

DOI: <https://doi.org/10.63332/joph.v4i3.3130>

Prevalence of Injuries in Rugby League Players in Antioquia and Possible Correlated Factors

Juan Felipe Correa Mesa¹, Juan Carlos Correa Morales², Manuela Marín Cardona³

Abstract

Rugby is a contact sport known for its high intensity and physical demands. Due to the physical nature of the game, there is a high prevalence of injuries worldwide. This study aims to estimate the prevalence of injuries among rugby players from the Colombian Federation and to identify potential correlated factors. This is a quantitative, observational, descriptive-correlational study with a cross-sectional design. The target population consisted of active rugby players from the Colombian Federation. The sample includes 80 players, of whom 62% (49) are men and 38% (31) are women. Of the participants, 78% (63 players) reported having sustained at least one injury. Based on the location of injuries, the most affected area was the shoulder, with 17% (14 cases). Regarding the types of injuries, sprains showed a prevalence of 18% (15 cases), followed by muscle injuries at 15% (12 cases). Additionally, 60% of the injuries (48 cases) were of traumatic origin, resulting from direct impacts or common accidents in this contact sport. It was observed that an increased number of training hours significantly raises the risk of non-traumatic injuries.

Keywords: Rugby, Musculoskeletal Injuries, Prevalence, Contact Sport, Gender.

Introduction

Rugby is a contact sport in which two teams face each other, recognized for its high intensity and physical demand. The goal is to get an oval ball (known as a "cherry") beyond the goal line, or to pass it between two posts and a crossbar located on that line. Its name is linked to the English city of Rugby, where, according to history, William Web Ellis would have invented rugby in 1823 during a football match, by lifting the ball with his hands and running towards the end line of the field(1). Based on this event, twenty-two years later, in 1845, the first rules of rugby were written, and in 1886 the organization was established **World Rugby**, which currently regulates the sport globally. Over time, rugby has influenced the creation of other sports, such as American football, with which it shares certain aspects in terms of physical contact and strategy. This sport is played in two main modalities: **rugby sevens**, which includes teams of seven players in shorter, more dynamic matches, and **rugby union**, with teams of fifteen players and two halves of 40 minutes. Due to its direct-contact nature, rugby has a high prevalence of injuries, particularly to the lower (MMII) and upper (MMSS) extremities. This study focuses on analysing the prevalence of injuries in rugby players and the variables associated with them(2). Worldwide, rugby generates controversies regarding the safety it offers its players, to the point

¹ Fundación Universitaria María Cano, Email: juanfelipecorreamesa@fumc.edu.co, ORCID: <https://orcid.org/0000-0001-9003-966X>.

² Escuela de Estadística, Universidad Nacional de Colombia, sede Medellín, Email: jccorrea@unal.edu.co, ORCID: <https://orcid.org/0000-0002-9368-4725>

³ Programa de Fisioterapia, Fundación Universitaria María Cano, Email: manuelamarincardona@fumc.edu.co, ORCID: <https://orcid.org/0009-0006-8397-1620>



that it has been banned in some regions, such as Nova Scotia, Canada, since 2019(3). This article seeks to contribute to the well-being and safety of rugby players in Colombia, providing relevant information for the prevention and management of injuries. As rugby has evolved, so has the understanding of the injuries associated with its practice. In this context, musculoskeletal injuries have become a key topic of research, as they affect both sports performance and the long-term health of players. This study aims to identify the most common types of these injuries, the factors that contribute to their high incidence, and the most effective prevention and management strategies(4). To achieve this purpose, the structure of the game, the tactics employed and the physical condition of each player must be understood, as well as the impact of training and the use of equipment on the prevention and treatment of these conditions. At the end of the study, recent data on the prevalence of musculoskeletal injuries in different player populations will be analysed and the associated risk factors will be assessed. This analysis aims to explore possible evidence-based interventions that contribute to improving the safety and well-being of rugby players in Colombia.

General Objective

To estimate the prevalence of injuries in rugby athletes belonging to the Colombian Federation and their possible correlated factors.

Specific Objectives

- Describe the sociodemographic characteristics of the study population.
- To determine the relationships between the prevalence of lesions and the morphological characteristics of the study subjects.
- Establish the relationships of injuries with the methodology of Rugby training.
- Identify the relationship between injuries and technical-tactical characteristics.

Research Question

What is the prevalence of injuries in rugby athletes in the Colombian Federation and their possible correlated factors?

Table of Variables

Variable	Guy	Operational Definition	Unit of Measure
Prevalence of lesions	Dependent	Proportion of athletes who have suffered injuries in a specific period	Percentage (%)
Age	Independent	Age of athletes in full years	Years
Gender	Independent	Gender of athletes (male/female)	Category

Weight	Independent	Body weight of athletes	Kilograms (kg)
Size	Independent	Height of the athletes	Centimeters (cm)
Training hours	Independent	Total hours that athletes train per week	Hours
Athlete Position	Independent	Position in which the athlete plays (e.g., forward, defender, midfielder, etc.)	Category

Methodology

Quantitative, observational, descriptive correlational research with a cross-sectional design, which aims to estimate the prevalence of injuries in rugby athletes belonging to the Colombian Federation and their possible correlated factors such as age, gender, weight, height, hours of training per week and the position of the athlete.

Hypothesis

Null hypothesis (H0): There is no significant relationship between the prevalence of injuries in rugby athletes and the factors of age, gender, weight, height, hours of weekly training and position.

Alternate Hypothesis (H1): There is a significant relationship between the prevalence of injuries in rugby athletes and the factors of age, gender, weight, height, hours of weekly training and position.

Study Population

The study population includes all active rugby athletes belonging to the Colombian Federation during the specific season in which the research will be conducted. These athletes must be actively participating in league games and practices in that time period.

White population

The white population is made up of all active rugby athletes from any professional or semi-professional league, regardless of region or country, who can be represented in the study and who meet the inclusion criteria, such as being in full competitive activity and having a minimum of one year of experience in the league.

Target Population

The target population refers to active rugby athletes in the league selected for the study, who meet the following specific criteria for inclusion and exclusion.

Sample

Convenience sampling was carried out, sampling that is part of non-probabilistic sampling and consists of selecting more convenient sample units for the study; therefore, there is no control

of the composition of the sample and the representativeness of the results; although it can be questioned, this method is necessary because the Antioquia region is the population with the highest level of this sport and with the largest number of players in Colombia.

Analysis of the Results

Information about the lesions will be obtained by a collection instrument that will record the type and location of the lesion. A univariate analysis of frequency distribution will be performed for the qualitative variables, as well as measures of central tendency and dispersion for the quantitative variables. Subsequently, a bivariate analysis will be carried out using Pearson's Chi-square test for categorical variables and Pearson's correlation coefficient for continuous variables, in order to verify the association between them. In addition, a logistic regression model (Poisson) will be implemented to determine the factors associated with the most prevalent injuries. These factors include sociodemographic, morphological, methodological training characteristics and technical-tactical variables. Likewise, multinomial tests will be carried out in relation to traumatic and non-traumatic injuries and the absence of injuries, considering the possible associated variables.

Inclusion Criteria

- Rugby athletes active in the league during the study season.
- Athletes of both genders (male and female).
- Age between 18 and 35 years. (if you are a minor, you must have the informed assent)
- Participation in at least 80% of the matches of the season.
- Athletes with a minimum of one year of experience in the league.
- Acceptance and signing of informed consent to participate in the study.

Exclusion Criteria

- Athletes with previous injuries that prevent them from participating in more than 50% of the games of the season.
- Athletes who do not meet the minimum of one year of experience in the league.
- Athletes who do not consent to participate in the study.
- Athletes who have been suspended or withdrawn from the league during the study season.
- Athletes who practice another sport simultaneously.

Results

The sample has an age range of 12 to 34 years, with a median of 23 years, indicating that half of the participants are less than or equal to 23 years old. The mean age is 22.75 years, with a dispersion ranging from 19 years in the first quartile to 25.25 years in the third quartile, showing a relatively young distribution of athletes. The participants, 49 are men and 31 are women, representing 62% and 38% of the sample respectively. The size of the participants varies between 154 and 201 cm, with an average of 173.5 cm. This indicates a relatively tall average height, with half of the participants measuring up to 172.5 cm.

846 *Prevalence of Injuries in Rugby League Players in Antioquia*

As for the weight, it ranges between 50 and 178 kg, with an average weight of 78.79 kg. The third quartile of weight stands at 87.75 kg, suggesting that 75% of participants weigh less than 88 kg. The sample seems to be distributed in several locations, with the majority of participants coming from Antioquia with 39 followed by Valle (11 participants), followed by Meta (8 participants) and Bogotá (5 participants). The training days per week vary between 1 and 7, with a median of 4 days. This suggests that most participants train approximately four days a week, with an average of 4.65 days.

variable	Min.	1q	median	Mean	3rd Wha t	Max.
Age	12.00	19.0	23.00	22.75	25.25	34.00

variable	Man	woman
Gender	49	31
percentage	62%	38%

variable	Min.	1q	median	Mean	3rd Qu	Max
size	154.0	167.8	172.5	173.5	178.5	201.0
weight	50.00	66.50	77.00	78.79	87.75	178.00

Antio	weather	Cesar	god	laugh ter	meta	valle y	maid	Tolim	N. S
39	2	3	5	2	8	11	5	3	1

variable	Min.	Median	1st Qu.	Mean	3rd Qu	Max.
Training days week	1.00	4.00	5.00	4.65	5.00	7.00

Participants have between 0.5 and 23 years of experience in the practice of sports, with a mean of 7.74 years and a median of 6.5 years. This suggests that, although there are beginners, a considerable part of the sample has significant experience. The average practice time per session is 5 hours, with a minimum of 2 hours and a maximum of 7 hours, indicating substantial practice sessions.

The majority, 73%, play on synthetic pitches, suggesting a prevalence of these types of surfaces

in sports facilities, possibly due to their durability and lower need for maintenance. In comparison, 21% of participants practice on natural terrain. Very few athletes, only 2%, use sandy terrain, and an equal percentage play on surfaces classified as 'other', which could include various unconventional surfaces specific to certain sports or locations.

In terms of manual dominance, the majority of participants (85%) are right-handed, which is consistent with the laterality distributions observed in the general population (5) Only 7% of athletes are left-handed and an additional 7% are ambidextrous.

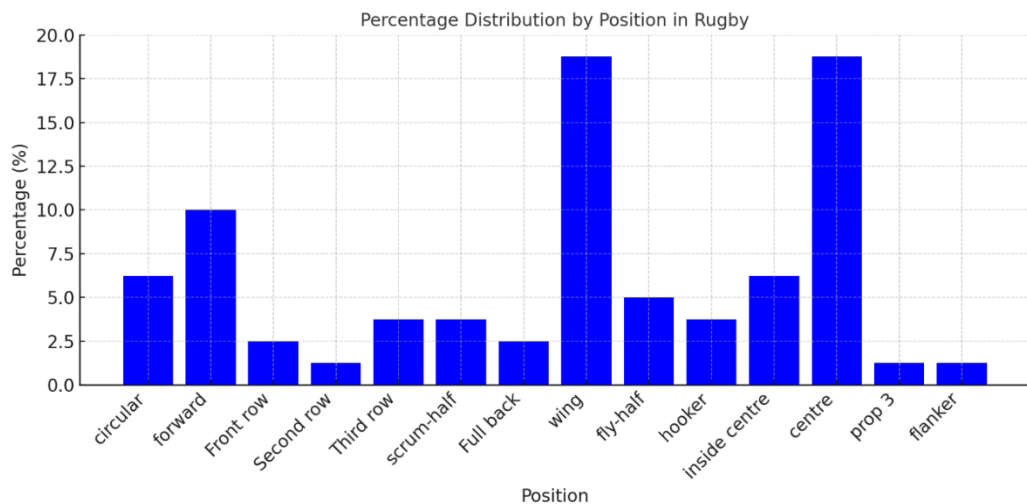
Finally, the footwear most used by athletes is rubber boots, with 61% of the sample, followed by aluminum boots (28%) and those who use both types of boots (10%).

The positions occupied by the rugby players analyzed in the sample show a distribution that underlines the diversity of roles within the teams. The 'wing' and 'centre' positions are the most common, with each represented by 15 players, which equates to 18.75% of the participants for each position. This highlights the importance of these positions, which are key to the offense in the game of rugby.

The 'forwards' represent 10% of the sample with 8 players, suggesting a significant role in the formation of the game, given that they are essential for ball control and scrum and lineout situations (6). The 'medium' and 'circular' positions also have a notable representation, with 5 players each, representing 6.25% of the total.

In contrast, positions such as 'Front line', 'Second line', 'Pillar 3' and 'flanker' are less common, with 2, 1, 1 and 1 players respectively, indicating a lower number of specialists in these areas within the sample studied. This may reflect specific player recruitment or development trends within participating teams.

The 'Third Row', 'Nine', 'Full Back', 'Flying' and 'Hooker' positions have an intermediate presence, with 3 players each, representing 3.75% of the total per position. These figures suggest a balanced distribution in roles that combine defence, game management and attacking skills, which are fundamental to the dynamism of rugby.(6)



The analysis of the data presented reveals significant information on the prevalence of lesions in the population studied. Of the 80 participants tested, 63 of them, representing 78%, reported

having suffered at least one injury. On the other hand, 17 participants, equivalent to 21%, indicated that they had not experienced any injury.

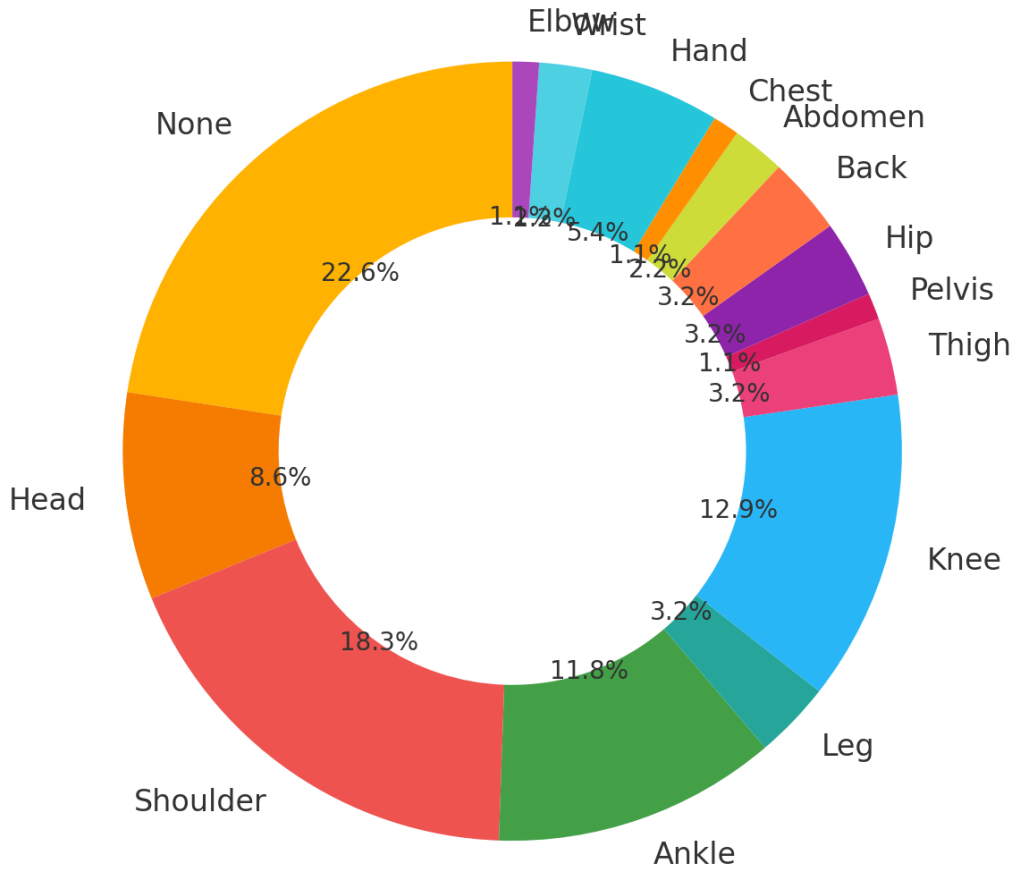
This high percentage of injuries (78%) suggests that the activity or conditions under study could be associated with a considerable risk of injury. The stark difference between injured and non-injured individuals highlights the importance of further investigating factors that may be contributing to this high injury rate, such as training practices, equipment used, environmental conditions, and the physical preparation of individuals.

Injury	yes	no
number	63	17
percentage	78%	21%

In the variable of the location of injuries in rugby players, it was observed that the most affected areas include the shoulder, with 17% (14 cases), and the ankle, with 11% (9 cases), which are commonly vulnerable in intense contact sports due to physical demands and the nature of repetitive movements and contacts. Knee injuries were also prominent, constituting 12% (10 cases) of the total.

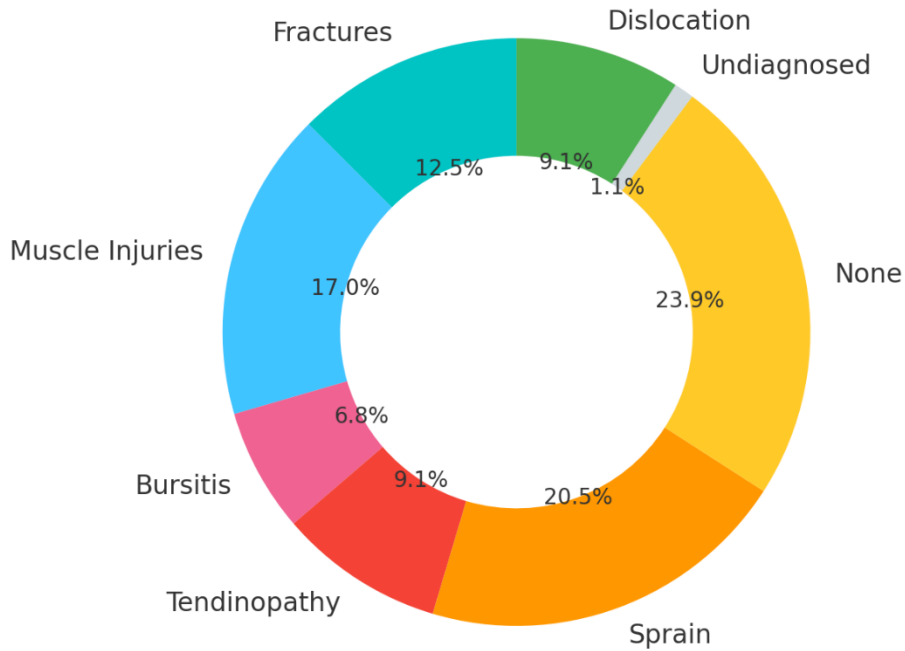
In addition, 8% (7 cases) of the injuries were located to the head, underscoring concerns about impacts and concussions, which are critical given the potential severity of their long-term consequences (7). Other injury locations included the hand (5% - 4 cases) and thigh (3% - 3 cases), in addition to a more dispersed distribution of injuries to the elbow, wrist, chest, abdomen, back, hip and pelvis, each accounting for less than 5% of cases.

Distribution of Injury Locations in Rugby Players

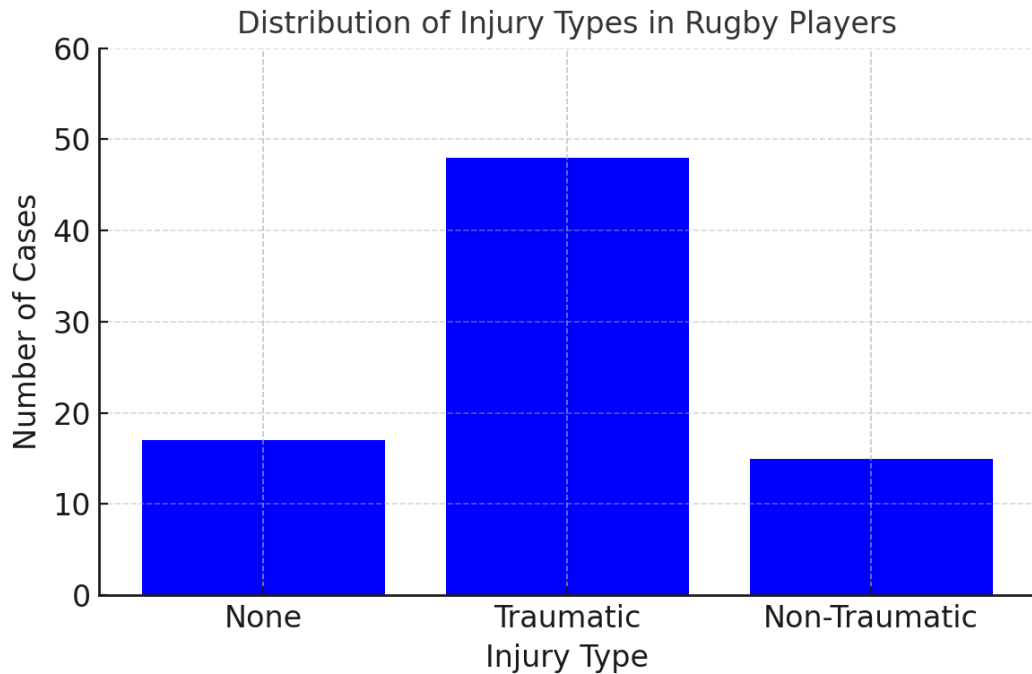


In the variable of types of injuries in a group of participants, sprains were observed, with a prevalence of 18% (15 cases), were the most frequent type of injury, followed by muscle injuries with 15% (12 cases), fractures represented 11% (9 cases), underlining the seriousness of possible injuries in rugby practice. Both tendinopathy and dislocations each accounted for 8% (7 cases), indicating the prevalence of injuries associated with repetitive efforts and direct trauma. Bursitis appeared in 6% (5 cases), showing the effects of continuous stress on the joints. One case (1%) was not diagnosed.

Distribution of Diagnosed Injury Types in Rugby Players

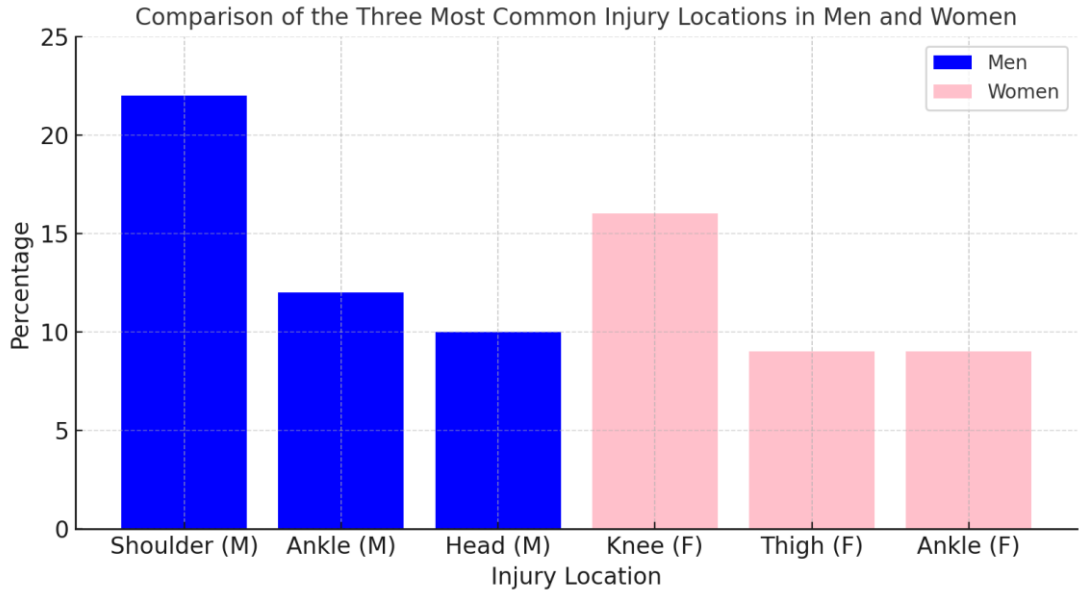


In the study of the mechanisms of injury among rugby athletes, it was observed that of a total of 80 evaluated, the majority, 60% (48 cases), experienced traumatic injuries, as a result of direct impacts or accidents common in this contact sport, highlighting the importance of preventive measures and use of protective equipment. In addition, 18% (15 cases) suffered non-traumatic injuries. This injury profile highlights both the risks inherent in rugby and the potential areas for preventative and management interventions to improve player safety and performance.



Separating the location of injuries for men, the most common areas of injuries are the shoulder (22%), followed by the ankle (12%) and the head (10%). These data suggest that activities or sports practiced by men could imply a greater risk of impact or stress in these areas. The low incidence of wrist (2%) and chest (2%) injuries could indicate reduced vulnerability or exposure to activities that put these parts of the body at risk.

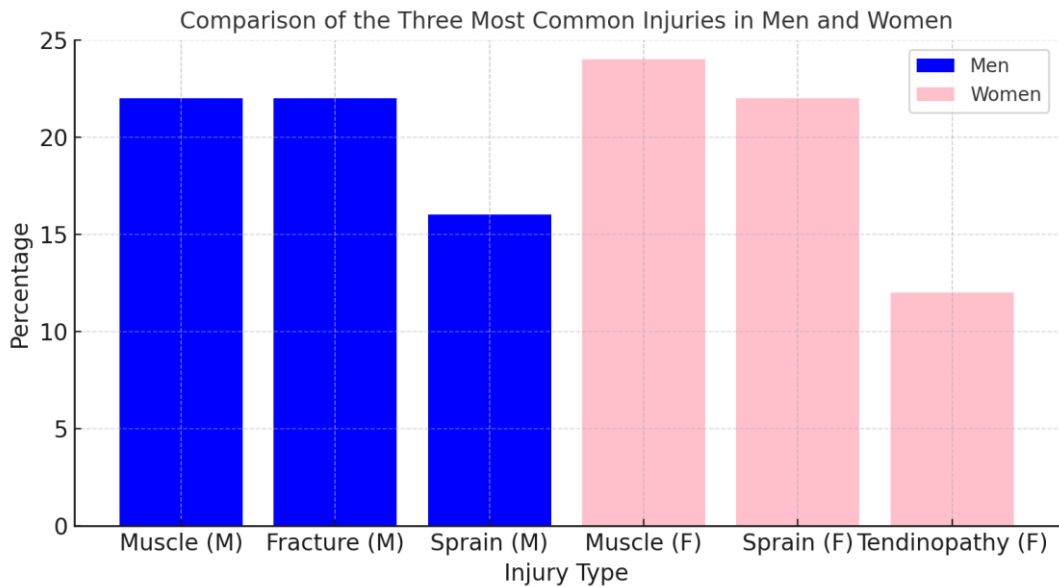
In contrast, women show a different pattern, with the knee as the most affected area (16%), followed by the thigh (9%) and ankle (9%). This pattern may reflect differences in biomechanics or in the types of physical activities most common among women, which may predispose to lower-body injuries more than upper body injuries. In addition, injuries to the head (6%) and abdomen (6%) are less common in women than in men, which could indicate differences in participation in contact sports or in the effectiveness of the protective measures used.



The percentage distribution of different types of injuries in men and women, providing a detailed perspective on the differences in injury patterns between genders. In men, muscle injuries and fractures are observed to be the most common, both at 22% each. This is followed by sprain (16%) and dislocations (10%). Tendinopathies and bursitis are less common, at 6% and 8%, respectively. 22% of men did not report any injuries, which is an important data to contextualize the frequency of injuries.

In the description of the type of injury of the women, it shows that muscle injuries are the most prevalent, affecting 24% of the participants. This is followed by sprains, which account for 22%. Tendinopathies are also relatively more common in women than in men, with 12% in women compared to 6% in men. Fractures and dislocations are less frequent in women, with 6% and 6%, respectively. As in men, a significant percentage of women (19%) reported no injuries.

These patterns suggest that while muscle injuries are common in both genders, women tend to suffer more sprains and tendinopathies compared to men. On the other hand, men have a slightly higher proportion of fractures and dislocations.



Regression Models

Regarding the days of absence, a multinomial logistic regression model is carried out, which analyzes the relationship between the **frequency of injuries** and the **days of absence grouped into: No day (0)**: Represents individuals who did not have days of absence.

- **1-7 days (1)**: Includes participants with absences of 1-7 days.
- **More than 7 days (2)**: Groups those with more than 7 days of absence.

It shows the following results:

1. Category of 1 to 7 days of absence:

a. The coefficient of injury frequency is 5.76, with a p-value of 0.003, indicating a statistically significant relationship at 5%. This suggests that an increase in the frequency of injuries increases the likelihood of having 1 to 7 days of absence.

b. The intercept is significant ($p=0.006$), which reinforces the relevance of the model in this category.

2. Category of more than 7 days of absence:

a. The coefficient of the frequency of injuries is 5.61, with a p-value of 0.003, also indicating a significance of 5%. This implies that an increase in the frequency of injuries is associated with a greater probability of having more than 7 days of absence.

b. The intercept is significant ($p=0.020$).

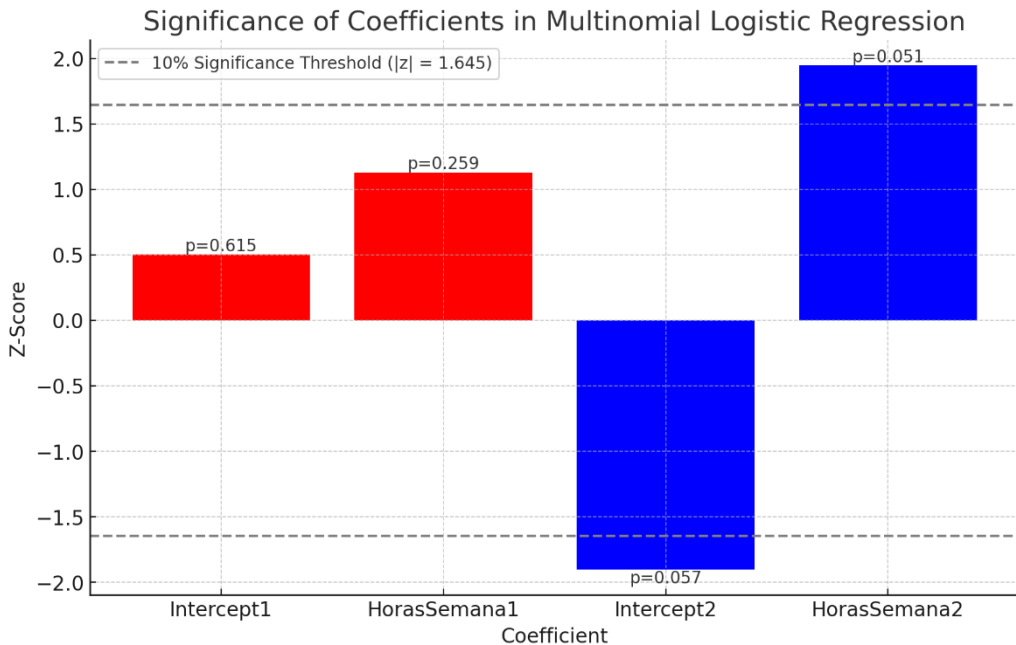
These results show that the **frequency of injuries** has a significant impact on the number of days of absence per injury, especially by increasing the probability of having absences of both 1 to 7 days and more than 7 days

In the multinomial logistic regression analysis investigating the relationship between practice hours per week and injury mechanisms among athletes, significant results were found suggesting

854 *Prevalence of Injuries in Rugby League Players in Antioquia*

a variation in injury risk depending on the number of hours spent practicing per week. The model revealed that, for non-traumatic injuries, the coefficient for weekly hours was 0.07161984 with a standard error of 0.03677581, resulting in a z-score of 1.947471. This z-score, when evaluated with a significance threshold of 10%, showed a p-value of 0.051, indicating that there is a significant trend at a level of 10%, where each additional hour of practice increases the risk of non-traumatic injuries by approximately 7%.

On the other hand, for traumatic injuries, the results did not show a statistically significant relationship at the same confidence level. This suggests that while non-traumatic injuries may be associated with training volume, traumatic injuries may be more influenced by other factors not captured in this model. The interpretation of these results indicates the need for careful management of training time to prevent non-traumatic injuries, especially in high-performance sports where training volume tends to be high. These findings underscore the importance of specific preventive strategies that can mitigate the risk of injury as the training load in athletes increases.

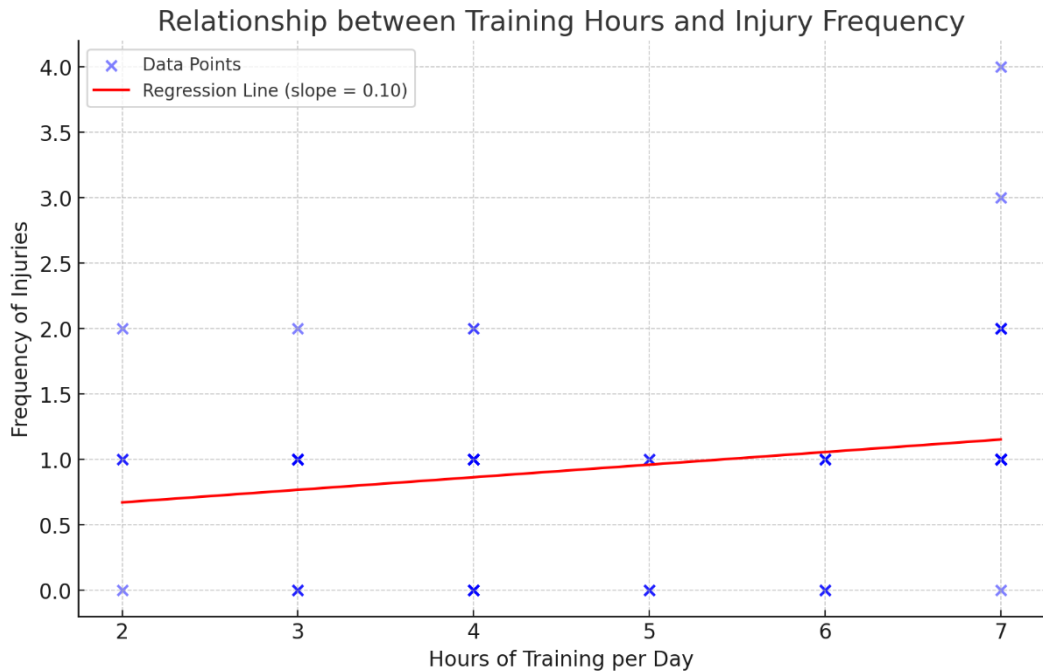


In the regression analysis applied to evaluate the influence of several variables on the frequency of injuries, it was found that one of the statistically significant variables was the number of hours of training per day, with a coefficient of 0.0991 and a p-value of 0.032, which is significant at 5%. This indicates that, the greater the number of hours of daily practice, the more frequent injuries are observed. This result suggests that each additional hour of daily training may be associated with an increased risk of injury.

In this model, the coefficient of training hours per day is 0.0991. This value represents the change in injury frequency for each additional hour of training.

To interpret this increase in terms of risk percentage:

1. Convert the coefficient to percentage: If the coefficient is taken as an approximation of the change in relative risk, a 0.0991 increase in injury frequency indicates a 9.91% increase in injury frequency for each additional hour of training per day.
2. Interpretation: Each additional hour of training per day is associated with a 9.91% increase in the risk of injury in this context, according to available data.



The graph that shows the relationship between the hours of training per day and the frequency of injuries, indicating that, for each additional hour of training per day, the frequency of injuries increases by an average of 0.10, or 9.91% in terms of relative risk.

The blue dots are the individual injury frequency data for each number of hours of training. This visualization confirms the trend of a slight increase in injury risk with more hours of daily training.

When analyzing only the variable days he trains per week with respect to the frequency of injuries, the results indicate that this variable does not have a statistically significant relationship with the frequency of injuries. The coefficient is 0.0526, with a p-value of 0.392, suggesting that there is insufficient evidence to state that the number of weekly training days influences the frequency of injuries in this dataset.

On the other hand, the analysis of the multinomial logistic regression model that was built to evaluate how weekly practice hours and gender influence the mechanism of injury in athletes. The model includes two response categories for the mechanism of injury, with the first group compared against a reference group. The results indicate that, when controlling for gender, each additional hour of training significantly increases the risk of injury by 6.8% for the second category of injury, with a statistical significance of 10% ($p=0.073$). This effect is more pronounced in this category comparing against the non-injury benchmark.

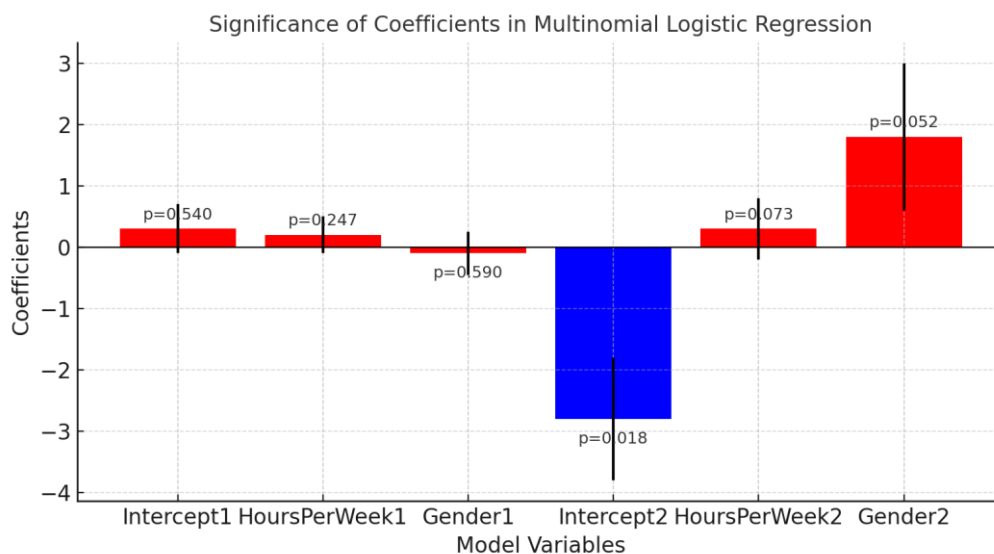
856 *Prevalence of Injuries in Rugby League Players in Antioquia*

For gender, the coefficients suggest significant differences in injury risk between genders for the second injury category. Specifically, the considerable positive coefficient (1.5363222) for the gender with a z-score of approximately 1.9427 and a p-value of 0.052 suggests that one of the genders is associated with an increased risk of the second injury category compared to the control group.

In terms of model fit, the residual deviation of 139,075 and an AIC of 151,075 indicate a reasonable fit of the model to the data. This analysis underscores the importance of considering both training hours and gender differences in the planning and management of sports training to minimize the risk of injury.

Therefore, according to the analysis of the model, women may suffer more risks with an additional hour of training compared to men. This is based on the positive and gender-significant coefficient in the riskiest injury category (second injury category), which shows a significant increase in injury risk compared to the reference group (female is coded as 1).

The coefficient of 1.5363222 for gender in this model, together with an approximate z-score of 1.9427 and a p-value close to 0.05, indicates that women have a greater increase in the risk of specific injury when weekly training hours are increased. Therefore, it is critical to consider these gender differences when designing and implementing training and injury prevention programs for athletes.



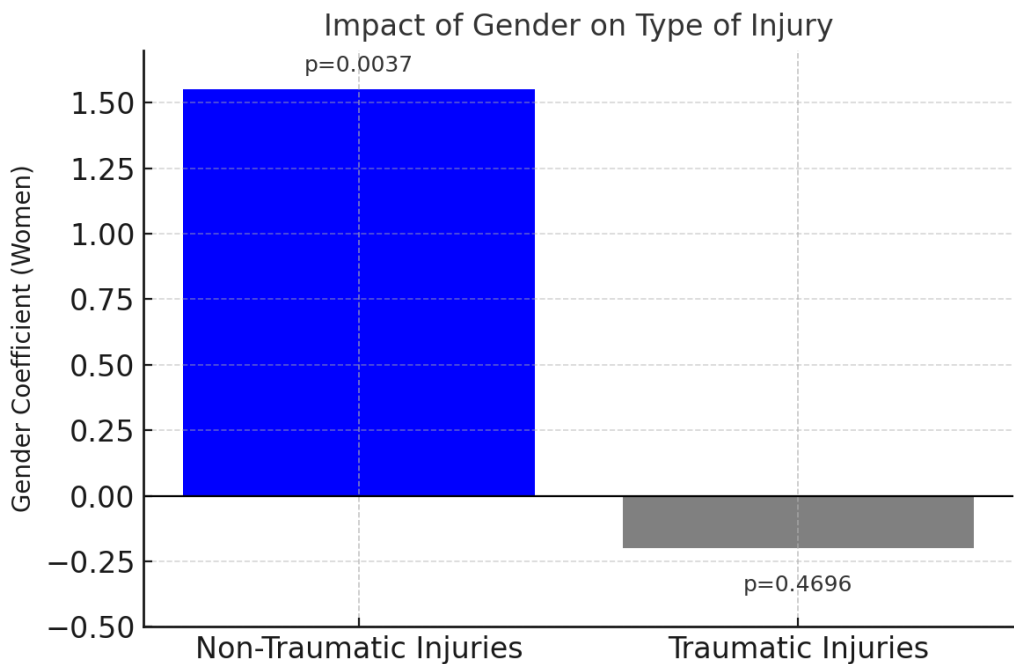
The graph shows the significance of the coefficients in multinomial logistic regression, especially highlighting the effects of training hours per week and gender on the probability of injuries. The blue bars indicate that the coefficients for "WeekHours2" and "Gender2" are statistically significant at 10% ($|z| > 1.645$), with p-values of 0.073 and 0.052 respectively. This result shows that an increase in training hours increases the risk of injury by 6.8% for both genders, being even more pronounced in women (coded as 1), where an additional hour of weekly training is significantly associated with an increase in the risk of injury.

In the study carried out through a multinomial logistic regression model that analyzes the impact of gender on the mechanism of injury, it has been identified that women, coded as 1, have a

significantly higher risk of suffering non-traumatic injuries compared to men, coded as 0. The results show that women have a 161% increase in the risk of these injuries, with a coefficient of 1.6177369 for gender in the category of non-traumatic injuries, which is statistically significant ($p=0.0365$).

On the other hand, for traumatic injuries, although the coefficient for gender is negative (-0.2811677), indicating a possible protective factor for women against this type of injury, this result is not statistically significant (z-score of -0.4696472). This suggests that there is not enough evidence to state that women have a lower risk of traumatic injury compared to men. The lack of significance indicates that more data would be needed to explore this relationship conclusively.

These findings highlight the need to consider gender differences in injury prevention strategies, especially in the implementation of measures that specifically address the elevated risk of non-traumatic injuries in women. They also point to the importance of further investigating factors that might contribute to differences in susceptibility to different types of injuries between men and women.



The comparative graph showing the impact of gender on the different types of injuries, based on the coefficients obtained from the multinomial logistic regression model. The coefficient for non-traumatic injuries is positive and significant ($p=0.0365$), indicating an increased risk for women

Discussion

Gender

The sample of this study is composed of 80 players, of which 62% (49) are men and 38% (31) are women. This sample size is comparable to that of previous studies, such as the article (8), in

which 90 players participated, with a distribution of 55 men and 35 women, reflecting a similarity in both the total number of participants and the distribution by gender. Another relevant study in the context of rugby (9) It analyzed a sample of 101 players, although it has limitations in the comparative exploration between genders, since the sample focuses exclusively on men. The current literature reveals a paucity of studies that describe or compare gender differences in this area in detail.

Prevalence

The analysis of the data obtained provides relevant information on the prevalence of lesions in the population studied. Of the 80 participants, 78% (63 individuals) reported having suffered at least one injury, while the remaining 21% (17 individuals) indicated that they had not experienced any. These results are consistent with previous findings, such as those reported in the article (10) , in which the prevalence of new lesions was 82%, a value close to that found in our study. Importantly, the current rugby literature tends to focus more on the incidence and risk factors associated with injuries than on the total prevalence in this sporting population. Regarding the distribution by gender, a prevalence of lesions of 62% was observed in male participants, similar to the 66.9% reported in the study(11). As for female participants, a prevalence of 38% was identified, in accordance with the Rugby Europe report, which reports a prevalence of injuries of 37.4% in women. These values are consistent and reinforce the representativeness of our findings in the comparison of both genders in the field of rugby

of days of absence

In the present study, days of absence are directly related to the frequency of injuries. To determine statistical significance, they were grouped into two categories: 1 to 7 days of absence and more than 7 days. In both groups, a significance of 5% was obtained, which indicates a relationship between these two variables, as shown by previous studies (12), (13), (14), although in contrast to the results of this research, this lower number of days of absence, compared to studies that show that days of absence are between 30 and 45 days, could be associated with the use of anti-inflammatories and physical means, such as the application of ice, to reduce inflammation, which accelerates the return to training and competitions. However, this practice opens up a possible area of research, since the excessive use of anti-inflammatories and physical means could aggravate injuries in the medium or long term, developing chronic characteristics that interfere with hypertrophy and muscle strength gain, as another study points out (15)In addition, it is important to consider that many athletes lack the necessary education about recovery and often choose to train or compete injured, ignoring the recommended recovery times.

Age

In the present study, the average age of the players was between 22 and 25 years, with a median of 23 years, indicating that most of the participants are in the age range of 19 to 25 years. These ranges are consistent with findings from previous research, where an average age of 27 years was reported in studies conducted in Mediterranean and Tier 1 countries(16). Likewise, in research carried out in Croatia, the average age was established at 24 years, remaining within the ranges mentioned above (9) . Finally, we found a study conducted in the United States where the average age was 21 years, which is close to the average age range of this study(17). These data reinforce the homogeneity in the age of rugby players in various populations and contexts.

Position

In relation to the position of athletes on the field, this study did not find a statistically significant association between the position of the players and the prevalence of injuries. However, some studies, such as the one carried out by the rugby division in Spain(16), They point out that location in the field can influence the risk of injury, that one position may have a greater risk of injury than others. For example, front-row players are found to be at higher risk of injury due to their direct exposure in the game, compared to third-row players, who are relatively less exposed.

Size

In this study, the average height of the participants, both male and female, is 172.5 cm. In contrast, previous studies have shown a difference in the height of European athletes, specifically in Spain, where players have a higher average height. In the reference articles (18) and (16), the average height reported is 181 cm, which confirms that in Spain athletes tend to be taller.

Location of the Lesions:

Considering all the players evaluated, both men and women, it was observed that the areas with the highest prevalence of injuries were the shoulder, with 17% (14 cases), and the ankle, with 11% (9 cases). These injuries are associated with the mobility characteristics required by these joints, the physical demands and the repetitive nature of the movements. In the case of the shoulder, rotations when passing and other movements, such as tackles, increase its vulnerability. On the other hand, the ankle is mainly affected due to continuous jumps and changes in direction. A significant prevalence of knee injuries was also found, at 12% (10 cases). These findings are consistent with the baseline study (16) in which it is mentioned that the most frequent injuries in matches correspond to knee and ankle sprains, in addition to serious injuries to the shoulder and collarbone. Likewise, our results coincide with the prevalence of ankle sprains in both genders, as mentioned in this study (16)

The research also showed a percentage of head injuries, which represent 8% (7 cases). These injuries, as widely mentioned in the literature on rugby injuries, are among the most serious, given the time that the athlete must remain out of practice and regular training. According to the reference article (19) Proper technique in various plays and movements could contribute to reducing the prevalence of this type of injury in high-impact matches, especially in cases of concussion. For example, when tackling, it is suggested to instruct the player to use the trunk or upper limbs, avoiding contact of the head with the opponent's hip.

Other injury locations included the hand (5% - 4 cases) and thigh (3% - 3 cases), in addition to a more dispersed distribution of injuries to the elbow, wrist, chest, abdomen, back, hip and pelvis, each accounting for less than 5% of cases. As in the aforementioned article, the lowest prevalence of lesions is in these locations. (19)

This study showed that, in women, the lesions were mainly concentrated in the lower limbs, while in men they predominated in the upper limbs. In women, the most affected areas were the knee (16%), thigh (9%), and ankle (9%). This pattern may reflect differences in biomechanics or the type of physical activities most common in women, which may predispose them to lower-body rather than upper-body injuries. In addition, injuries to the head (6%) and abdomen (6%) were less common in women than in men(20) . It should be noted that another study (21) It found a similar distribution of injuries, with the knee affected by 19% and the ankle by 11%, although this study reports a higher frequency of concussions (20%), these being the injuries

that most incapacitate players. The consideration of these differences is relevant, since it can guide prevention strategies adapted according to gender and type of injury.

In men, unlike women, the most common location of injuries was the shoulder (22%), followed by the ankle (12%) and the head (10%). These results are consistent with those reported in a previous study(21), in which shoulder and clavicle injuries represented 18.3%, and ankle injuries 13%, values very similar to those obtained in the present study. However, the aforementioned study also highlights a higher percentage of concussions (16.4%), in line with what was observed in women. It is essential to consider identifying movement patterns and proper technique in the game, as this can contribute to reducing the risk of injury in male players.

Types of Injury

In the present article, ligamentous injuries were the most frequent, representing 18% of cases, in agreement with the results of another study (22) In addition, another article reports that muscle strains have a prevalence of 23%, while in this study 15% was observed, a value not too distant. On the other hand, according to another study (23) Fractures accounted for 18% of injuries, which is comparable to the 11% recorded in this study.

"This article coincides with the findings of the referenced research (24), where it is observed that, although the percentages of injuries vary, there is a significant trend in the incidence of certain types of injuries in athletes. In this study, 25.2% of all injuries were joint sprains and 16.7% corresponded to muscle injuries. Although the total prevalence of injuries is not specifically addressed, the severity of these is highlighted in terms of the days of absence from sport. In line with these results, men have a higher incidence of knee injuries, especially ligament injuries, which is the main cause of prolonged absences. On the other hand, in women, ankle sprains are the most frequent and also a major cause of downtime(24)."

Mechanism

In this research it was observed that of a total of 80 evaluated, 60% (48 cases) experienced traumatic injuries due to direct contact, in addition to 18% (15 cases) in non-traumatic injuries, within the results show that women have an increase of 161% in the risk of these injuries, with a coefficient of 1.6177369 for gender in the category of non-traumatic injuries. which is statistically significant ($p=0.0365$), and possibly men are more likely to suffer traumatic injuries but within the study the statistics are not significant, just as the position of each player was not significant. According to other studies of the prevalence of traumatic and non-traumatic injuries, we found that the most prevalent position for these events to occur is tackling and collisions with 29 injuries out of 98 players in total, being the largest contributors of injuries during a match(18); In an observational study, it was shown that the most frequent injury was traumatic with 181 injuries of 258 players (16) In another study it was shown that in the matches it resulted in injuries of greater trauma, during training 5 (45.5%) non-traumatic injuries were caused and 6 (54.5%) of traumatic type, being traumatic due to overuse, out of a total of 40 injuries during 4 championships(18).

Relationship of Hours With the Mechanism of Injury

In the case of traumatic injuries, no direct relationship was found with increased training hours. However, for non-traumatic injuries, there was a statistically significant relationship with the increase in the time of training sessions. This is consistent with the findings of another study (25), which showed that injuries were associated with larger increases in workload during the

week in which they occurred, compared to the previous month and compared to non-injured controls. These results highlight the importance of paying special attention to training load, as it is a controllable factor in preventing or reducing the risk of injury. Additionally, another study analyzed the incidence of injuries in relation to hours of training, finding that for every 1000 hours of practice, between 1.0 and 3.5 injuries can occur.

According to the results of this research, the majority of players (73%) practice on synthetic grounds, while 21% practice on natural terrain and only 2% on other types of surfaces. According to another study(16), players who train or compete on natural terrain are more likely to suffer injuries. Although this research did not find a direct relationship with the type of surface, the predominant use of synthetic fields could act as a protective factor against injuries in players of the Antioquia rugby league.

It is important to note that certain results, such as age, weight, height, type of terrain, manual dominance, type of footwear, and years that the sport has been trained did not show a statistically significant association with the prevalence of injuries in this study. It is suggested that these factors can be considered in future research with larger sample sizes, which could provide greater precision in the evaluation.

Conclusions

- The sample studied reflects a similar representativeness to that of previous studies in terms of the participation of men and women, although the exploration of gender differences in rugby studies remains limited.
- It found that a high percentage of players (78%) reported having suffered at least one injury, which is consistent with similar research. However, lesions are more prevalent in men than in women, a finding that aligns with European and global studies.
- Women are at significantly higher risk of non-traumatic injuries. This highlights the need to adapt training programs and prevention strategies according to gender.
- An increase in the frequency of injuries increases the probability of absences from both 1 to 7 days and more than 7 days, highlighting the relevance of this factor in the duration of sports absences.
- The analysis showed that a greater number of hours of daily and weekly practice increases the risk of injury, with a notable increase in the risk of non-traumatic injuries (but not in the number of days). This finding highlights the need to balance the training load to prevent injury.
- Injuries in men are concentrated in areas such as the shoulder and ankle, while in women injuries to the knee and thigh predominate, reflecting possible biomechanical differences and exposure to specific activities.

References

- Rugby for beginners [Internet]. History and spirit of rugby. Available in: <https://www.world.rugby/the-game/beginners-guide/history>
- Calero S. Estudio de las lesiones más comunes en el Rugby ecuatoriano, categoría senior/Study of the most common injuries in ecuadorian Rugby, senior category.
- West SW, Shill IJ, Bailey S, Srydiuk RA, Hayden KA, Palmer D, et al. Injury Rates, Mechanisms, Risk Factors and Prevention Strategies in Youth Rugby Union: What's All the Ruck-Us About? A
posthumanism.co.uk

- Systematic Review and Meta-analysis. *Sports Med.* julio de 2023; 53(7):1375-93.
- Goes RA, Lopes LR, Cossich VRA, De Miranda VAR, Coelho ON, Do Carmo Bastos R, et al. Musculoskeletal injuries in athletes from five modalities: a cross-sectional study. *BMC Musculoskelet Disord.* diciembre de 2020; 21(1):122.
- Stöckel T, Carey DP. Laterality Effects on Performance in Team Sports. In: *Laterality in Sports* [Internet]. Elsevier; 2016 [cited 2024 Nov 14]. p. 309-28. Available in: <https://linkinghub.elsevier.com/retrieve/pii/B9780128014264000146>
- players and positions [Internet]. Available in: (<https://www.world.rugby/the-game/beginners-guide/positions>)
- Alanazi N, Fitzgerald M, Hume P, Hellewell S, Horncastle A, Anyaegbu C, et al. Concussion-Related Biomarker Variations in Retired Rugby Players and Implications for Neurodegenerative Disease Risk: The UK Rugby Health Study. *Int J Mol Sci.* 17 de julio de 2024; 25(14):7811.
- Toohy LA, Drew MK, Finch CF, Cook JL, Fortington LV. A 2-Year Prospective Study of Injury Epidemiology in Elite Australian Rugby Sevens: Exploration of Incidence Rates, Severity, Injury Type, and Subsequent Injury in Men and Women. *Am J Sports Med.* mayo de 2019; 47(6):1302-11.
- Bjelanovic L, Mijatovic D, Sekulic D, Modric T, Kesic MG, Klasnja A, et al. Injury Occurrence in Amateur Rugby: Prospective Analysis of Specific Predictors over One Half-Season. *Medicina (Mex).* 15 de marzo de 2023; 59(3):579.
- Brooks JHM, Fuller CW, Kemp SPT, Reddin DB. Epidemiology of injuries in English professional rugby union: part 1 match injuries. *Br J Sports Med.* octubre de 2005; 39(10):757-66.
- Yendluri A, Gallate ZS, Chari RR, Locke AR, Obana KK, Trofa DP, et al. Between 2008 and 2022, Lower-Extremity Injuries Declined in Male Rugby Players, Whereas Noncontact Knee Injuries Showed No Decline in Female Rugby Players. *Arthrosc Sports Med Rehabil.* octubre de 2024; 6(5):100967.
- Ma R, Lopez V, Weinstein MG, Chen JL, Black CM, Gupta AT, et al. Injury Profile of American Women's Rugby-7s. *Med Sci Sports Exerc.* octubre de 2016; 48(10):1957-66.
- Fuller CW, Taylor A, Molloy MG. Epidemiological Study of Injuries in International Rugby Sevens. *Clin J Sport Med.* mayo de 2010; 20(3):179-84.
- Cruz-Ferreira A, Cruz-Ferreira E, Santiago L, Taborda Barata L. Epidemiology of injuries in senior male rugby union sevens: a systematic review. *Phys Sportsmed.* 2 de enero de 2017; 45(1):41-8.
- Lundberg TR, Howatson G. Analgesic and anti-inflammatory drugs in sports: Implications for exercise performance and training adaptations. *Scand J Med Sci Sports.* noviembre de 2018; 28(11):2252-62.
- Murias-Lozano R, Mendía L, Sebastián-Obregón FJS, Solís-Mencia C, Hervás-Pérez JP, Garnacho-Castaño MV, et al. The Epidemiology of Injuries in Spanish Rugby Union División de Honor. *Int J Environ Res Public Health.* 24 de marzo de 2022; 19(7):3882.
- Sabesan V, Steffes Z, Lombardo D, Petersen-Fitts G, Jildeh T. Epidemiology and location of rugby injuries treated in US emergency departments from 2004 to 2013. *Open Access J Sports Med.* octubre de 2016; Volume 7:135-42.
- Solis-Mencia C, Ramos-Álvarez JJ, Murias-Lozano R, Aramberri M, Saló JC. Epidemiology of Injuries Sustained by Elite Under-18 Rugby Players. *J Athl Train.* 1 de noviembre de 2019; 54(11):1187-91.
- Whitehouse T, Orr R, Fitzgerald E, Harries S, McLellan CP. The Epidemiology of Injuries in Australian Professional Rugby Union 2014 Super Rugby Competition. *Orthop J Sports Med.* 1 de marzo de 2016; 4(3):2325967116634075.
- Almoussa S, Mullen R, Williams K, Bourne M, Williams M. Identification of potential risk factors for lower limb injuries in female team-sport athletes: a prospective cohort study. *Sci Med Footb.* 2 de abril de 2024; 8(2):126-37.
- Fuller CW, Taylor A. Eight-season epidemiological study of match injuries in women's international rugby

- sevens. *J Sports Sci.* 18 de abril de 2021; 39(8):865-74.
- Murias-Lozano R, San Sebastián-Obregón FJ, Lucio-Mejías H, Saló-Cuenca JC, Plaza-Manzano G, López-de-Uralde-Villanueva I, et al. Match Injuries in the Spanish Rugby Union Division de Honor. *Int J Environ Res Public Health.* 20 de septiembre de 2022; 19(19):11861.
- McIntosh AS. Rugby Injuries. In: Maffulli N, Caine DJ, editors. *Medicine and Sport Science* [Internet]. S. Karger AG; 2005 [cited 2024 Nov 14]. p. 120-39. Available in: <https://karger.com/books/book/2503/chapter/5739464>
- Corrigendum. *Am J Sports Med.* junio de 2019; 47(7):NP39-NP39.
- Li RT, Salata MJ, Rambhia S, Sheehan J, Voos JE. Does Overexertion Correlate With Increased Injury? The Relationship Between Player Workload and Soft Tissue Injury in Professional American Football Players Using Wearable Technology. *Sports Health Multidiscip Approach.* enero de 2020; 12(1):66-73.