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High-intensity interval training recommendations for combat sports athletes during the COVID-19 pandemic

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LETTERS TO THE EDITOR

Abstract
The COVID-19 pandemic has caused governments to establish quarantine and social distancing for the population in order to decrease the contamination peak, factors that have affected the athletes' preparation. In this context, we developed some high-intensity interval training (HIIT) recommendations for Olympic combat sports athletes that can be performed at home. The HIIT protocols should be added by body mass-based muscle strengthening exercises (similar to technical exercises), with the goal to preserve athletes' muscle mass and physical fitness. Finally, emergency situations require contingency plans for sport.
Keywords: Combat sports; martial arts; boxing; judo; karate; taekwondo; wrestling; home workout.

Recomendaciones de entrenamiento intervalado para atletas de deportes de combate olímpicos durante la pandemia del COVID-19

Resumen
La pandemia del COVID-19 ha obligado a los gobiernos decretar cuarentena y aislamiento social en la población con la intención de aplanar la curva de contagio, hechos que han afectado de igual modo la preparación de los atletas. En dicho contexto, hemos desarrollado algunas recomendaciones de entrenamiento intervalado de alta intensidad (HIIT) que podrían ejecutar atletas de deportes de combate olímpicos en sus hogares. Los protocolos HIIT debiesen complementarse con ejercicios de fortalecimiento muscular con el propio peso corporal (similares a los ejercicios técnicos), con la intención de conservar la masa muscular y la condición física de los atletas. Finalmente, situaciones de emergencia requieren planes de contingencia en el deporte.
Palabras clave: Deportes de combate; artes marciales; entrenamiento interválico; boxeo; judo; karate; taekwondo; lucha olímpica; entrenamiento en casa.

Recomendações de treinamento intervalado para atletas de esportes de combate olímpicos durante a pandemia de COVID-19

Resumo
A pandemia de COVID-19 tem obrigado os governos a decretarem quarentena e isolamento social para a população com a intenção de achatar a curva de contágio, ações que têm afetado a preparação de atletas. Neste contexto, desenvolvemos algumas recomendações de treinamento intervalado de alta intensidade (HIIT) que os atletas de esportes de combate olímpicos poderiam executar em seus lares. Os protocolos de HIIT devem ser complementados com exercícios de fortalecimento muscular com a própria massa corporal (similares aos exercícios técnicos), com a intenção de preservar a massa muscular e a condição física dos atletas. Por fim, situações de emergência requerem planos de contingência no esporte.
Palavras-chave: Desportos de combate; artes marciais; boxe; judô; karatê; taekwondo; luta olímpica; treinamento em casa.

Dear Editor-in-Chief, the COVID-19 pandemic has resulted, up to March 30th, in more than 766,000 infected patients and more than 36,000 deceased. This situation has generated a deep impact on people's lives, and governments have implemented different measures to cope with it, including the quarantine and social distancing to decrease the peak of contamination. The sport has also been affected by these pandemic effects, including the postponement of sports

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events, professional tournaments, events with a mass live audience, and classificatory events for the Olympic Games. This has resulted in the postponement of the Tokyo Olympics to 2021, as announced by the Japan Prime-Minister last March 24th. It is essential to consider that combat sports represent approximately 25% of all medals disputed during the Olympic Games and, as such, these sports are quite relevant for the countries' performance in this competition.

Athletes from countries that have declared quarantine, including Italy, Spain, Chile, Argentina, Brazil, among others, are confined at home trying to keep their Athletic preparation. Many of these athletes are showing their training routines on social media, performing their training exercises using a minimum of equipment, executing their training in small spaces such as their bedrooms, living rooms, and backyards.

Recently, a systematic review about the effects of high-intensity interval training (HIIT) on combat sports athletes performance was published (Franchini, Cormack, & Takito, 2019). Considering this scenario, we selected training methods that are feasible to be implemented during the quarantine period, which can be executed at home. Therefore, coaches and strength and conditioning professionals could prescribe HIIT protocols to maintain combat sports athletes' physical fitness (Table 1).

Table 1. High-intensity interval training recommendations for home workouts.

Sport	Original protocols	Recommendations
Boxing (Kamandulis et al., 2018)	Punching bag, 3 rounds (1 min between rounds), composed by14 x 3 s of punching executions interspersed by 10 s intervals, 3 times per week.	Shadow, punching bag or punching pads technique executions.
Judo (Franchini et al., 2016)	2 blocks 10 x 20 s all-out uchi-komi using arm or hip techniques (throwing the partner at the end of each set) with 10 s passive recovery intervals between sets and 5 min between blocks, twice per week.	Use elastic bands that allow a proper uchi-komi execution.
Karate (Ravier, Dugué, Grappe, & Rouillon, 2009)	7–9 20 s sets, running at 140% of the Maximal Aerobic Speed, with 15 s passive recovery intervals, twice per week.	Change the 20 s sprint by technical exercises to be executed all-out. Shadow, kicking or punching bag or pads.
Taekwondo (Monks, Seo, Kim, Jung, & Song, 2017)	Three times per week, running at 85–100% HR (10 to 60 s sets with 40 to 120 s intervals, distributed along the 4 weeks).	Change the 10 to 60s sprints by technical exercises to be executed all-out. Shadow, kicking or punching bag or pads.
Wrestling (Farzad et al., 2011)	6 x 35 m sprints interspersed by 10 s passive recovery intervals, twice per week (week 1: 3 sets interspersed by 3 min; 1 additional set per week).	Change the 35 m sprints by the time to finish this distance (5-6 s). Change the sprint by technical exercises to be executed all-out.

HRmax: maximal heart rate; uchi-komi: throwing technique repetition.

The immune metabolic responses vary according to the HIIT protocol, training status and energy stores availability. Typically, highly-trained individuals present a reduced interleukin 6 (IL-6) response when compared to sedentary counterparts when executing HIIT protocols (Panissa et al., 2015). Moreover, there is a positive immune metabolic adaptation, after only three HIIT sessions when 48 h rest intervals are adopted between sessions (Fisher et al., 2011). Thus, for athletes, the HIIT protocols presented in this letter are unlikely to result in relevant immune suppression. Even though we recommend that the professionals responsible for the preparation individually analyze the prescription of the training programs.

The HIIT protocol must be complemented by body mass-based muscle strengthening exercises (similar to the technical exercises), using the effort and pause characteristics of each specific combat sport, with the main goal to preserve the athletes' muscle mass and physical fitness. Finally, in face of emergency situations, coaches and athletes should search and follow contingency plans because the physical inactivity may reduce the athletic performance. Additionally, staying physically active may contribute to keep the immune system defenses, and to increase the time in

different activities during the quarantine may help to maintain a proper mental health. These actions may help to face the pandemic with a more positive attitude.

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