



Original research

Differences in injury risk and characteristics between Dutch amateur and professional soccer players



A.M.C. (Anne-Marie) van Beijsterveldt^{a,b,*}, J.H. Stubbe^{b,c}, S.L. Schmikli^a,
I.G.L. van de Port^a, F.J.G. Backx^a

^a University Medical Centre Utrecht, Department of Rehabilitation, Nursing Science & Sports, Utrecht, The Netherlands

^b Netherlands Organization for Applied Scientific Research (TNO), Leiden, The Netherlands

^c Amsterdam University of Applied Sciences, School of Sports & Nutrition, Amsterdam, The Netherlands

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ABSTRACT

Objectives: To compare the incidence and characteristics of injuries between Dutch amateur and professional male soccer players during one entire competition season.

Design: A prospective two-cohort design.

Methods: During the 2009–2010 season, 456 Dutch male amateur soccer players and 217 professional players were prospectively followed. Information on injuries and individual exposure to all soccer activities were recorded in both cohorts. Injuries were recorded using the time-loss definition.

Results: In total, 424 injuries were recorded among 274 of the amateur players (60.1% injured players) and 286 injuries were sustained by 136 (62.7% injured players) of the professional players ($p = 0.52$). Compared to the professionals, the injury incidence during training sessions was higher among amateurs ($p = 0.01$), but the injury incidence among professionals was higher during matches ($p < 0.001$). Professional players also had a higher incidence of minimal injuries ($p < 0.001$), whereas the incidence of moderate and severe injuries was higher for amateurs (all $p < 0.001$). Lastly, professional players sustained more overuse injuries ($p = 0.02$), whereas amateurs reported more recurrent injuries ($p < 0.001$).

Conclusions: The above-mentioned differences in injury rates between amateur and professional players in the Netherlands might be explained by the difference in the level at which they play, since factors like the availability of medical support and/or the team size may influence the injury risk and characteristics.

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1. Introduction

Soccer is one of the most popular sports worldwide. In the Netherlands, there are more than 1.2 million licensed members of the Royal Netherlands Football Association (KNVB) and 900 of them have been contracted by a professional soccer club (www.knvb.nl). The incidence rate of outdoor injuries in soccer is among the highest of all sports, particularly for adult male players.¹ International studies have observed large differences in the injury incidences. Injury risks range from 2.0 to 44.6 injuries/1000 soccer hours.^{2,3}

Soccer injuries result from a complex interaction of multiple intrinsic and extrinsic risk factors.⁴ There is general consensus that the incidence of injuries is higher during matches than in training

sessions.⁵ However, several studies describing soccer injuries in male players have produced contradictory results with regard to the relation between injuries and the skills levels. The majority of these results have been summarized in two reviews, but the studies included in them have considerable limitations, like small study populations, no exposure registration and only focusing on severe injuries.^{5,6} In addition, since the studies were published before 2006, they did not follow the guidelines of the consensus statement on injury definitions and data collection procedures for such studies by Fuller and colleagues.⁷ The two reviews describe the results of six studies. One showed a higher overall injury incidence at higher levels of play.⁸ Two other studies reported that players competing at higher levels have a higher injury rate during matches and a lower injury rate during training sessions, compared to players at a lower level.^{9,10} One of these studies specifically stated that the total injury incidence was similar between different skills levels.⁹ In contrast, the fourth study concluded that the total injury incidence was significantly different between low-skilled and high-skilled players

* Corresponding author.

E-mail addresses: anne-marie.vanbeijsterveldt@tno.nl,
a.m.c.beijsterveldt@umcutrecht.nl (A.M.C. van Beijsterveldt).

with the former showing a higher overall injury rate. However, specific incidences for matches and training sessions were not different between the two groups.¹¹ The last two studies showed that low-skilled players run a higher risk of suffering (time-loss or severe) injuries than high-skilled players.^{12,13}

Comparing characteristics and risk of injury between soccer players participating at different levels has been difficult due to differences between studies in research populations and methodology. To our knowledge, there have been no studies comparing the epidemiology of soccer injuries in professional and amateur soccer during the same season and using the same study design. Therefore, the aim of this study was to compare the incidences and characteristics of injuries between Dutch amateur and professional male soccer players, using data obtained with one consistent method during an entire competition season.

2. Methods

A prospective two-cohort design was used to study soccer injuries in Dutch male amateur soccer players and male professional soccer players. The data for the amateur cohort were obtained from a cluster-randomized controlled trial (RCT) comparing the injury incidences between an intervention group that used a training program (called “The 11”) during warm-up and a control group training as usual. Teams from two districts in the second highest Dutch amateur soccer league were invited to participate ($n=24$). Although the sample size was sufficient to detect differences, this RCT found that the program had no preventive effect on injury incidence or injury severity among these male amateur soccer players during one season. The trial design, the intervention program, and the results of the trial have been described in detail elsewhere.^{14,15} For the professional cohort, all teams participating in the Dutch premier league were invited to participate ($n=18$). Data on injuries and exposure for both cohorts were collected during the 2009–2010 competition season, from the first to the last regular competition match of the season. The teams in the amateur cohort collected data for 33 weeks, and all teams in the professional cohort for 39 weeks. Both study protocols were approved by the Medical Ethics Committee of the University Medical Center Utrecht (amateur cohort) and by the ethics committee of the Netherlands Organization for Applied Scientific Research (TNO) (professional cohort).

The amateur cohort was comprised of male soccer players, aged between 18 and 40 years. They generally had two or three training sessions (on average 90 min each) and one match each week. For the professional cohort, all male soccer players participating in the Dutch premier league were eligible for inclusion (no age restriction). On average, they had training sessions on 4–5 days of the week and at least one competition match every week. The training sessions consisted of endurance, skills training (both on average 70 min per session), strength, rehabilitation training (both 60 min per session on average) or a combination of these elements. For both cohorts, players who were already injured at the start of the season, as well as players who left the team during the season, were included in the study based on the time they spent on the team. All players of the included teams agreed to participate and provided written informed consent at the start of the study.

During the pre-season period, all amateur and professional players were asked to complete a questionnaire to record baseline characteristics, viz. age, self-reported body height and weight, field position and soccer injuries sustained during the previous year (number and location). During the competition season, data collection included exposure and injury registration. One person within each team was responsible for recording all injuries that occurred during organized soccer activities. In the amateur cohort, this was

done by a team paramedic or sports trainer. In the professional cohort, it was done by a member of the club's medical staff. In both cohorts, the responsible person was present at each of the team's training sessions and matches. All injuries sustained during organized soccer activities were recorded, using the Web-Based Injury System (BIS) developed by TNO.¹⁴ BIS includes all the categories that are needed to enter data according to the basic guidelines of the consensus statement on injury definitions and data collection procedures in soccer.⁷ When a player sustained an injury, he was asked to complete a questionnaire about this injury. This injury form comprised questions to collect epidemiological information on injuries (e.g. type, location, and duration). Following the recovery period, a recovery form had to be completed when the player was once again able to fully take part in soccer training or matches (this decision was made by the coach and/or the (para)medical staff each team). After the end of the season the research team still kept in contact with players who were injured at the end of the season. The self-reported injuries were recorded using the following time-loss definition, in accordance with the consensus statement by Fuller et al.: “any physical complaint sustained by a player resulting from a soccer match or soccer training session, and leading to the player being unable to fully take part in a soccer activity on the day after the injury”. A recurrent injury was defined as: “an injury 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”. An overuse injury refers to an injury caused by repeated micro-trauma without a single, identifiable event responsible for the injury. Injuries were classified according to their severity, based on the number of days of absence from soccer: minimal (1–3 days); mild (4–7 days); moderate (8–28 days); severe (>28 days) or career ending.⁷ Individual player exposure (in minutes) was reported on a weekly basis. The coaches in the amateur cohort recorded the individual exposure to training sessions and matches. The contact person of the professional team recorded the individual exposure to training sessions, while match exposure was provided by ‘Infosftrada Sports’ which is a worldwide provider of comprehensive and reliable sports statistics and sports information services. When a player was not present at a regular training session or match, the reason for his absence was reported on the exposure form as “injured” or “other”. Training exposure was defined as team-based and individual physical activities under the guidance of the team's staff. Match exposure was defined as play between teams from different clubs.⁷

The statistical tests were performed with Microsoft Excel and SPSS 20. Injury incidence per 1000 h of soccer participation (I) was calculated as $I=(n/e) \times 1000$, where n is the number of soccer injuries sustained during the soccer season and e the total exposure time expressed as total hours of soccer participation. The Poisson model was used to obtain 95% confidence intervals (95% CI). Differences between amateur and professional players were assessed using rate ratios¹⁶ and z -statistics for injury incidences,¹⁷ a univariate T -test for the normally distributed continuous parameters (e.g. age and BMI), Mann–Whitney U -test for the continuous variable absenteeism from soccer and χ^2 analysis for categorical parameters (e.g. field position and injury location). The two-sided significance level was set at $p<0.05$. For comparisons within the injury locations and injury types, a Bonferroni correction was used for multiple testing.

3. Results

The final amateur cohort consisted of 456 players from 23 teams (one team declined to participate). The mean team size was 20 (± 2), ranging from 16 to 23 players per team. On average, the amateurs had played soccer for 17.5 (± 4.5) years. Nearly seven out of ten

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