

WAS POSTPONING THE TOKYO 2020 OLYMPIC AND PARALYMPIC GAMES A CORRECT DECISION?



SPECIAL ARTICLE
ARTIGO ESPECIAL
ARTICULO ESPECIAL

O ADIAMENTO DOS JOGOS OLÍMPICOS E PARALÍMPICOS DE TÓQUIO 2020 FOI UMA DECISÃO CORRETA?

¿LA POSTERGACIÓN DE LOS JUEGOS OLÍMPICOS Y PARALÍMPICOS DE TOKIO 2020 FUE UNA DECISIÓN CORRECTA?

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ABSTRACT

In December 2019, Wuhan, in China, attracted international attention due to a pneumonia outbreak caused by the new coronavirus (2019-nCoV). Infection by 2019-nCoV is more likely in elderly people with comorbidities or with associated chronic diseases. Due to the high transmission rate among humans, this disease is rapidly disseminated, which led to several events being canceled, including the Tokyo 2020 Olympic and Paralympic Games. The aim of this article is to discuss the risk factors for Olympic and Paralympic athletes, as well as for spectators, that justify the decision to postpone the Tokyo Games 2020. Regular physical exercise is associated with health and the prevention of chronic diseases. Although athletes generally appear to be healthy and physically fit, this may not be true. The immune system, which protects the organism from invasive microorganisms, can be affected by the duration and quality of sleep, as well as by physical exercise which influences the quality of the immune response. High volumes of high-intensity physical exercise, as well as changes in sleep patterns during the pre-competition period and the impacts of jet lag on athletes traveling for the Tokyo Games in 2020 may lead to immune system suppression, making these groups more vulnerable to infection by 2019-nCoV. Moreover, during the period planned for the games in 2020 the pandemic may be subsiding in some countries and increasing in others, and this was also taken into consideration as a risk factor. Hence, the decision taken to postpone the Tokyo 2020 Olympic and Paralympic Games until 2021 due to the 2019-nCoV was the correct one, and was extremely important to protect the health of Olympic and Paralympic athletes, as well as spectators. **Level of evidence V; expert opinion.**

Keywords: COVID-19; 2019-nCov; Immune system; Sleep; Athletes.

RESUMO

Em dezembro de 2019, Wuhan, na China, despertou atenção internacional devido a um surto de pneumonia causada pelo novo coronavírus (2019-nCoV). A infecção pelo 2019-nCoV é mais provável em pessoas idosas com comorbidades ou com doenças crônicas associadas. Em virtude da alta taxa de transmissão entre humanos, essa doença tem disseminação rápida, o que fez com que diversos eventos fossem cancelados, dentre eles os Jogos Olímpicos e Paralímpicos de Tóquio 2020. Nesse sentido, o objetivo deste artigo é discutir fatores de risco dos atletas olímpicos e paralímpicos, bem como dos espectadores, que justificam a decisão de adiamento dos Jogos de Tóquio 2020. A prática de exercício físico regular é associada à saúde e à prevenção de doenças crônicas. Embora normalmente pareça que os atletas estão em boa forma e são saudáveis, isso pode não ser verdade. O sistema imunológico, que protege o organismo de microrganismos invasores, pode ser afetado pela quantidade e qualidade do sono, assim como pela prática de exercício físico que influencia a qualidade da resposta imunológica. A prática de exercícios de alta intensidade e grande volume, além das alterações do sono no período pré-competitivo e os impactos do jet lag dos atletas que viajariam para os Jogos de Tóquio no ano de 2020 podem levar à supressão do sistema imunológico, deixando esses grupos mais vulneráveis à contaminação pelo 2019-nCoV. Além disso, no período previsto de ocorrência dos jogos em 2020 a pandemia poderia estar em regressão em alguns países e ascensão em outros, e isso também foi levado em consideração como um fator de risco. Nesse sentido, a tomada de decisão de adiar os Jogos Olímpicos e Paralímpicos de Tóquio 2020 para o ano de 2021 devido ao 2019-nCoV foi correta e de extrema importância para preservar a saúde dos atletas olímpicos e paralímpicos, bem como dos espectadores. **Nível de evidência V; opinião do especialista.**

Descritores: COVID-19; 2019-nCov; Sistema Imune; Sono; Atletas.

RESUMEN

En diciembre de 2019, Wuhan, en China, despertó la atención internacional debido a un brote de neumonía causada por el nuevo coronavirus (2019-nCoV). La infección por el 2019-nCoV es más probable en personas de la tercera edad con comorbidades o con enfermedades crónicas asociadas. En virtud de la alta tasa de transmisión entre humanos, esta enfermedad tiene diseminación rápida, lo que hizo con que diversos eventos fuesen cancelados, entre ellos los Juegos Olímpicos y Paralímpicos de Tokio 2020. En ese sentido, el objetivo de este artículo es discutir factores de riesgo de los atletas olímpicos y paralímpicos, bien como de los espectadores, que justifican la decisión de postergación de los Juegos de Tokio 2020. La práctica de ejercicios físicos de forma regular está asociada a la salud y a la prevención de enfermedades crónicas. Aunque normalmente parezca que los atletas están en buena forma y son saludables, eso puede no ser verdad. El sistema inmunológico, que protege el organismo de microorganismos invasores, puede ser afectado por la cantidad y calidad del sueño, así como por la práctica de ejercicios físicos que influencia la calidad de la respuesta inmunológica. La práctica de ejercicios de alta intensidad y gran volumen, además de las alteraciones del sueño en el período precompetitivo y los impactos del jet lag de los atletas que viajarían para los Juegos de Tokio en el año 2020 pueden llevar a la supresión del sistema inmunológico, dejando a esos grupos más vulnerables a la contaminación por el 2019-nCoV. Además, en el período previsto de



ocurrencia de los juegos en 2020 la pandemia podría estar en regresión en algunos países y ascensión en otros, y eso también fue llevado en consideración como un factor de riesgo. En ese sentido, la toma de decisión de postergar los Juegos Olímpicos y Paralímpicos de Tokio 2020 para el año 2021 debido al 2019-nCoV fue correcta y de extrema importancia para preservar la salud de los atletas olímpicos y paralímpicos, bien como de los espectadores.

Nivel de evidencia V; opinión del especialista.

Descriptor: COVID-19; 2019-nCoV; Sistema Inmune; Sueño; Atletas.

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INTRODUCTION

In December 2019, a pneumonia outbreak with unknown etiology was observed in the Wuhan city of China, and it gained immense attention worldwide. In January 2020, the Chinese scientists identified the new coronavirus (2019-nCoV)¹. Initially, the main symptoms resulting from the 2019-nCoV infection were malaise, fever (98%), dry cough (76%), and dyspnea (55%)². The 2019-nCoV infections recently documented indicate transmission among humans, thereby presenting a broad dissemination risk of the disease¹.

Several commercial activities and sports events have been canceled due to the pandemic caused by the 2019-nCoV³, specifically the Olympic and Paralympic Games Tokyo 2020, which have now been postponed to 2021⁴. The present study analyzes the points that justify the decision by the International Olympic Committee and by the International Paralympic Committee to postpone the Tokyo 2020 Games.

A previous study demonstrated that the elderly population with comorbidities or chronic diseases are more prone to 2019-nCoV infection⁵, and this infection may even lead to severe respiratory disease and mortality. In this regard, healthy young people, mainly athletes, could be at a lower risk for this infection; however, this assumption may not be completely true as athletes are generally more prone to upper respiratory tract infections (URTIs)⁶. In an epidemiologic study with 27 years of analyses, the authors have found sufficient evidence suggesting that health care professionals need to encourage the athletes to adopt hygienic measures in order to decrease the URTI risk and to avoid heavy exercise during systemic diseases⁷.

Although athletes appear to be healthy and physically fit, they usually are not⁸. The regular practice of physical exercise is always associated with general health and prevention of chronic diseases^{9,10}. Recently, the Sociedade Brasileira de Medicina do Exercício e do Esporte published a report¹¹ highlighting the importance of physical exercise in the treatment and control of these diseases, because patients with chronic diseases are more susceptible to complications and aggravation of COVID-19 infection; however, sports performance and physical capacities of an athlete are often associated with the status of supreme health¹² considering that the athletes are immune to all diseases. In contrast, it is perceived that athletes frequently expose themselves to the high amount of physical exercise (training load) to excel in their performance during sports¹³, and this puts the athletes at a higher risk of infection, because their immune system could become compromised. Some points of this perspective will be discussed throughout the text.

Thus, the present study aims to discuss some important issues regarding the decision to postpone the Olympic and Paralympic Games Tokyo 2020 to 2021 due to the 2019-nCoV.

People agglomeration

After knowing about the possible postponement of Olympic and Paralympic Games Tokyo 2020 to 2021, we analyzed the risks in maintaining the 2020 game schedule for the local population and athletes. Factors such as people agglomeration, hygiene habits, and practicing physical exercise in high intensity could suppress the immune system, as well as the sleep complaints in the precompetitive period, besides

Jet Lag effects in the athletes that need to travel for the games and the tourists that could be a host for the virus.

It was expected approximately 11.091 athletes from 206 nations to the Olympic Games¹⁴. Considering the metal structures and use of plastic cups, the transmission rate could be very high.

Furthermore, the virus transmission via the travelers (athletes, coaches, journalists, audience) can represent a high risk of mass contamination^{16,17}, as the screening at the airports is ineffective, concluding that approximately 46% of the infected travelers could not be detected, leading to a high incidence of disease spread in the unaffected countries¹⁸. Another potential risk is the transmissibility during asymptomatic or presymptomatic periods, making it even more difficult to control the 2019-nCoV¹⁹. Considering that the incubation period of the virus is approximately 6–7 days²⁰, controlling the virus propagation seems to be difficult. In this respect, travel restrictions were indicated to prevent the virus spread²¹. Moreover, the social distancing strategy, initially restricted in China, to reduce the virus propagation is now extended to various countries²² as one of the measures to prevent rapid virus transmission.

Physical exercise and the immune system

The immune system is a complex molecular network that protects the host from pathogens²³. The increased risk of URTIs development in athletes has been reported for more than three decades²⁴, whereas the concern regarding the immunity and health of the athletes before Olympic Games has been demonstrated by Lynn in a study reported before the Seoul Games 1988²⁵. Considering that the disease caused by 2019-nCoV could easily spread via the airway, it is essential to understand the mucosal immunity, which protects the mucous membranes of the respiratory tract.

The effect of physical exercise on the mucosal immunity has been studied by analyzing the immunoglobulin A (IgA) alterations²⁶. Reduced secretion rate of mucosal immunity salivary markers has been considered as a risk factor for subsequent URTIs in the athletes²⁶. Although regular physical exercise improves immune system function²³, the training load could be a fundamental factor in improving or deteriorating the immune system²⁷. In a study reported in 1987, it was observed that a single bout of exercise performed in high intensity was able to suppress salivary immunoglobulins A and M (IgA and IgM, respectively)²⁸. In this study, it was observed that this suppression lasted for approximately 1 h and resumed to the pre-exercise levels after 24 h. Another study reported the IgA suppression with a single bout of high intensity physical exercise and demonstrated that the high intensity physical exercise for one year resulted in a significant decrease in the IgA secretion rate in a chronic manner²⁹, indicating that athletes may present lower IgA secretion rate, leading to higher risk of URTIs.

In 1994, Pedersen³⁰ defined that one single bout of exercise is associated with initial improvement of immune function; however, after the exercise, it has a transitory effect of immune depression that can last from 3 to 72 h, termed as “open window”. It is believed that this “open window” makes the host more susceptible to opportunist infections. It was suggested that during this state of immunodepression, viruses, and other microorganisms invade and infect the host cells³⁰, posing an

increased risk for 2019-nCoV contamination. In accordance with the aforementioned, another study demonstrated that increases in training load (intensity × volume) could weaken the athletes' immune system³¹. Although the trainings are performed in high intensities, the physical efforts during competition seem to be even higher^{32,33}, leaving the athletes more exposed during major competitions such as Olympic Games.

Sleep and athletes immune system

Sleep improves the immune system³⁴ and physiological recovery³⁵. This could be observed in two ways: 1) sleep deprived/restricted subjects usually have a higher probability to develop diseases, including pneumonia³⁶; 2) a sick person has more somnolence and requires more sleep for quick recovery. Sleep, in particular, the slow wave sleep³⁷ and the circadian system³⁸ work collaboratively to generate a proinflammatory environment. Lange et al.³⁸ described the main alterations that affect the immune system when sleep is impaired, which include higher hypothalamic-pituitary-adrenal axis activity and higher sympathetic nervous system activity, reduced growth hormone and prolactin secretion, increased proinflammatory cytokine action, in particular tumor necrosis factor alpha (TNF- α) and interleukin 6 (IL-6) and reduced natural killer and lymphocyte T (LT) action³⁸.

Olympic and Paralympic athletes often present bad sleep quality, sleep complaints, sleep disturbances, and inadequate sleep duration³⁹⁻⁴¹, particularly during periods that precede important competitions⁴²⁻⁴⁵. Besides negatively affecting the sports performance⁴⁶, sleep restriction presumably triggers important immunological alterations^{37,47}. It has been observed that increased training load in combination with psychological pressure could lead to injuries⁴⁹ and sport diseases that compromise athletes' health⁵⁰, being even more severe in the Paralympic athletes⁵¹⁻⁵³.

The International Olympic Committee and the International Paralympic Committee (IPC) monitored the incidence of illness and diseases in the Olympic and Paralympic Games London 2012 and Rio 2016⁵⁴⁻⁵⁷. The URTIs were identified as the most common related disease by athletes, demonstrating an elevated vulnerability of athletes to URTIs as 2019-nCoV/SAS; moreover, it was observed that Paralympic athletes were more susceptible to diseases when compared to the Olympic athletes⁵⁴⁻⁵⁷. This fact was also observed in the Winter Games (2014)⁵⁸, revealing that the proportion of injuries and diseases is greater in the Paralympic athletes in comparison to the Olympic athletes⁵⁹. This data could be justified by the fact that Paralympic athletes with spinal cord injury have altered autonomic control and impaired immune function, which increases the disease vulnerability in this population⁶⁰. Moreover, it was identified that wheelchair use by Paralympic athletes probably raises the infection transmission rates⁵⁵.

During the games, athletes are exposed to various stress factors such as intense competition, dehydration, psychological stress, and sleep restriction^{48,61}, which could lead to immunodepression, making them more prone to diseases⁶². While approaching athletes in a pre-competitive period, it is essential to highlight studies that evaluated the sleep quality, specifically in periods that precede Olympic and Paralympic games^{41,43-45,53,64}, which demonstrate a great sleep fragility in these athletes. In a study reporting athletes that participated in the Paralympic Games Beijing 2008, it was observed that 83.3% of athletes presented daytime sleepiness and also had poor sleep quality, and 72% presented medium anxiety levels, which also had a negative impact on the sleep quality⁴³. Other studies^{41,43,44,66} reported that Olympic athletes present poor sleep quality and low sleep efficiency, besides increased awakenings, fragmentation, and sleep latency, thereby reducing the physical and cognitive performance, as well as increasing the number of musculoskeletal injuries. The pressure to achieve better results, anxiety levels, and transmeridian⁶⁵ travels could affect

the sleep quality and performance in athletes during sports⁶⁶. Poor sleep quality and reduced sleep duration between athletes can be justified by schedule restrictions, beyond the reduced priority of sleep among other training demands and the lack of knowledge about sleep function in optimizing sports performance⁶⁷.

Another important aspect that needs to be highlighted is the sleep function in physiological recovery⁶⁸. Considering that the transitory period of immune depression ("open window" that could last to 72 h after exercise³⁰) presents inadequate sleep/recovery and if a second exercise session is performed during the open window, then the immune depression postexercise can be even severe and prolonged, making the athlete more susceptible to infections. Moreover, the problems related to the Olympic Games schedule have been previously described⁶⁹, so that events with a severe competition in a short period and in different time durations may present deleterious effects.

Travels and airports

Recent studies evaluating the contamination risks of travelers demonstrated that airports and planes provide higher contamination risks⁷⁰. Seats, trays, and airplane locations are certain risk factors causing respiratory infections. One of the main recommendations to travelers, especially athletes in competition, even being palliative, is to isolate any athlete with respiratory symptoms during the entire travel and to maintain a distance of at least two rows of chairs⁷¹⁻⁷³.

Moreover, while temporarily residing in an Olympic and Paralympic village, the constant and daily contact with people from different locations worldwide increases the infection risk despite taking appropriate measures of dissemination control. Previous studies have reported that infections occur with higher frequencies during the competition than during the training periods^{62,74-76}.

Doping and anti-doping

Another important factor that needs to be taken into account to the games, is that with the reduction and cancelation of qualification competitions and the reduction in the circulation of the officials responsible by the doping control culminating with the reduction in the number of tests, increases a lot the insecurity about the Fair Play in the games. The athletes that tend to illegal practice feels less watched and, therefore, more apt to doping, even after the positioning of World Anti-Doping Agency and National Anti-doping Agencies that the monitoring would be maintained, even in the quarantines period, before the postponement of games⁷⁷, however, some countries have stopped those procedures, like Russia⁷⁸.

Paralympic classification

For practicing Paralympic sport at a competitive level, it is fundamental for Paralympic athletes to be classified in categories based on their disabilities level. Each modality has its classification system, which is based on assessing the presence of a minimum disability for competitive Paralympic sport, considering the possibility of measuring the disability, degree of reversibility, and disadvantage in relation to people without disabilities. The functional classification involves two phases: the white phase occurs before the athletes come in contact with the classificatory officials and here the deficiency information such as level, causes, and indicators of remaining function is collected from the athletes and staff. In this phase, the physician performs clinical and complementary examination of the athletes by evaluating the main cause of the disability. In the white phase, health care professionals together with technical professionals of each modality, are evaluated exams, reports, and the athlete is examined in jury and in the field of the game, taking account of sportive gestures and rules of each sport⁷⁹.

With the actual rule of IPC of zero classification during Paralympic Games, every phase of this process may be compromised, since that besides the reduction in the competitions, making the classifications being also canceled, the displacement to realize the medical exams became limited. There would be much discussion about realize the classification again during the games or even maintain the previous classification.

Specific risks for Paralympic athletes

Accordingly to the historical estimates regarding the Brazilian Paralympic Delegation that have participated in the Paralympic Summer Games, the delegation represents on average 60% of physical-motor deficient athletes, 25% of visually impaired athletes, and 5% of intellectual disabilities. During competitions, the Paralympic athletes present twice the amount of diseases when compared to the Olympic athletes. Of these, about 35% are respiratory diseases. With these data, it is possible to infer that it controlling athletes with these symptoms would be more difficult compared to the Olympic delegations. It was presumed that 10%–20% of the Paralympic delegation would be at risk of the COVID-19 aggravation symptoms⁸⁰. This group may comprise athletes with severe neurological diseases, such as spinal cord injuries, neurodegenerative diseases, immunosuppressant users or immunomodulatory autoimmune diseases, and those with more common chronic diseases such as diabetes and hypertension, thus indicating that if this parallel was extrapolated to all delegation that participated in the Rio Games 2016, this population could have varied between 450 to 900 athletes of the total athletes participants. Athletes with high spinal cord injury (tetraplegics) present important loss of control of vital function due to reduced voluntary and involuntary breathing capacity, as they have limited respiratory muscle use, in addition to sympathetic plexus injury. This region is located next to the high thoracic spine and is responsible for the neurological control of autonomous functions, such as heart rate, respiratory rate, blood pressure, intestinal contractility, and others^{51,55,76}.

Orthoses, prosthesis, and wheelchair use

In particular, the athletes who depend on wheelchairs, walking sticks, crutches, or even hand support in case of visually impaired and low vision athletes who need these instruments to move or for the sports practice, exhibit increased contamination risk because the manual contact with surfaces previously touched by others is constant. These surfaces should be frequently used before every use⁸¹.

CONCLUSION

In conclusion, the Olympic and Paralympic Games Tokyo 2020 would represent a risk to athletes and audience health considering the people

agglomeration factor or the transmission in an asymptomatic period; however, the main factor would be the health risk of athletes due to frequent exposure to strenuous exercise and high training intensity that could suppress their immunity and open a window for contamination. In this respect, athletes may produce reduced key-cytokines in response to 2019-nCoV, and may be more prone to be contamination and suffer from severe symptoms of the disease. This may not occur in a population that practices physical exercise in low to moderate intensities, and depending upon the individual physical fitness it would present greater possibility to develop a proinflammatory state, which produces less severe effects when compared to the athletes, as suggested by Sociedade Brasileira de Medicina do Esporte e do Exercício¹¹.

Another important factor that needs to be highlighted is the sleep function and recovery for a better immune system response. The tourists and athletes can present Jet Lag symptoms that may impair their sleep, well-being, and general health, thereby compromising their immune response on the subsequent day after arriving at their destination. Moreover, athletes usually present sleep restriction in the preparatory months before Olympic and Paralympic Games, which could worsen in the precompetitive period, leading to a bad recovery, thus hampering the immune system of these athletes, making them more susceptible to 2019-nCoV contamination. Furthermore, since no vaccines or specific drugs are presently available, the approach to the virus is unspecific.

Therefore, we conclude that the decision of postponing the Olympic and Paralympic Games Tokyo 2020 to 2021 due to 2019-nCoV was appropriate and important in order to preserve the Olympic and Paralympic athletes as well as audience health.

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