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Investigating a Possible Association between mRNA COVID-19 Vaccination and Ischemic Stroke: A Case Study

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Abstract:

The emergence of COVID-19 has resulted in the development and deployment of mRNA COVID-19 vaccines worldwide. However, there have been reports of rare adverse events, including ischemic stroke, in vaccinated individuals. To determine if there is a possible association between mRNA COVID-19 vaccines and ischemic stroke, a thorough investigation is necessary. This investigation should include an analysis of the medical records of affected individuals, review of adverse event reporting system data, evaluation of vaccine development and clinical trial data, and consideration of public confidence in vaccine safety. While the benefits of mRNA COVID-19 vaccines are clear, the potential risks associated with vaccination must be evaluated in the context of the COVID-19 pandemic. Despite the rare adverse events associated with mRNA COVID-19 vaccines, vaccination remains the most effective tool in the fight against COVID-19, and efforts to improve vaccine safety surveillance and communicate vaccine risks to the public must continue to ensure the safety and efficacy of vaccination.

Key Words: COVID-19, Vaccines, Stroke, Benefits-Risk, Safety, association, Case study.



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Introduction:

The COVID-19 pandemic has caused significant morbidity and mortality worldwide (1). To combat the pandemic, several vaccines have been developed and authorized for use, including mRNA-based vaccines (2). These vaccines have been shown to be highly effective in preventing severe illness and death caused by COVID-19 (3, 4). However, as with any new medical intervention, concerns have been raised about potential side effects (5). One such concern is the possible association between mRNA COVID-19 vaccination and ischemic stroke (6), a type of stroke caused by a blockage in a blood vessel supplying blood to the brain (7). While there is currently no evidence to suggest a causal relationship between mRNA COVID-19 vaccination and ischemic stroke, case reports have emerged suggesting a possible link.

This report investigates the possible association between mRNA COVID-19 vaccination and ischemic stroke. The public health department received reports of 25 cases of ischemic stroke within one week in individuals who recently received the mRNA COVID-19 vaccines. While the incidence of adverse events after vaccination is expected, the potential association between the vaccine and ischemic stroke requires investigation. The objectives of this report are to investigate the background and current situation of the reported cases, identify potential risk factors for ischemic stroke, explore previous studies or data linking vaccines to ischemic stroke, evaluate the potential benefits of the vaccine in comparison to the potential risks, and propose solutions or recommendations to address the situation to ensure vaccines' benefits outweigh the risks. The findings and recommendations in this report will inform



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public health efforts to ensure the safe and effective use of mRNA COVID-19 vaccines while minimizing potential risks to individuals.

Background:

Ischemic stroke is a condition in which the blood supply to part of the brain is blocked (7). It is a leading cause of death and disability worldwide. Risk factors for ischemic stroke include hypertension, diabetes, smoking, obesity, physical inactivity, and family history of stroke (8, 9).

Investigation:

To investigate the reported cases of ischemic stroke after mRNA COVID-19 vaccination, a thorough examination of the medical records and vaccination history of affected individuals is necessary. Additionally, the investigation should evaluate the timing of the onset of symptoms after vaccination, the severity and duration of symptoms, and any potential confounding factors that may contribute to ischemic stroke, such as preexisting medical conditions (10).

Moreover, the investigation should also include a review of the adverse event reporting system data to determine if any similar cases have been reported in other regions or countries. The analysis of this data will provide insight into the prevalence and severity of the reported adverse events and their possible association with the mRNA COVID-19 vaccines (11, 12). Furthermore, it is essential to investigate the manufacturing, development, and clinical trial data of mRNA COVID-19 vaccines to determine if there are any possible mechanisms that could lead to the development of ischemic stroke (13). This investigation should involve consulting with experts in the



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field of neurology, immunology, and vaccine development to determine if there is any plausible biological mechanism linking the vaccine to ischemic stroke (14).

Lastly, the investigation should also evaluate the potential impact of the reported cases of ischemic stroke on public confidence in the safety and efficacy of mRNA COVID-19 vaccines (10). Ensuring public trust in vaccines is essential to maintaining high vaccination rates and achieving herd immunity, which is necessary to control the COVID-19 pandemic. Therefore, the investigation should consider the potential impact of the reported cases of ischemic stroke on vaccine uptake and the public's willingness to receive the vaccine.

A literature review was conducted on ischemic stroke, its risk factors, and any possible associations with vaccination. No previous studies or data on vaccine-related ischemic stroke incidents related to mRNA COVID-19 vaccines were found. The reported cases of ischemic stroke within one week in individuals who recently received the mRNA COVID-19 vaccines are concerning (15). However, it is important to note that the background rate of ischemic stroke in the general population is approximately 1.5% per year (16). In contrast, the incidence of ischemic stroke after mRNA COVID-19 vaccination is very low, estimated to be less than one case per 100,000 vaccinations (17). Therefore, the incidence of ischemic stroke after mRNA COVID-19 vaccination is similar to the expected background rate (18).

Risk factors for ischemic stroke include hypertension, diabetes, smoking, obesity, physical inactivity, and family history of stroke. It is unclear whether these risk factors play a role in the reported cases of ischemic stroke after mRNA COVID-19 vaccination (9).



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Benefits and Risks:

The mRNA COVID-19 vaccines have been shown to be highly effective in preventing severe illness and death from COVID-19 (19). The potential benefits of the vaccine outweigh the potential risks, including the very low risk of ischemic stroke. The mRNA COVID-19 vaccines have been shown to be highly effective in preventing severe illness, hospitalization, and death from COVID-19. Clinical trials have demonstrated that the vaccines have efficacy rates of up to 95%, and real-world data has confirmed their effectiveness in preventing COVID-19 in vaccinated individuals (20, 21). Vaccination also plays a crucial role in reducing transmission of the virus, which is critical for controlling the COVID-19 pandemic.

However, as with any medication or vaccine, there are potential risks associated with mRNA COVID-19 vaccines. Reports of rare adverse events such as ischemic stroke, myocarditis, and blood clotting disorders have emerged in some vaccinated individuals. The incidence of these adverse events is relatively low, and the benefits of vaccination outweigh the risks, especially in populations at high risk of severe COVID-19 disease (22).

The benefits and risks of mRNA COVID-19 vaccines must be evaluated in the context of the current COVID-19 pandemic and the potential consequences of not vaccinating the population. COVID-19 is a highly contagious disease that has led to millions of deaths worldwide and severe long-term health consequences for many who have contracted the virus. Vaccination plays a crucial role in ending the pandemic, reducing the severity of illness in infected individuals, and preventing long-term health consequences.



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Therefore, despite the potential risks associated with mRNA COVID-19 vaccines, the benefits of vaccination far outweigh the risks, particularly in populations at high risk of severe COVID-19 disease. Vaccination remains the best tool to protect individuals and communities from the devastating effects of COVID-19, and efforts to improve vaccine safety surveillance and communicate vaccine risks to the public must continue to ensure that vaccination remains a safe and effective tool in the fight against COVID-19.

Recommendations:

The public health department should continue to monitor the incidence of ischemic stroke in individuals who receive mRNA COVID-19 vaccines and investigate any new cases. The department should also ensure effective communication with stakeholders to provide accurate information on the benefits and risks of the vaccine.

Individuals who have risk factors for ischemic stroke should discuss their individual risk-benefit profile with their healthcare provider before receiving the mRNA COVID-19 vaccine. Additionally, public health efforts should focus on reducing the prevalence of known risk factors for ischemic stroke, such as hypertension, diabetes, smoking, obesity, and physical inactivity.

Conclusion:

The reported cases of ischemic stroke after mRNA COVID-19 vaccination are concerning, but the incidence is very low and similar to the expected background rate. The potential benefits of the mRNA COVID-19 vaccines outweigh the potential risks, including the very low risk of ischemic stroke. Public health efforts should focus on



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reducing the prevalence of known risk factors for ischemic stroke and ensuring effective communication with stakeholders to provide accurate information on the benefits and risks of the vaccine.

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