Effect of Exercise Training on Response of Covid-19 Like Vaccines in Older Adults; a Brief Report

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Abstract

Introduction: The 2019 outbreak of coronavirus (covid-19) infections, which began in China in late 2019, is growing rapidly and the disease has spread worldwide. Studies have shown that the elderly have a higher risk of Covid-19 infection and death than others in the community. The aim of the present study was to investigate the effect of exercise on the response to Covid-19 like vaccines in the elderly. Aging is associated with a decline in the normal function of the immune system. Among prevention methods, vaccination is the main drug strategy to reduce the incidence and severity of viral diseases. It is noteworthy that the most vulnerable populations in the community who experience the most severe cases of Covid-19 disease are those who show a decrease in the effectiveness of the vaccine. Reasons for reduced flu vaccine reactions in the elderly may be due to immune aging and chronic disease. The data show that humoral and cellular immune responses after vaccination are low in the elderly. Decreased efficacy of the vaccine may be related to decreased antibody response. The response of cytotoxic T lymphocytes to viral infections and vaccination in the elderly is also impaired. Chronic exercise is also associated with several anti-influenza benefits, including reducing the risk of influenza and increasing the effectiveness of the vaccine. In active elderly, anti-influenza IgG and IgM and influenza-specific lymphocyte proliferation are higher than in sedentary individuals. Therefore, it is recommended that the elderly do training exercise to increase the effectiveness of the vaccines.

Keywords: Exercise Training, Vaccine, COVID-19, Older Adult.

Extended Abstract

Among the known viral diseases, coronavirus disease 2019 has a global epidemic that has increased global mortality. In this disease, a strong innate response, indicated by an increase in CD14+ CD16+ activated monocytes and cytokine responses, is visible approximately 2 days after the onset of symptoms. Immunoglobulin M appears from the fourth day of infection and peaks approximately on the twentieth day and then decreases, while immunoglobulin G appears on the seventh day and reaches its peak on the twenty-fifth day and is maintained at a high level for 4 weeks. The elderly, especially the elderly with chronic diseases, are more prone to affliction and death from this disease. Of course, one of the reasons can be negative structural and functional changes in different
systems, parts and tissues of the body in old age. Among all the preventive methods recommended, vaccination is the primary pharmacological strategy to reduce the incidence and severity of viral diseases. But in old age, the response of special antibodies to the influenza vaccine decreases. A decrease in the number of T cells, especially naive T cells, along with an increase in memory T cells is an important factor in reducing the immune response to vaccination.

In the meantime, regular physical exercises are closely related to the immune response to viral infections. People who exercise regularly have a stronger immune system and a greater anti-inflammatory response than sedentary people. Moderate-intensity exercise is also associated with a reduced risk of influenza and increased efficacy of the vaccine. Antibody levels such as immunoglobulin M and G against the influenza vaccine are higher in the elderly who receive a regular exercise program than the sedentary elderly. Therefore, the aim of this study was to investigate the effects of exercise training in response to covid-19- like vaccines in older adults.

**Vaccination in the Elderly**

Today, vaccination is one of the most important methods of prevention and protection against infectious diseases. The purpose of it is to create an appropriate, strong and long-lasting immune response against the pathogens. In most countries, the elderlies are among the first groups to receive the vaccines. In the elderlies who had healthy cell-mediated and humoral immune responses, an increase in the proliferative responses of peripheral blood mononuclear cells and antibody titers was observed by influenza vaccine injection. The production of interferon gamma has a significant relationship with antibody and cell-mediated responses due to vaccination in this kind of people, so that with the injection of the vaccine, the amount of interferon gamma increased in them. The activity of cytotoxic T lymphocytes has also increased, but vaccination in the elderly hospitalized with chronic diseases does not alter the activity of cytotoxic T lymphocytes, so the activity of these cells is related to the health status of the elderly.

**The Effect of Exercise Training on Vaccine Response**

The vaccine is recommended as an important preventative measure to prevent infection and related complications in the elderlies, but altered immune system function and immunosenescence play a very important role in reducing the effectiveness of the vaccine in these people. Different methods are being studied to improve vaccine response in this vulnerable population. Physical exercise has been identified as an effective way to improve the response to the influenza vaccine.

Considering the appropriate intensity and duration of activity in designing an exercise program plays an important role in increasing vaccine response. It has been suggested that regular exercise for at least one year may increase the immune response to the influenza vaccine in the elderly. Studies have shown that 10 months of aerobic exercise and 3 sessions per week with moderate intensity have beneficial effects on vaccine responses, including a greater increase in antibody concentration after influenza vaccination than sedentary individuals. Higher levels of immunoglobulin M and G, and influenza-specific lymphocyte proliferation have been reported in the elderly who do more than 20 minutes and more than 3 sessions per week of aerobic exercise. Seroprotection in the influenza A/H3N2 and A/H1N1 types after 24 weeks of influenza vaccine injection in the elderly who did long-term aerobic exercise, was also more than the elderly who did not do such exercises.

A moderate-intensity 45-minute walk did not increase the antibody response to the influenza and pneumococcal vaccines. In one study, a moderate-intensity aerobic exercise session before vaccination further increased C-reactive protein and interleukin-6 levels. One acute exercise session only further increased antibodies in the elderly woman who had received the H1N1 influenza vaccine, while exercise had no effect on seroprotection.

The mechanisms for improving vaccine response to endurance training are not fully understood and need further investigation. High antibody titers after vaccination indicate that either the production of antibody is increased or the rate of clearance is decreased. In this context, exercise increases antibody-producing cells in response to the vaccine and decreases immunoglobulin G clearance. Also, the elderly who exercise have a higher level of natural killer cell function than the sedentary elderly. These factors increase the response to the vaccine in these people.

**Conclusion**

According to the contents of this article, it can be concluded that the vulnerable population experiencing the severe form of coronavirus disease 2019 is the same population that shows reduced vaccine
efficiency. Therefore, long-term exercises can be an effective approach to not only improve the immune response against viral pathogens, but to also improve the effectiveness of the vaccine in the elderly.

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Ethical Considerations: All ethical issues were considered in this study.

Applicable Remarks: To find newer ways to increase the effectiveness of the covid-19 vaccine in older adults.
چکیده

ایضمنی عفونت‌های بیماری کروناویروس 2019 (COVID-19) که از اوایل سال 2019 در چین شروع شد، به‌سرعت رشد کرده و این بیماری در سراسر جهان منتشرشده است. مطالعات نشان دادند که در سالمندان، خطر ابتلا به عفونت کووید-19 مبتنی بر تمرینات ورزشی نیز باید مورد توجه قرار گیرد. همچنین در مطالعات نشان دادند که افراد سالمند احتمالاً میزان اثر واکسن خاصی از افراد جامعه، شرکت در تمرینات ورزشی نیز باید به‌پرداخت. 

کلمات کلیدی: تمرینات ورزشی، واکسن، کووید-19، سالمند.
در نظر گرفتن شدت و مدت فعالیت مناسب در طراحی برنامه تمرین‌های سه‌هلولی در اثر تکثیر (Immunoglobulin M; IgM)
یک رابطه ایجاد می‌تواند در مورد واکسیناسیون کامل ترسیده باشد.

اثربخشی واکسن از طریق اینترلوکین-6 (IL-6) ارتباط دارد.

در این مطالعه ببینیم که این واکسن در افراد سالمند روش‌های مقابله با ابتلا به این واکسمانی به وسیله درک تهدید کننده می‌باشد. این واکسمانی باعث افزایش می‌شود.

در مورد واکسیناسیون از طریق اینترلوکین-6 (IL-6) تحقیقات انجام شده که در این مطالعه مورد بررسی قرار گرفته است.

در مورد واکسیناسیون از طریق اینترلوکین-6 (IL-6) اگرچه در این مطالعه مورد بررسی قرار گرفته است، اما در مورد واکسیناسیون از طریق اینترلوکین-6 (IL-6) بررسی نشده است.

در مورد واکسیناسیون از طریق اینترلوکین-6 (IL-6) تحقیقات قابل بررسی وجود دارد. این واکسمانی باعث افزایش می‌شود.

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محدودیت‌ها
مهم‌ترین محدودیت‌هایی که در این مطالعه ارائه شده‌اند، تمرین ورزشی بر پاسخ واکسن واسکار کووید-19 در سالمندان بررسی شده است. که هر دوی تمرین معنی‌داری نداشتند. 

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مشارکت مثبت نویسنده‌ها
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