¹Jiangsu Province Hospital, The First Affiliated Hospital of Nanjing Medical University, Nanjing, Jiangsu, China.

²Department of Neonatal Pediatric surgery, The Children's hospital, Pakistan Institute of Medical Sciences, Islamabad, Pakistan

³State Key Laboratory of Pharmaceutical Biotechnology, Institute of Artificial Intelligence Biomedicine, Nanjing University, Nanjing, China

⁴Riphah Institute of Pharmaceutical Sciences, Riphah International University, Islamabad, Pakistan

Corresponding Author:
Muhammad Abbas, PhD
Email:
tanoliabbas7@yahoo.com

Hesitancy towards COVID-19 Vaccination and Neutralization of False Perceptions among the Communities

P.S.H. Weerawarna¹, Murad Habib², Muhammad Abbas^{3,4}

Abstract

Coronavirus disease 2019 (Covid-19), which has invaded every continent very rapidly, has already been a pandemic. The best solution only seems to be the vaccination rather than simple preventive measures such as wearing masks, frequent hand washing, and social distancing.

In this article, we analyze the factors affecting hesitancy, delay, and refusal of Covid-19 vaccines and suggest how to take steps to overcome the vaccine hesitancy, thus increasing acceptance and eliminating the pandemic as soon as possible.

A comprehensive literature search was performed using Medline/PubMed, Web of Science, and Google Scholar to identify empirical literature published in English until April 2021.

Several countries and pharmaceutical companies have come up with different vaccines for SARS-CoV-2 coronavirus. Since several strains are emerging, more new vaccines will come to the market. The cost, facilities available, and convenience need to be considered in choosing an option for vaccination. Although the world is looking at the positives of vaccines and getting out of this threat, some more factors might slow down that effort. Vaccine hesitancy, delay, or refusal should be discussed extensively as that influences the vaccination process remarkably.

The demographic features of several communities, educational background, socio-economic status, and trust in healthcare services are factors leading to vaccine hesitancy or acceptance. The governments, experts, and healthcare professionals should have an excellent understanding of the factors influencing hesitancy and acceptance and should take necessary steps to encourage the population's vaccination.

Keywords: COVID-19; Approved vaccines; Vaccine hesitancy; Vaccine Promotion; Vaccine Awareness; Worldwide

Introduction

A novel coronavirus (Covid-19) outbreak has led to restrictions in most of the day-to-day functioning. It has already caused numerous damages to massive economies, to an extent where the world's best healthcare systems have run out of capacity (1). The disease itself has caused a threat to human lives. Furthermore, the presence of

chronic diseases making the risk of high morbidity and mortality is very significant today (2).

Despite all the disabilities, human beings have been able to come up with several solutions to date. The vaccination is one of the huge landmarks in eliminating the infection, and that's the sole option. Several vaccines have already come to the market. However, the perception among the people towards that varies (3). The vaccination drive is on in many

countries worldwide, with the priority being given to healthcare workers as the frontline of Covid-19 elimination program (4). Many countries, including low- or middle-income countries, have been successful in vaccinating their frontline. However, vaccinating the general communities is also necessary to successfully combat the pandemic since at least immunizing 70-80% of the total population is needed (5,6).

However, the topic “Vaccine Hesitancy” might be a topic to discuss in a situation where we have vaccines coming out during a short period of clinical trials. It can be defined as the delay in acceptance or refusal of vaccines despite the availability of vaccine services (7). Vaccine refusal is also a subset of vaccine hesitancy and delay. Therefore, the major problem to be addressed now is hesitancy.

Methodology

A comprehensive literature search was performed using Medline/PubMed, Web of Science, and Google Scholar by using all identified keywords associated with COVID-19 vaccine hesitancy worldwide. This review considered articles of any design (experimental, epidemiological or mixed) published in English in peer-reviewed journals or grey literature until April 2021. The core search terms of (2019-nCoV, OR SARS-COV-2 OR COVID-19) AND (Pandemic) AND (Approved Vaccines) AND (Treatment) AND (Vaccine hesitancy) AND (Vaccine resistance) AND (Contributing factors) AND (Awareness) AND (worldwide) were used.

Global Pandemic Overview of COVID-19

COVID-19 was first identified in Wuhan, the People's Republic of China, as an outbreak. It has already spread globally, leading to a massive pandemic that the world has seen (8). It is caused by SARS-CoV-2 coronavirus, which belongs to the Coronaviridae family (8). They are enveloped, positive-sense single-stranded RNA viruses with a helical nucleocapsid. 133,736,008 cases have been confirmed worldwide as of 8th April 2021, and the disease has claimed 2,902,156 lives (9).

The most common clinical manifestations included cough, fever, myalgia or fatigue, dyspnea, etc. Since it is a respiratory virus, mask-wearing, frequent hand washing, and social distancing have been the mainstay in preventing infection for more than a year now (8). However, the introduction of the latest vaccines

against this disease has been great news for few months. The greatest number of infections and deaths are reported from the United States of America, followed by Brazil and India (9). New variants of the virus have already been identified in the UK, South Africa, and Brazil (10). The experts in the field are developing new vaccines for the disease. However, the mutations might make the task difficult (10).

Available vaccines

There are many options available in the market for the immunization against Covid-19, as summarized in Table 1 (11).

BNT162b2 BioNTech/Pfizer

BNT162b2 has been an early option, which includes an Encapsulated mRNA vaccine encoding for the spike protein. The cells start producing spike proteins resulting in an immune response. It showed an efficacy of 95% against the original strain in phase 3 trials. However, the high cost and requirement of freezing temperatures to be stored has caused this to be an unpopular option in low- and middle-income countries (12).

mRNA-1273 Moderna

mRNA-1273 is another spike protein-producing agent which is also an encapsulated mRNA vaccine. It is 94% effective against the original strain. This also has the disadvantage of being expensive and requires freezer facilities (13).

ChAdOx1 / AZD1222 (Covishield) Oxford / AstraZeneca

ChAdOx1 / AZD1222 is a very cost-effective option with an efficacy of 82% against the original strain and 10% against the B.1.351 “SA” strain. The mechanism is different from the above two where this is a viral vector vaccine. This is encoding dsDNA for the spike protein. Ability to be stored in temperatures +2-8 Celcius has been a very vantage point of this vaccine (14).

JNJ-78436735/ Ad26.COV2. S Johnson & Johnson

JNJ-78436735/ Ad26.COV2. S is a single-dose vaccine that is also cost-effective in price and in storage facility temperatures. This is 72% effective against the original strain and 57% effective against the B.1.351 “SA” strain (15).

Spuntilk-V Gam-Covid-Vac Gamaleya (Sputnik V)

Spuntilk-V is a 91% effective vaccine against the original strain. It's a viral vector vaccine that is cost-effective although it needs two shots 21 days apart. Can be stored in normal refrigerator temperature for 6 months (16).

NVX-CoV2373 Novavax

This is a virus-like particle vaccine which also is a two-dose vaccine. It is also inexpensive, and very effective against original strain (95%), B1.1.7 “UK” strain (85%) and B1.351 “SA” strain (60%) as well (17).

BBIBP-CorV/Sino pharm

BBIBP-CorV/Sino pharm is a China-made vaccine that is 79% effective against the original strain, an inactivated virus. This two-dose vaccine, although a bit demanding in cost, can be stored in regular refrigerators. +2-8 C temperature range is adequate for storage (11).

CoronaVac/SinoVac

SinoVac is another Chinese inactivated virus vaccine that was only 50% effective against the original strain. It also needs two shots to get the complete immune response and doesn't need to store at freezers (11).

Table 1: Mechanisms of action of vaccines used for COVID-19 treatment.

Vaccine	Mechanism of action
BNT162b2 BioNTech/Pfizer	Encapsulated mRNA vaccine. mRNA which encodes for spike protein, is protected in a lipid nanoparticle. When taken up, the cells can express the spike protein resulting in an immune response (12).
mRNA-1273 Moderna	Ditto (13).
ChAdOx1 / AZD1222 (Covishield) Oxford / AstraZeneca	Viral vector vaccine. dsDNA encoding for the spike protein is protected in a safe virus. When a cell is infected, spike proteins are expressed leading to an immune response (14).
JNJ-78436735/ Ad26.COV2.S Johnson & Johnson	Ditto (15).
Spuntilk-V/Gam-Covid- Vac	Ditto (16).
Gamaleya (Sputnik V)	
NVX-CoV2373 Novavax	Virus like particle vaccine. Nanoparticles are coated with synthetic spike proteins. An adjuvant is also added (17).

BBIBP-CorV Sino pharm

Inactivated virus vaccine. Here the SARS-CoV2 is chemically inactivated, but it contains all the proteins intact (11).

CoronaVac SinoVac

Ditto (11).

Although more options are currently available, vaccine hesitancy is something that the responsible authorities need to eliminate. There are several factors responsible for vaccine hesitancy.

Factors contributing to vaccine hesitancy/ resistance

Most common reasons for hesitancy are concerns about side effects, long-term effects on health and lack of trust in vaccines. Many complaints have been minor ones, such as pain related to injection, fever, and myalgia, etc. In addition, some beliefs such as the possibility that vaccines may cause learning disabilities such as autism, that vaccine ingredients may be unsafe and that vaccines are not tested enough for safety also concerns (18).

Cultural and religious beliefs are a huge barrier to penetrate. Some beliefs, such as the spread of the Covid-19 virus itself, are due to eating the flesh of animals, and some other anti-scientific and pseudo-scientific beliefs have created a hindrance for people to believe in vaccines as well (19).

The lack of basic education, lower income, being uninsured, living in rural areas and lack of access to emerging novel science and technology, new trends and innovations have restricted many individuals being hesitant to take a shot (19). Some people aren't even aware what the Covid-19 disease itself is. The inadequate knowledge of available vaccines and their adverse effects i.e. Pain, redness, swelling, tiredness, headache, muscle pain at injection site, chills, fever, nausea, diarrhea and allergic reactions such as anaphylaxis- extremely rare are also a pitfall (20). The belief that vaccines are unnecessary, insufficient information, unknown/short duration of immunity and a general anti-vaccine stand were associated with lower acceptance (19). Since the general population is mainly paying attention to the adverse effects, the media also emphasizes the importance. However, they are not aware of the adverse effects in detail.

The belief that vaccines' administration causes death in some individuals, morbidity in some, and not having an understanding of simple allergic reactions to anaphylaxis is also a threat to the popularity of

vaccines. Also, the belief that vaccines might affect fertility is another dilemma among the public, thereby making women more reluctant to the vaccine²¹. Lower intentions among women than men- A recent multi-country study reported that women's vaccine refusal was more than double men's (19).

Many demographic factors hide behind access to immunization against Covid-19. As a recent US study suggests, ethnicity also matters (22). The high refusal rates were seen in Blacks, women and conservatives, and healthcare workers in ethnic minorities. Racism, discrimination, previous unethical healthcare research in black populations, discrimination of minorities in medical research, etc., might be the reasons (23). Ethnicity usually reflects socioeconomic status, and making vaccine access more difficult and also increasing hesitancy.

Asian Americans were even more receptive than whites. Some Asian countries such as China and South Korea have higher rates of acceptance. Majority expressed confidence in domestically-made COVID-19 vaccine (24). However, in one study where they observed Willingness to pay and country of origin of vaccine, US-made vaccines were preferred in the US, while in China, people expressed no preference (25). People over 55 or 65 were among the most receptive, where younger age had low acceptance. Lower rates of vaccination among overs 80s in ethnic minorities was also salient (26). Having a college degree or not also affected vaccine acceptance, where people having no degree were hesitant towards a vaccine, and acceptance of a vaccine was highest in post-graduates (25).

Healthcare workers (HCWs) involved in the care of COVID-19 positive patients were more likely to receive COVID-19 vaccination if and when available (27). However, HCWs not caring for SARS-CoV-2 positive patients expressed higher levels of vaccine hesitancy (27).

Previous vaccine malpractices have caused less confidence about vaccines. Concerns regarding the possibility of fake or faulty COVID-19 vaccines, lack of trust in the health care system, the pharmaceutical companies that brought the vaccines to market in a very brief period (24). In addition, the loss of belief among the community about the government of the country also is the main obstacle (18). The government officials, including health authorities and healthcare workers not paying much attention to reaching the

general population regarding awareness of the vaccines, are also realized as contributors.

The internet has led allegations of vaccine injury to spread all around the world rapidly (16). Social media is a significant threat when it comes to fake news circulation. However, it can be called a double-edged sword since it can benefit if authorities can access them. Politicians and government officials' request to take the vaccine before the general population has also been a very important discussion topic over social media, which further clarifies less trust about the vaccine among the public. However, certain countries' politicians also take the initiative to be vaccinated to encourage the people (28).

Psychological factors such as altruistic beliefs, neuroticism and conscientiousness, locus of control and cognitive reflection also contribute to vaccine hesitancy (29). The lack of motivation and psychological support is also a leading contributor. Lack of well-driven health promotion programs, especially during the pandemic, fails to keep peoples' knowledge up to date (30).

Most communities have the opinion of delaying the vaccination until the safety is confirmed and they didn't want to be the first to take. They preferred to wait until others have taken it (25). Fear of injection itself is a factor for vaccine hesitancy. Pain on injection, local reactions are some of them (7).

Overcoming vaccine hesitancy

The hesitancy should be appropriately addressed, and it needs timely solutions to overcome. The involvement of all the levels of representatives is mandatory to achieve this. Mass vaccine promotion campaigns are a way to enhance positive attitudes towards vaccination, through health promotion programs.

The rural population should be reached and communicated; messages should be given clearly, especially to uneducated citizens. Firstly, knowledge of the disease should be taught. The nature of the viral illness, the reason for quarantine, and so forth. The severity of the Covid-19 virus pandemic, as an example the real number of infections and mortalities, how dangerous is the pandemic should be realized by the public, the consequences, and then the methods of prevention such as face masks and hand washing, but most importantly vaccination being the only best option to eliminate the pandemic from the globe should be explained to the public.

The General Practitioners (GPs), the primary healthcare providers, are more likely to trust people. Thus supporting the community attached to direct healthcare services should take place (26). The doctor's recommendation was more accepted by people even more than the FDA recommendation. Opinion of families and friends also is a leading contributor (25).

Non-stigmatizing messages should be required to eliminate the myths and doubts regarding the religious acceptability of vaccines (26). Religious leaders may play essential roles. Since most low- and middle-income countries believe in herbal treatment, drugs, etc. and high bias towards religious beliefs, the priests of the respective religions, can be used as a mode of communication to their devotees to explain the benefits of the vaccine and also to teach them that there's nothing offensive to the religion in taking the vaccine. In addition, places of worship can be used as vaccination sites (26). Providing transport and food to people who come for vaccination is also an incentive to encourage vaccination (26).

Clear information regarding the content of the vaccines should be explained. Mechanism of action of the vaccine used should be explained in simple terms in their native language. This information should come in multiple languages- and they can be prepared as leaflets, or brochures, etc. (26). The advantages, effects and adverse effects must be addressed. People should be told about the severity of adverse effects and false beliefs regarding adverse effects should be corrected. Real data should be provided and should be explained, and should be explained about allergy and anaphylaxis. They should be allowed to ask questions and clear the doubts.

The fact that it is still being studied about pregnant women's safety for vaccination, other individuals should be encouraged to achieve herd immunity. Experts can be involved for those, but personnel- (e.g., Public Health Inspectors) who are closer to that particular population should interact with the public. Those facts should be delivered to and understood by the general public to convince them and bud positive attitudes towards immunization. The healthcare workers themselves can be an inspiration to the public.

Some countries have adopted administering the vaccine free of charge to the people, which is a very positive move. Most populations are hesitant due to the unwillingness to pay (25). The lack of enough financial support to spend for healthcare will always

be a problem for low-and middle-income countries (31).

Steps should be taken to monitor social media and other communication modes to tackle the spread of false information about the disease and the vaccination. Legal actions can be taken to spread fake news.

Pain at injection is an issue that has to be considered when administering any vaccine (7). Childhood history of traumatic experiences during vaccination might cause future fear towards injections (25). Psychological support to them will be worthwhile. Guidelines on pain mitigation during vaccination can be followed, so that fear of vaccination can be eliminated (7).

Conclusion

Vaccine Delay, Hesitancy and Refusal is a significant point in the list of hindrances to successful immunization of the world's population. Emerging strains will also add up to that. It has a vast range of factors contributing which differs from one country to another, community to community. Many solutions are available, and governments and healthcare experts task is to look for the relevant solution for their background. A better understanding of better decision-making is what's needed to overcome the above issue.

AUTHOR DISCLOSURES

Ethics approval:

The current study does not involve human subjects and it is non-experimental. All the analysis employs secondary data analysis, drawing on international organizations and key national representative peer reviewed articles, hence no ethical approval is required.

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All authors have contributed equally.

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