

The influence of proprioception, balance and plyometric strength on the occurrence of lower leg injuries in schoolboy rugby players

SUMMARY

Keywords: Lower Leg Injuries; Proprioception; Balance; Plyometric Strength; Schoolboy rugby players.

Background: Rugby injuries are a common phenomenon. The aim of medical professionals is to treat these injuries to the best of their abilities, and if possible, to help prevent their occurrence. Bahr and Holme (2003) argue that sports participation carries with it a risk of injury, with the even more weighty issue that it might later even lead to physical disability. Junge, Cheung, Edwards and Dvorak (2004) recommends the development and implementation of preventative interventions to reduce the rate and severity of injuries in Rugby Union. The Medical and Risk Management Committee of USA Rugby (2003) also reports that the key to preventing injuries in any sport is identifying and addressing the risk factors associated with it. Various studies have identified weakness in plyometric strength, proprioception and balance as causes of lower leg and ankle injuries (Margison, Rowlands, Gleeson and Eston, 2005; Stasinopoulos, 2004; Verhagen, Van der Beek, Twisk, Bahr and Mechelen, 2004; Baltaci & Kohl, 2003; Murphy, Connolly and Beynnon, 2003; Moss, 2002; Anderson).

Aims: The aim of this study was to investigate the influence of proprioception, balance and plyometric strength on the occurrence of lower leg injuries in schoolboy rugby players. A further aim was to develop a preventative training programme to address these variables, should they prove

to have an influence on lower leg injuries. The possible inclusion of these tests in talent identification test batteries will also be examined.

Design: A prospective cohort study.

Subjects: A group of 240 schoolboys in U/14, U/15, U/16 and U/18 age groups in two schools (Hoër Volksskool Potchefstroom (“Volksskool”) and Potchefstroom Boys High School (“Boys High”)) in the North West Province of South Africa was used as the test cohort.

Method: At the beginning of the 2006 rugby season all players were tested for proprioception, balance and plyometric strength. These tests were conducted using a computerised tilt board for proprioceptive testing; Star Excursion Balance Test for Balance and an electronic timing mat for plyometric strength. During the season, weekly injury clinics were held at both schools to document all injuries that occurred following the preceding weekend’s matches. A statistical analysis was done on all the data collected from the test batteries and injury clinics. Descriptive statistics (means, standard deviation, minimum and maximum) were used as well as practical significant differences (d-values) (Cohen, 1988). The ratios for left and right leg plyometric strength to bilateral plyometric strength (L+R/Bil) and individual left and right leg plyometric strength to bilateral plyometric strength (L/Bil and R/Bil) were also calculated.

Results: A profile of proprioception, balance and plyometric strength was compiled for schoolboy rugby players using the test data. The U/18 players generally had the best test results of all the age groups, outperforming U/14, U/15 and U/16 players with most tests. U/15 players outperformed both U/14 and U/16 players. Backline players performed better than loose forwards and forwards in plyometric tests in most age groups. Loose-forwards also outperformed tight-forwards with plyometrics at most age groups. At U/15 and U/16 level, tight-forwards slightly

outperformed loose-forwards with Star Excursion Balance Tests. Generally, A-teams performed better than B-teams with all the tests except L+R/Bil; L/Bil and R/Bil. The difference between the teams, however, only had a small to medium effect and cannot be considered practically significant. At U/14 and U/15 levels, there were more practically significant differences between the A- and B-teams, with A-teams outperforming B-teams. The tests could have some value for talent identification at this age level.

A rugby epidemiological study was done on the data collected in the weekly injury clinics. This study recorded 54 injuries at the two schools involved during the 2006 season from April to July. Two hundred and forty players were involved in 10890 hours of play. Eight thousand nine hundred and ten of these player hours were practices and 1980 were match hours. These injuries occurred at a prevalence rate of 4.96/1000 player hours. Match injuries accounted for 77.78% of all injuries with training sessions resulting in the remaining 22.22% of injuries, with a match injury rate of 1 injury per individual player every 3.14 matches. U/14 players showed an overall match injury rate of 11.11/1000 match hours. U/15 players showed a rate of 2.47/1000 match hours. The low rate may be attributed to underreporting of injuries by the U/15 players. U/16 players showed a rate of 22.33/1000 hours, while U/18 players showed an exceptionally high rate of 45/1000 match hours. The tackle situation was responsible for the highest percentage of injuries (57.14%). Boys High presented with more injuries (57.4%) than Volkskool at a higher prevalence rate (5.60/1000 player hours). In a positional group comparison, backline players presented with 51.85% of injuries. Since backline players only present 46.7% of players in a team, this shows that backline players have a higher risk of injury. A-team players presented with 66.6% of injuries at a prevalence rate of 6.37/1000 player hours. B-team players had an injury rate of 3.43/1000 player hours.

The test values for the players suffering lower leg injuries were compared to those for uninjured players. There were eight players with nine lower leg injuries: one player had injuries of both legs.

Six of the injuries were intrinsic of nature and two players had extrinsic injuries. Test values for all five tested players with intrinsic injuries were weaker by a high practically significant margin for the L+R/Bil ratio.

Conclusion: L+R/Bil proved to be the test result with the most influence on the occurrence of intrinsic lower leg injuries. When the individual test results for the players with intrinsic injuries are compared to the percentiles for all players, it becomes visible that the injured players fall in the 20th percentile for both L+R/Bil and Injured leg/Bil ratios. These 20th percentile values could thus be used as a standard for determining the possible occurrence of intrinsic lower leg injuries. These 20th percentile values are 1.012 for R+L/Bil ratios; 0.483 for L/Bil ratios and 0.492 for R/Bil ratios.

This study shows that plyometric ratios for L+R/Bil, L/Bil and R/Bil have an influence on lower leg injuries in schoolboy rugby players. Proprioception and balance did not have any practically significant effects on the occurrence of these injuries. A preventative training programme was also designed following a study of the literature, combined with these results. The tests could also possibly be integrated in talent identification test batteries at U/14 and U/15 level.