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Francisco José Gondim Pitanga
a) Graduate Program in Rehabilitation Sciences. Federal University of Bahia (UFBA), Salvador, BA, Brazil
b) Department of Physical Education of the Brazilian Society of Cardiology, Bahia, Brazil

Cristiano Silva Pinho
Department of Physical Education of the Brazilian Society of Cardiology, Bahia

Bruno Penas Seara Pitanga
a) UniFTC, Salvador, Bahia, Brazil
b) UNIJORGE University Center, Salvador, Bahia, Brazil

Alex Cleber Improta Caria
Department of Physical Education of the Brazilian Society of Cardiology, Bahia, Brazil

Jorge Medeiros Gomes
Department of Physical Education of the Brazilian Society of Cardiology, Bahia, Brazil

Corresponding Author:
Francisco José Gondim Pitanga
a) Graduate Program in Rehabilitation Sciences. Federal University of Bahia (UFBA), Salvador, BA, Brazil
b) Department of Physical Education of the Brazilian Society of Cardiology, Bahia, Brazil

Importance of physical activity in immunization against influenza and COVID-19

Francisco José Gondim Pitanga, Cristiano Silva Pinho, Bruno Penas Seara Pitanga, Alex Cleber Improta Caria and Jorge Medeiros Gomes

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Abstract
The Ministry of Health's National Plan for the Operationalization of Vaccination Against COVID-19 has been advancing rapidly, making Brazil one of the countries that most applied vaccines against COVID-19 in the entire planet. On the other hand, for some time now, several authors have been calling the attention of the scientific community about the importance of physical activity to increase the potential of immunization in people vaccinated against influenza. They also suggest that these results can be observed in relation to COVID-19, as they are infectious processes with similar viral characteristics. Thus, the objective of this short communication is to demonstrate that physical activity can increase the immunization potential of people vaccinated against influenza and COVID-19. After consulting different publications on the subject, it is suggested that the regular practice of physical activity, especially at moderate intensity, can enhance the effect of the vaccine in immunizing people against influenza and COVID-19. Thus, actions to publicize the importance of remaining or becoming physically active, even after immunization with the vaccine, must be publicized and encouraged to the population. Thus, it is expected that people are better prepared to face adverse effects, both from the current and from future pandemics with similar characteristics that may affect humanity.

Keywords: Physical activity, COVID-19, influenza, vaccines

Introduction
The Brazilian Ministry of Health's National Plan for the Operationalization of Vaccination Against COVID-19 has its main objective to establish actions and strategies for the operationalization of vaccination against COVID-19 in Brazil [1]. In this way, until March 04, 2022 the Ministry of Health of Brazil had already distributed 465 million doses of vaccine against COVID-19 in all brazilian states, which in turn had already applied 379 million doses in the Brazilian population [2], it left Brazil rank among the countries that most applied COVID-19 vaccines worldwide [3].
In addition, in 2021 in Brazil, a vaccination campaign against influenza was also underway, which represents a double challenge for the full functioning of immunizations against COVID-19 and influenza [4].
On the other hand, for some time now, several authors have been calling the attention of the scientific community about the importance of physical activity to increase the potential of immunization in people vaccinated against influenza [5,6,7,8]. Even individuals who performed regular physical exercise such as walking and strength training before being vaccinated against influenza are less likely to be infected with this virus, most likely due to the benefits of physical exercise on cells of the innate and adaptive immune system [9].
It is noteworthy that the potentiation of the effect of the vaccine in physically active people was seen both in the general population [10] and in athletes[11], but mainly in the elderly [5,6,7,8].
On the other hand, in recent publications [12, 13], researchers drew attention that the findings in studies on physical activity and the effect of the influenza vaccine can also be observed in relation to COVID-19, since they are infectious processes with similar viral characteristics.
Thus, the objective of this short communication, which reflects the call to action of a Brazilian entity, is to demonstrate that physical activity can increase the immunization potential of people vaccinated against influenza and COVID-19, and thus propose actions during the campaigns of vaccination, to increase the practice of physical activity by society.

Who is The Proponent of the Short Communication

This present research letter is proposed by the Department of Physical Education in Cardiology (DEFIC) of the Brazilian Society of Cardiology (SBC), Bahia region. The DEFIC-SBC/BA was initially created on September 4, 2000 when it was called the Department of Physical Education and Physiotherapy (DEFFI). Later, on December 9, 2002 it was dismembered and was renamed Department of Physical Education in Cardiology. It is a civil entity, of a scientific and social nature, with legal personality, non-profit, with an unlimited number of members, which brings together professionals with bachelor's degrees and/or graduates in Physical Education who are interested in or dedicated to assistance and related teaching or research the application of physical activity in the primary, secondary and tertiary prevention of cardiovascular diseases.

How the practice of physical activity increases the immunization potential in people vaccinated against influenza and COVID-19.

The main arguments presented in publications about the increased potential for immunization in physically active people vaccinated against influenza would be the fact that the most physically active people present, after the application of the vaccine, a greater amount of specific anti-influenza antibodies (IgM and IgG) as well as increased proliferation of influenza-specific lymphocytes, mainly observed in the elderly [5, 6, 7, 8, 14].

In addition, there was also greater post-vaccination expansion of monocytes and blasts in blood plasma, as well as upper regulation of genes associated with phagocytes, such as monocytes and macrophages [5, 6, 7, 8, 14].

In this sense, the regular practice of physical activity seems to provoke more significant immune responses as a result of the influenza vaccine, both in the innate immune system and in the adaptive immune system [5, 6, 7, 8]. In this context, authors cite the importance of cytokines produced by moving skeletal muscles, which are specialized in a positive immunomodulatory response, thus serving as an important immunizing enhancer [15].

However, it is important to emphasize that physical activity in light to moderate intensity is capable of promoting a more adequate immune response, favoring the production of pro-inflammatory cytokines. In this way, there is protection against infectious diseases. On the other hand, intense physical activity can cause immunosuppression, block lymphocyte proliferation and decrease the production of antibodies by lymphocytes [16]. As a result, you are properly vaccinated and physical activity at moderate intensity seems to be the best strategy for immune health.

In this sense, the International Manifesto for the Promotion of Physical Activity in Post-COVID-19: A Call for Action [17], a document recently published in Brazil and endorsed by the SBC, proposes, in its first call for action, to encourage the practice of physical activity by the population during and after the pandemic, both individually (me), and socially (us) and collectively (governmental and non-governmental departments), even after the population's vaccination.

Conclusions and Recommendations

The regular practice of physical activity, especially at moderate intensity, can enhance the vaccine's effect on the immunization of people against influenza and COVID-19. Thus, the DEFIC-SBC/BA suggests that, globally, in the National Immunization Plans against influenza and COVID-19, actions be taken to publicize the importance of remaining or becoming physically active, even after immunization with the vaccine. In this way, it is expected that people are better prepared to face adverse effects, both from the current and from future pandemics with similar characteristics that may affect humanity.

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