Original articles

The incidence, patterns, associated factors, and burden of knee injuries among under–19 Division A school rugby players in Colombo District, Sri Lanka, during a four-month Division A rugby league tournament.

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Abstract

Introduction: Rugby is a physically demanding full-contact team sport that carries a high risk of musculoskeletal injuries during both match play and training. Knee injuries are among the most typical injuries reported by rugby players globally, accounting for the largest percentage of practice and game days lost (21%), yet there is no data on knee injuries among Sri Lankan school-level rugby players.

Methods: A descriptive cross-sectional study with analytical components was conducted from 1st of October 2025 to 31st of January 2026. The study population comprised all Under-19 A-Division school rugby players from ten Colombo District schools.

Results: Knee injuries recorded 149 (47.0%). The most frequent injury types were meniscal tears (34.9%), collateral ligament sprains (24.2%) and anterior cruciate ligament (ACL) sprains (16.8%). The right knee was most commonly affected (74.5%), and the majority of injuries occurred during the second half of match play (59.1%), predominantly through tackling (33.6%). BMI category showed a statistically significant association with knee injury occurrence (p=0.02), with obese class II players at the highest risk. Playing position, age group, playing experience, and preferred kicking leg were not significantly associated with injury occurrence. All injured players experienced absence from training or matches and from school, both of which are highly significant.

Conclusions: Knee injuries are common within Under-19 A-Division school rugby players in the Colombo District, causing a significant impact on athletic performance and academic performance. Elevated BMI and the tackling phase are important modifiable targets for prevention. A national prospective injury surveillance system and evidence-based knee injury prevention programs are urgently needed for school-level rugby in Sri Lanka.

Keywords: Knee injuries, Rugby union, School-level rugby, Under-19 rugby players, Incidence, Injury patterns

Introduction

Rugby is a team sport that involves physical contact and uses an oval-shaped ball. Kicking, carrying, passing the ball, and running are the main activity domains (1). The school rugby teams have developed a lot during the last 10 years. A rugby game is different from other games. The game is about thirty men getting into contact play, and it is also associated with a lot of injuries. Rugby players get injured during matches and during strenuous practice sessions (1). Due to the involvement of funding and the increase in popularity of school rugby among spectators, the expectations of school authorities, parents and coaching staff increased, and the school rugby league developed into a competitive tournament. Every A – division team is having a dedicated fulltime qualified team physiotherapist, who is managing acute injures, carrying out rehabilitation and keeping records of injuries.

Under-19 "Division-A" school rugby league is played between the top 16 teams of Sri Lankan schools. Among them, ten of the teams are from Colombo district. There are 15 players in each team and additional 30 players participate as replacements during a game, and the game is played with big scrums and tackles, then formation on rucks and mauls (2).

The literature review shows 11.1% to 17.2% incidence of knee injuries in elite rugby players (2). Acute knee injury of greatest impact to the player is the ACL tear. Meniscal injuries are commonly combined with ACL or MCL injuries (3). Importantly, the articular cartilage of knee joint is often damaged in association with meniscal or ligament injuries (2). Dislocation and sprain of joints and ligaments of the knee are categorized under codes S83.0-S83.9 in the ICD-10 (www.ICD10Data.com).

Previous research on professional school rugby leagues in other countries has shown that knee and lower-limb injuries are among the most typical forms of injuries suffered by the player (5). No studies regarding knee injuries have been done in Sri Lankan Under-19 "Division-A" school rugby league. When looking at world rugby, there exists only a sparse data on knee injury subtypes among rugby players (6). The studies conducted in the Australian rugby union have revealed that resulted knee injuries have caused missing training and playing most of the time when compared to other ailments in the body (7).

Rugby backs, who have less body and muscle mass but are more aerobically fit, have a lower BMI than forwards, who have a larger BMI (5). Injury incidence, site, severity, and mechanism of injury are all influenced by variations in playing position (5).

When compared to all other injuries in the body, knee injuries accounted for the highest percentage of days missed from practice and games (21%) (8). This demonstrates the importance of collecting injury monitoring data on knee injuries incurred during school rugby league in order to inform effective prevention and management measures for lowering the risk of knee injuries.

Tackling was responsible for the largest proportion of knee injuries, which was 38%, particularly for ACL and MCL injuries. The rucks and mauls accounted for 17% of injuries. It is widely recognized that ACL injuries pose a significant risk to a player's career and well-being. Of all knee injuries, anterior cruciate ligament tears caused the highest absence rate from athletic competition (29%) followed by medial collateral ligament tears (25%).

Knee injuries most commonly occurred during the final 20 minutes of the second half of the match, according to research done in the English professional rugby union and furthermore 16% of all knee injuries occurred during training sessions (3). Age, body mass, playing experience, playing position, and previous injuries have been identified as risk factors for knee injuries in rugby players during researches done on school rugby league players (8,9).

Understanding the incidence, patterns, associated factors and burden of knee injuries among Under-19 Division-A School Rugby players in the Colombo district of Sri Lanka becomes imperative for ensuring the health and well-being of these young players.

Methodology

The study was a descriptive cross-sectional study with analytical components and conducted over a three month period, starting from 1st October 2025 to 31st January 2026. The study was conducted at school rugby grounds and training venues of A-division Rugby Schools in Colombo District. Each team was composed of forty-five players and there were ten teams within Colombo district playing for Under-19 Division-A Rugby league. All the players of these ten teams were included in the research.

For developing the injury questionnaire (interviewer administered data collection form) for this study, “Factors associated with lower limb injuries in high school rugby players” research injury data collection questionnaire was used and it was modified using “A consensus statement on injury definitions and data collection procedures for studies of injuries in rugby union” (1,11). Judgmental validation was done by an expert committee consisting of a Sports & Exercise Medicine Physician, an orthopaedic surgeon and a rheumatologist. Data was systematically collected by the researcher in the field, utilizing a dedicated injury questionnaire (interviewer administered data collection form).

The data was entered into a datasheet in the Statistical Package of Social Sciences (SPSS version 25) and analyzed. Socio-demographic data, patterns and associated factors were described initially using descriptive statistics. Continuous variable with normal distribution was described using mean and standard deviation. Continuous variable with skewed distribution was described using median and inter quartile range. Discrete variables were described using count, percentage and confidence intervals. The comparison of numerical data was performed using the Student t-test, and the Chi-square test was employed for comparing categorical data.

The significance level for all analyses was set at 0.05. Observational descriptive statistics such as percentages was calculated for type of injuries. The incidence of injury was assessed as the number of injuries per 1000 hours of play time exposure.

Ethical consideration

Since no intervention was implemented, participants in the study face no associated risks. Participants were asked to provide informed written consent after receiving a Participant Information Sheet containing comprehensive details about the procedure. In the case of minors, informed written consent from their parents or guardians were also be taken.

Ethical clearance

Approval from the Ethical Review Committee of the University of Colombo, Sri Lanka, was sought for ethical clearance. Administrative approval was secured from the Ministry of Education, Sri Lanka.

Results

A total of 319 players recruited from ten Under-19 Division-A rugby playing schools. The total exposure per person was 54.14 ± 4.51 hours and the injury incidence per 1000 hours of exposure was 71.50 ± 38.37. With regard to the age group distribution, 87(27.4%) players were aged 16–17 years and 230(72.6%) players were aged 18 years and above. When considering the incidence of knee injuries among Under-19 Division-A rugby players, 149(47.0%) players sustained a knee injury, while no knee injury was recorded in 168(53.0%) players. The body mass index (BMI) had a wide variability and 39(12.4%) players were overweight, 180(57.1%) players were obese (class 1) and a further 96(30.5%) players were found to be obese class II. With regard to the position of playing, 157(49.8%) players were back players and 158(50.2%) players were forward players. With regard to the preferred kicking leg, 247 (78.7%) reported a right leg preference and 67(21.3%) players reported a left leg preference.

With regard to the knee injury type (n=149), 52(34.9%) players had tears of meniscus, 36(24.2%) players had sprain of collateral ligaments and 25(16.8%) players had sprain of anterior cruciate ligament (ACL) (Table 1, Chart 1). Among the study participants, the right knee was the most commonly injured limb, accounting for 111(74.5%) players, while the left knee was affected among 35(23.5%) of players. 22(14.8%) players sustained knee injuries during the first half of the play, 88(59.1%) players sustained knee injuries during the second half of the game and 27(18.1%) players sustained knee injuries during training. Re-injuries were reported by 8(5.4%) players while 141(94.6%) players sustained a new injury. Concerning the mechanism of injury, a contact mechanism was identified in 95(63.8%) players and a non-contact mechanism was identified in 48(32.2%) players.

With regard to the phase of play or aspect of training, 13(8.7%) players sustained knee injuries during scrum, 8(5.4%) players sustained knee injuries during line out and 36(24.2%) players sustained knee injuries during ruck. The burden of knee injuries in terms of absence from training, matches, and school among the study participants varied and overall 150(49.5%) players reported absence. Concerning the number of matches lost, 119(79.9%) players lost 0–3 matches, 24(16.1%) players lost 4–6 matches, and 6(4.0%) players lost 7–9 matches. With regard to absence from school due to knee injury, 147(48.8%) players reported school absence (Table 2, Chart 2).

Among players in the obese class I category, 112(62.2%) players sustained a knee injury, Among players in the obese class II category, 26(27.1%) players sustained a knee injury. The association between BMI and knee injury occurrence was statistically significant, with a positive correlation observed between BMI category and knee injury occurrence.

There was a statistically non-significant association between position of playing and knee injury occurrence among the study participants and 80(51.0%) back players sustained a knee injury whereas 69(43.7%) forward players sustained a knee injury.

The absence from training or matches due to knee injury was reported by all 149(100.0%) injured players. The mean training absence duration among injured players was 27.91 ± 27.82 days. Concerning the number of matches lost among injured players, 119(79.9%) players lost 0–3 matches.

The association between position of playing and knee injury type (ICD-10) was analyzed and tearing of meniscus was seen among 20(38.5%) back players and 32(61.5%) forward players. Sprain of the collateral ligaments of the knee, was experienced by

23(63.9%) back players and 13(36.1%) forward players. 6(24.0%) back players experienced sprain of anterior cruciate ligament of the knee whereas 19(76.0%) forward players experienced the same. The association between position of playing and knee injury type among players was statistically significant (p value = 0.005).

The association between phase of play or aspect of training and knee injury type was analyzed and it was seen that tackling has been associated with occurrence of tear of meniscus in 17(32.7%) players, sprain of collateral ligament in 7(19.4%) players, and sprain of ACL in 15(60.0%) players, all of which were statistically significant (p value = 0.004) (Table 3, Chart 3).

The analysis of association between number of matches lost and knee injury type revealed that 51(98.1%) players with tear of meniscus, 32(88.9%) players with sprain of collateral ligament of knee and 3(12.0%) players with sprain of ACL have lost 0–3 matches. Among study participants, absence of school due to knee injury was reported among 52(100.0%) players with meniscal tears, 36(100.0%) players with collateral ligament sprain and 22(100.0%) players with ACL sprains.

Discussion

This study was carried out to comprehensively evaluate the incidence, patterns, associated factors, and burden of knee injuries among A-Division Under-19 school rugby players in Sri Lanka. The findings provide specific epidemiological evidence for a population that represents the major pathway to elite rugby in Sri Lanka. Nearly half of all players sustained a knee injury during the four-month Division-A rugby league tournament emphasizing that knee injuries continue to be a major health problem in school rugby.

The current study revealed that 47.0% of players sustained at least one knee injury during the tournament, with an injury incidence of 71.5 injuries per 1000 player-hours. This incidence is significantly higher than figures reported from professional rugby cohorts in England, New Zealand and Australia, where knee injury incidence usually ranges between approximately 11 and 20 injuries per 1000 match hours depending on injury definitions and surveillance methods (3).

Several factors may have contributed to this difference. Firstly, this study focused exclusively on knee injuries rather than overall rugby injuries, which may have increased the apparent proportion. Secondly, school players may have lower levels of neuromuscular control, poor tackling technique and physical conditioning compared to professional players (1). The differences in surveillance methodology, exposure calculation and injury definitions, makes it difficult to compare our study directly with international literature.

Interestingly, meniscal tears represented the commonest diagnosis, followed by collateral ligament injuries and ACL injuries. In contrast international studies frequently report ACL injuries as the most severe knee injury because of prolonged absence from competition and high treatment costs, whereas meniscal injuries often occur together with ACL or collateral ligament injuries (2,3,4).

The predominating incidence of meniscal injuries observed in the present study reflects the nature of the biomechanics of rugby. The predisposing factors are rapid pivoting, twisting while bearing weight, rotational forces during tackling and contact with an opponent.

ACL injuries accounted for approximately one-sixth of all knee injuries. Although less frequent than meniscal injuries, ACL injuries contributed the greatest burden in terms of matches missed, emphasizing their major clinical significance.

The predominance of right-sided injuries in this study reveals the fact that nearly 80% of players preferred their right leg for kicking. During tackling or sidestepping, the dominant limb often functions as the plant leg, exposing it to greater rotational loading. However, there is no association between preferred kicking leg with injury occurrence, indicating that limb dominance alone cannot explain the injury risk.

Most injuries occurred during the second half of matches, particularly during tackling situations. These findings are compatible with previous studies in professional rugby confirming that injury rates increase towards the end of games (1,3). There can be several mechanisms which contribute to this observation which includes progressive neuromuscular fatigue which reduces the lower-limb stability, reaction time and proprioception (1).

Tackling was the commonest injury mechanism in the present study which is in keeping with World Rugby injury surveillance studies, which continuously identify tackling as the highest-risk phase of play (9). Tackling accounted for one-third of all injuries and was particularly associated with ACL injuries. This finding supports previous biomechanical studies showing that rapid deceleration, cutting and direct contact during tackles produce excessive rotational forces across the knee (1).

Contact injuries predominated over non-contact injuries in our study. In contrast ACL-specific studies show that many ACL ruptures occur without direct contact. However, our study finding is consistent with rugby which is a collision sport in which overall injury burden is largely contact-related (3).

The only player characteristic significantly associated with knee injury occurrence was Body mass index. Increased BMI increases ground reaction forces and joint loading during running, landing and tackling. Greater body mass also increases momentum during collisions, thereby increasing stress across ligaments, menisci and articular cartilage (3).

Interestingly, highest injury frequency was observed in obesity class I, whereas obesity class II showed lower injury occurrence. Overall association between BMI and injury supports previous studies and it identifies increased body mass as an important risk factor for lower limb injuries (3,4,5).

Playing position also showed no significant association with overall injury occurrence. However, when injury subtype was analyzed, important differences identified. Forward players sustained significantly more meniscal and ACL injuries, while backs experienced more collateral ligament injuries. These findings are biomechanically plausible because forwards are exposed to repeated high-energy collisions during scrums, rucks and tackles, whereas backs frequently sustain valgus injuries during high-speed running and open-field tackles (3,6,8).

The study clearly demonstrates the substantial burden imposed by knee injuries. Every injured player experienced absence from training and competitive matches. The average training absence approached four weeks, while players also missed an average of approximately twenty school days (8).

These findings demonstrate that knee injuries extend beyond athletic participation and significantly affect educational performance. School absence negatively affect academic achievement, psychological well-being and social development, particularly among students preparing for national examinations.

The greatest sporting injury burden is ACL injuries with most players missing four to nine matches averagely. This observation is compatible with international literature identifying ACL injuries as the knee injury associated with the longest rehabilitation period and highest healthcare costs (8).

Knee injuries should be considered not merely sporting injuries but important public health issues affecting adolescent health, education and future sporting careers.

Clinical implications

The findings have important implications for sports medicine practice in Sri Lanka.

Tackling technique should become a major focus of coaching, particularly safe body positioning and lower-limb alignment during contact.

School rugby training should be included structured neuromuscular warm-up programmes, such as adaptations of FIFA 11+ and World Rugby Activate. These programmes have demonstrated significant reductions in lower limb injuries internationally (12).

Monitoring of BMI and individualized conditioning programmes should become regular components of preseason medical screening.

Improved access to early MRI evaluation and specialist sports medicine services may facilitate accurate diagnosis and timely management of ligamentous injuries.

Establishment of a national prospective rugby injury surveillance system would ensure continuous monitoring of injury trends and evaluation of prevention strategies.

Strengths of the study

This study has several important strengths.

It represents the most needed study of knee injuries among Sri Lankan school rugby players.

By including all eligible players from Colombo District A-Division schools selection bias was minimised.

Standard ICD-10 injury classification improved diagnostic consistency.

Objective MRI findings were incorporated whenever available.

Not only injury incidence but also injury patterns, associated factors and burden, providing a comprehensive understanding of knee injuries were evaluated by the study.

Limitations of the study

Several limitations should be acknowledged.

The cross-sectional design prevents causal inference between identified factors and injury occurrence.

Data collection after completion of the season may have introduced recall bias despite verification using medical records.

MRI was performed only in relatively few injured players potentially leading to under-diagnosis of internal derangements.

Only schools from Colombo District were included, limiting national generalizability.

Previous knee injury, playing surface, footwear, muscle strength, neuromuscular control and fatigue were not evaluated which are potential contributing variables.

Finally, injury exposure during matches and training was estimated rather than individually recorded.

Despite these limitations, the study provides valuable baseline evidence for school rugby injury prevention in Sri Lanka.

Conclusion

This study reveals that knee injuries are highly prevalent among Under-19 A-Division school rugby players in the Colombo District, with almost one in two players sustaining a knee injury during a single competitive season. The injury incidence was substantial, confirming that knee injuries constitute a major health concern in school rugby.

Meniscal tears were the most frequent injury, followed by collateral ligament and ACL injuries. Most injuries affected the right knee, which occurred during the second half of matches, resulted from contact mechanisms, and were sustained during tackling. It emphasizes the importance of fatigue and contact situations in injury occurrence.

Body mass index was significantly associated with knee injury occurrence, whereas age, playing experience, playing position and preferred kicking leg were not associated significantly with overall injury risk. However, forwards sustained significantly more ACL and meniscal injuries than back players.

All injured players missed training and competitive matches, and also experienced prolonged absence from school due to knee injuries reflecting the burden of the injury. ACL injuries produced the greatest sporting burden in terms of matches missed.

The urgent need to implement evidence-based injury prevention strategies in Sri Lankan school rugby is highlighted by the above findings, including structured neuromuscular warm-up programmes, tackling technique education, preseason screening, BMI optimization, improved access to sports medicine services, and establishment of a national prospective rugby injury surveillance system. Such interventions have the potential to reduce injury incidence, preserve athletic performance, minimize educational disruption and support the long-term development of young rugby players in Sri Lanka.

Declarations

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Table 01: The knee injury types classified by ICD-10 and affected limb among injured players.

Knee injury type (ICD 10)	**Frequency (%) (n=149)**
Tear of meniscus	52 (34.9)
Sprain of collateral ligament of knee	36 (24.2)
Sprain of anterior cruciate ligament(ACL) of knee	25 (16.8)
Unspecified knee injuries	12 (8.1)
Sprain of other specified parts of knee(other)	8 (5.4)
Subluxation and dislocation of patella	7 (4.7)
Tear of articular cartilage of knee	6 (4.0)
Sprain of posterior cruciate ligament of knee	3 (2.0)

Table 02: Association between burden of knee injuries and knee injury occurrence among study participants

The preferred kicking leg of the players	Knee injury occurrence during rugby training or matches (n=317)		P value
	Injuries (n=149)	No injuries (n=168)	
Absence from training or matches due to knee injury			
Absent	149 (100.0)	1 (0.6)	$\chi 2=299.03$ df=1 $p<0.001$*
Present	0 (0.0)	153 (99.4)	
Number matches lost			
0-3	119 (79.9)	0 (0.0)	-
4-6	24 (16.1)	0 (0.0)	
7-9	6 (4.0)	0 (0.0)	
Absence from school due to knee injury			

Absent	146 (100.0)	1 (0.6)	$\chi 2$=297.02 df=1 p<0.001*
Present	0 (0.0)	154 (99.4)	
Number of days or weeks with absence from school due to knee injury (Mean ± SD) (n=149)	20.09 ± 19.01	-	-

Table 03: Association between phase of play or aspect of training and knee injury type (ICD-10) - Tear of meniscus, Sprain of collateral ligament of knee, Sprain of ACL among study participants.

Phase of play or aspect of training	Knee injury type (ICD 10)			P value
	Tear of meniscus (n=52)	Sprain of collateral ligament of knee (n=36)	Sprain of anterior cruciate ligament of knee (n=25)	
Scrum	10 (19.2)	3 (8.3)	0 (0.0)	$\chi 2$=6.66 df=2 p=0.04
Line out	2 (3.8)	6 (16.7)	0 (0.0)	$\chi 2$=7.76 df=2 p=0.02
Ruck	7 (13.5)	14 (38.9)	4 (16.0)	$\chi 2$=8.68 df=2 p=0.01
Maul	0 (0.0)	0 (0.0)	0 (0.0)	-
Tackle	17 (32.7)	7 (19.4)	15 (60.0)	$\chi 2$=10.88 df=2 p=0.004
Kicking	0 (0.0)	0 (0.0)	0 (0.0)	-
Running	16 (30.8)	6 (16.7)	5 (20.0)	$\chi 2$=2.59 df=2 p=0.27
Other	0 (0.0)	0 (0.0)	1 (4.0)	$\chi 2$=3.55 df=2 p=0.17

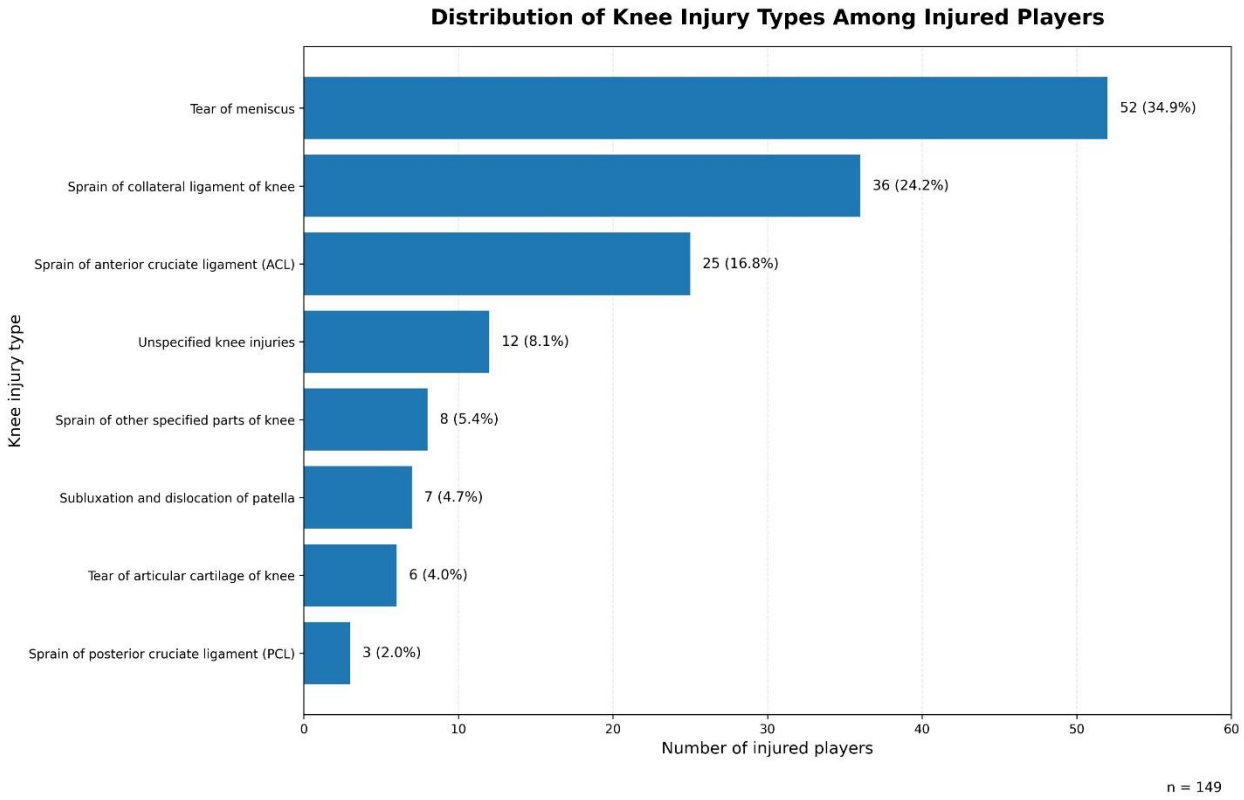
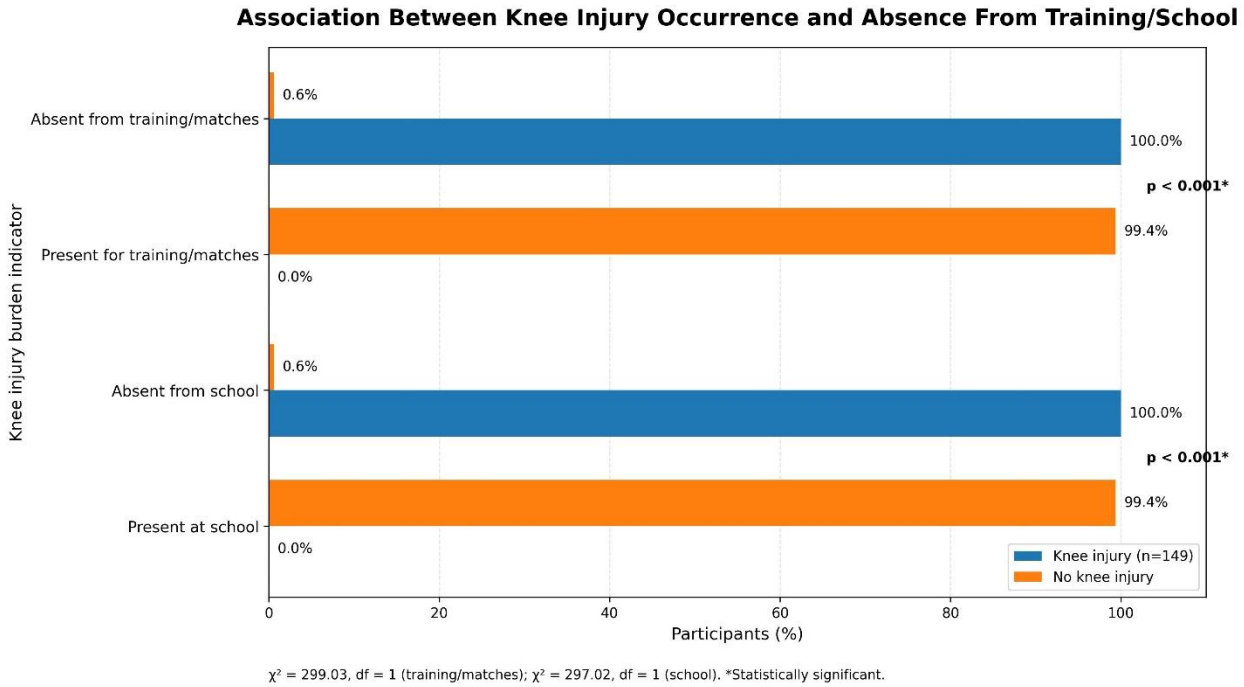


Chart 01: The knee injury types classified by ICD-10 and affected limb among injured players.



χ^2 = 299.03, df = 1 (training/matches); χ^2 = 297.02, df = 1 (school). *Statistically significant.

Chart 02: Association between burden of knee injuries and knee injury occurrence among study participants

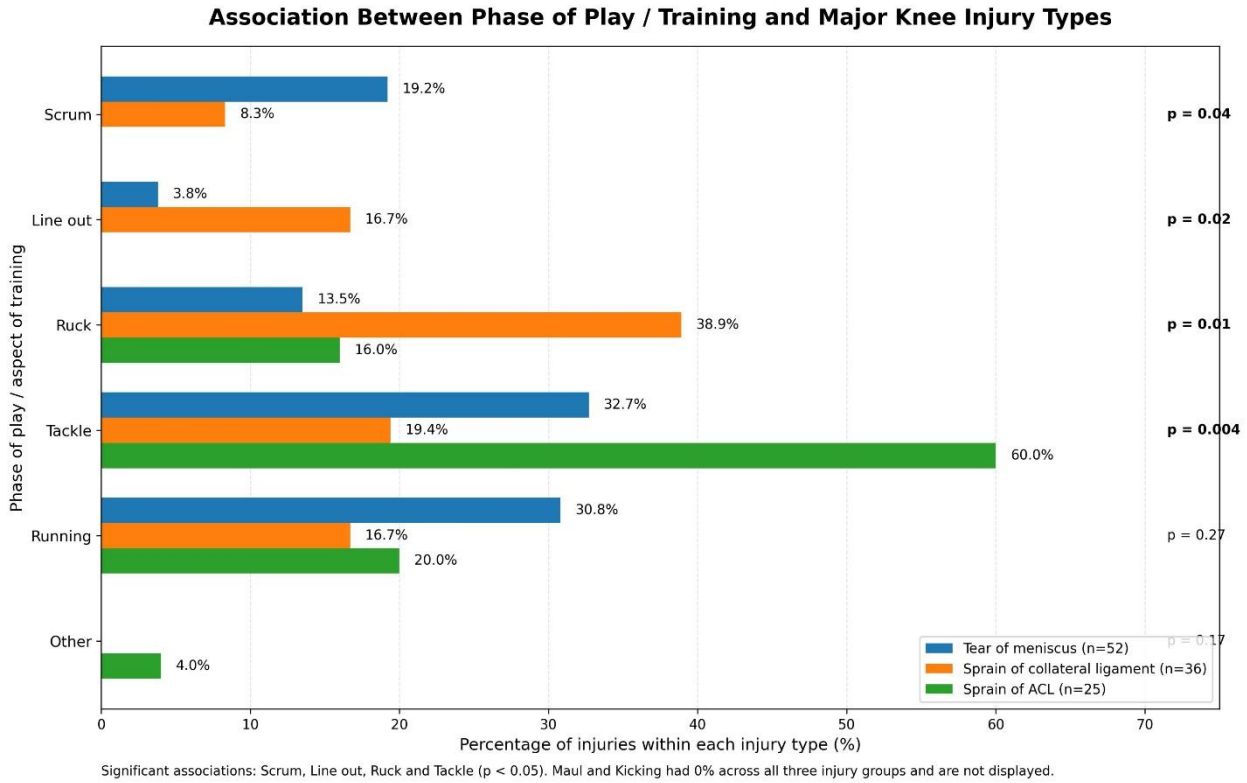


Chart 03: Association between phase of play or aspect of training and knee injury type (ICD-10) - Tear of meniscus, Sprain of collateral ligament of knee, Sprain of ACL among study participants.