

Short Commentary*Open Access, Volume 3***Barriers and motivators about COVID-19 vaccination*****Corresponding Author: Zohreh Jadali**

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Received: Jun 02, 2022

Accepted: Jul 05, 2022

Published: Jul 12, 2022

Archived: www.jcimcr.org

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DOI: www.doi.org/10.52768/2766-7820/1942

Keywords: COVID-19; Vaccines; SARS-CoV-2.

Short commentary

The Coronavirus Disease (COVID-19) pandemic is a natural disaster and its destructive effects will have serious long-term consequences for the economics and global health. This deadly disease is caused by infection with Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2) which belongs to the coronaviridae family [1]. At present, there are no effective specific antivirals or drug combinations for COVID-19. Therefore, development of effective vaccines against this disease is one of the most important strategies for infection prevention and control. As a result of vaccination importance, global research efforts have focused on the development of vaccines against COVID19. Fortunately the efforts have borne fruits and it is appeared that it is possible to a rise a sufficient amount of immunity in a large part of the world population with vaccines. In relative short time period, multiple vaccines have been approved for use around the world and great numbers of vaccine candidates are under constant development. This is unquestionably

an important success story in the vaccine history. Much of this success is owed to real international collaboration and large public investment in vaccine manufacturing capacity. Extensive knowledge from previous vaccines is another important factor that will need to be considered [2].

SARS-CoV-2 contain four major structural proteins: Spike(S), envelope(E), membrane(M), that are important for the formation of virus envelope and nucleocapsid(N), that contribute to the formation of the capsid and the packaging of genomic RNA. Among them, S protein is the most promising candidate antigen for vaccine development. This protein is highly immunogenic and contains five linear immunodominant sites. Moreover, it has been shown that anti-S antibodies are long-standing and can provide protective immunity. It must be mentioned that S protein mediates SARS-CoV-2 entry into cells via interaction with angiotensin-converting enzyme 2 [3].

Several approaches such as viral vector vaccines, whole-inac-

tivated vaccines, and live-attenuated vaccines have been used for vaccine development against COVID-19. Each of them has their own strengths and weaknesses based on its capacity to induce protective immunity against its target antigen, vaccine production capability and safety for human consumption [4]. Moreover, these technologies appear to determine the vaccine cost, stability, storage and transport requirements. All of these characteristics are providing opportunity as well as challenges for vaccine manufacturers. For instance, Pfizer-BioNTech vaccine (a messenger RNA based vaccine against 4 COVID-19) needs ultra-cold freezer storage (-80°C to -60°C). This is an issue that hampered the accessibility of the vaccines to low- and middle income countries because safe distribution of this vaccine requires cold-storage infrastructure. In contrast, China's Sinopharm vaccine as whole inactivated virus vaccines can be stored at normal refrigeration temperatures of 2 to 8 degrees centigrade. Therefore, it can be given to a large number of people in almost every region of the world [5].

Vaccine efficacy and safety is another important issue that must be considered. Every authorized vaccine have gone through intense safety testing in a complex multi-step process [6]. In most instances, careful evaluation can take several years to occur. But for COVID-19 vaccine this time was faster than usual. Several factors are responsible for the rapid development of COVID-19 vaccines. Among them the more important are the following:

1. The use of advanced manufacturing technology in vaccine production.
2. Increasing the number of vaccine volunteers via social media efforts that generate high level of enthusiasm around the COVID-19 vaccines.
3. Some companies began manufacturing their COVID-19 vaccine before gaining authorization or approval. Therefore, some supplies would be ready when they were authorized. This method facilitates the availability and use of vaccine.

In spite of the rapid development of vaccines against COVID-19, successfully vaccinating the global population faces several fundamental challenges, from manufacturing to distribution, deployment, and acceptance.

Equitable distribution of vaccines for all countries regardless of their ability to pay, political orientation and ideological inconsistencies is an important issue in terms of ethics and social justice that must be considered. Unfortunately, basic information about COVID-19 vaccine manufacturing technology remains confined mostly to developing countries. Therefore, international cooperation between developed and developing countries is necessary for fair, equitable and timely allocation of COVID-19 vaccines globally [7].

Achieving a balance between vaccine demand and supply is another essential requirement for disease control and eradication. This issue has a direct relation to technical problems that are connected with the large-scale production of vaccine [8].

Maintenance of high levels of immunity against COVID-19 in the next years is also an essential part of prevention. The appearance of new variant of SARS-CoV-2 that escapes from natural and 5 vaccine-induced immunity [9] can reduce vaccine effectiveness. Therefore, COVID-19 vaccines need to be updated

with a new vaccine in response to emerging variants of the SARS-CoV-2. COVID-19 vaccine hesitancy and resistance is another barrier against the prevention and control of COVID-19. There are many reasons for vaccination avoidance such as conspiracies, misinformation, fake news on the safety of vaccine and some observations on the serious side effects of COVID-19 vaccine. Providing clear, useful, and trusted information to address pressing public questions are the effective ways to combat this problem [10].

Conclusion

In summary, widespread vaccination is a suitable approach in inducing herd immunity for many diseases including COVID-19. Therefore, anticipating and addressing corona virus vaccination challenges can help design actionable plans and new strategies to prevention or control of disease. Although, the global effort in response to the COVID-19 pandemic is unique, but the end of this pandemic is not really in sight. Therefore, continued efforts should be made to identify and remove obstacles and barriers for eradicating the disease.

Conflict of interest: There is no conflict of interest.

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