

ORIGINAL

Musculoskeletal Injuries in an Ecuadorian Professional Soccer Team: A Retrospective Study (2022–2025)

Lesiones Musculo-esqueléticas en un equipo profesional de fútbol ecuatoriano: estudio retrospectivo 2022–2025

Lesões musculoesqueléticas em uma equipe profissional de futebol equatoriana: estudo retrospectivo 2022–2025

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ABSTRACT

Introduction: Professional football is associated with a high risk of injury, particularly lower-limb muscle injuries; therefore, epidemiological surveillance and diagnostic processes should be strengthened within each club. **Objective:** To determine the frequency and distribution of the most common musculoskeletal injuries in high-performance athletes from a professional football team in Ecuador during the 2022–2025 seasons. **Methods:** An observational, descriptive, retrospective, cross-sectional study was conducted. Forty-one anonymized clinical-imaging records of players evaluated between March 2022 and December 2025 were analyzed. The variables assessed were age, imaging diagnostic method, diagnosis, affected anatomical region, and type of injury. Descriptive statistical analysis was performed using absolute frequencies, percentages, mean, standard deviation, median, and range. Since the dataset did not include exposure hours, it was not possible to calculate incidence rates per 1000 hours of training or competition. **Results:** The mean age was 25.6 ± 3.6 years (median: 25; range: 19–37). The 23–26-year age group accounted for 51.2% of the records. Ultrasonography was the most frequently used diagnostic method (90.2%), whereas radiography accounted for 9.8%. The most affected anatomical region was the thigh (56.1%), followed by the knee (17.1%) and the ankle/foot (12.2%). Muscle injuries were the main type of injury (63.4%), followed by ligamentous and inflammatory joint injuries (9.8% each). Among muscle injuries, quadriceps/anterior thigh and semitendinosus/hamstring involvement were the most frequent findings, each accounting for 26.9% of all muscle injuries. **Conclusions:** In this Ecuadorian professional football team, injuries predominantly involved the thigh and were mainly muscular, with extensive use of ultrasonography as an initial diagnostic tool. These findings support the need to strengthen preventive strategies targeting the anterior thigh, hamstrings, adductors, and medial knee, as well as to standardize surveillance using exposure, time-loss, and recurrence variables.

Keywords: professional football; sports injuries; muscle injuries; ultrasonography; descriptive epidemiology.

RESUMEN

Introducción: el fútbol profesional conlleva un alto riesgo de lesiones, especialmente de lesiones musculares del miembro inferior, por lo que es necesario reforzar la vigilancia epidemiológica y los procesos diagnósticos en cada club. **Objetivo:** determinar la frecuencia y distribución de las lesiones musculoesqueléticas más frecuentes en deportistas de alto rendimiento de un equipo profesional de fútbol de Ecuador durante las temporadas 2022–2025. **Métodos:** se realizó un estudio observacional, descriptivo, retrospectivo y de corte transversal. Se analizaron 41 registros clínico-imagenológicos anonimizados de jugadores evaluados entre marzo de 2022 y diciembre de 2025. Las variables analizadas fueron edad, método diagnóstico por imagen, diagnóstico, región anatómica afectada y tipo de lesión. Se efectuó un análisis estadístico descriptivo mediante frecuencias absolutas, porcentajes, media, desviación estándar, mediana y rango. Dado que la matriz no incluía horas de exposición, no fue posible calcular tasas de incidencia por 1000 horas de práctica o competición. **Resultados:** la edad media fue de $25,6 \pm 3,6$ años (mediana: 25; rango: 19–37). El grupo de 23 a 26 años concentró el 51,2 % de los registros. La ecografía fue el método diagnóstico más utilizado (90,2 %), mientras que la radiografía representó el 9,8 %. La región anatómica más afectada fue el muslo (56,1 %), seguida de la rodilla (17,1 %) y el tobillo/pie (12,2 %). Las lesiones musculares constituyeron el principal tipo de lesión (63,4 %), seguidas de las lesiones ligamentarias y articulares inflamatorias (9,8 % cada una). Entre las lesiones musculares, los compromisos del cuádriceps/muslo anterior y del semitendinoso/isquiotibiales fueron los más frecuentes (26,9 % cada uno del total de lesiones musculares). **Conclusiones:** en este equipo profesional ecuatoriano predominó un patrón de lesiones centrado en el muslo y en las lesiones musculares, con amplio uso de la ecografía como herramienta diagnóstica inicial. Los resultados respaldan la necesidad de reforzar estrategias preventivas dirigidas al muslo anterior, los isquiotibiales, los aductores y la rodilla medial, así como de estandarizar la vigilancia con variables de exposición, tiempo de baja y recurrencia.

Palabras clave: fútbol profesional; lesiones deportivas; lesiones musculares; ecografía; epidemiología descriptiva.

RESUMO

Introdução: o futebol profissional está associado a um alto risco de lesões, especialmente lesões musculares dos membros inferiores; portanto, é necessário reforçar a vigilância epidemiológica e os processos diagnósticos em cada clube. **Objetivo:** determinar a frequência e a distribuição das lesões musculoesqueléticas mais frequentes em atletas de alto rendimento de uma equipe profissional de futebol do Equador durante as temporadas de 2022–2025. **Métodos:** foi realizado um estudo observacional, descritivo, retrospectivo e transversal. Foram analisados 41 registros clínico-imagenológicos anonimizados de jogadores avaliados entre março de 2022 e dezembro de 2025. As variáveis analisadas foram idade, método diagnóstico por imagem, diagnóstico, região anatómica afetada e tipo de lesão. Foi realizada análise estatística descritiva por meio de frequências absolutas, porcentagens, média, desvio-padrão, mediana e intervalo. Como a matriz não incluía horas de exposição, não foi possível calcular taxas de incidência por 1000 horas de treino ou competição. **Resultados:** a idade média foi de $25,6 \pm 3,6$ anos (mediana: 25; intervalo: 19–37). O grupo de 23 a 26 anos concentrou 51,2% dos registros. A ultrassonografia foi o método diagnóstico mais utilizado (90,2%), enquanto a radiografia representou 9,8%. A região anatómica mais afetada foi a coxa (56,1%), seguida pelo joelho (17,1%) e pelo tornozelo/pé (12,2%). As lesões musculares constituíram o principal tipo de lesão (63,4%), seguidas pelas lesões ligamentares e articulares inflamatórias (9,8% cada). Entre as lesões musculares, os acometimentos do quadríceps/coxa anterior e do semitendíneo/isquiotibiais foram os mais frequentes, cada um correspondendo a 26,9% do total de lesões musculares. **Conclusões:** nesta equipe profissional equatoriana, predominou um padrão de lesões centrado na coxa e nas lesões musculares, com amplo uso da ultrassonografia como ferramenta diagnóstica inicial. Os resultados respaldam a necessidade de reforçar estratégias preventivas direcionadas à coxa anterior, aos isquiotibiais, aos adutores e ao joelho medial, bem como de padronizar a vigilância com variáveis de exposição, tempo de afastamento e recorrência.

Palavras-chave: futebol profissional; lesões esportivas; lesões musculares; ultrassonografia; epidemiologia descritiva.

INTRODUCTION

Professional football is a discipline with high biomechanical and metabolic demands, characterized by the repeated performance of actions such as sprints, decelerations, changes of direction, jumps, collisions, and ball striking.^(1, 2) This combination of demands exposes players to a substantial injury burden during training and competition.⁽²⁾ Prospective studies and meta-analyses conducted in elite leagues have shown that musculoskeletal injuries represent a major concern because of their high incidence, recurrence, loss of competitive availability, and economic impact on clubs.^(3, 4)

From an epidemiological perspective, the most common injury patterns in professional football indicate a predominance of muscular and myotendinous injuries of the lower limb, particularly in the thigh, groin region, and knee.^(2, 4) UEFA study series have identified that the hamstrings, adductors, and quadriceps account for a large proportion of the muscle injury burden, although the exact distribution may vary across teams, seasons, playing styles, and preventive strategies.^(4,5)

In parallel, the quality of epidemiological recording and diagnostic classification has become a central aspect of research in sports medicine.^(5, 6) Both the International Olympic Committee consensus statement and its football-specific extension recommend standardizing definitions, severity, exposure, recurrence, and injury burden so that study results are comparable and clinical and preventive decision-making can be improved.^(7, 8) Musculoskeletal ultrasound plays a prominent role in the diagnostic process for athletes because of its availability, relatively low cost, dynamic nature, and usefulness in assessing superficial muscle, tendon, and ligament injuries.^(9, 10) However, its interpretation should be complemented by clinical information, physical examination, and, when appropriate, other imaging techniques, especially in complex or deep injuries.⁽¹¹⁻¹³⁾

In Ecuador, it is necessary to strengthen local scientific production in sports medicine through studies based on real-world data from professional teams. In this context, the present study aims to describe the frequency and distribution of the most common musculoskeletal injuries recorded in high-performance players from a professional Ecuadorian football team during the 2022–2025 seasons.

MATERIALS AND METHODS

An observational, descriptive, retrospective, cross-sectional study was conducted, based on an anonymized secondary dataset of clinical and imaging records from high-performance athletes belonging to a professional football team in Ecuador.

The observation period extended from March 2022 to December 2025. The unit of analysis was the clinical and imaging evaluation record related to suspected or confirmed injury. Records with available information on age, diagnostic imaging method, and reported diagnosis were included. Empty rows or records without useful clinical information were excluded.

A total of 41 valid records were analyzed. The variables considered were age, diagnostic imaging method (ultrasound or radiography), reported diagnosis, affected anatomical region, and type of injury. Because the original dataset did not contain direct variables on exposure, playing position, injury mechanism, time-loss from sport, or recurrence status, the analysis was limited to the description of frequencies and proportions, without estimating incidence rates or injury burden based on days lost.

For the descriptive analysis, absolute and relative frequencies were calculated for categorical variables, as well as the mean, standard deviation, median, and range for age. In addition, diagnoses were grouped by anatomical region and type of injury according to the content of the original clinical report. In mixed diagnoses, the predominant category from a clinical and imaging perspective was assigned in order to standardize the presentation of the results.

From an ethical standpoint, the analyzed database did not include direct player identifiers. Data processing was carried out exclusively for academic and research purposes, respecting confidentiality criteria. The manuscript does not include an ethics approval number because this information was not available in the dataset provided; it should be added if required by the institution or the journal.

RESULTS

A total of 41 valid clinical and imaging records were analyzed. Of these, 40 (97.6%) corresponded to pathological findings and 1 (2.4%) to a study without pathological structural findings. The mean age was 25.6 ± 3.6 years, with a median of 25 years and a range of 19 to 37 years.

Table 1. General characteristics of the sample

Characteristic	Value
Number of records analyzed	41
Records with pathological findings	40 (97,6 %)
Mean age \pm SD (years)	25,6 \pm 3,6
Median age (years)	25
Age range (years)	19–37
Most frequent age group	23–26 years (51,2 %)

Interpretation. The analyzed sample corresponded to a predominantly young group, with a mean age of 25.6 years and a main concentration between 23 and 26 years. This profile is consistent with the stage of peak competitive performance in professional football, during which high physical loads, greater exposure to playing minutes, and repetitive demands involving sprints, accelerations, and ball striking commonly coincide. The observed range (19–37 years) also reflects a heterogeneous squad combining young players and more experienced footballers, which is relevant because age has been associated in other cohorts with differences in injury risk and recovery.

Table 2. Diagnostic imaging methods used.

Diagnostic method	n	%
Ultrasound	37	90,2
Radiography	4	9,8

Note: Percentages were calculated based on the total number of records (n=41).

Interpretation. Ultrasound was the most frequently used diagnostic method. This finding suggests that, in the team's daily practice, the initial assessment of injury was preferably based on an accessible, dynamic technique that is useful for evaluating muscular, tendinous, and ligamentous structures. The low proportion of radiographs is consistent with their selective use in bone injuries or to rule out structural findings that cannot be visualized by ultrasound. In sports medicine settings, this distribution is clinically reasonable, although the absence of magnetic resonance imaging in the dataset limits the characterization of deep or complex injuries.^(12, 13)

Table 3. Distribution of injuries according to anatomical region.

Anatomical region	n	%
Thigh	23	56,1
Knee	7	17,1
Ankle/foot	5	12,2
Shoulder	2	4,9
Groin/hip	2	4,9
Lumbar spine	1	2,4
Hand	1	2,4

Note: Percentages were calculated based on the total number of records (n=41).

Interpretation. The thigh accounted for more than half of all records, establishing it as the main anatomical region affected. This distribution is consistent with the international literature, in which the thigh is one of the most frequently injured areas in professional football due to the high demands of sprinting, deceleration, and repetitive ball striking. The knee ranked second and the ankle/foot third, which is coherent with the typical biomechanical pattern of this sport. Overall, the results show that the healthcare burden in this team was mainly concentrated along the thigh-knee-ankle axis.^(3,4)

Table 4. Distribution of records according to type of injury.

Type of injury	n	%
Muscle injury	26	63,4
Ligament injury	4	9,8
Joint/inflammatory condition	4	9,8
Tendon injury	3	7,3
Bone injury	1	2,4
Spinal/functional condition	1	2,4
Other non-musculoskeletal conditions	1	2,4
No pathological findings	1	2,4

Note: Percentages were calculated based on the total number of records (n=41).

Interpretation. Muscle injuries were the most common type of injury, followed at a considerable distance by ligament injuries and inflammatory joint conditions. This pattern supports the idea that the main sports health problem in the sample was soft-tissue injury of the lower limb. The presence of a single bone finding and only one study without pathological evidence further suggests that most consultations effectively corresponded to real structural or inflammatory damage. From a methodological perspective, these results should be interpreted as frequencies of diagnostic records rather than as population-based incidence.

Table 5. Most frequent muscle injury subgroups.

Muscle injury subgroup	n	% On muscle injuries (n=26)
Quadriceps/anterior thigh	7	26,9
Hamstrings (semitendinosus)	7	26,9
Adductors	4	15,4
Deep gluteal/piriformis	1	3,8
Other muscles/muscle injuries	7	26,9

Note: Percentages were calculated based on the subset of muscle injuries (n=26).

Interpretation. Among muscle injuries, involvement of the quadriceps/anterior thigh and the semitendinosus/hamstrings was equivalent and constituted the core of the team's injury pattern. The adductors ranked next. This result is partially consistent with UEFA series, in which hamstring injuries usually rank first, followed by adductor and quadriceps injuries. However, in the analyzed sample, the magnitude of anterior thigh injuries was similar to that of hamstring injuries.⁽¹⁴⁾ This difference could be related to specific training characteristics, ball-striking actions, sample size, or squad composition.^(15,16)

DISCUSSION

The main finding of this study was the predominance of muscle injuries in the thigh, for which ultrasound was the most frequently used diagnostic method. In addition, records were mainly concentrated among young adult footballers, with a secondary but relevant involvement of knee and ankle/foot injuries.^(1, 2) In practice, these results define an injury profile consistent with the biomechanical demands of professional football, in which acceleration, high-speed running, braking, and ball striking generate a high load on the musculotendinous unit of the lower limb.^(3, 4)

The predominance of thigh injuries is consistent with the findings of multiple international prospective studies and meta-analyses. Ekstrand and colleagues demonstrated that muscle injuries represent a substantial proportion of all injuries in professional football and that the thigh accounts for the largest number of episodes, especially among the major muscle groups of the lower limb.^(1, 2) López-Valenciano and colleagues confirmed in their meta-analysis that musculotendinous injuries are the most frequent injuries in male professional football. Likewise, the most recent UEFA series has shown that the incidence of hamstring injuries not only persists but has increased over time.^(3, 4)

In the present sample, the most affected muscle groups were the quadriceps/anterior thigh and the semitendinosus/hamstrings, each accounting for 26.9% of muscle injuries. This distribution partially differs from large European registries, where hamstring injuries usually rank first more clearly.⁽¹⁶⁾ However, the greater weight of anterior thigh injuries in our study may be explained by an injury profile linked to ball-striking actions, explosive movements, and repetitive stress on the rectus femoris and quadriceps, aspects already addressed in specific reviews on rectus femoris and anterior thigh injuries in football players.^(17, 18)

The adductors represented the third most frequent muscle subgroup. This result is consistent with the evidence on groin pain and adductor injuries in men's professional football, where these conditions account for an important proportion of time loss and accumulated clinical burden.^(19, 20) The literature has indicated that the groin region is not only frequently affected but also complex because of its multifactorial nature, which reinforces the importance of preventive protocols and specific functional assessment.⁽²¹⁾

Knee injuries, particularly those compatible with medial collateral ligament involvement and associated inflammatory conditions, represented the second most affected anatomical region. Although their proportion was clearly lower than that of thigh injuries, they are not less important from a clinical perspective, as they may cause functional limitation and affect performance, even when they do not represent injuries of high structural severity. This supports the need to include surveillance of medial stability, load control, neuromuscular training, and progressive return to sport-specific training.^(21, 22)

The predominance of ultrasound as a diagnostic method deserves special mention. Musculoskeletal ultrasound is an appropriate tool for the initial assessment of sports injuries because of its speed, availability, ability to perform dynamic examination, and usefulness for follow-up, especially in superficial muscle and tendon injuries.^(9, 10) Furthermore, its correlation with other imaging techniques makes it a valuable resource within a stepwise diagnostic approach. However, in deep, extensive, or prognostically complex injuries, magnetic resonance imaging may provide additional information. The absence of this modality in the dataset does not invalidate the study, but it does limit stratification.⁽¹¹⁻¹³⁾

From an applied perspective, the results suggest that the team's prevention programs should prioritize thigh protection, especially for the quadriceps, hamstrings, and adductors.^(23, 24) Evidence supports the effectiveness of specific preventive strategies, such as eccentric hamstring training and targeted adductor strengthening, as well as comprehensive monitoring of symptoms and strength during the preseason. At the same time, isolated strength assessment does not always predict future risk; therefore, the preventive approach should be multifactorial and integrated within the team context.^(25, 26)

This study provides local and contextualized evidence on Ecuadorian professional football, an area in which descriptive publications based on real clinical data remain scarce. Its main value lies in offering an initial characterization of the injury pattern of a professional team and in identifying specific priorities for surveillance, diagnosis, and prevention. Although its results cannot be directly extrapolated to all clubs, they constitute a useful basis for national multicenter studies and for the future standardization of injury recording.

CONCLUSIONS

Of the 41 clinical and imaging records analyzed from a professional football team in Ecuador during the 2022–2025 seasons, muscle injuries were the most frequent type of injury, and the thigh was the most affected anatomical region

Ultrasound was the most commonly used diagnostic technique, supporting its usefulness as an initial tool in the context of professional football.

Among muscle injuries, the quadriceps/anterior thigh and semitendinosus/hamstrings accounted for the highest proportion, followed by the adductors. Therefore, these structures should be prioritized in preventive planning, medical follow-up, and functional rehabilitation.

To improve the quality of evidence in the national context, the implementation of standardized records including exposure, severity, recurrence, time loss, and injury mechanism is recommended, in accordance with international methodological consensus statements.

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CONSENT

For the conduct of this study, consent was obtained from the patients.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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