>132 (13.6)</td>
</tr>
<tr>
<td></td>
<td>More than 15 Lakh</td>
<td>62 (6.5)</td>
</tr>
<tr>
<td>Is any member including you in your family? (can choose multiple options)</td>
<td>You or family member(s) is/are Senior Citizen &gt;60 years age</td>
<td>559 (58.0)</td>
</tr>
<tr>
<td></td>
<td>You or family member(s) is/are health care worker</td>
<td>65 (6.7)</td>
</tr>
<tr>
<td></td>
<td>You or family member(s) have diabetes, hypertension or asthma</td>
<td>629 (65.3)</td>
</tr>
<tr>
<td>I would not take COVID-19 vaccine due to...(can choose multiple options)</td>
<td>Have heard from media or social media that it is not safe</td>
<td>323 (33.5)</td>
</tr>
<tr>
<td></td>
<td>Did not know where to get correct information</td>
<td>294 (30.4)</td>
</tr>
<tr>
<td></td>
<td>Someone I know had serious reaction to vaccine</td>
<td>53 (5.4)</td>
</tr>
<tr>
<td></td>
<td>Does not think vaccine is effective</td>
<td>187 (19.3)</td>
</tr>
<tr>
<td></td>
<td>Because of herd immunity now it is not required</td>
<td>265 (27.4)</td>
</tr>
<tr>
<td></td>
<td>Fear of needles</td>
<td>249 (25.8)</td>
</tr>
</tbody>
</table>

Figure 1: Education of responders (%)
DISCUSSION

The world is reeling under the global pandemic worst in last 100 years after the Spanish flu of early 20th century. Particularly developing world has an ongoing huge rise in the 2nd wave of COVID-19, with anticipation of further waves in the near future. It is pertinent to note that even though the medical fraternity is sufficiently aware of COVID safety precautions,[14] expecting the same in general population is not logical, therefore the mass vaccination program becomes highest priority. Despite the vaccination program being conducted in a war-scale, the reception and acceptance of vaccine remains questionable. To our knowledge we have conducted the first vaccine hesitancy survey in the NCR of the subcontinent. In the midst of raging pandemic, it is of key importance to identify barriers for vaccination uptake so that right strategies can be prepared to maximize vaccine acceptance. Literature indicates vaccine hesitancy is a common phenomenon globally, with myriad of reasons for decreased vaccine acceptance.[15,16] Common and important reasons are perceived risks versus benefits, certain religious beliefs and lack of knowledge and awareness.[17,18] We intended to find out if these reasons can be applied analogous to COVID-19 vaccines. In our study 33.5% population accepted the COVID-19 vaccination and 18.5% refused it and 20.9% were in confusion state, this is in contrast with the study in French population where acceptance rate was 71.9% and outright refusal was 28.8% participants.[19] A similar hesitancy study conducted in Egyptian medical students reported 46% of vaccine hesitancy and 6% vaccine refusal.[20] About 33.5% participants in our study referred
to confusing information in social media/broadcast media for their lack of belief in safety of the vaccine. This is in contrast to study conducted in Jordan and Kuwait where the authors reported participant beliefs in COVID-19 vaccine conspiracy theories regarding injecting microchips into recipients and the vaccines are related to infertility.[21] This particular Arab study also reported vaccine acceptance rates for COVID-19 and influenza vaccines were 29.4% and 30.9%, respectively.[21] About 20.9% of participants in our study stood undecided about going for vaccination and 27.1% opined they wanted further reliable information about vaccines in order to make a decision. Our findings depict that the public understanding results from the overabundance of both right and wrong information, thereby causing confusion in accepting or rejecting the vaccine.[22] In our study 19.3% of participants felt that vaccines can be ineffective; this is in contrast to the Egyptian study where 93.2% of medical students expressed concerns of ineffectiveness.[20] This disparity in findings may have been resulted due to the difference in education background of the study population in respective studies. Around half of our study participants felt the COVID-19 vaccine is important for their health and expressed positive attitude for vaccination which is in contrast with the account reporting association of the negative attitude toward COVID-19 vaccines and resulting unwillingness to get the vaccines.[23] More than half of our participants expressed concerns about serious adverse effects of vaccination, this is in similar lines to the other studies which have reported similar proportions of adverse reaction concerns.[12,19,24] Majority of participants (55.5%) participants in this study opined that COVID-19 vaccine helps in protecting them from coronavirus and vaccines are important also for the health of community. Similar findings were obtained from the participants who reported community protection feelings in a hospital-based Philadelphia study.[25]

Strengths and Limitations
We assessed the vaccine acceptability and responses by direct interaction with the participants following the strict Covid-appropriate behaviors, this mode of data collection increases the trust and reflects real-world perceptions- which can be considered as the strength of this study. Our study involved physical questionnaire distribution and collections; dissemination of survey by electronic means (e-mails, Whatsapp, social media, etc) was not considered- since we felt physical reporting returns with more serious, genuine responses and less attrition rates. This can also be taken as a limitation of this study since electronic means of survey dissemination has a wider reach and easier data collection also results larger sample size. The investigators of this study distributed questionnaires in their zonal residential populations, this might have resulted in geographical bias.

CONCLUSION
Participants reported considerable vaccine acceptance with indecisiveness regarding the safety. Vaccine hesitancy in our study reflects the concerns about the serious adverse effects, exposure to unreliable information, and probes towards vaccine infectiveness. Even though a substantial proportion of the population expressed the feeling that COVID-19 vaccines are protective, there is a need for the provision of further information to make decision. The government agencies, private organizations, mass media, and educational institutions can play a vital role in the dissemination of the essential evidence-based information about the necessity, effectiveness, and safety of COVID-19 vaccines. Consequently, enabling the general population to make the right informed decision.

REFERENCES

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