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Physical collisions and injury in professional rugby league match-play

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Abstract

Objective: To document the frequency of physical collisions and incidence of contact injury in professional rugby league match-play. *Design*: Prospective cohort study. *Methods*: Video recordings of 77 National Rugby League (NRL) matches were coded for the number and type of physical collisions in which players were involved. Each match was analysed and coded for defensive (i.e. tackles, missed tackles, and ineffective tackles) and attacking collisions (i.e. tackled in possession, broken tackles, offloads, support runs, and decoy runs). Injuries that occurred as a result of a physical collision were also recorded. *Results*: The total number of physical collisions performed per game was greatest in the wide running forwards (47 [95% CI, 42–52]), and was significantly greater ($P < 0.05$) than the hit-up forwards (36 [95% CI, 32–40]), adjustables (29 [95% CI, 26–32]), and outside backs (24 [95% CI, 22–27]) positional groups. A total of 48 collision injuries were sustained, resulting in an overall injury incidence of 10.6 (95% CI, 7.6–13.6) per 10,000 collisions. Injuries resulting from attacking collisions were consistently higher than injuries sustained in defensive collisions. Wide running forwards had the lowest incidence of injury, and the adjustables and outside backs had the highest incidence of injury. *Conclusions*: These results highlight the physical demands associated with collisions and tackles in professional rugby league. Furthermore, the results of this study suggest that playing position and the type of collision sustained have a greater influence over contact injury risk in rugby league than the number of physical collisions performed.

Keywords: Contact sport; Conditioning; Physical demands; Injury rate; Team sport

1. Introduction

Rugby league is a collision sport played in several countries worldwide.[1] The sport has similar rules and movement patterns to rugby union, however, unlike rugby union, rugby league does not have a line-out, involves 13 players per team (rather than 15), and involves an immediate play-the-ball after each tackle.[2,3] A typical senior rugby league match is 80 min in duration, requiring players to compete in a challenging contest, comprising intense bouts of sprinting and tackling, separated by short bouts of lower intensity activity. During the course of a rugby league match, players are exposed to multiple physical collisions and tackles.[4] As a result, musculoskeletal injuries are extremely common.[5,6]

To date, few studies have documented the frequency of collisions in professional rugby league. Early research suggested that rugby league players are involved in 20–40 tackles each match, depending on position played.[7] However, more recently it has been shown that these values may underestimate the actual physical cost of collisions in some positions (e.g. prop, hooker, second row), and overestimate the actual number of collisions in others (e.g. fullback, wing).[4] In a series of studies, Gissane et al.[4,6] coded the number of collisions sustained by a professional rugby league club over one competitive season. The authors coded collisions that occurred both in attack and defence, including tackles and incomplete tackles, and whether the attacking player broke the tackle, offloaded out of the tackle, or was caught in possession of the football. On average, forwards were involved in 55 collisions (39 defensive collisions and 16 attacking collisions), while backs were involved in 29 collisions (16 defensive collisions and 13 attacking collisions). Interest-

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ingly, the incidence of injury was higher in backs, despite their involvement in significantly fewer collisions.[6] While this study provided important information on the contact demands of professional rugby league, and the injury risk associated with these events, the findings of Gissane et al.[4,6] are dated. Indeed, significant rule changes, including the introduction of the limited interchange rule, makes generalizations of these findings to the modern game problematic. Furthermore, no information was provided on the incidental contacts (e.g. support and decoy runs) that occur throughout a game.

It has recently been shown that the number and intensity of collisions performed in rugby league skills training differ significantly among playing positions.[8] Hit-up forwards (i.e. props) and wide running forwards (i.e. second row and lock) reportedly perform more collisions than the adjustables (i.e. hooker, halfback, five-eighth, and fullback) and outside backs (centre and wing) positional groups. However, the incidence of contact injury in the training environment is greatest in the adjustables positional group.[8] This finding may reflect the different physiological and anthropometric characteristics (e.g. strength, body composition), the specific nature of tackles affected, and/or different levels of tackling proficiency among the different playing positions.[9] Indeed, the adjustables are typically required to defend greater spaces, and are often required to tackle larger players (e.g. wide running forwards).

Given the importance of tackling in rugby league,[3,9] the high frequency of tackles and collisions,[4] and that the highest incidence of injury occurs as a result of these physical collisions,[5] information on the contact demands of the game are critical from both an injury prevention, recovery, and performance enhancement perspective. With this in mind, the purpose of this study was threefold. Firstly, we documented the demands associated with high-intensity physical collisions in professional rugby league match-play. Secondly, the incidence of contact injury was investigated. Finally, we investigated the effect of short, medium, and long recovery periods between matches on contact injury rates in these athletes.

2. Methods

Fifty-one professional rugby league players (mean ± SD age, 23.6 ± 3.8 yr) participated in this study. All participants were highly motivated players from the same professional rugby league club and were competing in the elite National Rugby League (NRL) competition. All players were free from injury at the commencement of the study. All participants received a clear explanation of the study, and written consent was obtained. The University of Queensland Ethics Committee for Human Investigation approved all experimental procedures.

Video recordings of 77 NRL matches played over three competitive seasons (2008–2010) were coded for the number and type of physical collisions in which players were involved. The total number of match-play hours was 102.4, which was equivalent to 1331.3 player hours (13 players × 1.33 h × 77 games). Each match was analysed by the principal investigator and classified according to criteria modified from Gissane et al.[4]

The coded defensive statistics included:

1. Tackles – where the defending player(s) halted the progress of the ball carrier, and as a result the ball carrier was required to play the ball;
2. Missed tackles – where the defending player(s) made contact with the ball carrier, but failed to prevent forward progress;
3. Ineffective tackles – where the defending player(s) made contact with the ball carrier, and failed to prevent the attacking player from offloading the ball.

The coded attacking statistics included:

1. Tackled in possession – where the ball carrier was tackled while in possession of the ball, forward progress was halted and the ball carrier was required to play the ball;
2. Broken tackles – where the ball carrier was able to break through the tackle and continue forward progress;
3. Offloads – where the ball carrier made contact with the defender but was able to pass the ball;
4. Support runs – where an attacking player ran in support of the ball carrier, and made contact with a player(s) in the defensive line;
5. Decoy runs – where an attacking player was in a position to receive the ball, but the ball was passed to an alternate player. Only runs where the decoy runner made contact with a player(s) in the defensive line were coded.

The sum of the total defensive (tackles, missed tackles, and ineffective tackles) and attacking involvements (tackled in possession, broken tackles, offloads, support and decoy runs) were used to calculate the total number of physical collisions per game for each player. The intra-observer reliability was assessed by the first author coding 10 randomly selected matches. The intraclass correlation coefficients and typical error of measurement for the coding of attacking and defensive statistics were above 0.80 and below 5.0%, respectively.

Players were assigned to one of four positional groups in accordance with previous research.[8] The four groups included hit-up forwards (props), wide running forwards (second row and locks), adjustables (hookers, halfbacks, five-eighths, and fullbacks), and outside backs (centres and wing).

For the purpose of this study, an injury was defined as any pain or disability suffered by a player during a match that occurred as a result of a physical collision, and resulted in a missed match. All injuries were diagnosed by the club physiotherapist and were classified according to matches missed; minor (1 match missed), moderate (2–4 matches missed), or major (5 or more matches missed).[10]

Differences in the number of collisions performed among playing positions were compared using a one way analysis of