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COVID-19 VACCINE - WHEN WILL WE HAVE ONE? UNCERTAINTY, HOPE, EARLY WARNINGS AND ADULT MENTAL HEALTH

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Abstract

The emergence of COVID-19 has affected the economies of different countries negatively due to the containment measures put forth by WHO after the disease was declared a pandemic. These measures also impact the mental health of individuals. Owing to these undesirable effects, several researchers are developing vaccines to contain the spread of the disease and mitigate it. These efforts have been successful as some candidate vaccines from different countries have been presented for trial. This paper uses the descriptive research design to analyze the development of vaccines with special focus on specific areas, namely uncertainty and hopes concerning the COVID-19 vaccine, early warnings, adult mental health, the Russian vaccine, Brazil's COVID-19 application, and the Australian University's process. The study finds that researchers are constantly developing vaccines for the disease. However, some developers use controversial strategies that make the validity and reliability of their vaccines doubtful. Consequently, the study concludes that developers need to be keen on following the standard operating procedures to develop safe, effective, and reliable vaccines against COVID-19.

Keywords: Adult Mental Health, Covid-19 vaccine, COVID-19

1. Introduction

The most favorable solution for mitigating novel viruses is vaccines. COVID-19 bears similarity to influenza as it has the potential of becoming a seasonal disease (Shin et al., 2020). Since the announcement of the genetic make-up of the coronavirus that causes COVID-19 on the 11th of January 2020, extensive and comprehensive research and development to discover a vaccine has been in progress (Le et al., 2020). The COVID-19 pandemic has severely impacted humanitarian services and economies. Consequently, efforts to develop a next-generation vaccine have been accelerated by establishing partnerships and the use of new paradigms. As a result of these efforts, the first vaccine sample was received on the 16th of March 2020 for human clinical trials (Le et al., 2020). The Coalition for Epidemic Preparedness Innovations (CEPI) partners with vaccine developers and health authorities worldwide to support research for the vaccine (Le et al., 2020). Despite the efforts put in place, research and development of a COVID-19 vaccine still encounters challenges such as the design and its production and distribution around the world (Shin et al., 2020). This paper aims to determine how far the efforts towards finding the vaccine have gone as well as the impact of this development on the mental health of adults.

2. Methodology

The researcher used a descriptive research design to describe the situation accurately and systematically. The research design is appropriate for this study because the researcher can identify trends, frequencies, and characteristics of vaccine development (Aquino et al., 2018; Siedlecki, 2020). The design is also appropriate since little is known about the topic. The data for this study was collected using the qualitative method through a review of literature because the researcher seeks to gain an in-depth understanding of the topic (Halley et al., 2018; Talbot et al., 2020). The literature reviewed for this study was exclusively from journals. The journal articles were obtained from an engine search on Google Scholar using various keywords and phrases such as "COVID-19 vaccine", "adult mental health and COVID-19 vaccine development", "Russian vaccine", and "Australian University process." Through content analysis, the data obtained from these sources was examined (Assarroudi et al., 2018; Granheim et al., 2017). The method is advantageous to the study since data collection is unobtrusive, transparent, replicable, inexpensive, and flexible (Assarroudi et al., 2018). Given these advantages, the results of content analysis are reliable. Even though content analysis is advantageous, it also has some disadvantages since it is time-consuming, reductive, and subjective nature of the method (Graneheim et al., 2017). To counter reduction and subjection, the researcher used multiple sources with different publishers.

3. Research Questions

3.1. What uncertainties and hopes are present concerning the development of the COVID-19 vaccine?

3.2. Were there any early warnings concerning a viral pandemic like COVID-19?

3.3. How do the uncertainties and efforts of vaccine development affect the mental health of adults?

3.4. What is the Russian vaccine for COVID-19 and how far has it gone to mitigate the pandemic? Is the vaccine safe for mass release?

3.5. How is the Brazilian application useful in the development of the vaccine?

3.6. Which measures have been put in place by Australian universities to aid in developing the COVID-19 vaccine?

3. Discussion

3.1. Uncertainties and Hopes Concerning the COVID-19 Vaccine

As scientists attempt to find a vaccine for COVID-19, they have to ensure that the individuals who participate in clinical trials do not develop counterproductive or enhanced immune systems. This predisposes researchers to logistical and scientific challenges. The main challenge, according to Peeples (2020), concerns understanding how the human immune system interacts with both the pathogen and vaccine since this understanding is crucial for the development of a vaccine that is safe and effective. More specifically, researchers have to understand whether the new vaccine leads to malfunctions of the immune system similar to those seen during previous vaccine development processes. From the 1960s, a paradoxical phenomenon has been observed in the test results of candidates for clinical trials of vaccines (Peeples, 2020). When later exposed to the virus for which a vaccine was received, people or animal candidates developed more severe symptoms than those who did not receive the vaccine (Graham, 2020; Dhama et al., 2020). The phenomenon is termed immune enhancement and it manifests itself in various ways, namely antibody-dependent enhancement and cell-based enhancement (Peeples, 2020). These enhancement processes might occur either independently or together. Consequently, scientists currently debate which of these phenomena could be exhibited with the current strain of coronavirus and how the phenomena might impact the effectiveness of the vaccine. Despite these uncertainties, there is hope concerning developing an effective COVID-19 vaccine since researchers are making progressive steps towards finding one. Several countries, such as Russia, China, Brazil, and the United States, are in the frontline of vaccine development (Le et al., 2020). At present, over 165 candidate vaccines for SARS-CoV-2 are undergoing assessment globally (Mahase, 2020). While eight of these vaccines are in phase 3 trials, two vaccines, namely the Chinese vaccine and the Russian vaccine, have been approved for restricted application. More specifically, the Chinese government has approved the Ad5-nCoV vaccine by the CanSino drug company in the armed forces (Mahase, 2020). The developers of the COVID-19 candidate vaccines are in different sectors, namely the private sector, academic sector, public sector, and non-profit organizations. Most of the vaccine developers are in the private sector.

Further, based on the findings of previous studies, the risk of immune system enhancement can be mitigated. The mitigation is informed by earlier research on respiratory syncytial virus (RSV) vaccines (Graham, 2020). After analysis of these findings, current research can implement the suitable mitigation measures for the development of an effective and safe COVID-19 vaccine. During vaccine development, one mitigation measure demonstrates the potential efficiency of a vaccine during the early stages of a clinical trial. For human specimen, the demonstration is achieved by assessing the stimulation of neutralizing antibodies (Graham, 2020). A second mitigation measure involves using antigens that are accurate to produce high-quality antibodies that bear practical significance. Graham (2020) notes that this measure also prevents the stimulation of antibodies that lack a neutralizing effect and TH2 biased immune responses.

3.2. Early Warnings

Scientists projected a pandemic with the potential of the coronaviruses over ten years ago. For the last 30 years, the public health system has been pushed to its limits by a novel coronavirus that manifested once in a decade. Of these manifestations, the COVID-19 pandemic is the most severe. Despite these recurrent warnings, discussions, and debates, the world was still unprepared for the pandemic. Consequently, amid the pandemic, applying early warning strategies can result in the mitigation of the virus and the development of an effective vaccine (Zhu et al., 2020). Presently, Artificial Intelligence (AI) has found a new application in early warnings and notification, tracing and extrapolation, data control panels, diagnosis and prognosis, treatment and cure, and public regulation (Bullock et al., 2020; Naudé, 2020). An example of an AI system that predicted the COVID-19 pandemic is BlueDot (Naudé, 2020). The system predicted the outbreak before the WHO. This prediction enabled scientists to forecast cities that would spearhead the spread of the pandemic. The impact of AI systems for early warnings during the pandemic is, however, insignificant due to the challenges of inadequate and excess data.

3.3. Adult Mental Health

The COVID-19 pandemic affects not only the physical health of individuals but also their mental health. According to psychopathologists, since the pandemic cannot be compared to natural disasters and wars, it presents a new type of stressor and trauma (Fiorillo & Gorwood, 2020). Consequently, at least for categories of people are expected to be hard-hit by the mental effects of the pandemic. These are people who have come into direct or indirect contact with the virus. health professionals, and people following news concerning the virus using different media. The pandemic and the containment processes associated with it have an undesirable impact on the mental health of adults. Due to decreased social interactions, there has been an increase in loneliness (Duncan et al., 2020). These are risk factors for multiple mental illnesses like depression and schizophrenia (Fiorillo & Gorwood, 2020). Other mental disorders arise from the stigmatization of those infected by the virus, worry about the welfare of friends and family, or an increased workload for mental health professionals. Further, according to the UN, the pandemic has triggered extensive distress and poor mental health, especially in nations with little or no investments in mental healthcare (BBC News, 2020). To counter the development of these mental disorders, one recommendation from professionals is that individuals should reduce the sources of stress (Fiorillo & Gorwood, 2020). Consequently, focusing on the possibility of the development of an effective vaccine is an effective way to fulfill the recommendation. BBC News (2020) indicates that the WHO recommends that people should come to terms that COVID-19 might never disappear completely as an alternative coping mechanism.

3.4. The Russian Vaccine

The government of Russia has approved the widespread use of a COVID-19 vaccine named Sputnik V even though it has undergone only one stage of trial and has no published results (Mahase, 2020). The approval of a vaccine that has not undergone all the stages of vaccine development has caused disquiet among researchers who want a publication of the results for analysis and further tests before mass distribution. The developer of this vaccine is the Gamaleya Institute in Moscow (Mahase, 2020). The development of this vaccine is surrounded by controversies as other countries claim that the formula of the

vaccine is stolen and the human trials were conducted unconventionally. One of the main objectives of vaccines is the safety of otherwise healthy individuals. Currently, the risk that vaccination could aggravate subsequent SARS-CoV-2 infections is present (Graham, 2020). Evidence of this risk can be observed from previous events where vaccines based on whole-inactivated virus formulated in alum were developed and used to mitigate respiratory viruses in children and coronavirus in cats (Graham, 2020; Mahase, 2020). As a result, human and animal participants develop either one of two syndromes linked to vaccine-enhanced disease. One syndrome is the vaccine-associated enhanced respiratory disease (VAERD), while the other is an antibody-dependent enhancement (Graham, 2020). Given this possibility, the Gamaleya Institute needs to publish the trial results of the vaccine so that it undergoes further research to ensure that it is safe for public consumption. Amid the COVID-19 pandemic, it is quite rational to require that candidate vaccines have certain properties. The first property is that the vaccines should avoid TH2 biased responses (Graham, 2020). Also, the vaccine should contain the correct antigens for desirable outcomes. Upon possession of these properties, the candidate vaccine commences phase 1 clinical trials depending on initial immunogenicity in animals and further trials depending on human immunogenicity in addition to proof of protection in animal prototypes (Graham, 2020). Phase 2 and phase 3 trials are efficacy trials that justify the use of the vaccine to thousands of participants. These phases include added evidence of the safety of the vaccine. Cautious assessment of candidate vaccines in healthy human adults should be conducted simultaneously with trials in animal prototypes to accelerate the availability of a vaccine for COVID-19 and reduce human participants (Graham, 2020). The accelerated availability is also ensured through corresponding process development to increase the production capacity. Generally, for a vaccine to be approved, Kommenda (2020) indicates that it is required to undergo four phases: the pre-clinical phase where animal prototypes are used, phase 1 trials where a small human sample is used to test the safety of the vaccine, phase two trials where expanded safety tests are conducted, and phase 3 trials where the efficiency of the vaccine is tested on larger sample size.

Contrary to these universal requirements, the Russian vaccine underwent a phase 1 trial with a small sample of human subjects before its widespread use. Some Scientists see this move as a strategy for the Russian government to prove its national scientific prowess because Russia is known for vaccine development (Mahase, 2020). Since the sample size is insignificant, the safety and efficacy of the vaccine are still doubtful. Consequently, the use of the Russian vaccine on a large population increases the risk of significant vaccine-enhanced disease syndromes that cannot be regulated among Russians (Mahase, 2020). The Russian government should, therefore, ensure that the vaccine undergoes all the stages of development to prevent future viral pandemics effectively.

3.5. Brazil's COVID-19 Application

Geolocation data obtained from mobile phones can be used in the examination of a population's movement patterns. In the face of the COVID-19 pandemic, these movement patterns are critical for the prediction of the possible spatial spreading of the disease. Consequently, researchers have used mobile geolocation data in Sao Paulo and Rio de Janeiro, Brazil, to study the most likely spreading patterns of COVID-19 within Brazilian states (Peixoto et al., 2020; Ribeiro et al., 2020). Findings from the study by Peixoto et al. (2020) demonstrated that even though regions closer to the capital cities where the infection started were at a high

risk of infection and spread of SARS-CoV-2, other cities in the countryside are also potential high-risk areas. The findings of the studies are an important resource for public administrators because they can use the information to develop action plans and allocate resources to the affected areas in order of the severity of infection or exposure to the risk of infection. In these studies, the researchers use short-term prediction models to analyze the spreading patterns of COVID-19 in different Brazilian states. The short-term models used by the researchers are important tools for regulating the spread of the virus in its early stages. Using this approach, public administrators can prevent deaths from COVID-19 by developing strategic plans for the public health system.

3.6. The Australian University's Process

The first COVID-19 case to be reported in Australia was a 58-year-old man who had arrived from Wuhan, China (Caly et al., 2020). The patient was admitted to the Monash Medical Center in Melbourne, where he underwent systematic procedures to determine the cause of his symptoms. First, a diagnostic test for SARS-CoV-2, the virus that causes COVID-19 was conducted (Caly et al., 2020). After confirmation of the SARS-CoV-2 virus, a viral culture was made followed by electron microscopy of the microbial growth. Next, nucleic acid from the viral isolate was extracted for whole gene sequencing and phylogenetic analysis. The information is then published and shared with the public and academic domains. Through the sharing of information about diagnostic tests and genomic data, the appearance and spread of the SARS-CoV-2 can be clarified rapidly (Caly et al., 2020). Further, through information-sharing, the pace of the processes for vaccine development is increased. Concerning vaccine development in Australia, a tuberculosis vaccine that has been existent for 100 years is undergoing phase 3 trials conducted by the Murdoch Children's Research Institute (BBC News, 2020). The vaccine does not offer direct protection against the COVID-19 virus. However, it enhances the non-specific immune response of the body.

4. Conclusion

Despite early warnings about the magnitude of the effects of the coronaviruses, the COVID-19 pandemic has significantly impacted economies, public health systems, and the health of individuals all around the world. Consequently, researchers are continuously working on the development of a safe and effective vaccine against the virus. Additionally, other researchers have come up with strategies that public administrators and governments can use to mitigate the spread of the disease. Although the development process is faced with multiple challenges, several breakthroughs have been witnessed in different countries such as China, the United States, and Russia. Even with these breakthroughs, developers must follow the correct procedures for vaccine development to prevent the occurrence of immune system enhancement in individuals who take part in the clinical trials of candidate vaccines.

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