Assessing the Risks and Benefits of the COVID-19 Vaccine Among Ethnic Minority Groups

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Abstract page

The latest ongoing threat to global health, recognized in December of 2019, was recently given the name Coronavirus Disease 2019. COVID-19 is a disease resulting from a severe acute respiratory syndrome coronavirus 2 infection. Individuals infected with this novel virus typically present symptoms such as fever, cough, sore throat, respiratory issues, fatigue, and body aches. Government efforts to create and distribute a vaccine have been met with safety and validity questions, particularly among ethnic and minority populations. Researching and determining the virus's exact properties to develop effective immunotherapy for long-term immunity continues to be an ongoing process as the virus has unpredictable properties. This literature review seeks to identify and evaluate the risks and benefits of vaccine efforts and perceived barriers to the effective distribution to minorities and at-risk populations. Both qualitative and quantitative syntheses were applied. The screening process excluded irrelevant studies and research published more than two years ago. Twenty-seven records were searched, resulting in no exclusions. Twenty-four articles were screened, three of which were excluded due to irrelevance and/or out-of-date studies. Twenty-six studies were utilized in a qualitative synthesis, and one study was utilized in a meta-analysis. Given the recent occurrence of the COVID-19 event, research is in its infancy. Therefore, no books or other non-digital sources were used in this review. High efficacy rates were found among sub-groups, including ethnicity, with efficacy rates between 90 and 100 percent. The disproportionate affliction on the vulnerable communities is underrepresented in medical research, causing scholarly researchers to unravel the contemporary COVID-19 vaccine predicament with racial and ethnic minority groups worldwide. Supplemental analyses indicate that the vaccine efficacy among these subgroups were generally consistent with the overall minority vaccinated population.

INTRODUCTION

COVID-19 is a disease resulting from a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection that began circulating in Wuhan, China in late 2019. Individuals infected with this novel virus typically present with symptoms such as fever, cough, sore throat, respiratory issues, fatigue, and body aches. (Singhal, 2020). There are two modes of transmission for COVID-19, both direct, and indirect. Direct transmission can include viral shedding from aerosols released through medical procedures and respiratory droplet nuclei, bodily fluids or secretions, and through a mother's womb or breast milk to child. Indirect transmission can occur as a result of immediate contact with surfaces and objects that an infected individual has been in contact with (Karia, Gupta, Khandait, Yadav, & Yadav, 2020).

The COVID-19 pandemic has had devastating effects on the health and well-being of populations throughout the world. However, minority ethnic populations have suffered disproportionately from the effects compared to Caucasians, with a 10-50% higher mortality risk in the UK and the USA (Ekezie, Czyznikowska, Rohit, Harrison, Miah, Campbell-Morris, & Khunti, 2020). Individuals within these vulnerable groups have suffered more severe symptoms as a result of a heightened immune response to the virus, known as the cytokine storm. In fact, the Intensive Care National Audit and Research Centre (ICNARC) has released data that reveals a significant portion of critically ill patients with COVID-19 were from ethnic minority communities. This is likely because of comorbidities that individuals within minority groups disproportionately suffer from. These health disparities result from a myriad of socio-economic issues within these communities such as lack of access to primary care, inability to pay for prescriptions, lack of health coverage, food scarcity, and lack of nutritious food sources in local communities, also known as food deserts. Each of these items put minority groups at higher risk

for cardiovascular disease, hypertension, type 2 diabetes, and cancer. Patients with comorbidities such as these are highly susceptible to cytokine storm events.

Ethnic minority communities are also underrepresented in clinical trials and vaccination efforts (Flores, Frontera, & Andrasik, 2021). This lack of representation is due to distrust within ethnic communities of scientists, western medicine, and government health organizations (Razai, Osama, McKechnie, Majeed, 2021). Despite research on the increased incidence of cytokine storm events and underrepresentation in clinical trials for treatment and prevention, there has been little to no evidence of adverse reactions to any of the SARS-CoV-2 vaccines within ethnic minority populations. Given the potential for protection from these often-fatal cytokine events and the incidence of comorbidities among ethnic minority populations, individuals within these communities receiving COVID-19 vaccination stand to benefit favorable health outcomes. This review seeks to identify and evaluate the risks and benefits of vaccine efforts and perceived barriers to the effective distribution to minorities and at-risk populations.

Methods

Search Strategy

For this literature review, careful consideration was taken to identify sources that outlined and explained both the potential risks and benefits to individuals among ethnic minority groups who either have taken or plan to take any vaccine to prevent the development or reduce the severity of COVID-19. Keywords, terms, and phrases such as “COVID-19” AND “Disparities”, “health outcomes” AND “ethnic groups” were used to narrow search results. Synonyms of key terms were also used. Studies were researched using Google Scholar and the Old Dominion University Library Reference Tools, such as PubMed.

Eligibility Criteria

This literature review only sources research published within the past two years. No work published prior to the year 2020 was used. Only peer-reviewed articles from reputable scientific journals listed in the Directory of Open Access Journals were referenced to ensure validity and reliability. No duplicates were discovered, eliminating the need to remove them from inclusion. Twenty-seven records were searched, resulting in no exclusions. Twenty-four articles were screened, three of which were excluded due to irrelevance and/or out-of-date studies. Twenty-six studies were utilized in a qualitative synthesis, and one study was utilized in a meta-analysis. Given the recent occurrence of the COVID-19 event, research is in its infancy. Therefore, no books or other non-digital sources were used in this review.

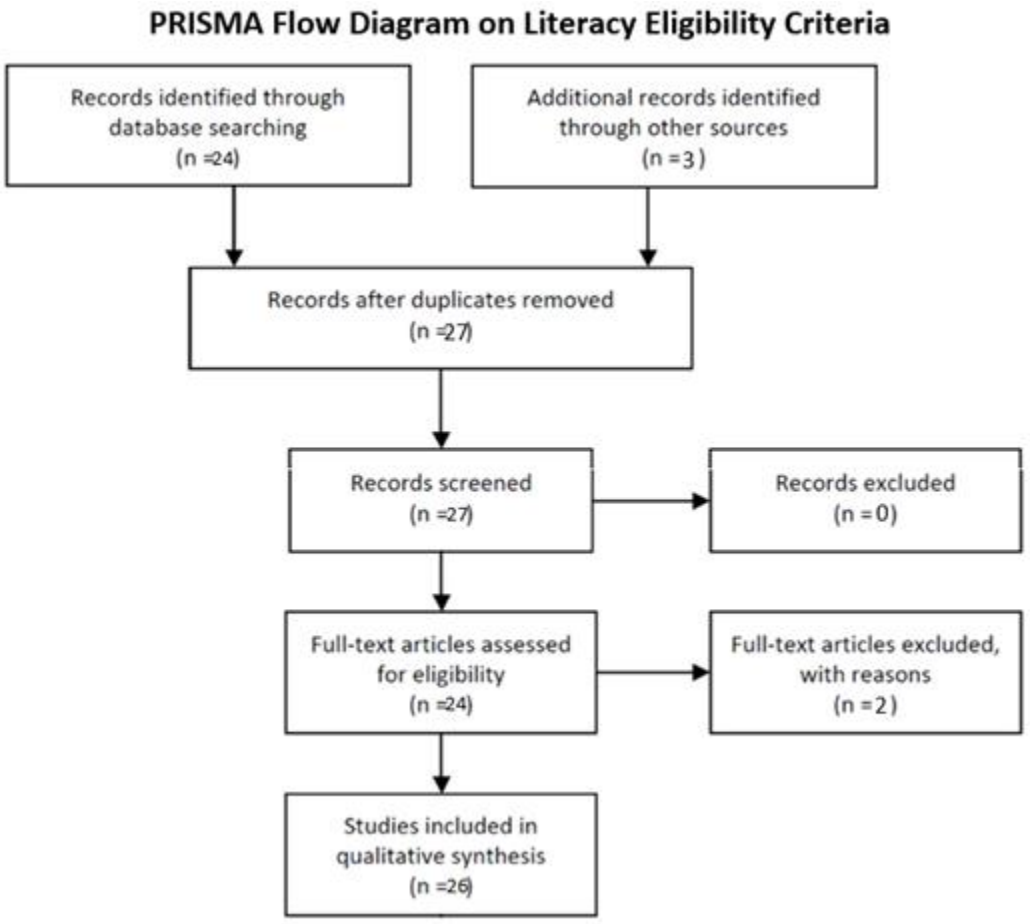

Figure 1. This PRISMA flow diagram demonstrates the elements of literacy eligibility criteria following three steps: identification, screening, and eligibility, described in the Methods section.

Results

The aim of the study strived to assess how the benefits and risks of the recent pandemic, SARS-CoV-2, vaccine affects ethnic minority groups. Due to research still being in its infancy, the information is deficient. Research results are limited due to newly created vaccinations, commencing research trials, and little investigation on ethnic minority groups. During the first round of vaccination dosage, Pfizer and BioNTech announced their mRNA-based vaccine candidate (BNT162b1) that resulted in neither exhibiting serious short-term effects (Suzuki & Gychka, 2021). A large clinical trial of 43,548 participants conferred a 95% protection rate and 95% credible interval in persons 16 years and older, from which only 16,583 people were of the ethnic minority groups i.e., African American and Latinx (Polack et al., 2020). Generally, 90 to 100% similar vaccine efficacy was observed across various subgroups. There were 0 cases of BNT162b2, or 100% vaccine efficacy for African Americans or black, 3 cases or 94.4% vaccine efficacy for Hispanic or Latinx, and one case or 98.3% vaccine efficacy for all others or American Indian, Alaska Native, Asian, Native Hawaiian, Pacific Islander, multiracial, and not reported (Polack et al., 2020). Supplemental analyses indicate that the vaccine efficacy among these subgroups were generally consistent with the overall minority vaccinated population.

Perhaps the African Americans and Latinos should be overrepresented in vaccine trials (Olson, 2020). According to the U.S. Centers for Disease Control, black individuals show 1.1x cases, are 2.9 times more likely to be hospitalized with COVID-19, and 1.9 times more likely to die from it. Hispanic individuals show 1.3x cases, are 3.1 times more likely to be hospitalized

with COVID-19, and 2.3 times more likely to die from it (CDC, 2021). These rate ratios were compared to white, non-Hispanic persons. “Race and ethnicity are risk markers for other underlying conditions that affect health including socioeconomic status, access to health care, and exposure to the virus related to occupation, e.g., frontline, essential, and critical infrastructure workers” (CDC, 2021). A key reason behind this is that there is a higher proportion of these minority groups having jobs that encounter others. If they have come into contact and contracted the virus, they are “more likely to have a serious case of the disease” (Olson, 2020). This is due to higher rates of chronic diseases, and less accessibility to an adequate health care system.

The Federal Health Agencies such as the CDC and FDA recommend pausing for the use of the vaccine from Johnson & Johnson after six individuals experienced “a rare and severe type of blood clot” after receiving the shot (CDC, 2021). The mRNA-1273 by ModernaTX, Inc proved 94.1% effective in preventing no prior COVID-19 infection (CDC, 2021). The three other vaccines by Johnson & Johnson, AstraZeneca, and Gamaleya Research Institute of Epidemiology and Microbiology all express the SARS-CoV-2 spike protein (Logunov, 2020). Along with other underdeveloped vaccines, these vaccines help stimulate the body to fight against the virus. Further investigation on vaccination effects on the pandemic for SARS-CoV-2 is still in effect. Long-term consequences of these vaccines are, however, unknown (Suzuki & Gychka, 2021).

Discussion

The COVID-19 pandemic has affected all aspects of life around the world for well over a year now. The world has adjusted; the new norm has been found in what has most commonly

been referred to as “social distancing”. While mitigating and preventative measures have been implemented to slow the spread of the virus, the pandemic continues to persist. The hope of returning to life before the pandemic has been the driving force for most, as the pandemic continues to affect everyday life. With development and distribution of the COVID-19 vaccines, there now appears to be a light at the end of the tunnel. However, questions of the vaccine’s safety and validity create uncertainty, particularly among minority groups (Tibbetts, 2021).

The concerns over the safety and efficacy of the COVID-19 vaccine have resulted in a hesitancy to have the vaccine administered. Vaccination hesitancy is seen highest among racial and ethnic minorities with the CDC reporting that of the 55% of the U.S. population that has received at least one vaccine dose 65% of them were white, 11% Hispanic, 8% African American, 5% Asian, and 1% Native American (Nambi Ndugga, 2021). Ethnic and racial minorities are disproportionately affected by the COVID-19 virus, with higher morbidity and mortality when compared to Caucasian populations (Rueben C. Warren, 2020). The fatality rate among African Americans is twice that of the white population and Latino populations are hospitalized at four times the rate of whites (Tibbetts, 2021).

The reasons for the hesitancy can be seen in several factors including lack of trust in the safety of the vaccine and the relative time the vaccine was developed. Average vaccine development can be 10 years (Tibbetts, 2021). The U.S. government “Operation Warp Speed” task force was created and tasked to create a vaccine within a few months, significantly less than the average time for vaccine development (Tibbetts, 2021). The current COVID-19 vaccine was approved under an Emergency Use Authorization (EUA) and was not FDA approved (CDC, 2021). Lacking FDA approval will affect the perception of the vaccine as safe and effective, and this creates a barrier to establishing trust. Trusting the vaccine is one aspect of the hesitancy to

have the vaccine, while the other is trusting the organization supplying the vaccine. Racial and ethnic minorities may be slow to trust large pharmaceutical companies to deliver safe products that were rushed to the market (Rueben C. Warren, 2020).

Overall, the level of vaccination rates for previously controlled diseases have been shown to be decreasing in recent years. As a result, preventable diseases such as measles, mumps, and polio cases have been increasing. This trend of non-vaccination can be traced to the messages being circulated on social media depicting the vaccines as unsafe (Tibbetts, 2021). For clarification purposes there is a difference between those that are hesitant and those that advocate for anti-vaccination. Those that are hesitant are open to accepting vaccinations if they are safe and effective, while anti-vaccination advocates oppose vaccination for religious or cultural reasons. The vaccine is perceived as rushed and relatively untested at this time, and as a result the perceived benefits of getting the vaccine do not outweigh the potential risks of getting the vaccine (Tibbetts, 2021).

Prioritization for vaccination recipients has been a topic of debate, with vaccinations for health care and front-line workers being considered more critical. At the same time arguments can be made to prioritize African Americans, Latinos, and Native Americans because they are more affected by the virus. Minorities are slow to trust the vaccine, and by citing a historical example, “The Tuskegee Syphilis Study” (Samantha Artiga, 2021), this experiment resulted in the exploitation of African Americans for medical testing (CDC, 2020). These damages to the trust needed by public health officials’ efforts bring into question the ethical standards, and as such, putting minority groups first in vaccination be similar experimental exploitation (Tibbetts, 2021).

Significance of the Results

There is a lack of information regarding risk and benefits of these vaccines among minorities due to low participation in trials. The significance from this perspective shifts the main aim of the study, resulting in lack of statistical significance and higher efforts to expand and obtain the desired target population sample. The close validity in this research will push the research characteristics to prove a closer sample parameter, thus creating better measured findings that will reflect values (Middleton, 2020). The safety analysis seems to efficiently identify and include all research participants that receive at least one dosage of a vaccine or placebo. The methodology behind this safety analysis creates a higher quality observational research between exposed and unexposed minority individuals and a greater understanding. The general premise of this retrospective cohort study is that it is an effective tool to decrease mortality and morbidity risk and increasing benefits.

Findings were based on formulating statistical hypothesis testing conducted from all research articles because they were data driven, not research driven. Examination of statistical hypothesis testing was gathered from each study for the research to be reliable. As noted in a scholarly research article, human host cells respond sensitively to the spike proteins or peplomers to elicit cell signaling. This information, in turn, makes future researchers monitor long-term effects on the spike protein produced by covid-19 vaccines affecting the host cell (Suzuki & Gychka, 2021). A definite p-value to indicate whether these studies are statistically significant in the relationship between the factors is delayed until further research is conducted, and the lack of research results is updated. The null and alternative hypotheses concerning plausibility is not supported in the scholarly research articles.

Implications for Policy and Practice

The vaccine's safety and effectiveness have been called into question, one method to correct this trend, an information campaign may be utilized to increase understanding of the vaccine and decrease hesitancy. Increasing participation of minorities in COVID-19 vaccination trials requires direct and effective methods. A key aspect that needs to be established before moving ahead with any policy implementation is building a sense of trust. Increasing the level of trust in global health COVID-19 vaccination efforts is essential for optimal immunization to end the pandemic. Starting at the community level and working with local leaders, with a respected reputation among the community, to better understand the vaccine objections and concerns (Mohammad S Razai, 2021).

Depending on the sources of information on the vaccine it can create various messages that are either in support of the vaccine or denounce the vaccine as potentially harmful. Working with community health care workers is an effective method to establish information concerning the safety and effectiveness of the COVID-19 vaccine. Reducing vaccine hesitancy through an information campaign about the vaccine's safety is better understood when coming from a trusted source (Winifred Ekezie, 2020). Information on the COVID-19 vaccine can be accessed from a multitude of sources including the Kaiser Family Foundation website and the CDC website for continuing vaccine information (Nambi Ndugga, 2021).

The results of research studies on vaccine trials can be misinterpreted, which can lead to confusion for people, causing distrust and a negative public opinion on the vaccine. While data collected can be used to make inferences about what populations are being vaccinated there are limitations depending on the way the data was collected. Gaps and inconsistencies can lead to

inaccurate conclusions, an example of this would be the vaccine demographic reporting methods used by some states that report rates of race/ethnicity vaccination rates while other states do not report race/ethnicity rates (Nambi Ndugga, 2021). Ensuring adequate and understandable information is made available to reassure minority communities of the vaccine's safety and efficacy, which is paramount in increasing vaccination rates (Winifred Ekezie, 2020).

Conclusion

This review was conducted to identify and evaluate the risks and benefits of vaccine efforts and perceived barriers to the effective distribution to minorities and at-risk populations. By exploring the risks and benefits of vaccination, the overall findings conclude that the vaccination rates have been declining which results in the increase in preventable diseases. With CDC having proclaimed cases, hospitalization, and death rates in minority groups that have come into contact with the virus, this has led to vaccine hesitancy. Vaccination hesitancy and anti-vaccination advocates are entangling the healthy population by creating a downfall of herd immunity. This in turn creates uneven distribution of risk-benefit analysis (Tibbetts, 2021). Research on COVID-19 vaccination among ethnic minority groups is limited. Some reasons that support this claim are higher social interactions from occupations, higher chronic disease rates, less healthcare access, quotidian lower socioeconomic status (SES) and the like.

The disproportionate affliction on the vulnerable communities is underrepresented in medical research, causing researchers to actively seek approaches that include ethnic minority groups in vaccine trials (Ekezie et al., 2020). There has been little to no evidence of adverse reactions to any of the SARS-CoV-2 vaccines within ethnic minority populations. Researching and determining the virus's exact properties to develop effective immunotherapy for long-term

immunity continues to be an ongoing process. More studies will need to be conducted in the future to determine whether this may or may not prove to be an issue.

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