

## Knowledge and Attitude towards COVID-19 Vaccine in Saudi Arabia: A Narrative Review

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### Abstract

Regarding COVID-19, infections caused by RNA Coronaviruses, which are part of the Coronaviridae family, are susceptible to genetic modifications and mutations will continue to form a critical global health threat. The manufacture of vaccines for viral diseases and drug creation is difficult and time-consuming. Because of the disease's uncertain pathogenesis, the lack of a validated animal model and the success of human clinical trials, the process is much more complex in the case of COVID-19 disease. Vaccines teach the immune system how to detect and activate defense lines against disease-causing microorganisms such as bacteria and viruses. This narrative review aims to present and summarize the literature review investigating the knowledge, attitude and practice towards COVID-19 vaccination in Saudi Arabia. This review demonstrated low levels of knowledge and attitudes among the Saudi population towards the COVID-19 vaccination, which implies poor intentions to vaccinate. Moreover, the healthcare workers also recorded poor knowledge and negative attitudes.

**Keywords:** Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2); World Health Organization (WHO); Coronavirus Disease 2019 (COVID-19)

### Introduction

By the end of 2019, a hospital in Wuhan, China, reported a series of cases suffering from unexplained pneumonia, which attracted the world's attention [1]. After two weeks, coronaviruses' novel strain was determined and was called severe acute respiratory syndrome

coronavirus 2 (SARS-CoV-2) [2]. Later on February 11, 2020, the World Health Organization (WHO) named the new epidemic caused by SARS-CoV-2 the novel Coronavirus Disease 2019 (COVID-19) [3].

As established by COVID-19, the infections caused by RNA Coronaviruses, a member of Coronaviridae family, are subjected to genetic alterations and mutations will continue to shape a critical global health danger [4]. Even though COVID-19 is a new epidemic, MERS and SARS studies have helped researchers identify how the human body responds to coronaviruses and how the immune system's reaction provides protection against the virus [5].

Vaccine production for viral infections, including drug development, is complicated and time-consuming. The mechanism is even more complex in the case of COVID-19 disease due to the unclear pathogenesis of the disease, the absence of a validated animal model and the efficacy of human clinical trials [6]. The appropriate vaccine dosage and schedule can also be calculated using restricted human trials. Such vaccines cause an adequate immune response after a single dose, while others need a booster dose after a month or longer [7].

Vaccines provide the immune system the instructions it needs to recognize and activate lines of protection against disease-causing microorganisms, including bacteria and viruses. Antigens resulting from inactivated or half-active bacteria or attenuated viruses are released into the body in conventional vaccines. These antigens can cause disease, but they can also activate the immune system, forcing the cells to produce antibodies. Suppose the individual comes into contact with the native pathogen. In that case, the immune system will already have the requisite antibodies ready and replicate them even faster because it has been notified by vaccination [7,8].

Global immune deficiency is a critical risk factor for the effectiveness of the anti-COVID-19 vaccine, especially in the elderly who have been subjected to a range of factors that lead to an immune system weakness. Obesity/obesity-related disorders, such as type II diabetes, metabolic syndrome and immune-mediated cancers, are also triggered by these causes. These diseases are caused by a loss of antigen identification, a reduction in immune cell quantity and functioning, an improvement in the level/length and timing of humoral immune changes of components, a decline in the induction of cellular responses and memory cell disturbances [9].

Following the WHO announcement, countries all over the world, including Saudi Arabia, have relied on action strategies to combat the pandemic and contain the virus. Following the announcement of COVID-19's first case on Monday, March 2, 2020, the Saudi government closely monitored the situation and developed country-specific steps in compliance with WHO guidelines for coping with the outbreak [10]. This narrative review aims to present and summarize the literature review investigating the knowledge, attitude and practice towards COVID-19 vaccination in Saudi Arabia.

### Safety of the vaccine

Vaccine applicants must follow many standards, including safety, effectiveness and quality. Many aspects could change due to the current escalation of the global pandemic of COVID-19. The rapid production of vaccines can induce public health ministers, heads of state and the pharmaceutical industry to review their plan for large-scale budget investments in vaccine research [11]. Based on the minimal evidence of promising vaccine applicants, they must determine when to schedule mass production activities. The desire to cover billions of people on the planet has pushed governments and communities around the world to have a "high expectation" for the current vaccine [12].

mRNA- and DNA-based technologies of vaccination are being performed in humans, particularly as vaccine candidates. Aside from its enticing future benefits, many questions have been raised regarding the efficacy of mRNA vaccines. The most critical concern is that mRNA vaccinations can induce severe type I interferon responses, leading to inflammation and autoimmune disorders [13,14].

**Location and population**

COVID19 vaccine development sites contain test subjects from a number of nations, including the United States, Germany, India, Saudi Arabia and others [15]. In the production of vaccines, the need for multicenter testing is clear. The vaccines' safety, tolerability and effectiveness should be assessed using data from various geographic areas, ethnicities and the prevalence and varieties of the virus circulating in the countries [16].

In order to meet this criteria, countries with limited funds and underdeveloped facilities could be involved, making the individuals involved much more vulnerable as test subjects from an ethical and humane standpoint. The potential trafficking of poor people from developing countries should be extensively investigated. The vaccine trial should provide them with fair trading benefits, such as capacity building, knowledge transfer and access to the vaccine during the ongoing COVID19 pandemic [12].

Another source of concern is the lack of appropriate clinical facilities and infrastructure to guarantee that research patients, their partners and/or populations have access to medication and proper services in the event of significant adverse effects due to trial results. Before any clinical trials begin, this must be decided. Providing the most comprehensive clinical care to the research community would be a huge gain for population included in the trial. The best vaccine clinical trial techniques should provide immediate societal effects, such as expanding and providing basic health services [17].

**Knowledge and attitudes towards COVID-19 vaccination**

A cross-sectional that aimed to assess the acceptability of the COVID-19 vaccine among healthcare workers in Saudi Arabia found that notwithstanding the fact that healthcare personnel is expected to be aware and knowledgeable about the risks and benefits of vaccinations, only half of their sample were willing to be vaccinated [18]. This implies an urgent need for evidence-based programs to enhance COVID-19 vaccination uptake among healthcare personnel, as they are at great risk of catching and spreading the infection. However, the vaccination's acceptance rates were even lower in studies conducted earlier in Saudi Arabia before the approval of vaccination [19] and before the availability of the vaccine [20].

Another cross-sectional study used a self-administrated web-based questionnaire among the general population of different major cities in Saudi Arabia (including Riyadh, Jeddah, Dammam and Abha). They demonstrated a good intention among the public population to accept the COVID-19 vaccination. However, they recommended that educational campaigns should target different socio-demographic groups to boost the behavior of COVID-19 vaccine uptake [21]. Alfageeh, *et al.* [22] conducted a cross-sectional study to assess the COVID-19 vaccine acceptability in Saudi Arabia. They demonstrated a relatively low acceptance rate. More than half of their population (52%) were uncertain about their intentions to get vaccinated.

A cross-sectional study aimed to assess the attitudes of healthcare providers towards COVID-19 vaccination. They found that the overall approval rate for a newly produced COVID-19 vaccine among healthcare providers was normal. Their findings also showed that gender, age, the prevalence of chronic diseases and allergy are important predictors of vaccine approval. It is widely advised that healthcare professionals be prepared to take research- and evidence-based approaches to addressing vaccine safety and effectiveness in the population to create and sustain consumer interest in the vaccine [23]. Another study estimated the acceptance rates towards COVID-19 vaccination in different Arab countries, including Saudi Arabia. The Saudi acceptance rate was reported to be 31.8% which was lower than the other mentioned countries [24].

A self-administrated questionnaire was administered among the general Saudi population to determine the barriers and beliefs regarding the COVID-19 vaccination. They reported that half of their sample support the vaccination. Furthermore, they identified many primary predictors of aversion to COVID-19 vaccination. Another positive indicator of COVID-19 vaccine adoption was the male gender.

Their results may be explained by the previously recorded high COVID-19-related morbidity and mortality rates in infected male patients. They also found that younger participants were more supportive of vaccines than older participants [25]. A study targeted assessing the Saudi population's willingness for COVID-19 vaccine trial and reported that cases who recovered from COVID-19 were more willing to take part in clinical trials of COVID-19 vaccination [26].

## Conclusion

This review demonstrated low levels of knowledge and attitudes among the Saudi population towards the COVID-19 vaccination, which implies poor intentions to get vaccinated. Moreover, the healthcare workers also recorded poor knowledge and negative attitudes. These findings imply that educational campaigns about vaccination of COVID-19 to the Saudi general population and training programs for the healthcare personnel are required.

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