Lower re-injury rate with a coach-controlled rehabilitation program in amateur male soccer: A randomized controlled trial

Martin Hägglund, Markus Waldén and Jan Ekstrand

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Lower re-injury rate with a coach-controlled rehabilitation program in amateur male football – a randomized controlled trial.

Martin Hägglund, BSc, Markus Waldén, MD, and Jan Ekstrand, MD, PhD.

From the Department of Social Medicine and Public Health Science, Linköping University, Linköping, Sweden.

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ABSTRACT

Background: Football injuries are common and players returning to play after injury are especially at risk. Few studies have investigated how to prevent re-injury.

Hypothesis: The rate of re-injury is reduced using a coach-controlled rehabilitation program.

Study Design: Block-randomized controlled trial

Methods: Twenty-four male amateur football teams were randomized into an intervention (n=282) and control group (n=300). The intervention was implemented by team coaches and consisted of information about risk factors for re-injury, rehabilitation principles, and a 10-step progressive rehabilitation program including return to play criteria. During the 2003 season, coaches reported individual exposure and all time loss injuries were evaluated by a doctor and a physiotherapist. Four teams (n=100) withdrew from the study after randomization, leaving 10 teams with 241 players for analysis in both groups.

Results: There were 90 injured players (132 injuries) in the intervention group, and 10 of these (11%) suffered 14 re-injuries during the season. In the control group, 23 of 79 injured players (29%) had 40 recurrences (134 injuries). A Cox regression analysis showed a 66% re-injury risk reduction in the intervention group for all injury locations (Hazard ratio 0.34, 95% CI 0.16-0.72, p=0.0047) and 75% for lower limb injuries (HR 0.25, 95% CI 0.11-0.57, p<0.001). The preventive effect was greatest within the first week of return to play. Injured players in the intervention group complied with the intervention for 90 of 132 injuries (68%).

Conclusion: The re-injury rate in amateur male football players was reduced following a controlled rehabilitation program implemented by coaches.

Key Terms: Soccer, recurrent injury, prevention, rehabilitation

INTRODUCTION

Injuries in football are common but many injuries can be prevented.[10, 21] There are, however, still relatively few studies that evaluate preventive measures for football injuries. In a recent review, Junge & Dvorak[22] identified nine studies on the prevention of football injuries and advocated the need for more well-designed studies that evaluate the effects of specific preventive programs. To our knowledge, only one prospective intervention study has been published since then.[3] There is some evidence that multi-modal intervention programs can reduce injury rate in general; Ekstrand et al.[10] showed a 75% risk reduction in male amateur football players, and Junge et al.[21] reported 21% fewer injuries in amateur youth players. Furthermore, a reduction in overall injury rate was found in female youth players by introducing a pre-season training program.[15] There is also support of the preventive effect of ankle bracing and ankle disc training on the rate of ankle sprains in previously injured ankles[28,30] and of eccentric training on the rate of hamstring injury.[4] Neuromuscular training has in some studies been found to reduce the rate of severe knee injury in female athletes including football players[16] and ACL-injuries in male players[5], while no preventive effects were found on the rate of traumatic lower limb injuries in female players.[29] Finally, in a recent study on the two highest male leagues in Iceland, no effect was found on the rate of football injury from a video-based awareness program.[3]

Previous injury is consistently identified as an important risk factor for injury[2,20] and players are especially at risk just after return to play. Re-injury rates of between 15-30% have been reported for elite football players[18,20,31] and 33% for amateurs[8] when defining re-injury as an identical injury within two months after return to play. Inadequate rehabilitation and premature return to competition are probable risk factors for recurrent injury.[7,10,22,25]

Structured rehabilitation was a part of a multi-modal intervention program in two previous prevention studies[10,21] and this also included return to play decisions by medical personell[10] or weekly visits and supervision of rehabilitation by a physiotherapist.[21]

Medical support at amateur level is very poor or even non-existing; often the rehabilitation of injuries is performed without supervision of medically trained personnel and return to play decisions are made by the team coach together with the player. Our aim was therefore to test a low cost and easy program to prevent re-injury that amateur team coaches could use in the club without close monitoring by medical staff. Our hypothesis was that a coach-controlled intervention program would reduce the rate of recurrent injury.

MATERIAL AND METHODS

Participants and study design

All 24 fourth division male teams (amateur level, sixth highest division, normally 2-3 training sessions/week) in the region of Östergötland, Sweden, were invited to participate in the study. Initially, all teams agreed to participate and were randomized into an intervention and a control group (Figure 1). Randomization was performed by a statistician. Four teams withdrew from the study after randomization and were excluded from the analyses. Twenty teams participated and delivered complete prospective data throughout the 2003 season (January to October). All players in the first team squads were included in the study. Players who joined the squad after the first study month were not included. Twenty-five players (10%) in the intervention and 20 (8%) in the control group left the study for various reasons before the end of the season (Figure 1). Data from these players were included in the analysis for their time of participation (mean intervention 5.8 months; control 5.2 months)

Data collection

Data was collected using three standardized forms previously validated and implemented at elite level[19]:

- *Baseline form:* Player anthropometrics were collected at the start of the study as well as information about previous severe injuries and surgery.
- *Exposure registration form:* Each team coach registered individual exposure data (minutes of participation) during all training sessions and matches for the players included. Exposure forms were sent in on a monthly basis.
- *Injury form:* All injuries were recorded on a standard injury form. Injured players in both groups were encouraged to visit a sports injury clinic, where injuries were examined by a

physiotherapist and an orthopedic surgeon (authors). If a player was unable to visit the clinic for an assessment, one of the authors filled in the injury form based on a structured telephone interview with the player and coach. If an injured player had visited a hospital or other clinic for injury assessment these medical journals were reviewed. The study group was not involved in the rehabilitation of players.

Definitions

Training exposure was defined as participating fully in all parts of a training session under the supervision of the team coach. *Match exposure* was defined as participation in a first or reserve team match against a team from a different club.[12] *Injury* was defined as any physical complaint sustained during football training or match play resulting in the player being unable to participate fully in at least one training session or match.[19] A player was considered injured until the team coach allowed him to participate fully in team training and being available for match selection. Injuries were categorized into four degrees of severity based on the number of days absence: minimal (1-3 days), mild (4-7 days), moderate (8-28 days) and severe (>28 days).[19] A *re-injury* was defined as an injury of the same type and to the same bodily location as an index injury sustained during the study. A re-injury that occurred within 2 months of a player's return to full participation after the index injury was defined as an early recurrence, and one that occurred after 2 months was defined as a late recurrence.[12] Injuries such as contusions, lacerations and concussions and sequelae resulting from an index injury were not recorded as recurrences.[12] Illnesses or injuries that occurred outside scheduled football activity were not included.

Intervention

Team coaches in the intervention group were informed about the intervention program at a meeting prior to study start. The intervention was aimed at preventing re-injury and it was based on the hypothesis that many re-injuries occur because of premature return to play after injury. It consisted of information about risk factors for re-injury, rehabilitation principles, and a 10-step progressive rehabilitation program including return to play criteria. The team coach was responsible for implementation of the intervention program and the decision when to allow return to play. All intervention team coaches signed a contract not to reveal the content of the prevention program to other clubs.

The 10-step rehabilitation program was intended to serve as a guide for the coaches with structured assessment during the functional rehabilitation of players and to assist in return to play decisions. It was designed primarily for lower extremity injuries but coaches were instructed to use the program for all injuries. The program was introduced to injured players when they were able to walk without limping and without pain. The program contained various exercises with a gradually increased load on the injured limb (Figure 2). Progress through the program was allowed when the player was able to comply with the exercises without pain and swelling at the injured site. If a player experienced pain or swelling he returned to the previous symptom-free level and resumed the progress at a later session. No specific time limit or number of repetitions were set for the progress, but coaches were instructed to evaluate symptoms both when exercises were performed as well as the day after. Steps 1-6 in the program were individual exercises performed without a ball. This included various turning and cutting manoeuvres (in both directions) starting at a slow pace and then with increasing speed. When the player had completed steps 1-6 at full speed, individual skill training with a ball was introduced (step 7). In step 8, more match-like components, e.g. shooting (stationary and moving ball), jumping (e.g. heading) and sprinting (varying

directions, with a ball), were introduced, initially as individual exercises and then with team mates (no contact allowed). In step 9, full team training was commenced and tackling allowed. The final step was return to competitive play, and an injured player was not eligible for first team selection until he had been able to fully participate in team training without pain and swelling at the injured body site. The required number of pre-match training sessions varied based on the severity of the injury (Figure 2).

Compliance

Compliance with the intervention programme was partly evaluated through review of the monthly exposure forms and by examining the number of training sessions a player fully participated in before returning to play after injury.

Blinding

It was not possible to blind coaches or players to their team's allocation to intervention or control group since coaches were responsible for implementing the intervention program. The primary author was not blinded to team allocation, but the orthopedic surgeon responsible for injury assessment was blinded to team allocation.

Control group

Coaches in the control group were informed that they participated in a study of injury risk and injury pattern in football and were instructed to go on with training and management of injuries as usual. No information about management of injuries or return to play was given to coaches in the control group.

Sample size

It can be estimated that about 20% of injured players suffer a recurrence during the same season.[8, 20] Therefore, to achieve 90% power with $\alpha = 5\%$ approximately 220 players were needed in each group to detect a 50% reduction in risk.

Statistical methods

The primary outcome was re-injury. A Cox proportional hazards model was used to compare the risk for re-injury (for all injuries and lower limb injuries separately) between groups. A player was included in the model when he sustained his first injury. The exposure time to a recurrence of injury (uncensored event) or to the end of follow-up (censored) was the main variable. Player age and diagnostic method (clinical assessment or telephone interview) was checked for interaction. In addition, logistic regression analysis was performed to evaluate the risk for suffering a re-injury within various time periods after return to play (≤1 week, ≤4 weeks, ≤2 months and within season). Analysis was performed according to the intention-to-treat principle. Injury incidences (training and match, re-injury) were compared between groups using z-statistics.[24] Injury incidence was calculated as the number of injuries per 1000 player hours and presented with 95% confidence intervals ["incidence / ($e^{(1.96\times\sqrt{(1/injuries.)}}$" to "incidence × ($e^{(1.96\times\sqrt{(1/injuries)}}$"]. Anthropometrics, weekly exposure, squad sizes, number of re-injuries and the number of training sessions before return to play after injury were compared between groups with a Mann-Whitney U-test because of a non-normal distribution. Qualitative variables were compared between groups with the χ^2 test.

The study was approved by the Ethics Committee of the University of Linköping, Sweden (Dnr 02-316)

RESULTS

Exposure and injury incidence

In total, 18244 training hours and 6851 match hours were documented in the intervention group and 19246 and 6644 training and match hours in the control group. The weekly number of training sessions and matches did not differ between groups (Table 1). Ninety players (37%) in the intervention group incurred 132 injuries during the season, and 79 players (33%) in the control group suffered 134 injuries. Sixty-six of the 132 (50%) injuries in the intervention group and 75 of 134 (56%) injuries in the control group were assessed clinically by the authors (remaining injuries assessed via telephone interview). The injury incidences did not differ between the intervention and control groups, being 3.3 (95% CI 2.6-4.2) vs 2.7 (2.1-3.5) injuries/1000 training hours ($p>0.05$) and 10.5 (8.3-13.2) vs 12.3 (9.9-15.3) injuries /1000 match hours ($p>0.05$).

Recurrent injuries

Injury pattern

Eleven per cent (14 of 132) of the injuries in the intervention group and 30% (40 of 134) in the control group were recurrent injuries ($p<0.001$). Teams in the intervention group had 1.4 ± 1.6 (range 0-5) recurrent injuries per team on average compared to 4.0 ± 2.5 (range 1-9) in the control group ($p=0.014$) (Figure 3). In the control group, re-injuries occurred most frequently during match play, while the proportion of training and match recurrences was similar in the intervention group (Table 2). Muscle strains, tendon injuries and overuse complaints accounted for 85% of all recurrences, and only five recurrent injuries were ligament sprains. Nine of 115 (8%) lower limb injuries in the intervention group and 39 of 117 (33%) in the control group were recurrences ($p<0.001$) (Table 2). The majority of the recurrent injuries

(93%) were early recurrences, with 44% of re-injuries occurring within the first week, and 80% within the first 4 weeks (Figure 4).

Risk for re-injury

Ten of the 90 players (11%) in the intervention group that were injured had at least one re-injury during the season (eight players n=1; one player n=2; and one player n=4) and in the control group 23 of 79 injured players (29%) suffered a recurrence ($p<0.01$) (twelve players n=1; seven players n=2; two players n=3; and two players n=4). There were 6120 hours of exposure recorded post-injury for the 90 players in the intervention group and 4970 hours for the 79 players in the control group. The incidence of re-injury was 2.3/1000 hours (95% CI 1.4-3.9) in the intervention group and 8.0/1000 hours (5.9-11.0) in the control group ($p<0.001$). The Cox regression analysis showed a 66% re-injury risk reduction in the intervention group compared to the control group when all injury locations were considered (hazard ratio 0.34, 95% CI 0.16-0.72, p=0.0047). Analysis with only lower limb injuries showed a 75% lower risk of re-injury in the intervention group (hazard ratio 0.25, 95% CI 0.11-0.57, $p<0.001$). The relative risk of re-injury was adjusted for diagnostic method (clinical investigation or telephone interview) and player age, but none of these variables changed the relative risk in the Cox regression analysis. Univariate logistic regression showed that the preventive effect in the intervention group was greatest within the first week of return to play (Table 3).

Compliance

Injured players in the intervention group followed the recommended number of training sessions before return to play for 90 of 132 injuries (68%). All three recurrences within one week of return to play resulted from not following the intervention. The median number of

training sessions before return to play was higher in the intervention group than the control group, being for minimal injuries 1.5 vs 1 (p=0.73), for mild injuries 2 vs 1 (p=0.022), for moderate injuries 3 vs 2 (p=0.022) and for severe injuries 4 vs 2 training sessions (p=0.021).

DISCUSSION

The principal finding of this study was that the coach-controlled intervention program was effective in reducing the re-injury rate for male amateur football players. The preventive effect was most apparent within the first week of return to play after injury.

Effect of the intervention program

Overall injury incidence

The injury incidences observed during training and match play in our study is somewhat lower than that reported in a previous study at amateur level in Sweden (7.6/1000 training hours and 16.9/1000 match hours).[9] In that study, only the 15 best players in each squad were selected for participation which might explain this slight discrepancy. Even though it is disappointing that the overall injury incidence was not reduced in the intervention group in our study, this may have several explanations. First, the coaches in the intervention group may have been more aware of players' injuries due to the extra attention given to the intervention group. Second, a part of the intervention program was that coaches were encouraged to be more aware of symptoms such as pain and swelling during the rehabilitation of injured players. It is plausible that this also led to generally increased awareness of complaints with players resting from team training as a safety precaution.

Risk for recurrence

Overall, we found a 66% reduction in the re-injury risk for players in the intervention teams. The re-injury rate in the control group in our study is comparable with previously reported early recurrence rates for male amateurs (33%)[8] and elite players (15-30%).[18,20,31] Similar rates have also been found in many other studies, defining recurrence as a repeat of a previous injury ever in the career (22-42%).[1,13,26] Only Hawkins et al.[14] reported as low recurrence

rates as that found in the intervention group in our study. Ekstrand et al.[10] reported no re-injury at all in the intervention group following a multi-modal prevention program including structured rehabilitation, but their intervention also included that return to play decisions were made by medical personnel.

In the present study, the greatest preventive effect was seen within the first week of return to play. Here, the intervention group had an almost 90% reduction in re-injury risk; only three recurrent injuries occurred within one week of return to play in the intervention group compared to 21 in the control group. In addition, all three recurrences within one week in the intervention group resulted from not following the intervention program. Thus, avoiding early recurrences due to premature return to play probably was an important component of the intervention.

The injury risk during match play is generally 4 to 6 times higher than during training[22], probably due to higher intensity of play and more contact situations. It thus seems hazardous to expose a player to competitive match play before having fully completed training with the team. The finding that 29 of 40 recurrences in the control group occurred during match play compared to only 6 of 14 re-injuries in the intervention group seems to support this. Our data also showed that the mean number of training sessions before return to competition was higher in the intervention group than in the control group. This indicates that the part of the intervention where match play was allowed only after having completed full team training was also important for preventing re-injury. It certainly makes sense that a player who cannot complete team training without symptoms should not be allowed to participate in match play as this will increase the risk of re-injury.

The 10-step rehabilitation program was designed primarily for lower limb injuries and a 75% re-injury risk reduction was also observed for injuries to the lower extremities. No recurrences to the head, neck or upper extremities were seen in either group. There were more recurrences to the lower back in the intervention group (5 vs. 1), but four of these recurrences were repeat absences for one player with lumbar spondylolisthesis.

Due to the limited number of injuries it was not possible to test the effect of the prevention program specifically for acute and overuse injuries, but re-injury rates were consistently lower in the intervention group for all injury types. Many of the components in the 10-step program (e.g. twisting and cutting manoeuvres, shooting, jumping and sprinting in various directions) were adapted mainly for acute injuries such as ligament sprains and muscle strains. However, the standardized progression and gradually increased loading through the program probably gave players sufficient time to recover and evaluate symptoms also from various overuse injuries. Many overuse complaints are mild in nature and players may otherwise be tempted to return at a premature stage. Indeed, there were no recurrences among tendon injuries and overuse complaints in the intervention group in our study.

Muscle strain injuries accounted 43% of all recurrences in the present study. Approximately one fifth of all muscle strains in the intervention group were re-injuries compared to 48% of the strains in the control group. The frequency of recurrent muscle strains in the control group is comparable to previous studies (muscle strain recurrence 29-46%; hamstring 12-43%; groin strain 31-50%).[1,6,13,32] A previous study indicated that rehabilitation time itself is not a predictor of recurrence of acute hamstring strain[27], so it is possible that the 10-step program offered a structured way of assessing symptoms through functional rehabilitation, thereby avoiding premature return to play.

The frequency of recurrent ligament sprains in our study was lower than that reported previously (ligament sprains 32-58%; ankle sprains 62-69%; knee sprains 30-40%).[1,13] There was only one recurrent sprain (ankle sprain) in the intervention group. One can thus speculate that the exercises included in the program were decisive in that progress was delayed until sufficient functional restoration after a ligament injury had been achieved. The frequency of recurrent sprains in the control group (14%) was also low and one reason for this could be that taping/bracing of sprained ankles together with proprioceptive training is routinely used in Swedish football for secondary prevention of recurrence, even at amateur level.

It is unclear whether the information regarding risk factors for re-injury given to coaches prior to study start contributed to the lower re-injury rate. Results from a previous study showed that information about common mechanisms of acute injuries did not have any effect on the rate of injury.[3] Even though the intervention in that study was different from ours it could indicate that education alone is not sufficient to get the desired effect.

It is commonly recognized that premature return to play increases the risk for re-injury,[7,10,17,22,23,25] probably due to incomplete tissue healing or because functional skill and endurance properties are not restored. At the elite level post-injury functional testing is therefore often performed to confirm that a player is fully recovered from injury and able to return to competitive play.[17] Still, few studies have documented the effects of structured rehabilitation in a football population. In a recent study, Fuller & Walker[11] evaluated a structured, quantified rehabilitation program and suggested that it could be valuable in helping management's return to play decisions for injured players. Their program was based on various fitness and skill exercises with subjective graded assessment of performance and

where each player's benchmark performance in the exercises were used for comparison with their performance during functional rehabilitation. The comprehensive program was tested in a professional football club where injured players trained during rehabilitation for an average of 4 hours a day with one physiotherapist especially assigned for each injured player.[11]

However, close monitoring of therapists and daily assessment of players is impossible to achieve in amateur football clubs where medical support is little or non-existent. For this reason a low cost and easy program that could be used as assistance for coaches in the assessment of functional rehabilitation and in return to play decisions was tested in our study. Compliance with the program was acceptable, indicating it was suitable for coaches to use at amateur club level. The most common reasons for not adhering to the intervention program was that the squad was small or that the player or the game was too important to not select the player for the game. The results show that the rate of recurrent injury in the intervention group was significantly reduced and we thus recommend its use in lower levels of football.

Methodological considerations

A few methodological issues in our study need to be addressed. First of all, due to the limited study size no subanalysis on the risk for recurrence of specific injury types was possible. Another limitation to the study was that not all injuries were examined clinically. The most common reasons for players not attending the sports injury clinic for examination were that the injury seemed too slight, that the player had already visited another doctor or physiotherapist, or that he did not want to make the journey to the clinic. Unfortunately, we were not able to visit clubs to assess injured players, and instead the primary author conducted telephone interviews with the injured players and team coaches. A third issue is that the primary author was not blinded to team allocation, and this is another weakness of the study

design. However, since the study group did not give advice on rehabilitation and was not in any way involved in return to play decisions in the clubs it is believed that any effect of non-blinding on the recurrence rate was minimal. Furthermore, we saw no interaction between diagnostic method and the risk for recurrence between groups. Another possible weakness of our study design is that we have no record of how injuries were managed in the clubs. There is, however, no obvious reason to suspect a skewed access to medical assistance between teams in the intervention and control groups. Finally, since teams had activities (training or match) every other day on average, there is a risk that we missed some minimal injuries with the current injury definition used. In a recent consensus agreement, it was proposed that time loss injuries should be defined as absence from future participation in training or match play regardless of whether or not a training session or match is scheduled the day after injury.[12] However, this requires a difficult judgment to be made as to whether a player should be able to play the day after an injury or not, and the suitability of such judgement may be poor at amateur level without medical support. A team coach, however, is not likely to miss that a player is absent from a training session or match because of injury.

Conclusions

In conclusion, this study showed that the risk for recurrent injury in amateur football clubs was reduced by using a low cost and easy coach-controlled rehabilitation program. Teams in the intervention group had very few recurrences within the first week of return to play, indicating that many re-injuries that occur simply due to premature return to competition were avoided. Since medical availability at amateur level football is low our rehabilitation program was designed to assist team coaches to assess progress through functional rehabilitation and to help in return to play decisions. Based on the current findings, we recommend its use in grassroots and lower levels of football.

Acknowledgements

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Table 1. Anthropometrics and team statistics for amateur football players.

	Intervention (n=241)		Control (n=241)		
	Mean (SD)	Range	Mean (SD)	Range	P-value
Anthropometrics					
Age (years)	24 (6)	15-42	24 (5)	15-46	0.85
Stature (cm)	180 (6)	160-197	180 (6)	168-196	0.70
Body mass (kg)	77 (9)	54-114	77 (8)	62-110	0.89
Weekly activities					
Training sessions	2.4 (0.3)	1.9-3.0	2.5 (0.3)	2.0-2.9	0.38
Matches	1.0 (0.1)	0.7-1.1	0.9 (0.1)	0.8-1.0	0.089
Total activities	3.3 (0.4)	2.8-4.1	3.4 (0.3)	2.7-3.9	0.85
Team data					
Squad size	24 (4)	17-30	24 (5)	15-31	0.97

Table 2. Injury pattern in intervention and control groups**.** Values within brackets show percentage of re-injuries of total injuries within each category.

	Intervention (n=241)		Control (n=241)	
	No re-injury	Re-injury	No re-injury	Re-injury
Activity				
Total injuries	118	14 (11)	94	40 (30)
Training injuries	52	8 (13)	41	11 (21)
Match injuries	66	6 (8)	53	29 (35)
Injury severity				
Minimal	11	1 (8)	15	3 (17)
Mild	28	4 (13)	20	12 (38)
Moderate	48	6 (11)	37	18 (33)
Severe	31	3 (9)	22	7 (24)
Injury location				
Head & neck	1		4	
Upper limbs	2		3	
Trunk	9	5 (36)	9	1 (10)
Hip/groin	10	1 (9)	7	5 (42)
Thigh	24	6 (20)	6	5 (45)
Knee	29		28	14 (33)
Lower leg/Achilles	12	1 (8)	12	8 (40)
Ankle	18	1 (5)	16	6 (27)
Foot/toe	13		9	1 (10)
Injury type				
Fracture	4		1	
Dislocation	1		1	
Sprain/ligament	26	1 (4)	24	4 (14)
- Knee MCL	3		4	2
- Ankle	18	1	9	2
Meniscus/cartilage	3			
Muscle injury/strain	35	8 (19)	16	15 (48)
- Hamstrings	13	3	6	5
- Quadriceps	11	3		
- Groin	9	1	6	5
- Calf	2	1	4	5
Tendon injury	8		9	7 (44)
- Patella			2	3
- Achilles	4		1	1
- Ankle/foot	1		4	3
Haematoma/contusion	21		17	
Laceration	1		1	
Concussion	1		2	
Synovitis/effusion	5		6	3 (33)
- Knee	5		2	1
- Ankle			3	2
Overuse unspecified	9	5 (36)	12	11 (48)
- Lower back	3	5	6	1
- Patellofemoral joint	2		6	8
- Lower leg	3		2	2
Other type	4		5	

Table 3. Risk for re-injury for injured players in the intervention (n=90) versus control group (n=79). Table shows number (n) and percentage (%) of players within each group that suffered a re-injury, and odds ratios (OR) with 95% confidence intervals and p-values from the univariate logistic regression analysis.

	Intervention		Control				
	n	(%)	n	(%)	OR	(95% CI)	P
Re-injury within 1 week	2	(2)	14	(18)	0.11	(0.02-0.48)	0.0036
Re-injury within 4 weeks	7	(8)	20	(25)	0.25	(0.01-0.63)	0.0031
Re-injury within 2 months	9	(10)	22	(28)	0.29	(0.12-0.67)	0.0039
Re-injury within season	10	(11)	23	(29)	0.30	(0.13-0.69)	0.0043

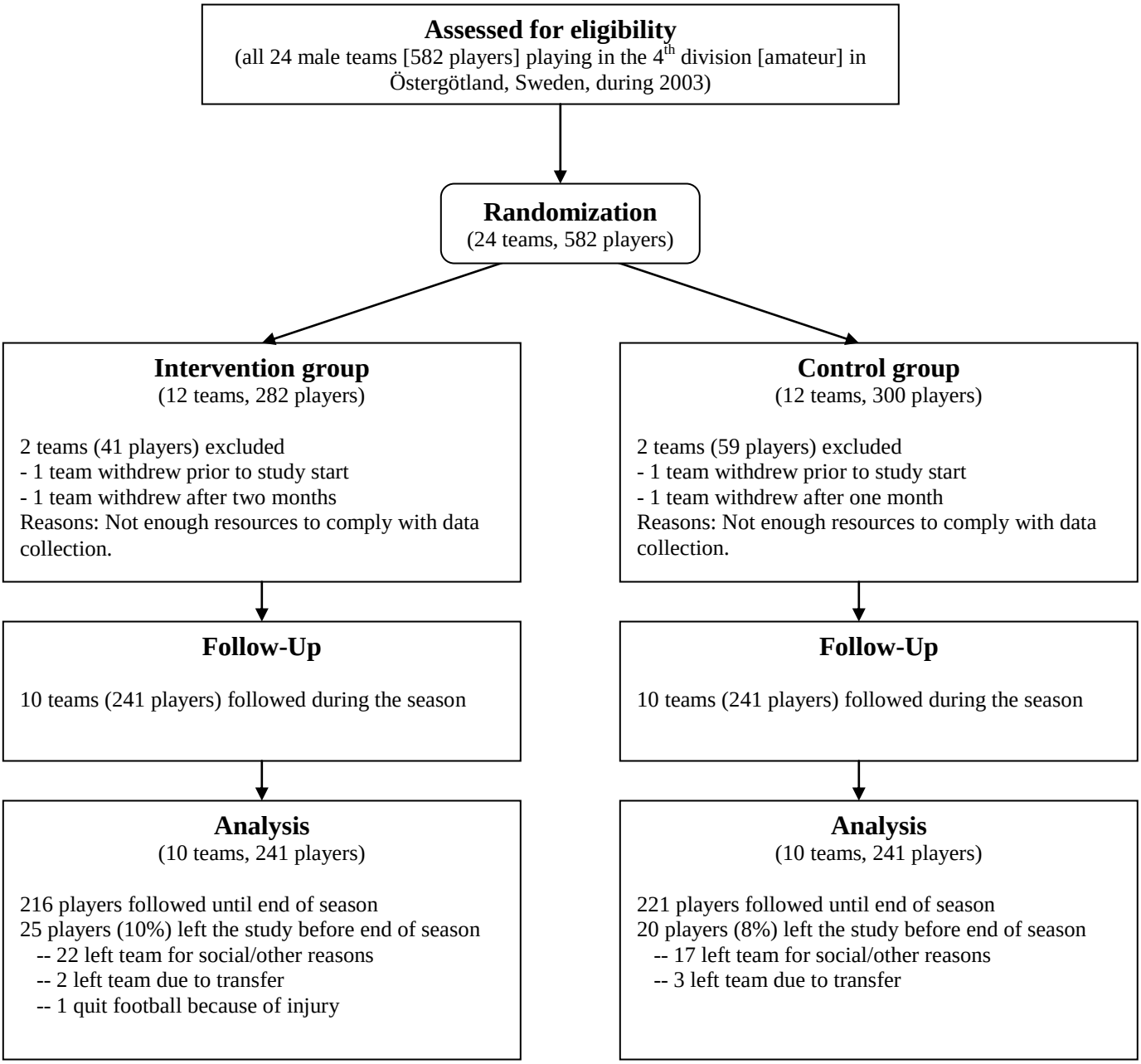

Figure 1. Flowchart of randomized controlled trial in amateur football.