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Prospects and Risks of Injuries in the Resumption of High-performance Sports Activities After Social Isolation due to COVID-19 Pandemic

Perspectivas e riscos de lesões na retomada de atividades esportivas de alto rendimento após isolamento social devido à pandemia de COVID-19

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ABSTRACT
The objective of this narrative review was to discuss whether distance training was able to maintain physiological, cardiovascular and muscular conditions to safe return to elite athletes to their activities, and what risks of injuries they will be submitted to. Considering this unprecedent situation, and the lack of studies that address the possible risks of injury associated with returning to high-performance sports after social isolation we aim to collect such data in the present article. Since December 2019, the world has been affected by a pandemic caused by the new coronavirus. Similar situation had only occurred more a hundred years ago, when the Spanish flu affected Europe around 1918. Although most athletes are likely to experience only mild symptoms as a result of coronavirus infection, preventive strategies are necessary.

Keywords: Athletes, sports injuries, COVID-19, injury risks.

RESUMO
O objetivo desta revisão narrativa foi discutir se o treinamento a distância foi capaz de manter as condições fisiológicas, cardiovasculares e musculares para o retorno às atividades com segurança dos atletas de elite, e quais os riscos de lesões a que estarão submetidos. Considerando essa situação inédita e a carência de estudos que abordem os possíveis riscos de lesões associados ao retorno aos esportes de alto rendimento após o isolamento social, objetivamos coletar tais dados no presente artigo. Desde dezembro de 2019, o mundo foi afetado por uma pandemia causada pelo novo coronavírus. Situação semelhante ocorrera há mais de cem anos, quando a gripe espanhola afetou a Europa por volta de 1918. Embora a maioria dos atletas provavelmente apresentará apenas sintomas leves como resultado da infecção por coronavírus, estratégias preventivas são necessárias.

Palavras-chave: Atletas, lesões esportivas, COVID-19, risco de lesão.

1 INTRODUCTION

Since December 2019, the world has been affected by a pandemic caused by the new coronavirus [1]. Similar situation had only occurred more a hundred years ago, when the Spanish flu affected Europe around 1918 [2]. Beginning in Wuhan, China, the disease quickly spread to other Asian countries, and then to other continents: Europa, the Americas, Africa and Oceania. The right rate of contagion and the possibility of evolution to SARs, among other important complications [3], have forced many countries to take sanitary measures including quarantine and social isolation, dramatically changing humanity as we know it. The ramifications of the changes brought by COVID-19 in global civilization have only began and are likely to continue for decades[4].

High-performance sports, as well as several other professional activities, were interrupted during the quarantine, due to pandemic COVID-19 [5, 6]. All sports were affected to a greater or a lesser extend, since social life became a source of contagion and risk of transmission of the new coronavirus, and, the health of athletes, technical teams, and spectators became priority [6], and as consequence , the entire sports calendar was canceled or postponed [7] like Tokyo Olympic games 2020 [8].

Although most athletes are likely to experience only mild symptoms as a result of coronavirus infection, preventive strategies are necessary for several reasons. First, to prevent the spread of the disease, because although most athletes are young and do not use to have comorbidities, they can help to spread the viral contamination. Secondly, it is important that competitive athletes stay healthy and preserve their physical, respiratory and cardiovascular capacities, since the long term consequences for this new disease are still unknown [7]. Therefore, its is essential that professional athlete, as well as the rest of population respect quarantine and social isolation.

This situation caused an unusual change in the routine of millions of athletes around the world, who for the first time in their careers, had to stay away from their practices for a period longer than thirty days [9]. Professional athletes, even on vacation, follow training plans and nutritional guidance so that the loss of their athletic conditions is not so severe in this period. However, in the face of social isolation imposed by pandemic, the closing of clubs, training centers, fitness centers and others, these subjects had to face a new reality: remote training, each one in the space and with the resources that were available, often improvised, and without direct supervision by health and sports professionals [10]. Another relevant element mentioned by some authors, related to training during social isolation, is the lack of experience of health and sports professionals for such activity, since a paradox is established. We know that high-performance athletes need intense training with high loads, on the other hand, we also know that prolonged and strenuous training can temporarily depress the activity of immune system for hours or days[11].

Another element to be taken into account concerns the principle of reversibility of training effects, wish establishes that the suspension or significant reduction in training, induce a partial or total reverse effect of loss adaptations previously obtained through training, what compromises the athletes performance [12]. The reversibility principal is also known as deconditioning or detraining. The effects of detraining include decreased strength and muscle mass [13], increased blood pressure values at rest, as well as altering blood pressure behavior when returning to activity, increasing cardiovascular risk [14]. The breach of normal standards, whether due to injuries, illness, and now, confinement and social isolation, can negatively affect vascular diameters, reducing transport and consumption of oxygen, leading to a subsequent decreased in endurance of the athlete. It is important to note that these changes in vascular diameters are more striking in the first two weeks of physical inactivity, suggesting that the changes produced by detraining occur very quickly [13]. Short periods of reductions or suspension of training cause rapid loss of aerobic and neuromuscular performance, increase body mass and increase the percentage of body fat [15]. The higher the level of training of aa

subject, what is the case of elite athletes, the greater the loss in adaptation to training both in VO2max and muscle strength [16].

This scenario lasted at least ninety days for some professional athletes and continues to many others [17]. And, consequently, it generates doubts regarding the conditions of the professional when returning to activities, the risk of injuries that athletes will be submitted to.

Considering this unprecedent situation, and the lack of studies that address the possible risks of injury associated with returning to high-performance sports after social isolation we aim to collect such data in the present article. The objective of this narrative review was to discuss whether distance training was able to maintain physiological, cardiovascular and muscular conditions to safely return to their activities, and what risks of injuries they will be submitted to.

2 HIGH PERFORMANCE ATHLETE PREPARATION

The preparation of a high-performance athlete involves a long and meticulous process, which begins almost always in childhood a time when specific skills and abilities are usually identified by the professionals in the field of sports. The routine of such athletes is lived intensively from a very young age with few or no phases of absolute inactivity [18]. Even in the inter-season periods, these individuals follow a maintenance body care and diet plans. Each season is planned in details, based on competition calendar and annual goals of each athlete or team, featuring what is called training periodization [19].

The 2020 pandemic abruptly broke this strict planned routine, as all the sports practice was suspended in mid-March with championships postponed, sporting events canceled, with uncertain prospects for returning [20]. Athletes conditioned for years by their ruled and programmed activities, from one hour to the next were prevented from carrying they out, causing a series of changes that transcended the field of physical condition. Social isolations and confinement produced in these athletes great changes in habits, family life, food, and social relationships [21]. Add to this frustration, anxiety, anguish, financial uncertainty, loss of sponsorships, contractual insecurities and we will have professional athletes involved in great problem, which goes beyond what as thought by he coaches and training teams when they idealized remote training programs [22, 23].

Another element to be considered are the athlete who were actually contaminated by COVID-19. Considering the theme, to what extend are the proposed works to be carried out during the social isolation and without direct supervision suitable for these people, since we deal with an unknown disease [4]? What kind of pathophysiological changes may these subjects have suffered, or will they suffer in the medium and long term? Will the post COVID-10 athletes respond in a similar way to the

others when returning to competitions? It is also worth to mentioning that cardiovascular risks have been reported by some studies in patients after contamination by the new coronavirus [24]. Are the athletes safe? What criteria will be taken into account before allowing a return to sports? And those who have returned, were evaluated under all of these prisms? Have thrombocytopenic risks considered? And vascular risks? There are descriptions of cases of amputation resulting from changes in microcirculation caused by COVID-19 infection [25].

With the poverty of literature because it is a new and unknown condition, it is difficult to assess the injuries risks to which athletes after social isolation will be subjected when they return to action. For this review we found no studies related to muscle mass loss, changes in body composition, or pos-quarantine cardiovascular condition. Although specific scientific articles are still scarce, newspapers and sports websites have linked a large number of injuries, specially in soft tissues, to soccer players who resumed their activities in the Europeans championships [26, 27].

3 PREVALENCE OF SPORTS INJURIES

Sports injuries, notably those that affect the locomotor system, are a problem that every high-performance athlete learns do deal and fear from early age. Such injuries have physical, emotional and financial consequences. Careers can be interrupted indefinitely or ended according the type and severity of the injury [8]. The prevalence of sports injuries varies from one modality to another, taking into account the physical demands and biomechanical requirements inherent in each sport, but is a fact that high-performance sports involve a high prevalence of injuries [8]. The general prevalence of sports injuries is difficult to estimate, since the modalities are very diverse, but when considering specific modalities, we will see thar in soccer, the total prevalence of musculoskeletal injuries is very high, and the professional players use to have two injuries per season on average [28], been the most common muscle and tendon injuries, followed by unspecific contusions, joint and ligaments injuries and fractures, with the lower limb being the most affected [29]. In relation to basketball, we will find that injuries are more frequent in competitions than in training, and that ankles, knees, lumbar spine and fingers are the most affected regions [30]. In volleyball, we can also find a high injuries prevalence, with the most affected regions being the shoulders, ankle and lumbar spine [31]. In long distance runners (marathon or long distance runners) there is a high prevalence of injuries due to repetitive movements as patellar tendinitis, cannellitis and fatigue fractures in tibia and calcaneus [32,33].

Sports injuries result from several factors, which are usually divided into extrinsic and intrinsic factors [34]. Extrinsic factors are considered external or independent of the athlete, such as environment, including the floor where sport is practiced, lightning, ventilation, climatic conditions

(specially for sports practiced outdoors) such as rain, wind, temperature, brightness. In addition are too extrinsic factors the athletes clothes and shoes, sports equipment, type, quality, frequency and period of training. Intrinsic risks factors for sports injuries are those that are directly related to the athlete, and, in this group are included: general health status of the athlete, gender, age, biotype, physical conditions, previews injuries, emotional state [35].

With the suspension of the competition calendar, and consequently the withdrawal from on site training activities, it is very simple to note the increase in risk factors of both groups (extrinsic and intrinsic) in professional athletes. We will discuss bellow the risks associated to sports injuries and their relations with social isolation and remote training.

4 EXTRINSIC RISK FACTORS

1) Environment: with the institution of remote training athletes were displaced from their natural work environments and started to train in their homes. Some with larger spaces, other with smaller ones, but certainly very different from their daily training spaces. The change in the routine is obvious and inevitable, as surely a volleyball player dos not have a volleyball court in his house, as well a gymnast will hardly have a gym in his backward, or a 100-meter runner on an athletic track. The consequences of the lack of ambiance are, among other things, loss of spatial notion, the amount of force to perform certain motor gestures and the speed necessary to travel a certain distance [10].

2) Sport equipment: just as an athlete does not have his training environment at home, the sports equipment necessary to maintain the physical conditions he will have at his disposal will also not to be the same. With very few exceptions, with a minority of millionaire athletes, most of high-performance athletes do not have a complete training structures in their homes to maintain the same routines as before the social isolation. For these subjects home workout was scheduled based on substitution of exercises and activities, and it is known that many training procedures can hardly be replaced [36].

3) Training programs: the type, intensity, frequency, regularity, seasonality for training are fundamental elements in the preparation of elite athletes. This extrinsic factor related to the risk of sports injuries is probably the one that suffers most from the COVID-19 pandemic. Accustomed to face-to-face training and supervised by physical education, physiotherapy and exercises physiology professionals, the athletes started to train on their own, based on instructions provided by e-mails, videos or audios, having to adapt these training sessions to the reality of the space and material available to each one [10, 37]. How to adapt the training of a swimmer who does not have a pool at his

disposal? In addition, possible corrections of movements, posture, speed and execution have became impossible, which also increases the risks of diseases and injuries to the locomotor system [6].

5 CONCLUSION

Based on this contextualization and the current aspects that the world is going through due to this pandemic, several factors can influence the athlete's performance.

The deconditioning and lack of guidance of a qualified professional during social isolation can expose the athlete to greater vulnerability of short, medium and long-term injuries, and thereby directly affect their performance. Both intrinsic and extrinsic factors have a high level of relevance in the protective nature of injury facilities.

Numerous evidences prove the need for continuity of training, as well as the support of the entire multidisciplinary team that assists this athlete and/or his/her team. Thus, minimizing the performance losses of your physical capacity.

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