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Research on the Necessity of Wearing a Mask after Vaccination

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Abstract. In recent years, the COVID-19 pandemic has caused many people to wear masks. This article discusses the need for masks after vaccination. The research method of this study is to do some statistics and compare them to confirm the conclusions. Research shows that wearing a mask for extended periods of time after vaccination provides better protection. Therefore, it is very necessary to wear a mask after vaccination.According to the number of statistics to prove the necessity of wearing masks and vaccinations, people are urged to take relevant protective measures to minimize the spread of the virus, reduce the transmission rate, and end the era of the virus early.

Keywords: mask, necessity, vaccine

1. Introduction

As vaccines become more widely available, both severe and fatality rates from COVID-19 have declined. However, there has been controversy in the academic community about whether to continue to wear masks after vaccination. Therefore, this article will explore whether people still need to wear masks after vaccination to avoid infection during COVID-19. This research could make a theoretical attempt to reduce the severe and fatality rates brought on by the virus.And through the data display and some related reports and articles, remind people to pay attention to the protection of the virus, improve their own safety awareness, do not spread to others and do not let others spread to themselves, to reduce the transmission rate of the virus to the greatest extent, in order to achieve the effect of eliminating the virus.

2. Analysis of the necessity of wearing a mask after vaccination

As for whether wearing masks can reduce the transmission rate of COVID-19, according to domestic and foreign studies, when two people are in contact, assume that one person is sick: A, and the other person is healthy: B. In the first case, neither A nor B wore masks and the infection rate was 90%; in the second case, B wore masks and the infection rate was 30%; in the third case, A wore masks and the infection rate was 5%; in the fourth case, both A and B wore masks and the infection rate was only 1.5%

Whether vaccination can really reduce the transmission rate of the virus to the greatest extent, and whether it is still necessary to wear masks after vaccination, these questions caused me to think deeply

This article compares the transmission rate of the virus between vaccinated and non-vaccinated people, and it may improve the speed of vaccination and the acceptance of the vaccine. The more people get vaccinated, the more the transmission rate will be greatly reduced. It may also speed up vaccine research to develop and upgrade new vaccines.

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Some say that the mesh of the mask is larger than COVID-19, so it does not protect against COVID-19. This is wrong. It's like shooting into a thick shelterbelt. The gap between the trees is much larger than the bullet, but the chance that the bullet will be blocked by the trees is very high, and the chance that the bullet will pass through the trees is very low. The same is true of masks for viruses. The role of masks cannot be denied just because a few people still get infected while wearing masks, and those infected may not be infected by the virus through masks.

On high-speed trains and airplanes, as long as you wear masks, wash rooms are often disinfected, and people do not eat or drink at the same time as other passengers, there is no chance for the virus to spread.

When combined with social distancing, ventilation, and hand washing, wearing a mask can be completely effective. These four measures are extremely inexpensive and highly effective, even outperforming vaccines (about 79% effective).

To sum up, masks have a great resistance to the infection of the virus. In light of this, some may wonder, "If the infection rate of wearing masks is so low, do I also need to get vaccinated?" In the history of mankind, the fight against infectious diseases has never stopped. In the 21st century, we are constantly facing the threat of emerging infectious diseases. The COVID-19 outbreak since December 2019 has taken a heavy toll on people around the world. The focus of our attention is how to scientifically control, manage and control the spread of the epidemic as soon as possible.

The dynamic model of infectious diseases is a mathematical model established based on the characteristics of the population and the disease itself, and the law of spread and diffusion. Through quantitative and qualitative analysis and numerical simulation of the model, the development and changing trend of infectious diseases can be predicted, providing guidance for the formulation of the best public health prevention and control strategies. In view of the scientific prevention and control of COVID-19, based on the actual spread of COVID-19 in China, this paper discusses the prevention and control strategies of COVID-19 through the establishment of an infectious disease dynamics model combined with statistical analysis methods, puts forward prevention and control suggestions, and looks into the world. It mainly focuses on the following four questions :(1) How to establish an infectious disease dynamics model to better simulate the development law of the epidemic? (2) What are the actual effects of various prevention and control measures? (3) Who are the high-risk groups, i.e., the primary prevention and control targets? (4) How should the current epidemic be addressed in terms of prevention and control?

The main contents are as follows :1. Theoretical study on dynamic model of infectious diseases. We constructed a SEIAHR infectious disease kinetic model with latent and asymptomatic infection, and both latent and asymptomatic infection are infectious. Also, it introduces diagnostic rate (?) , and increase the diagnostic treatment room H; The expression of the basic regeneration number 0R is calculated based on the method of the second generation regeneration matrix. Mathematical knowledge is used to prove the existence and stability of the disease-free equilibrium point, and numerical simulation is performed using MATLAB software. 2. Research on the rules of domestic epidemic transmission. Based on the real epidemic data of China from January 10 to May 1, 2020, we established a multi-stage infectious disease dynamics model, namely, the SEIAHDR model without intervention, the SEIAQHDR model with tracking isolation measures, and the SEIAQHDR model with variable coefficient function. The data fitting results show that the prediction results of the model are in good agreement with the actual data, and the average error is small, which is in line with the law of epidemic transmission. In particular, we considered a variable coefficient function model of exposure rate, diagnosis rate, isolation rate, and cure rate over time with higher accuracy (Bias=0.76%). At the same time, the government analyzed the time distribution, spatial distribution, case fatality rate and current situation of imported cases, and determined that the key cities for imported cases are Shanghai, Guangzhou and Beijing. Finally, the change of effective regeneration number R (t) over time was studied, and the sensitivity analysis of controlled regeneration number cR under the intervention was conducted to obtain important influencing parameters, which provided theoretical guidance for the prevention and control measures of COVID-19. 3. Evaluation of the actual effect of prevention and control measures.

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Based on the improved SEIAHDR infectious disease model, we study the actual effects of a series of prevention and control measures taken by the Chinese government, society, and citizens to control the spread of COVID-19. Wearing masks can effectively reduce the scale of the epidemic. The stricter the measures are, the better the prevention and control effect will be. Based on the analysis results of the previous chapters, we put forward comprehensive prevention and control recommendations, including "general rules", "soft and hard measures" and "core prevention and control". Combined with the current domestic and international epidemic situation, it is believed that the focus of China's current epidemic prevention and control is to prevent imported patients, isolate infected people and close contacts, and speed up detection and diagnosis [1].

Since the outbreak of COVID-19, China's vaccine research and development process has always been in the first tier in the world, providing strong support for the world's fight against the epidemic. Currently, domestic COVID-19 vaccines have shown good protective efficacy and safety in clinical trials and real-world studies. However, due to the uncertainty of the duration of vaccine protective efficacy and the emergence of multiple mutant strains, domestic vaccines still face many challenges. Strengthening immunization with homologous vaccines can improve the protective effect of vaccines, but in the long run, it is important to accelerate the development of polyvalent vaccines containing multiple variant strains and COVID-19 universal vaccines, and at the same time, carry out scientific and standardized active monitoring of the safety of COVID-19 vaccines as soon as possible to scientifically assess the long-term safety of COVID-19 vaccines[2].

Zhang Yuntao, chief scientist of Sinopharm China, said in an interview with the Global Times that the high incidence of COVID-19 among the elderly is not only related to their physical condition, but also to the low vaccination rate of the elderly. Data from many places show that vaccination has a strong protective effect on severe illness and death. The elderly and those with underlying medical conditions are most in need of protection and vaccination. Regarding the concerns of the outside world about vaccination of the elderly, Zhang Yuntao explained that for safety reasons, first of all, the restrictions on contraindications to vaccination in the vaccination manual are more stringent. There should now be uniform guidance for all vaccination sites to maximize coverage of older patients and underlying diseases within the framework of the National Health and Wellness Guidance. In particular, this part of the population, as Mr. Mick Dijon's strain protection group, should complete the booster third injection as soon as possible after completing the two injections.

"Based on the data we have from around the world, we do see a significant increase in antibodies after the three doses, a better mobilization of the immune system, and it should be extremely effective in preventing severe illness and death." However, the data shows that the strengthening of the vaccination of this part of the population in China is far from enough. Yuntao admitted that "developing a vaccine with the ability to prevent virus infection" is the highest, but also the ideal, level for vaccine researchers. The reality is that of the more than 50 vaccines already on the market, only a handful have complete protection against infection. "The first focus of vaccines is to prevent disease, and the same is true of COVID-19 vaccines." In his view, prevention of disease is the main objective at present because there is a great deal of uncertainty as to whether a vaccine against COVID-19 infection will be developed in the future.

At this stage, he said, the ongoing development of vaccines against COVID-19 strains is needed in response to the ongoing changes in COVID-19 strains. "In addition, I think the development of a universal vaccine for COVID-19 should also be considered," he said. A universal vaccine is a vaccine with a broad spectrum that protects against the various variants of the pandemic, including alpha, beta and Omicron. However, as the COVID-19 mechanism is not yet well understood, this development will take a long time.

Regarding the fourth dose of vaccination being carried out by multinational companies, Zhang Yuntao said that we are now conducting research on the fourth dose of vaccine. From the current research data, the antibodies produced after the fourth dose of the new crown vaccine will not exceed the third antibody. In China's current situation, whether the fourth needle will be fully implemented at this stage is still open to question. He said that the second and third shots should be given 4-6 months

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apart, and the fourth shot should be at least given. 4-6 months until the third shot if needed. Vaccine intervals must be adequate. If it is too short, the vaccine will have limited effect. Because the antibody will have a memory response when it falls, if the antigen is at a relatively high stage, it will not stimulate more memory responses, so the antibody titer will not be high, that is, the enhancement effect is not obvious. The omicron mutant strain has caused multiple outbreaks around the world, and the Omicron strain has a wider range of variation than the previous strain, which is already 80 percent "different" from the original strain, Zhang said, and it can even be seen as a " new strains". This mutation significantly reduces the effectiveness of previously developed COVID-19 vaccines and antibody treatments. The vaccines already on the market were 20% to 30% less protective against the Beta and Delta variants, but the original vaccine was 70% to 80% less protective against the Omicron variant developed antibody levels. For example, mRNA vaccines approved for emergency use in late 2020 produced much higher levels of antibodies than inactivated vaccines. However, after half a year, the antibody level of the mRNA vaccine decreased significantly, resulting in a significant decrease in the protective effect. 70% of Hong Kongers are vaccinated with mRNA, but it is still difficult to stop the pandemic of mutant Omicron. In contrast, inactivated vaccines have a broader antigenic spectrum, cover some omicron variants and offer some theoretical protection, albeit with reduced protection.

When used as booster shots, existing vaccines can produce cellular immunity in addition to humoral immunity. As can be seen from the outbreaks in many places in China, the number of severe cases of the omicron variant strain was significantly reduced after people received booster injections, while the rate of severe cases was significantly higher among people who had not been vaccinated.

In terms of overall protection strategy, the emergence of the omicron variant has increased the urgency of developing a new vaccine, Zhang said, adding that vaccine developers around the world are now preparing for this. Sinopharm Sinobiological has been developing a new vaccine against Omicron since the end of last year, making it the first vaccine in China and the world. Sfda is in the process of final rolling approval. Two of the inactivated vaccines have completed their final drug reviews and will soon begin clinical studies. In addition, the national drug China Bio mRNA vaccine and gene recombinant vaccine have also submitted rolling applications. "We hope that the four vaccines from these three technology paths, once approved, will be combined with the current situation of COVID-19 vaccination in China and the world to cope with the ongoing epidemic by continuing to administer new vaccines against the omicron mutant strain."[3]

"It's true when you get a shot and you get a shot."[4]

Drone aerial propaganda, community organization bus unified shuttle, veteran party members take the lead in vaccination... Vaccination and personal protection are important measures to prevent and control COVID-19, and experts recommend that people aged 60 and above take the initiative to get vaccinated as soon as possible. In Lishui District, villages and communities have taken innovative measures to encourage the elderly to actively get vaccinated against COVID-19 through various measures to build a safety barrier.[5][6]

The prevention of major infectious diseases through immunization is a global consensus. The spread of vaccination has prevented the disability and death of countless children. Since 1978, China has implemented the policy of a national immunization program, which has effectively controlled the incidence of infectious diseases. [7][8]Through the immune

3. Conclusion

Although this article compared the vaccination and wearing a mask to the virus transmission rates, etc., in addition to the vaccination and the way of wearing a mask there is more to reduce the spread of the virus. This paper did not mention that it is also one of the future direction of research: in addition to vaccines and wearing a face mask if there are more good ways to reduce the spread of the virus, what kind of collocation is the best way to reduce the spread of the virus. In addition, the current vaccination technology is not mature, and in the future of scientific and technological development, vaccines will become better and better. Whether people should get vaccinated now or after the technology is mature has also become one of the research directions.

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