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Causation events of stud laceration injuries in rugby union

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Abstract

Laceration injuries in rugby union account for approximately 6% of all injuries sustained during match play. Commentators often cite the design of studded footwear as a causal factor in laceration injuries. In order to assess the laceration injury risk of different stud designs, there is a need to develop a testing protocol that is able to replicate the laceration injury event. This study used a questionnaire to identify the play scenarios that result in laceration injuries. The questionnaire was answered by 191 rugby players, of which 72% had experienced one or more stud injuries during their career which hindered them playing rugby. Half of the laceration injuries described by the respondents came from the ruck, and 27% from a tackle. When analysing free-text responses, a deliberate stamp was described in 35% of the responses and a tackle from behind was described in 14% of responses. These injury scenarios are considered to be the dominant cause of laceration injuries. In future work the identified injury scenarios will be replicated in simulated play and kinetic and kinematic measurements will be recorded. This will inform test parameters for future assessment of laceration injury risk of stud designs.

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Keywords: rugby; injury causation; stamping; laceration; studded footwear

1. Introduction

Rugby union is a full-contact sport with a high injury prevalence of up to 91 injuries per 1000 match playing hours at the professional level [1]. Studded footwear is often cited as a cause for laceration injuries occurring in field sports. This was highlighted by Hall & Riou (2004) [2] who cited three case studies of severe laceration injuries and suggested that the design of the stud was the causal factor. To help mitigate the risk of laceration injuries in rugby union, stud design is regulated by the governing body, World Rugby. Currently, the testing protocol for studs, as described in the World Rugby standards [3], are recommended but not mandatory for manufacturers to follow. In the World Rugby protocol, studs are to be tested on skin simulant materials (such as silicone rubber) which are known to be loading rate dependent. The protocol uses a stud mounted on a drop hammer to simulate stamping - a perpendicular movement of the foot onto a player on the ground; and a stud mounted on a pendulum to simulate raking - a similar movement which also includes a horizontal component. The protocol's current test parameters are considered to be unreliable as they lack any supporting evidence to justify their selection. There is a need to improve the test protocol with relevant loading conditions. Kinetic and kinematic data need to be obtained for the dominant injurious scenarios; however, these scenarios are currently unknown.

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A preliminary review of injury surveillance studies in rugby union was conducted to evaluate the laceration injury prevalence in the sport. Inclusion criteria were: (1) conducted after 1995, (2) including a skin or laceration injury category, (3) prospective study design, (4) information on player-exposure hours, (5) written in English or Dutch. Eleven studies [1, 4–14] were selected based on the inclusion criteria. The mean overall match injury prevalence found in these 11 studies was 78 injuries per 1000 exposure hours. The laceration injury prevalence was on average 4.7 injuries per 1000 match exposure hours. Laceration injuries are therefore estimated to make up approximately 6% of the laceration injuries sustained during match play. However, these studies failed to report the injury situation in which these laceration injuries occur. This is because injury scenario classifications commonly used, e.g. 'ruck', 'tackle' or 'open play', lack the detailed information needed to replicate injurious scenarios for measuring kinetic and kinematic parameters of stud-player contacts.

To identify injury scenarios which can be replicated in the lab, detailed information on the injury event is needed. This can be obtained through qualitative research, either by prospectively observing and analysing laceration injuries in the field or by retrospectively asking players about their experiences with this type of injury. Prospectively observing injuries is unfeasible due to the relatively low injury prevalence and excessively long time that would be required; it is more effective to analyse injuries retrospectively, particularly when large samples are required. Therefore, this study used a questionnaire approach to identify the dominant play scenarios that resulted in laceration injuries in rugby union.

2. Methods

Ethical approval for this study was obtained from the Health and Wellbeing ethics committee of Sheffield Hallam University. Respondents had to be over 18 years old and give informed consent for their answers to be used for research purposes.

2.1. Questionnaire development

An online questionnaire was developed to investigate the causation of laceration injuries. The questionnaire contained 16 questions, of which 15 were closed and one was open ended. Closed question answer options were developed through exploratory interviews (N = 4) with experienced players. A pilot version of the questionnaire was completed by 12 respondents. The pilot was used to verify the questionnaire on intelligibility and the range of answer options. The pilot version of the questionnaire also included the option to give feedback to the authors at each question.

A final version of the questionnaire was developed in response to the pilot work. Respondents were first asked how often they had experienced stud injuries, including the option to select that they had never received one. Stud injuries were further defined as being 'minor stud injuries' - meaning that it did not hinder the respondent from continuing to play rugby - and 'substantial stud injuries', where a player had to refrain from fully participating in training or matches. If respondents had never received a substantial stud injury, they were still asked to continue with the questionnaire, answering generic questions on their boot type and stud checks. Respondents that had experienced at least one substantial stud laceration injury were invited to answer questions on the cause of their most severe stud injury. First, they were asked to categorise the event into the categories *'being tackled'*, *'tackling someone'*, *'on the ground in a ruck'*, *'stepping over a ruck'*, *'collapsed maul'*, *'I don't remember'* or *'other'*. The respondents were asked to describe the injury event in their own words (open question). Generic questions were answered by all respondents. The generic questions collated information on the use of different stud types through asking players what type of boots they used. Multiple answers were possible since players can have more than one pair of boots for varying pitch conditions or playing positions. The respondents were also asked how often they would check their own studs and if they had ever found their studs sharpened due to wear.

2.2. Questionnaire deployment

Amateur rugby players of any gender were targeted during the distribution of the questionnaire. The final version of the questionnaire was open to receiving respondents from the 9th March 2015 until 14th April 2015. The questionnaire was publicised through various internet platforms such as Facebook and Twitter, blog posts and on rugby discussion forums. The questionnaire was also publicised through contact with university sports teams and by asking rugby clubs to forward the link to their members.

2.3. Questionnaire analysis

Closed question responses were converted to percentages of total responses for the particular question. The open question analysis was an iterative process, based on the thematic analysis approach of Braun and Clarke (2006) [15]. First, the researchers familiarised themselves with the data. Second, the data was loaded into a computer assisted qualitative data analysis software program called NVivo (version 10, QSR International Pty Ltd., Australia). Since analysis of qualitative data in its raw form is likely to be too unmanageable to produce systematic and significant outcomes, data must initially be sorted and categorized [16]. Subsequently, initial themes in the form of 'nodes' were generated and these themes were expanded and refined based on the