

Chapter 168

Crossfit effects and risks: a narrative review

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ABSTRACT

CrossFit, a recent method of multi-joint physical training, has been gaining popularity since its creation in the 90s. Allied with the growing number of practitioners, there has also been an increase in injuries in sports, resulting in the need to investigate these conditions. The study aims to analyze the main lesions and body regions affected, as well as the factors associated with such conditions. The prevalence of injuries in CrossFit practitioners ranged from 1.94 to 18.9 injuries per 1,000 hours of training. The most affected body regions were the shoulders, followed by the back and knees in addition to complaints of pelvic floor injuries and urinary incontinence in the female audience. Regarding the factors associated with injuries, the type of exercise performed, the time of CrossFit practice, gender, and execution of the exercises stood out. It was concluded that the subject is little investigated in the academic area, therefore, it is necessary to deepen in research.

Keywords: Exercise, Wounds and Injuries, CrossFit.

1 INTRODUCTION

CrossFit is a physical activity that includes several modalities and requires high-intensity performance. This practice has gained a lot of visibility since its creation in the 1990s by coaches Greg Glassman and Lauren Glassman in California. Performing CrossFit brings with it several benefits, however, risk factors that allow the occurrence of injuries is also observed, a motivational fact for carrying out this review article.

CrossFit has several objectives related to the well-being of the individual practitioner, which are related to the benefits offered by the sport. CrossFit is a physical activity known for being motivational and democratic, since it covers several physical areas, known as Multimodal Training, allowing different people to practice such activity, which directly contributes to the growth in the number of fans of the modality. Relates the different directions of practice with the risk of injury. (SZELES et al. 2020)

Due to this vision of practice with high intensity, it became important to analyze data on the risk of injuries during its execution. According to the analysis of the above, the regions most affected by CrossFit injuries are the shoulders, knees, and lumbar spine, these areas are related to such risks because they are areas of great impact. There are different risk factors for these injuries, such as incorrectly performing the exercise, some previous injuries, and even gender, in which men have a greater number of injuries. (DOMINISKI; SIQUEIRA; SERAFIM; ANDRADE, 2004).

The General Objective of this work is to carry out a systematic review referencing the benefits, effects, and risks of injuries during the practice of CrossFit, searching through data and questions about the subject and central articles' different information. And in this way, being able to reach conclusions about the sport and comparisons with other sports. Finally, the anatomical and orthopedic analysis of possible fractures caused by the practice of CrossFit in association with risk factors.

2 BIBLIOGRAPHIC REVIEW

The databases used were PubMed, SciELO, and Google Scholar. The descriptors used were "exercises", "CrossFit" and "wounds and injuries". Nine articles were analyzed, all of which identify the prevalence of musculoskeletal injuries in the Crossfit modality.

Dominski et al. (2018) highlight CrossFit as a new training modality, showing an alternative way for those who are not fans of other sports. The exercises performed aim to promote physical fitness through the development of components such as aerobic capacity, muscle strength, endurance, speed, coordination, agility, and balance, performing sports and functional exercises, including Olympic lifting exercises, gymnastic movements, and aerobic conditioning. , which can be performed at high intensity, thus providing the risk of injury. Information was gathered, with the injury prevalence rate not being considered high when compared to other modalities, such as street running, handball, triathlon, gymnastics, football, and rugby every 1,000 hours of training. In addition, regarding the body areas most affected by injuries, the shoulder is the most affected, relating it to the execution of exercises considered harmful because they have a high

range of motion, rhabdomyolysis, usually triggered by poor prescription of exercises or performance without supervision, as well as knee and back injuries. This incidence is also related to the presence of risk factors such as previous injuries, often obtained in other modalities, and a higher risk of injuries in males. Galvão et al. (2003) define rhabdomyolysis as a syndrome that is characterized by the destruction of muscle fibers, leading to muscle necrosis and the release of cellular substances, such as myoglobin, hemoglobin, endotoxins, toxic vasoactive substances of purines, creatine, potassium, uric acid, calcium, phosphate and creatine kinase for blood circulation and is linked to excessive physical exercise, as there is a high rate of muscle contractions, which may lead to ischemic necrosis.

Hak et al. (2013) defined injury as anything that prevents the individual from training, working, or competing in any way and for any period. The authors found similarities between injury rates sustained during CrossFit training and reported injury rates in Olympic weightlifting. Similar to Dominski et al., Szeles et al., Da Costa et al., and Xavier and Lopes, the results report a high incidence of shoulder injuries, caused by mechanisms that involve the requirement that the shoulders move beyond their normal physiological range of motion combined with muscle fatigue due to the high number of repetitions performed during the sessions of CrossFit, which may have effects on the glenohumeral joint, as the congruence of this joint depends on sustained muscle activation, in addition to contributing to the loss of proper exercise technique and resulting injury.

Sprey JW et al. (2016) state that the CrossFit exercise routine consists of a combination of several synchronous exercises. These moves are often performed at high intensity with little or no rest between sets, hence the high risk of injury among practitioners. When dealing with the practicing public, it is generally noted young people with experience prior and most physically active, report the practice of other sports during the week, such as running, bodybuilding, surfing, yoga, pilates, and cycling. Normally, this sport draws attention to breaking the routine of dynamic training and quickly showing an improvement in physical conditioning. Although the practice of this modality may present a greater risk of injury for individuals under 18 years of age, there are recent studies that show the efficiency and positivity of better health conditions for these practitioners.

Szeles et al. (2020) studied the injury rate in CrossFit participants using a baseline questionnaire printed and distributed to CrossFit boxes. In total, there was an evaluation of the participants, with the presence of injuries, the most reported being muscle injuries and joint pain. Soon after, the shoulders and lumbar spine stand out. Regarding these injuries, it is understood that, as it is a practice that involves high-intensity multi-joint functional movements, including weight lifting, gymnastics, running, cycling, polymetric training, and rowing activities, observing a high susceptibility to injuries due to continuous exposure to high-energy traumatic mechanisms that are associated with factors such as alternating loads and the presence of previous injuries.

Da Costa et al. (2019) collected data over a period of 12 months through a questionnaire applied directly to practitioners of gyms affiliated with CrossFit in the state of São Paulo, in which participants

were evaluated, with the presence of injuries related to variables such as previous injuries and the time of CrossFit practice as risk factors, with a greater probability of injuries in athletes with practice time superior to 12 months than in athletes with a practice time of up to 12 months, also having associations between the presence of injuries and the athlete's proficiency, with the probability of injuries being 5 times higher in competitive level athletes and 2 times higher in recreational level athletes than in beginner athletes. Regarding injuries, as in the previously cited article, the shoulder and lumbar spine were the most affected sites. Xavier and Lopes (2017) relate CrossFit injuries to a series of factors that will be divided into intrinsic and extrinsic, with extrinsic being those linked to the preparation or practice of CrossFit, involving planning and execution errors, problems on the training surface, duration, strength, balance and physical conditioning. Regarding intrinsic factors, they are classified as those inherent to the organism, including biomechanical and anatomical abnormalities such as flexibility, history of injuries, bone density, anthropometric characteristics, body composition, and cardiovascular and cardiorespiratory conditioning.

Still, on injuries, Xavier and Lopes (2017) characterize them as a challenge to specialists because they have a slow recovery and highlight bruises, strains or strains, cramps, and tendinopathy as the most common injuries in sports. An online questionnaire was carried out on Google Drive/Sheets designed exclusively for Crossfit practitioners in two gyms in Belo Horizonte, in which, in the sample of CrossFit practitioners, 56.2% had already had some injury related to the practice in the past, with the most affected sites are the shoulder, spine, and knee. Variables such as sex, time of practice of activity, and daily training time were associated with injuries, with a higher proportion of men who presented with injuries and higher in patients with a high average time of practice. In addition, the article highlights the researched social habits, such as the use of alcoholic beverages, cigarettes, and dietary supplements as factors that predispose to the appearance of musculoskeletal injuries.

When dealing with female practitioners, there is a risk of pelvic floor muscle injuries associated with complaints of urinary incontinence. Ketiane et al. (2021) point out the practice of high-intensity physical exercises as a risk factor for the emergence of stress urinary incontinence in women, a fact explained due to the increase in intra-abdominal pressure during training, causing impact force on the floor of three to four times greater than body weight, causing an overload of the pelvic muscles. It is necessary to balance intra-abdominal pressure and urethral closure pressure, when this balance is not achieved, there is an excessive increase in intra-abdominal pressure, favoring involuntary loss of urine. Allied with this, a relationship was observed between the type of previous delivery, with greater episodes of urinary incontinence occurring during practice, a fact that is justified by the fact that labor and vaginal delivery favor lesions in the pelvic soft tissues, vaginal walls, rupture of the endopelvic fascia and nerves, these structures represent an important factor in maintaining urinary continence, in addition to weight gain during pregnancy that can increase the risk of UI. Yang et al. (2019) cite the three types of exercises that most cause incontinence: the Double Under, the Jumping Rope, and the Box Jump, all of which have in common the presence of jumps with the maximum reaction of the feet with the ground and/or box, abrupt changes

of movements, squatting supporting large loads and causing cyclical movements, a fact that causes constant pressure on the pelvic floor and increases in abdominal pressure.

Regarding the sites of the prevalence of injuries, there was a consensus in the analyzed articles, which may associate the affected joints with the number of exercises with high repetitions and movements performed at high amplitude and speed, a combination that, together with other factors, seems to offer a high risk of injury to CrossFit practitioners (DOMINSKY et al., 2018; XAVIER AND LOPES, 2017). However, the result of the aforementioned epidemiological study demonstrates that injury rates in CrossFit are similar to or even lower than those of other sports, contrary to common sense that associate this modality with a high incidence of injuries when compared to other modalities (DOMINSKY et al., 2018). Therefore, when assessing such incidence, it is appropriate to associate these levels with the increase in practitioners due to the growing popularity of the sport.

When comparing the risk factors mentioned in the articles, divergences were obtained regarding the variables, with gender, practice time and daily training, history of injuries, and planning and execution errors being among the main ones (DOMINSKY et al., 2018; SZELES et al., 2020; DA COSTA et al., 2019; XAVIER AND LOPES, 2017). Thus, it is worth emphasizing the importance of care aimed at preventing the occurrence of injuries and minimizing injuries, such as the need to search for professionals specialized in the modality, to devise individual strategies that respect the limits of each individual, prioritizing the improvement and performance improvement with appropriate breaks and strengthening exercises to reduce the overload on the musculoskeletal system. Furthermore, from the complaints of pelvic floor injuries and urinary incontinence, it is clear that there is a need to strengthen the pelvic muscles, to increase the capacity for contraction and muscle resistance, preventing injuries in the practice of CrossFit (KETIANE ET AL., 2021).

About the methodology of the cited references, there is a discrepancy in terms of data analysis, with two of the studies using data obtained through online questionnaires that limit the full knowledge of the injury and its implications, in addition to monitoring the evolution of these injuries, both their treatment and the possibility of returning to the sport. Also, in this type of sampling, the possible presence of selection bias is seen, due to the collection method. Another impacting factor in the study concerns the reduced number of articles that addressed the presence of injuries in the context of CrossFit, a fact explained by the recent popularization of the sport, being a topic that has not been studied in depth in the literature.

3 CONCLUDING REMARKS

It is understood in this review study that injuries in the CrossFit sport modality result from the high intensity of multijoint movements, thus becoming susceptible to musculoskeletal injuries, mainly in the shoulder, knee, and lumbar spine joints. Concomitant with the exposure of traumatic mechanisms, which demand a high associated load, capable of being related to previous injuries, prolonged practice time, and inadequate execution, in addition to a greater probability in individuals who are beginners in the modality.

However, it is still inconclusive that CrossFit causes more injuries than any other sport, thus being compared as equal to the others. Therefore, it is a little-investigated subject that demands more in-depth research.

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