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Letter to editor

Is exercise a medicine or a vaccine adjuvant? A look at obesity and covid-19

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Dear Editor-in-Chief

In recent years, exercise has been called an 'amazing' medicine and a 'miracle' cure. Scientific research shows that regular exercise is effective in preventing and treating many common diseases, including type 2 diabetes, dementia, depression, heart disease, some cancers, and other common diseases (Fang et al., 2022). In fact, exercise in a specific dose and formula is prescribed for each patient who is diagnosed with the disease. The prescription should be very clear in terms of modality, intensity, frequency, and duration.

In this regard, the American College of Sports Medicine (ACSM) has launched the "Exercise is Medicine" project to recognize the myriad health benefits of exercise. These include reducing the incidence of a number of different cancers, lowering the risk of excessive weight gain (along with related health problems as well as diabetes), and improving cardiovascular health (as well as reducing the risk of high blood pressure in addition to heart stroke) (Ghardashi-Afousi et al., 2018).

The acute effect of exercise has been shown to lead to a transient decrease in triglyceride levels, an increase in HDL cholesterol levels, a decrease in blood pressure, a decrease in insulin resistance, and an improvement in glucose control. Regular exercise increases blood flow and oxygen to the brain which improves memory and mental function. It also increases the production of a number of hormones that stimulate the growth of brain cells (Ueno-Pardi et al., 2022).

In addition, some literature describes exercise even better than medicine. For example, a review of more than 300 randomized controlled trials found that exercise was as effective as drugs at risk for heart disease and diabetes, and more effective than post-stroke rehabilitation drugs (Naci & Ioannidis, 2013).

It has previously been suggested that vaccinating children with exercise can control the obesity epidemic in them. Recently, in the coronavirus outbreak, exercise has been referred to as a vaccine or vaccine adjuvant (Naci & Ioannidis, 2013). A recent study in the British Journal of Sports Medicine (BJSM) suggests that routine activities may protect people with COVID-19 from serious illness.

Evidence suggests that exercise and obesity are involved in the pathogenesis of COVID-19 disease and vaccine efficacy. Regular exercise has been shown to exert immune regulatory effects, control viral gateway, modulate inflammation, stimulate NO production pathways, and control oxidative stress. Adaptation to ordinary exercise seems to affect immune function, particularly innate and adaptive immunity, and ameliorate humoral immunity with enhanced vaccination responses. Exercise may at least partially reduce the detrimental effect of SARS-CoV-2 binding to the ECA2 receptor. Exercise training can activate anti-inflammatory signaling pathways (Shirvani & Rostamkhani, 2020). Today, COVID-19 vaccination has shown that individuals who exercise continuously and regularly may develop higher antibody titers to the SARS-CoV-2 strain contained in the vaccine compared to individuals who do not exercise (Hallam et al., 2022).

On the other hand, understanding how obesity and adiposity affect immunity and more specifically the production and function of antibodies is of great importance (Malavazos et al., 2020). Numerous studies have shown the effect of obesity on antibody properties. For example, adaptive immune responses to influenza virus are impaired during obesity, innate and adaptive immune responses to influenza are delayed in obese patients, and obesity was suggested to decline influenza antibody titers following influenza vaccination and reduce vaccine efficacy with poor vaccine immunization. In the same manner, lower COVID-19 mRNA vaccine-induced antibody titers have been related to central obesity and severe acute respiratory syndrome (Ghanemi et al., 2021).

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In general, recent research on the Covid-19 epidemic has shown that exercise is not only a wonderful medicine in the prevention and treatment of many diseases, but also regular exercise can act as an adjunct vaccine. Therefore, prescribing exercise will always help promote community health and is completely in line with the P4 medicine approach (predictive, preventative, personalized, and participatory).

References

Fang, P., Ge, R., She, Y., Zhao, J., Yan, J., Yu, X., . . . Zhang, Z. (2022). Adipose tissue spexin in physical exercise and age-associated diseases. Ageing Research Reviews, 73, 101509. doi: https://doi.org/10.1016/j.arr.2021.101509

Ghanemi, A., Yoshioka, M., & St-Amand, J. (2021). Impact of adiposity and fat distribution, rather than obesity, on antibodies as an illustration of weight-loss-independent exercise benefits. Medicines, 8(10), 57. doi: https://doi.org/10.3390/medicines8100057

Ghardashi-Afousi, A., Holisaz, M. T., Shirvani, H., & Pishgoo, B. (2018). The effects of low-volume high-intensity interval versus moderate intensity continuous training on heart rate variability, and hemodynamic and echocardiography indices in men after coronary artery bypass grafting: A randomized clinical trial study. ARYA Atherosclerosis, 14(6), 260. doi: https://doi.org/10.22122/arya.v14i6.1781

Hallam, J., Jones, T., Alley, J., & Kohut, M. L. (2022). Exercise after influenza or COVID-19 vaccination increases serum antibody without an increase in side effects. Brain, Behavior, and Immunity, 102, 1-10. doi: https://doi.org/10.1016/j.bbi.2022.02.005

Malavazos, A. E., Romanelli, M. M. C., Bandera, F., & Iacobellis, G. (2020). Targeting the adipose tissue in COVID‐19. Obesity (Silver Spring, Md.). doi: https://doi.org/10.1002/oby.22844

Naci, H., & Ioannidis, J. P. (2013). Comparative effectiveness of exercise and drug interventions on mortality outcomes: metaepidemiological study. Bmj, 347, f5577. URL: https://www.bmj.com/content/bmj/347/bmj.f5577.full.pdf

Shirvani, H., & Rostamkhani, F. (2020). Exercise considerations during coronavirus disease 2019 (COVID-19) Outbreak: A narrative review. Journal of Military Medicine, 22(2), 161-168. URL: http://eprints.bmsu.ac.ir/id/eprint/8291

Ueno-Pardi, L. M., Souza-Duran, F. L., Matheus, L., Rodrigues, A. G., Barbosa, E. R., Cunha, P. J., . . . Buchpiguel, C. A. (2022). Effects of exercise training on brain metabolism and cognitive functioning in sleep apnea. Scientific Reports, 12(1), 1-12. doi: https://doi.org/10.1038/s41598-022-13115-2