[Rugby Europe Championship (Men) – 2022/23]

Injury Surveillance Report

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1. Introduction

Understanding the incidence and nature of the injuries sustained during the practice of rugby is key in order to clarify the risks posed to players. Due to its nature as a contact sport, rugby, as well as ice hockey, lacrosse, and American football, has a higher injury incidence than non-contact sports. Through Injury Surveillance Studies in various competitions, it is possible to gain an understanding of how, where and when injuries happen, which is a fundamental requirement to advance player welfare standards across all ages and levels of the game.

Several Injury Surveillance Studies have been implemented previously in World Rugby Competitions[1–4], but none were in the Rugby Europe Championship; although, there is a study in the Rugby Europe Super Cup, a competition which takes place in Europe, but doesn't involve national teams.

Rugby Europe is committed to implementing injury surveillance studies at all major Rugby Europe tournaments and to disseminate the results within the Rugby community.

The aims of these studies are:

- To record and analyze injuries sustained by men and women at the men's and women's Rugby Europe Championships.
- To identify injury trends.
- To bring injury-related areas of concern to the attention of Rugby Europe's Chief Medical Officer and when appropriate to World Rugby's Chief Medical Officer.

This report continues the on-going study of Rugby Europe competitions by reporting injuries sustained during the men's Rugby Europe Championship.

2. Methods

The study was conducted in accordance with the definitions and protocols described in the World Rugby approved consensus statement on definitions and procedures for injury surveillance studies in Rugby[5].

The definition of injury was: 'Any injury sustained during the 2023 men's Rugby Europe Championship matches that prevents a player from taking a full part in all normal training activities and/or match play for more than one day following the day of injury'. A recurrent injury was defined as 'An injury (as defined above) of the same type and at the same site as an index injury and which occurs after a player's return to full participation from the index injury'.

Specific injuries were classified using the OSICS 10 coding system[6]. Injury location, type and cause together with the event leading to the injury were also recorded.

Injury severity was determined by the number of days a player was injured: a player was deemed to be injured until he/she could undertake full, normal training and be available for match selection whether he/she was actually selected. Medical staff were informed to make an informed clinical judgment about a player's fitness to train/play on those days when players were not scheduled to train or play. Injured players were followed up after each tournament to obtain their return-to-play date: the return-to-play dates for players with injuries that remained unresolved 3 months after the final Tournament in the Rugby Europe Championship were defined on the basis of the player's medical staff's judgment and prognosis. The complete lists of categories and sub-categories used for categorizing injury location and injury types are provided in the Rugby consensus publication[5].

Only match injuries resulting in > 1 day of absence from training or from the match were recorded in this study. The rest of the injuries that were not included in this definition were not recorded.

3. Data Collection

Prior to the tournament taking place, the purpose of the epidemiological study was outlined to each participating team. Each player's baseline anthropometric information was recorded: (playing position [back, forward]; date of birth; body mass [Kg]; stature [cm]); players joining a country's squad at a later date were added to the list of players and the anthropometric data recorded at the time the player joined the squad.

Medical staff prospectively recorded match injuries sustained during each tournament. A member of the team's medical staff also recorded detailed information about each injury (date of injury, date of return to play, location and type of injury, cause of injury, event leading to injury). The final piece of information recorded is normally an injured player's return-to-play date.

4. Results

4.1 Players' anthropometric data

Table 1 summarises the numbers and anthropometric data for players, categorised as backs, forwards and all players, taking part in REC 2023.

The total sample for the study was 290 players, 114 backs and 176 forwards. The mean age was 27,0 years (backs: 26,4 years; forwards: 27,3 years; *p value =0,005*). The average stature (cm) for all players was 185,7; forwards (188,0 cm) were taller than backs (182,1 cm) (*p value <0,001*). The body mass was 101,2 kg, forwards (109,7 kg) heavier than backs (88,1 kg) (*p value <0,001*).

Table 1. Players' anthropometric data

Measure	Mean (± standard deviation)		
	Backs	Forwards	All players
Players (n)	114	176	290
Stature (cm)	182,1 (5,8)	188,0 (7,1)	185,7 (7,2)
Body Mass (kg)	88,1 (8,4)	109,7 (11,0)	101,2 (14,6)
Age (years)	26,4 (4,1)	27,3 (4,5)	27,0 (4,4)

Table 1.1. Players' anthropometric data

Measure	Mean (± standard deviation)					
	Front Row	Second Row	Third Row	Halves	Inside backs	Outside backs
Players (n)	77	43	55	44	42	29
Stature (cm)	183,1 (4,9)	196,2 (4,6)	188,6 (4,7)	179,1 (6,3)	185,5 (4,2)	182,7 (4,9)
Body Mass (kg)	114,6 (11,7)	111,9 (6,7)	101,8 (6,8)	83,0 (7,3)	95,7 (4,7)	88,0 (7,5)
Age (years)	28,1 (4,8)	26,7 (4,5)	26,7 (3,8)	26,9 (4,6)	26,4 (4,0)	26,0 (3,6)

4.2 Match injuries

4.2.1 Injury incidence

Table 2 summarises the match injury frequency and incidence and match exposure data for players, categorised as backs, forwards and all players, taking part in REC 2023.

The total number of injuries sustained was 62 (backs: 28; forwards: 34) and the total match exposure was 800,0 player-hours (backs: 373; forwards: 427). The overall match incidence was 77,5 injuries/1000 match hours (backs: 75,1 forwards: 79,6).

Table 2. Match injury frequency, match exposure volume, and match injury incidence

Measure	Backs	Forwards	All players
Injuries (n)	28	34	62
Match Exposure (player-match-hours)	373	427	800
Incidence (95% confidence interval)	75,1 (48,3-101,8)	79,6 (53,9-105,3)	77,5 (59,0-96,0)

4.2.2 Injury severity

Table 3 summarises the mean and median match injury severity data for players, categorised as backs, forwards and all players, taking part in REC 2023.

The mean severity of the study was 36,4 days missed. Backs missed 38,8 days, while forward missed 34,4 days due to injuries.

The median severity was 20.0 days for all players and between positions.

Table 3. Mean and median match injury severity (days lost)

Measure	**Severity** (95% Confidence interval), days		
	Backs	**Forwards**	**All players**
Mean (95% confidence interval)	38,8 (21,7-55,9)	34,4 (19,5-49,2)	36,4 (25,5-47,3)
Median (95% confidence interval)	20,0 (13-41)	20,0 (11-27)	20,0 (14-21)

Table 4 summarises the proportion of match injuries by time-loss data for players, categorised as backs, forwards and all players, taking part in REC 2023.

Moderate severity (8-28 days) was the most common representing 48,4% of all injuries, followed by severe (29-90 days) with 20,9%, minor (2-7 days) with 17,8% and major (> 90 days) with 12,9%. Backs suffered more moderate, severe and major injuries than forward, whilst forwards presented more minor injuries than backs.

Table 4. Proportion of match injuries by time-loss category

Measure	Backs	Forwards	All players
Minor (2-7 days)	10.7%	23.5%	17.8%
Moderate (8-28 days)	53.6%	44.1%	48.4%
Severe (29-90 days)	21.4%	20.6%	20.9%
Major (>90 days)	14.3%	11.8%	12.9%

4.2.3 Injury burden

The total days-absence resulting from match injuries sustained during the REC 2023 was 2256 days-absence (backs: 1087; forwards: 1169).

Injury burden, which is equal to injury incidence x mean severity, is an important ISS output measure, as it provides an overall indication of the risk of injury[7,8].

The injury burden in the REC 2023 was 2821 days lost/1000 player-hours (backs: 2914; forwards: 2738 days lost).

4.2.4 Injury location

Table 5 summarises the proportion of match injuries by injury location data for players, categorised as backs, forwards and all players, taking part in REC 2023. The most common injury locations were the head/face (22,6%) followed

by the ankle (12,9%) and the wrist/hand/fingers (9,7%). For backs, the most common injury locations were the head/face (28,6%) followed by the wrist/hand/fingers (14,3%), posterior thigh (10,7%) and the knee (10,7%). For forwards, the most common injury locations were the head/face (17,6%) and ankle (17,6%) followed by the shoulder/clavicle (11,8%) and the anterior thigh (8,8%).

Table 5. Proportion of match injuries by injury location

Measure	% (95% Confidence interval)		
	Backs	**Forwards**	**All players**
Head / Neck	28,6 (11,9-45,3)	20,8 (10,7-30,9)	24,2 (13,5-34,9)
Head/face	28,6 (11,9-45,3)	17,6 (4,8-30,4)	22,6 (12,2-33,0)
Neck/cervical spine	-	2,9 (0,0-8,5)	1,6 (0,0-4,7)
Upper limb	25,0 (14,02-35,8)	23,5 (12,9-34,1)	24,2 (13,5-34,9)
Shoulder/clavicle	3,6 (0,0-10,5)	11,8 (1,0-22,6)	8,1 (1,3-14,9)
Upper arm	-	-	-
Elbow	3,6 (0,0-10,5)	2,9 (0,0-8,5)	3,2(0,0-7,6)
Forearm	3,6 (0,0-10,5)	2,9 (0,0-8,5)	3,2 (0,0-7,6)
Wrist/hand/fingers	14,3 (5,6-23,0)	5,9 (0,0-13,8)	9,7 (2,3-17,1)
Trunk	3,6 (0,0-10,5)	8,8 (0,0-18,3)	6,5 (0,4-12,6)
Ribs/upper back	3,6 (0,0-10,5)	5,9 (0,0-13,8)	4,8 (0,0-10,1)
Abdomen	-	-	-
Low back	-	-	-
Sacrum/pelvis	-	2,9 (0,0-8,5)	1,6 (0,0-4,7)
Lower limb	42,8 (30,5-55,1)	47,0 (34,6-59,4)	45,1 (32,7-57,5)
Hip/groin	3,6 (0,0-10,5)	-	1,6 (0,0-4,7)
Thigh, anterior	3,6 (0,0-10,5)	8,8 (0,0-18,3)	6,5 (0,4-12,6)
Thigh, posterior	10,7 (0,0-22,1)	5,9 (0,0-13,8)	8,1 (1,3-14,9)
Knee	10,7 (0,0-22,1)	5,9 (0,0-13,8)	8,1 (1,3-14,9)
Lower leg	7,1 (0,0-16,6)	5,9 (0,0-13,8)	6,5 (0,4-12,6)
Ankle	7,1 (0,0-16,6)	17,6 (4,8-30,4)	12,9 (4,6-21.2)
Foot/toe	-	2,9 (0,0-8,5)	1,6 (0,0-4,7)

4.2.5 Injury type

Table 6 summarises the proportion of match injuries by injury type for players, categorised as backs, forwards and all players, taking part in REC 2023.

The most common injury types were the muscle / tendon injuries (35,5 %) followed by the joint / ligament (32,3%). The most common specific injury types sustained by backs and forwards at REC2023 were muscle strain/cramp (backs: 21,4%; forwards: 26,5%) followed by the sprain / ligament (backs: 17,9%; forwards: 23,5%). Concussions in backs are as frequent as sprains/ligament injuries at 17.9%

Table 6. Proportion of match injuries by injury type

Measure	% (95% Confidence interval)		
	Backs	**Forwards**	**All players**
Bone	17,9 (3,7-32,1)	2,9 (0,0-8,5)	9,7 (2,3-17,1)
Fracture	17,9 (3,7-32,1)	2,9 (0,0-8,5)	9,7 (2,3-17,1)
Other bone injury	-	-	-
C/PNS	17,9 (3,7-32,1)	14,7 (2,8-26,6)	16,1 (7,0-25,2)
Concussion	17,9 (3,7-32,1)	14,7 (2,8-26,6)	16,1 (7,9-25,2)
Nerve injuries	-	-	-
Joint (non-bone) / ligament	25 (9,0-41,0)	38,2 (21,9-54,5)	32,3 (20,7-43,9)
Dislocation / subluxation	7,1 (0,0-16,6)	11,8 (1,0-22,6)	9,7 (2,3-17,1)
Meniscus / Disc Injury	-	2,9 (0,0-8,5)	1,6 (0,0-4,7)
Sprain/ligament	17,9 (3,7-32,1)	23,5 (9,2-37,8)	21,0 (10,9-31,1)
Other	-	-	-
Muscle / tendon	32,1 (14,8-49,4)	38,2 (21,9-54,5)	35,5 (23,6-47,4)
Haematoma/bruise	10,7 (0,0-22,1)	11,8 (1,0-22,6)	11,3 (3,4-19,2)
Muscle strain/cramp	21,4 (6,2-36,6)	26,5 (11,7-41,3)	24,2 (13,5-34,9)
Tendon injury/tendinopathy	-	-	-
Other	-	-	-
Skin	3,6 (0,0-10,5)	-	1,6 (0,0-4,7)
Abrasion	-	-	-
Laceration	3,6 (0,0-10,5)	-	1,6 (0,0-4,7)
Other types	3,6 (0,0-10,5)	5,9 (0,0-13,8)	4,8 (0,0-10,1)
Visceral	-	-	-
Other	3,6 (0,0-10,5)	5,9 (0,0-13,8)	4,8 (0,0-10,1)

C/PNS: Central and Peripheral Nervous System

4.2.6 Most common and highest risk injuries

Table 7 identifies the most common match injuries by injury diagnosis for players, categorised as backs, forwards and all players, taking part in REC 2023.

The most common injury was concussion (16,1%), followed by anterior talofibular ligament sprain (6,5%), AC joint sprain (4,8%) and metacarpal fracture (4,8%).

Table 7. The four most common injury diagnoses reported for backs, forwards and all players (% of all reported match injuries)

Backs		Forwards		All players	
Injury	%	Injury	%	Injury	%
Concussion	17,9	**Concussion**	14,7	**Concussion**	16,1
Metacarpal fracture	7,1	**Anterior talofibular ligament sprain**	8,8	**Anterior talofibular ligament sprain**	6,5
Medial gastrocnemius strain	7,1	**AC joint sprain**	5,9	**AC joint sprain**	4,8
MCL tear knee	7,1	**Soleus strain**	5,9	**Metacarpal fracture**	4,8

Table 8 summarises the injuries with greatest burden for players, categorised as backs, forwards and all players, taking part in REC 2023.

The injury with greatest burden was anterior elbow dislocation (7,8%), followed by patellar fracture (7,6%), anterioinferior shoulder dislocation (6.5%) and shoulder osteochondral lesion (5,3%).

Table 8. The four injury diagnoses with greatest burden reported for backs, forwards and all players (% of all reported days lost to match injuries)

Backs		Forwards		All players	
Injury	%	Injury	%	Injury	%
Patellar fracture	15,7	**Anterior elbow dislocation**	15,1	**Anterior elbow dislocation**	7,8
Distal triceps tendon rupture	10,3	**Anterioinferior shoulder dislocation**	12,5	**Patellar fracture**	7,6
Fracture radius	8,4	**Shoulder osteochondral lesion**	10,3	**Anterioinferior shoulder dislocation**	6,5
Metacarpal fracture	6,3	**Chest muscle trigger points**	10,2	**Shoulder osteochondral lesion**	5.,3

4.2.7 Injury onset

Table 9 summarises the proportion of match injuries by nature of onset data for players, categorised as backs, forwards and all players, taking part in REC 2023.

Acute onset was the most common cause of injury with 91,9% versus 8,1% of gradual onset. Acute injuries were the most common for backs (89,3%) and forwards (94,1%).

Table 9. Proportion of reported match injuries by nature of onset

Measure	% (95% Confidence interval)		
	Backs	Forwards	All players
Acute	89,3 (77,9-100,0)	94,1 (86,2-100,0)	91,9 (85,1-98,7)
Gradual	10,7 (0,0-22,1)	5,9 (0,0-13,8)	8,1 (1,3-14,9)

4.2.8 Cause of injury onset

Table 10 summarises the proportion of match injuries by cause of onset data for players, categorised as backs, forwards and all players, taking part in REC 2023.

Contact mechanism represents 82,3% of all injuries while non-contact was 17,7%. Contact injuries were the most common for backs (85,7%) and forwards (79,4%).

Table 10. Proportion of reported match injuries by cause of onset

Measure	% (95% Confidence interval)		
	Backs	Forwards	All players
Contact	85,7 (72,7-98,7)	79,4 (65,8-93,0)	82,3 (72,8-91,8)
Non-contact	14,3 (1,3-27,3)	20,6 (7,0-34,2)	17,7 (8,2-27,2)

4.2.9 Match events leading to injury

Table 11 summarises the match events causing the injuries suffered by players, categorised as backs, forwards and all players, taking part in REC 2023.

The most common match event leading to injury was being tackled (30,6%), followed by tackling (24,2%) and running (16,1%). For backs, the most common match event leading to injury was being tackled (50,0%), followed by tackling (21,4%) and running (10,7%). For forwards, the most common match event leading to injury was tackling (26,5%), followed by running (20,6%) and being tackled (14,7%).

Table 11. Proportion of reported match injuries by match event leading to injury

Measure	% (95% Confidence interval)		
	Backs	Forwards	All players
Collision	7,1 (0,0-16,6)	8,8 (0,0-18,3)	8,1 (1,3-14,9)
Kicking	-	-	-
Lineout	-	-	-
Maul	-	5,9 (0,0-13,8)	3,2 (0,0-7,6)
Ruck	7,1 (0,0-16,6)	8,8 (0,0-18,3)	8,1 (1,3-14,9)
Running	10,7 (0,0-22,1)	20,6 (7,0-34,2)	16,1 (7,0-25,2)
Scrum	-	11,8 (1,0-22,6)	6,5 (0,4-12,6)
Tackled	50,0 (31,5-68,5)	14,7 (2,8-26,6)	30,6 (19,1-42,1)
Tackling	21,4 (6,2-36,6)	26,5 (11,7-41,3)	24,2 (13,5-34,9)
Other/Not known	3,6 (0,0-10,5)	2,9 (0,0-8,5)	3,2 (0,0-7,6)

4.2.10 Time of injury

Table 12 summarises the proportion of reported match injuries by time during match for players, categorised as backs, forwards and all players, taking part in REC 2023.

The highest number of match injuries happened during the second half (56,5%), specific during the 4th quarter (32,3%), followed by the second (30,6%), the third (24,2%) and the first quarter with the smaller number of injuries (12,9%). Also, Forwards suffered more injuries during the second half, meanwhile backs suffered the same in both halves.

Table 12. Proportion of reported match injuries by time during match

Measure	% (95% Confidence interval)		
	Backs	Forwards	All players
First half	50,0 (33,2-66,8)	38,2 (21,9-54,5)	43,5 (26,8-60,2)
First quarter	17,9 (3,7-32,1)	8,8 (0,0-18,3)	12,9 (4,6-21,2)
Second quarter	32,1 (14,8-49,4)	29,4 (14,1-44,7)	30,6 (19,1-42,1)
Second half	50,0 (33,2-66,8)	61,8 (45,5-78,1)	56,5 (39,8-73,2)
Third quarter	25,0 (9,0-41,0)	23,5 (9,2-37,8)	24,2 (13,5-34,9)
Fourth quarter	25,0 (9,0-41,0)	38,2 (21,9-54,5)	32,3 (20,7-43,9)

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