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# Sports injuries in the weightlifting league, Colombia

## Abstract

Objective To characterize the incidence of sports injuries in weightlifters in the league. Materials and method. We performed a descriptive correlational study of a sample of 46 athletes with an average age of 18.60 ± 1.96 years, where anthropometric parameters and history of sports injuries were evaluated through a technical sheet. Additionally, the Sit and Reach and Schöberg tests were used, applying descriptive statistics as a comparison of means with Pearson Chi-square ($p < 0.05$). Results Normality was found in the anthropometric parameters, where the predominant lesions were sprains and inflammatory processes in lower and upper limbs. In the same way, high and moderate correlations were observed between the type, the location of the injury, and the relationship between muscle flexibility and muscle stretching time. ConclusionsInjuries in weightlifters indicate a higher prevalence towards sprains and inflammatory processes in the lower limbs, which denotes a greater study in terms of the incidence and association with the heating and stretching processes.

**Keywords:** sports, weightlifting, sports injuries

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## Introduction

Weightlifting is a sport that requires significant muscular development and strength work of a dynamic nature, where the tensions in some limiting postures of competitive exercises, such as the snatch and jerk, are considerable.[1]

The technical movements of this sport require mechanical efficiency, such as balance. Some studies determine that the athlete is exposed to loads that exceed their body weight up to two or five times,[2] which leads to high physical demand.

Therefore, sports injuries in this area represent a high prevalence, so a better understanding of them and their localization is essential for the coach and the athlete when talking about prevention.

Three anatomical areas believed to be at high risk of injury for weightlifting are the knees, lower back, and shoulder.[3] In the same way, other studies have found increased intrathoracic and intra-abdominal pressures during exercises, causing the body to collapse sometimes under load.[4]

Sports injuries have been described as acute, being common in weight training such as sprains, strains, tendon avulsions, and compartment syndromes. Common chronic injuries have also been characterized, including rotator cuff tendinopathy and stress injuries in the vertebrae, clavicles, and upper extremities.[4] Its manifestation in this population needs to be known.

The origins of sports injuries are diverse; some authors cite physical and physiological factors that are associated with lifestyle habits such as diet and sleep; others indicate that injuries are associated with age, sex, the training process, and fatigue.[5] In short, many aspects can influence the lesion of an athlete; therefore, the knowledge of the processes that represent a risk factor helps to minimize its incidence.

Currently, the information on the frequency and location of sports injuries in weightlifters in league is limited, which led to this research to propose specific actions for their prevention as an early intervention in the future.

The studies by Rodas et al.[6] cite a high tendency for injuries in a competition, of which 30 to 40% are of muscular origin implying an injury risk of almost 2 per 1,000 hours of exposure.[7] In the same way, other studies show between 50% to 60% of injuries related to the articular and ligament system.[8]

Based on the above, it is suggested that both the snatch and jerk are techniques that generate extra biomechanical efforts on the joints, tendons, and muscles. Because they associate rotating movements that require adequate coordination to make adjustments during the exercise with the bar, originating lower mechanical efficiency with a prevalence of injury.[9]

Undoubtedly, sports injuries that affect muscles and tendons generate a lower rate of torque development, and early contractile impulse during slow maximum eccentric contraction compared to the contralateral uninjured limb; a fact that impacts when determining its diagnosis.[10]

The importance of early diagnosis of sports injuries decreases disability processes and the time spent away from the field of play. This is observed in the physical and performance aspects of the athlete. Knowing the incidence in sports such as weight lifting allows us to carry out a more timely prevention process with fewer complications.

## Materials and method

### Subjects and samples

This study had a quantitative, cross-sectional, descriptive-correlational approach that was carried out in the second period of 2019. The convenience sample was 46 athletes considering the inclusion and exclusion criteria.

The inclusion criteria that were the active league athletes who had some national representation and belonged to a competitive level. Also, the signature and knowledge of informed consent. The exclusion criteria corresponded to athletes sanctioned and who did not attend the scheduled evaluations.

The population went to the functional assessment and physical conditioning laboratory of the Universidad del Cauca for tests. There they were evaluated by the medical and project support staff after training and piloting the parameters to be measured, considering the criteria established by the International Society for the Advancement of Kinanthropometry (ISAK).

### Anthropometric measurements

Weight and body size were assessed on a height-measuring scale (Meter Professional, USA), with a capacity of 180Kg and precision of 0.1Kg and 0.1 cm respectively, measurements that allowed estimating the Body Mass Index (BMI), which was calculated by dividing "the weight in kg by the height in mt2. The classification was made according to the cut-off points recommended by the WHO: <18.5 Malnutrition, 18.5 to 24.99 Normal, 25 to 29.99 Overweight, ≥30 Obesity ".[11]

To determine the waist circumference (WC) and, following the protocol described by Buendía et al.[12] the midpoint between the last rib and the iliac crest on expiration was measured twice in succession, determining the classification presented by Campos-Mondragón et al.[13] There was a "no risk" rating for men: <94cm; "Moderate risk": 94–101.9cm; "High risk": ≥102cm.

Hip circumference (HC) "was obtained by measuring at the level of the greater trochanters, coinciding with the pubic symphysis; for this, the subject had to stand, with the glutes relaxed and the feet together ".[14] "Subjects at risk of metabolic syndrome were identified: women: ≥0.85; men: ≥0.90 ".[13]

### Injury file

A file was filled out with personal data such as sports related to the time of sports practice, days of training, presence of injury, type, location and time of injury, need for disability, or surgeries derived from the sports injury.

Modified Sit and Reach tests were performed for the assessment of flexibility being the subject seated with the back resting on a wall, the hips flexed, and knees stretched, the arms outstretched and hands one on top of the other. Then, the athlete was asked to lean forward with the feet together to reach the maximum distance without bending the knees and holding the position for 3 seconds. The distance between the hands and the tips of the feet was measured.[15]

The Schöberg test was used, which measures the mobility of the lumbosacral spine, between a mark 10 cm higher than the line drawn between both posterosuperior iliac spines, and a mark 5 cm in the lower direction. The subject performs a global spinal flexion, then the distance is compared, limiting the influence of the hip, pelvic, and hamstring joints, with excellent inter-rater reliability.

The difference between the two measurements shows the amount of flexion that occurs in the lower back. The classification parameter is between hypomobility less than 20cm, normality between 20-22 cm and hypermobility more than 22 cm.[16]

### Statistic analysis

A statistical means such as the Shapiro-Wilk test was used to demonstrate the normality of the sample. For the descriptive analysis of the data, measures of central tendency (mean±standard deviation) were obtained. A statistical means such as the Shapiro-Wilk test was used to demonstrate the normality of the sample. For the descriptive analysis of the data, measures of central tendency (mean±standard deviation) were obtained. Also, a comparison analysis of means between different variables and correlational analysis was carried out using the Pearson test (R), establishing the significance value $p \leq 0.05$. The statistical treatment of the data was run with the SPSS version 24 program (Inc., Chicago, Illinois, United States) for MAC.

### Ethical legal aspects

This study followed the ethical aspects validated by the Ethics Committee of the Universidad del Cauca under ID 4925, as stipulated in the HELSINKI declaration by the World American Association (AAM), and resolution 8430 of the Ministry of Health, which establishes the scientific and administrative research standards for health, and with human beings in Colombia. The research was declared of minimal risk.

## Results

The population of weightlifters had an average age of 18.60±1.96 years. At the anthropometric level, 71.7% of the athletes presented normality with the BMI (21.43±3.00 Kg/m$^2$), without cardiovascular risk measured through the waist circumference (73.91±6.42 cm ). Regarding sports injuries, the athletes who have been lifting weights for a long time (more than four years, 63%) registered various types of lesion, like sprains with 21.7% and inflammatory processes with 17.4%, as shown in Figure 1.

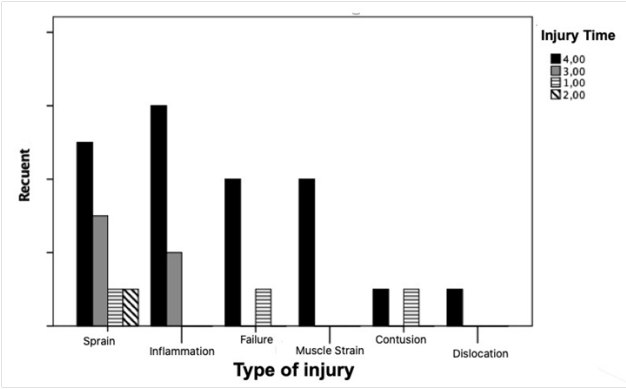


**Figure 1** Relationship between practice time and type of sports injury.

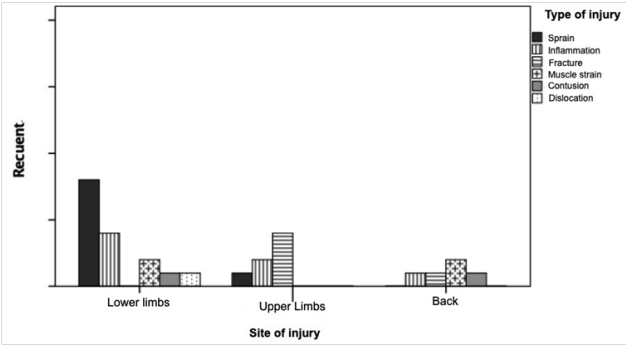


**Figure 2** Relationship between type and place of injury.

When analyzing the type and place of injury, it could be estimated that 34.8% of injuries occur in the lower limbs, followed by the upper limbs with 15.2% (p = 0.000) and in the back at a lower percentage (Figure 2).

Regarding the flexibility tests such as Schöberg's (22.34±1.71 cm), it was found that the evaluated athletes presented hypermobility of the

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lumbosacral spine in 47.8% and hypomobility in 15.2%. The Sit and Reach test showed an average of -0.55 ± 61 cm. In the classification, it was observed that 39.1% were in the mean, and 23.9% had a good rating.

The correlation based on the Pearson statistic showed a level of association between high and moderate, as shown in Table 1, finding that sports injuries are a risk for the health of athletes.

**Table 1** Finding that sports injuries are a risk for the health of athletes

| Variables | Significance | R Value | Classification |
|---|---|---|---|
| Type of injury vs disability | 0,000 | 0,790 | High |
| Schöberg Test vs Muscle Stretching Time | 0,002 | 0,631 | High |
| Site of injury vs type of injury | 0,000 | 0,564 | Moderate |
| Site of injury vs disability | 0,001 | 0,489 | Moderate |

## Discussion

We found that weight lifters registered a normal BMI, which agrees with other studies in the same field. The practice weightlifting is relevant to display a muscle balance, where muscle mass predominates over fat, giving the athlete an increased performance of strength and power. Continuous monitoring in the development of sports talents is needed.[17] In studies conducted in other sports, it was shown that the BMI was higher in weightlifters because they develop exercises for the improvement of lean mass since a correlation between sports injuries and BMI was not evident. Some research shows a strong association and predictive mechanism for bone lesions.[18]

Regarding sports injuries, it was found that lower limb injuries associated with sprains and inflammatory processes prevailed. Summitt et al.[19] also show the same situation, indicating that 20% of the participants suffered a musculoskeletal injury, which provides an injury rate of 2.4 per 1000 hours as a result of the high physical demand that this type of sports generates as repetitive movements as maximum ranges. Therefore, during training, the loading process is monitored, since the snatch is where stereotyped extension-flexion-extension patterns of the joints of the lower extremities, especially the knee, are carried out, leading to future injuries.[20]

There is no doubt that the population studied expresses an inflammatory process when faced with an injury. Several studies agree that inflammation is a process that generates overload in extreme joint positions and classifies such training as a risk factor for injury,[21] especially at the moment of starting for the upper limbs. Regarding lower limb injuries, there is inflammation when squatting movements are performed, associating the risk of osteoarthritis at the knee level with 80%. As a result, more stress is generated during training and, therefore, longer recovery time that could be more than four weeks.[22]

Current knowledge on the benefits of warming up and stretching muscles is well documented, establishing that the time spent warming up is more than the time spent straighten. Shellock and Prentice[21,23] suggest that elite athletes need more than 15 minutes to warm up because body temperature rises as well as the disposition of structures to the tension and traction processes typical of weight lifting. One of the recommendations for this type of sport is a high-load dynamic warm-up, as it facilitates results compared to strength or power.[24]

Whenthe time for stretching is short, the risk of injury increases, a fact that has been corroborated by the lack of muscle stretching that produces muscle fatigue. Consequently, muscle stretching favors the adaptive response to static and repetitive loads, in the same way, it promotes gains in strength, size, and collagen content.[25] Therefore, it has been established that the lack of dedication to the stretching process increases the risk of sports injury 17 times more.[26]

The relationship found between the flexibility test and the stretching time is also evident in other studies, which stated that a lack of muscle elasticity leads to an inadequate length of the muscle fiber and tension in the muscular tendinous unit. Therefore, with any force caused by any sporting movement, it can generate a tear in the unit and loss of the motor integrity of the segment.[27] Hence the importance of performing both a warm-up and stretching process to keep the functionality of the musculoskeletal system unscathed, as well as the functional ability of the athlete.

## Conclusion

Weightlifters maintain normal ranges against adiposity indices, reducing the risk of injury. There was an incidence of injuries in the lower and upper limbs where sprains and inflammatory processes prevailed problems in training and sometimes, disabilities and abandonment of the competition. It is necessary to implement longer warming processes such as stretching since the evidence shows a high tendency to injuries, specifically at the level of the lower and upper limbs, which are necessary for different sports techniques.

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## Conflicts of interest

No potential conflict of interest relevant to this article was reported.

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