

# Football injuries – surveillance, incidence and prevention

**Football is the game played by more participants internationally than any other at all levels.**

**DEMITRI CONSTANTINOU, MB BCH, BSc (Med) Hons, FFIMS**

**Adjunct Professor: Sports and Exercise Medicine, Centre for Exercise Science and Sports Medicine and FIFA Medical Centre of Excellence, School of Therapeutic Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg**

*Demetri Constantinou completed his medical degree at the University of the Witwatersrand (Wits) and postgraduate qualifications in sport science at UCT. He is a Fellow of the International Sports Medicine Federation and is actively involved in teaching and research. He is a past Board member of the South African Institute for Drug Free Sport and current Chairperson of its Therapeutic Use Exemption Committee (TUEC). He is also vice-chairperson of the International Cricket Council's TUEC. He is a member of the International Sports Medicine Federation's Education Commission.*

*He has been awarded Life Membership of the South African Sports Medicine Association and is a member of the American College of Sports Medicine. He was Venue Medical Officer for Ellis Park for the FIFA Confederations Cup in 2009 and has also been appointed to this position for the 2010 FIFA World Cup South Africa.*

*Correspondence to: D Constantinou (demetri.constantinou@wits.ac.za)*

The FIFA World Cup is an enormous event unlike any other sporting event, and attracts hundreds of millions of television viewers around the world. The player participants are as much sports stars as they are entertainers, and their wellbeing is paramount to them, as it is to their fans and to football officials. From a player point of view, at whatever level of play, be it at school or as a highly paid professional, avoiding and reducing injury severity is very

important. An understanding of injury incidence, mechanisms of injury and prevention strategies is therefore essential to achieve that outcome.

The sporting code that has proactively been at the forefront of systematically maintaining records of injuries, and promoting research in the field, is football, through the code's Fédération Internationale de Football Association (FIFA). Research by

**Table I. Incidence of football injuries in different countries<sup>1</sup>**

Country	Level of play	Injuries per 1000 game hours	Injuries per 1000 training hours
<b>MALES</b>			
Iceland	National elite, first league	24.6	2.1
Sweden	Sr. National team	30.3	6.5
Sweden	National top division	25.9	5.2
US	MLS professionals	35.5	2.9
UK	Premier League, 1st and 2nd division	25.9	3.4
Finland	Highest national league	25.9	3.4
Sweden	1st division	21.8	4.6
	2nd division	18.7	5.1
	3rd division	16.9	7.6
	6th division	14.6	7.5
Denmark	2nd division (high)	18.5	2.3
	Series (low)	11.9	5.6
<b>FEMALES</b>			
Sweden	Senior players, various skill levels	14.3	3.7
Sweden	Premier, 2nd division	24	7
<b>YOUTH (&lt;18y)</b>			
New Zealand	Schoolboy	16.2	3.7
Switzerland	High level males	18.7	4.1
	Low level males	21.7	8.2
Denmark	Male youth	14.4	3.6

Table II. Exposure time and average number of injuries in different age and skill-level groups<sup>1</sup>

	Adult players				Youth 16-18y		Youth 14-16y	
	Top	3rd league	Amateur	Local	High level	Low level	High level	Low level
Training hours	307.4	337.1	184.3	133.8	267.7	148.5	249.9	135.6
Game hours	51.3	60.2	46.3	54.7	55.4	40.6	51.4	32.2
Training /game ratio	6.0	5.6	4.0	2.4	4.8	3.7	4.9	4.2
<b>Injury per player</b>								
<b>TOTAL</b>	2.0	1.8	2.1	3.8	2.2	2.6	1.8	1.9
Mild	.86	.71	.94	2.25	1.23	1.59	1.03	.87
Moderate	.95	.68	.59	1.23	.78	.55	.53	.59
Severe	.19	.45	.53	.44	.22	.45	.24	.48

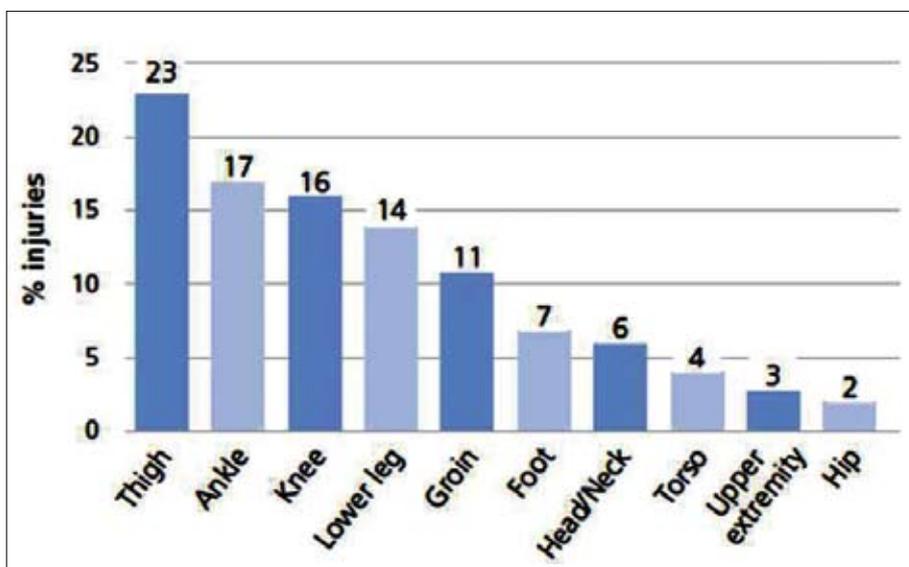


Fig. 1. Injury distribution of football injuries by location.<sup>3</sup>

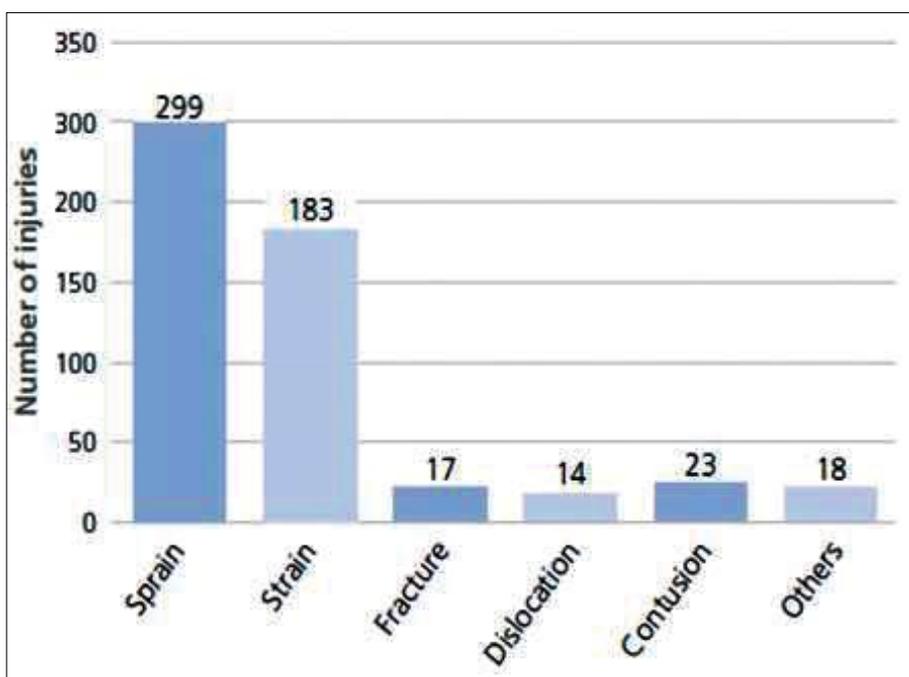


Fig. 2. Injury distribution of football injuries by type.<sup>3</sup>

F-MARC (FIFA Medical Assessment and Research Centre) has been extensive, and has included epidemiological studies since 1994, with a recent FIFA publication summarising these results.<sup>1</sup>

These studies have included over 50 publications in peer-reviewed journals, and this work is continuing internationally. The aims of these studies have been to document the incidence of injuries, to assess aetiological factors and to identify risk factors for injuries. A further ongoing important objective is to assess the effectiveness of injury prevention programmes.

**In adult football there is broad evidence that a previous injury represents an important risk factor for another injury.**

‘Prevention should always be our priority and it is even more important when treatment possibilities are restricted. The new F-MARC, *The 11+ – a complete programme to prevent injuries*, has proved successful in reducing injuries in general by a third and severe injuries by half. I feel it is not only more important, but might prove to be even more effective in African players’ (Professor Jiri Dvorak, MD, FIFA Chief Medical Officer and Chairman of the FIFA Medical Assessment and Research Centre, F-MARC).

## Incidence of injuries

The incidence of football injuries in different countries is listed in Table I. Irrespective of the different definitions of injury used in the literature, it is believed that the risk of injury in football is high compared with other sports.<sup>2,4</sup> In general, the risk of injuries in football varies according to the definition of injury, the research design<sup>5</sup> and a number of characteristics of players,<sup>6</sup> such as age<sup>7</sup> and skill with respect to level of play.<sup>8</sup> Professional adult football players have a risk of injuries that is incomparably higher than that observed in employees in most other occupations.<sup>9</sup>

The injury incidence in adult male players ranges from 12 to 35 injuries per 1 000 hours of match play and 1.5 - 7.6 injuries per 1 000 hours of exposure.<sup>10</sup> On average every elite male football player incurs approximately 1 performance-limiting injury each year.<sup>11</sup> The incidence of match injuries is on average 3 - 6 times higher than the incidence of injuries during training.<sup>11,12</sup> Data on injury incidence and risk factors in youth and adolescent players are scarce and inconsistent. An earlier study found that male senior players sustain more injuries than youth players, based on incidence of football injuries per 1 000 hours of match play.<sup>12</sup> A review of epidemiological data in 2005 classified youth football as a relatively safe sport with an injury incidence ranging from 2.3 per 1 000 practice hours to 14.8 per 1 000 match hours.<sup>13</sup> A Swedish study of 1 800 players aged 13 - 16 years recorded injury rates of 2.4 - 6.8 injuries per 1 000 playing hours and concluded on a low injury rate in football, recommending the match to increase physical activity in the youth (Table II).<sup>14</sup> In a prospective epidemiological study of youth academy players over two seasons, the Football Association (FA) observed a higher risk of injury in the age group of 17 - 19 years compared with players aged 9 - 16 years.<sup>15</sup> A cohort study in French elite youth players observed an injury rate of 4.8 per 1 000 hours exposure time with no significant difference between the age groups of 14, 15 and 16 years.<sup>16</sup> As seen in adults, too, injury rates in training were lower (3.9) compared with matches (11.2 per 1 000 hrs). Studies also indicate that most injuries in youth players occur at the lower extremities (Fig. 1).<sup>13,15,17</sup> Ankle sprains are the most common injury, with contusions and strains being the most frequent types of injury.<sup>13</sup> Head injuries in youth football seem rare. Fractures and dislocations account for approximately 3 - 12% of injuries (Fig. 2).<sup>13</sup> In adult football there is broad evidence that a previous

injury represents an important risk factor for another injury.<sup>12,18,19</sup> This also seems to apply to youth players.<sup>20,21</sup>

The tackle in football is a direct extrinsic cause of injury. Video analysis of tackling situations in a study by Fuller *et al.*<sup>26</sup> revealed that of 8 572 tackles from 123 match recordings in 3 FIFA tournaments, 40.4% were fouls, 44% of injuries requiring on-field medical attention were fouls, 74% of post-match reported injuries were from the tackled player and tackles from the side and behind were twice as likely to require post-match medical attention. Further analysis indicated that different tackling situations had the greatest tendency for specific players, and included clash of heads (both tackler and the tackled), two-footed tackles (the tackled), tackles from the side (tackler), jumping vertically (tackler). The laws of the game need to be continually revised to ensure that players are protected from serious injury. This has already been evident where lifting arms in jumping actions is prohibited to prevent elbow to head/face injuries, and forward straight leg tackles. Referees only play a part in so far as their eyes (including assistants) can take them, and therefore a culture of fair play is necessary and is actively promoted by FIFA through Fair Play.

## Injury frequency and characteristics vary with different styles of play, but also between countries and geographical regions.

### Football injuries in Africa and South Africa

Injury frequency and characteristics vary with different styles of play, but also between countries and geographical regions (Table I).<sup>13,22</sup> The incidence of football injuries in South Africa is unknown, as no large epidemiological studies have been conducted. One study<sup>23</sup> showed that the 1-year prevalence rate of injuries in 103 first team high school female football players from nine schools in Johannesburg was 46.1% and the point prevalence was 37.8%. The main sites of injury were the knee (18.6%) and the ankle (17.6%). Another report from a study at one hospital over a 42-month period states: 'Thirty-two patients were admitted

with severe injuries. The injuries included 18 fractures of the tibial and femoral shaft. Two tibial shaft fractures were compound. Four tibial plateau fractures and five epiphyseal injuries were identified. One patient had a fracture-dislocation of the hip. One patient with a popliteal artery injury presented 48 hours after the injury had occurred. He had an above knee amputation. In the same period 122 patients were treated as outpatients. The types of injury in this cohort were similar to soccer injuries reported in other countries.<sup>24</sup>

There is not much research from elsewhere in Africa. A recent study in the *British Journal of Sports Medicine* reported a prevalence of 81.6% injury in 196 players from premiership, professional, national and state amateur clubs in Benin City, Nigeria. Ankle sprains were the most prevalent (25%), followed by the knee (20%). Most were deemed to be moderate in severity for (28.9%).<sup>5</sup>

### Prevention of injuries in football

Despite the known high risk of injuries in football, systematic approaches to prevention are poorly documented in the literature and were for a long time limited mainly to small populations. A randomised study 25 years ago in 180 senior male players included a broad spectrum of measures from information, prophylactic taping, correction of training to rehabilitation and followed them for 6 months, achieving an injury reduction of 75% (calculated as injuries per team per month) in the intervention group with a significant reduction of the most common injuries in football.<sup>27</sup> However, this study did not relate injury incidence to exposure time, so the results might have been influenced by varying exposure to match play and training in the intervention and control group.

In a more recent study the effects of a pre-season conditioning programme (cardiovascular conditioning, plyometric work, sport-specific drills, strength training and flexibility exercises to improve speed and agility) on the occurrence of football injuries in 42 out of 300 female high school players were investigated during 1 year of competitive football.<sup>28</sup> Significantly fewer players in the intervention group were injured (14%) compared with the control group (33.7%). Again, injury incidence was not related to exposure time, and age, skill level and performance variables in the intervention and control groups were not considered and, if considered, might have influenced results differently.

# The 11+

## PART 1 RUNNING EXERCISES · 8 MINUTES



### 1 RUNNING STRAIGHT AHEAD

The course is made up of 6 to 10 pairs of parallel cones, approx. 5-6 m apart. Two players start at the same time from the first pair of cones. **Jog together** all the way to the last pair of cones. On the way back, you can increase your speed progressively as you warm up. **2 sets**



### 2 RUNNING HIP OUT

Walk or jog easily, stopping at each pair of cones to lift your knee and **rotate your hip outwards**. Alternate between left and right legs at successive cones. **2 sets**



### 3 RUNNING HIP IN

Walk or jog easily, stopping at each pair of cones to lift your knee and **rotate your hip inwards**. Alternate between left and right legs at successive cones. **2 sets**



### 4 RUNNING CIRCLING PARTNER

Run forwards as a pair to the first set of cones. Shuffle sideways by 90 degrees to meet in the middle. **Shuffle an entire circle around one other** and then return back to the cones. Repeat for each pair of cones. Remember to stay on your toes and keep your centre of gravity low by bending your hips and knees. **2 sets**



### 5 RUNNING SHOULDER CONTACT

Run forwards in pairs to the first pair of cones. Shuffle sideways by 90 degrees to meet in the middle then **jump sideways towards each other to make shoulder-to-shoulder contact**. Note: Make sure you land on both feet with your hips and knees bent. Do not let your knees buckle inwards. Make it a full jump and synchronize your timing with your team-mate as you jump and land. **2 sets**



### 6 RUNNING QUICK FORWARDS & BACKWARDS

As a pair, run quickly to the second set of cones then **run backwards quickly to the first pair of cones keeping your hips and knees slightly bent**. Keep repeating the drill, running two cones forwards and one cone backwards. Remember to take small, quick steps. **2 sets**

## PART 2 STRENGTH · PLYOMETRICS · BALANCE · 10 MINUTES

### LEVEL 1



### 7 THE BENCH STATIC

**Starting position:** Lie on your front, supporting yourself on your forearms and feet. Your elbows should be directly under your shoulders. **Exercise:** Lift your body up, supported on your forearms, and pull your stomach in, and hold the position for 20-30 sec. Your body should be in a straight line. Try not to sway or arch your back. **3 sets**



### 8 SIDEWAYS BENCH STATIC

**Starting position:** Lie on your side with the knee of your lowest leg bent to 90 degrees. Support your upper body by resting on your forearm and knee. The elbow of your supporting arm should be directly under your shoulder. **Exercise:** Lift your uppermost leg and hips until your shoulder, hip and knee are in a straight line. Hold the position for 20-30 sec. Take a short break, change sides and repeat. **3 sets** on each side.



### 9 HAMSTRINGS BEGINNER

**Starting position:** Kneel on a soft surface. Ask your partner to hold your ankles down firmly. **Exercise:** Your body should be completely straight from the shoulder to the knee throughout the exercise. Lean forward as far as you can, controlling the movement with your hamstrings and your gluteal muscles. When you can no longer hold the position, gently take your weight on your hands, falling into a push-up position. Complete a minimum of 3-5 repetitions and/or 60 sec. **1 set**



### 10 SINGLE-LEG STANCE HOLD THE BALL

**Starting position:** Stand on one leg. **Exercise:** Balance on one leg whilst holding the ball with both hands. Keep your body weight on the ball of your foot. Remember: try not to let your knees buckle inwards. Hold for 30 sec. Change legs and repeat. The exercise can be made more difficult by passing the ball around your waist and/or under your other knee. **2 sets**



### 11 SQUATS WITH TOE RAISE

**Starting position:** Stand with your feet hip-width apart. Place your hands on your hips if you like. **Exercise:** Imagine that you are about to sit down on a chair. Perform squats by bending your hips and knees to 90 degrees. Do not let your knees buckle inwards. Descend slowly then straighten up more quickly. When your legs are completely straight, stand up on your toes then slowly lower down again. Repeat the exercise for 30 sec. **2 sets**



### 12 JUMPING VERTICAL JUMPS

**Starting position:** Stand with your feet hip-width apart. Place your hands on your hips if you like. **Exercise:** Imagine that you are about to sit down on a chair. Bend your legs slowly until your knees are flexed to approx. 90 degrees, and hold for 2 sec. Do not let your knees buckle inwards. From the squat position, jump up as high as you can, land softly on the balls of your feet with your hips and knees slightly bent. Repeat the exercise for 30 sec. **2 sets**

### LEVEL 2



### 7 THE BENCH ALTERNATE LEGS

**Starting position:** Lie on your front, supporting yourself on your forearms and feet. Your elbows should be directly under your shoulders. **Exercise:** Lift your body up, supported on your forearms, and pull your stomach in. Lift each leg in turn, holding for a count of 2 sec. Continue for 40-60 sec. Your body should be in a straight line. Try not to sway or arch your back. **3 sets**



### 8 SIDEWAYS BENCH RAISE & LOWER HIP

**Starting position:** Lie on your side with both legs straight. Lean on your forearm and the side of your foot so that your body is in a straight line from shoulder to foot. The elbow of your supporting arm should be directly beneath your shoulder. **Exercise:** Lower your hip to the ground and raise it back up again. Repeat for 20-30 sec. Take a short break, change sides and repeat. **3 sets** on each side.



### 9 HAMSTRINGS INTERMEDIATE

**Starting position:** Kneel on a soft surface. Ask your partner to hold your ankles down firmly. **Exercise:** Your body should be completely straight from the shoulder to the knee throughout the exercise. Lean forward as far as you can, controlling the movement with your hamstrings and your gluteal muscles. When you can no longer hold the position, gently take your weight on your hands, falling into a push-up position. Complete a minimum of 7-10 repetitions and/or 60 sec. **1 set**



### 10 SINGLE-LEG STANCE THROWING BALL WITH PARTNER

**Starting position:** Stand 2-3 m apart from your partner, with each of you standing on one leg. **Exercise:** Keeping your balance, and with your stomach held in, throw the ball to one another. Keep your weight on the ball of your foot. Remember: keep your knee just slightly flexed and try not to let it buckle inwards. Keep going for 30 sec. Change legs and repeat. **2 sets**



### 11 SQUATS WALKING LUNGES

**Starting position:** Stand with your feet at hip-width apart. Place your hands on your hips if you like. **Exercise:** Lunge forward slowly at an even pace. As you lunge, bend your leading leg until your hip and knee are flexed to 90 degrees. Do not let your knee buckle inwards. Try to keep your upper body and hips steady. Lunge your way across the pitch (approx. 10 times on each leg) and then jog back. **2 sets**



### 12 JUMPING LATERAL JUMPS

**Starting position:** Stand on one leg with your upper body bent slightly forwards from the waist, with knees and hips slightly bent. **Exercise:** Jump approx. 1 m sideways from the supporting leg on to the free leg. Land gently on the ball of your foot. Bend your hips and knees slightly as you land and do not let your knee buckle inward. Maintain your balance with each jump. Repeat the exercise for 30 sec. **2 sets**

### LEVEL 3



### 7 THE BENCH ONE LEG LIFT AND HOLD

**Starting position:** Lie on your front, supporting yourself on your forearms and feet. Your elbows should be directly under your shoulders. **Exercise:** Lift your body up, supported on your forearms, and pull your stomach in. Lift one leg about 10-15 cm off the ground, and hold the position for 20-30 sec. Your body should be straight. Do not let your opposite hip dip down and do not sway or arch your lower back. Take a short break, change legs and repeat. **3 sets**



### 8 SIDEWAYS BENCH WITH LEG LIFT

**Starting position:** Lie on your side with both legs straight. Lean on your forearm and the side of your foot so that your body is in a straight line from shoulder to foot. The elbow of your supporting arm should be directly beneath your shoulder. **Exercise:** Lift your uppermost leg up and slowly lower it down again. Repeat for 20-30 sec. Take a short break, change sides and repeat. **3 sets** on each side.



### 9 HAMSTRINGS ADVANCED

**Starting position:** Kneel on a soft surface. Ask your partner to hold your ankles down firmly. **Exercise:** Your body should be completely straight from the shoulder to the knee throughout the exercise. Lean forward as far as you can, controlling the movement with your hamstrings and your gluteal muscles. When you can no longer hold the position, gently take your weight on your hands, falling into a push-up position. Complete a minimum of 12-15 repetitions and/or 60 sec. **1 set**



### 10 SINGLE-LEG STANCE TEST YOUR PARTNER

**Starting position:** Stand on one leg opposite your partner and at arm's length apart. **Exercise:** Whilst you both try to keep your balance, each of you in turn tries to push the other off balance in different directions. Try to keep your weight on the ball of your foot and prevent your knee from buckling inwards. Continue for 30 sec. Change legs and repeat. **2 sets**



### 11 SQUATS ONE-LEG SQUATS

**Starting position:** Stand on one leg, loosely holding onto your partner. **Exercise:** Slowly bend your knee as far as you can manage. Concentrate on preventing the knee from buckling inwards. Bend your knee slowly then straighten it slightly more quickly, keeping your hips and upper body in line. Repeat the exercise 10 times on each leg. **2 sets**



### 12 JUMPING BOX JUMPS

**Starting position:** Stand with your feet hip-width apart. Imagine that there is a cross marked on the ground and you are standing in the middle of it. **Exercise:** Alternate between jumping forwards and backwards, from side to side, and diagonally across the cross. Jump as quickly and explosively as possible. Your knees and hips should be slightly bent. Land softly on the balls of your feet. Do not let your knees buckle inwards. Repeat the exercise for 30 sec. **2 sets**

## PART 3 RUNNING EXERCISES · 2 MINUTES



### 13 RUNNING ACROSS THE PITCH

Run across the pitch, from one side to the other, at 75-80% maximum pace. **2 sets**



### 14 RUNNING BOUNDING

Run with high bounding steps with a high knee lift, landing gently on the ball of your foot. Use an exaggerated arm swing for each step (opposite arm and leg). Try not to let your leading leg cross the midline of your body or let your knees buckle inwards. Repeat the exercise until you reach the other side of the pitch, then jog back to recover. **2 sets**



### 15 RUNNING PLANT & CUT

Jog 4-5 steps, then plant on the outside leg and cut to change direction. Accelerate and sprint 5-7 steps at high speed (80-90% maximum pace) before you decelerate and do a new plant & cut. Do not let your knee buckle inwards. Repeat the exercise until you reach the other side, then jog back. **2 sets**



KNEE POSITION CORRECT



KNEE POSITION INCORRECT



© 2010 FIFA



© 2010 FIFA

Fig. 3. The 11+ warm-up programme.

Other prevention studies focused particularly on specific injury types, for example the most common injury type in football, i.e. ankle sprains. A study of 55 male senior football teams followed up for 6 months demonstrated that ankle disk training and wearing of an orthosis prevented sprains in players with previous ankle problems.<sup>29</sup> A study in South Africa prospectively evaluating the effect of a semi-rigid orthosis over the course of one playing season showed a significant reduction in recurrence of ankle sprains.<sup>30</sup> No preventive effect was observed for players without previous ankle sprains. A recent review of interventions for preventing ankle ligament injuries including five randomised trials concluded that external ankle support reduces the number of ankle sprains.<sup>31</sup> This reduction was shown to be greater for athletes who have had previous ankle sprains but was also evident in those without prior sprain.

## The tackle in football is a direct extrinsic cause of injury.

With regard to other injury types, in a study including 40 semi-professional and amateur football teams prospectively followed over three seasons, a proprioceptive training programme significantly reduced the incidence of injuries to the anterior cruciate ligament.<sup>32</sup> In another study concentrating on hamstring strains, eccentric training combined with warm-up stretching significantly reduced the risk of hamstring strains in male elite football teams, while no effect was detected from flexibility training alone.<sup>33</sup> The impact of stretching on sports injury risk has not sufficient evidence to endorse or discontinue routine stretching before or after exercise to prevent injury among competitive or recreational athletes.<sup>34</sup>

The evidence with regard to the effect of prevention programmes in youth and adolescent football is even more limited. One of the largest prevention studies was conducted in female players between the ages of 14 and 18.<sup>35</sup> Over 2 years, a total of 1 041 female players from 45 teams (of a total of 52) received a football-specific training called 'Prevent Injury, Enhance Performance' (PEP) in a prospective non-randomised trial. The control group, 1 905 out of 1 913 players from 95 out of 112 teams, performed their traditional warm-up. Overall, there was an 80% reduction in ACL injuries as a result of the PEP training programme consisting primarily of neuromuscular and proprioceptive

training. An F-MARC prevention study in male youth amateur players, published in 2002,<sup>36</sup> observed a reduction of injuries in general of 20 - 36%, depending on the outcome criteria.

A 2004 review showed few well-designed and controlled studies investigating strategies to prevent injuries in sports in general, and an even smaller number with regard to such strategies in children and youth.<sup>37</sup> While most authors acknowledged the need for more research, they unanimously advocated prevention programmes in youth players.<sup>13-15,38</sup>

A larger randomised controlled trial assessed the effect of the *F-MARC 11* in 2 100 female players aged 14 - 16 years.<sup>39</sup> The ten exercises of the programme, complemented by Fair Play, were designed to reduce injuries of the lower extremity as the most common injuries in football. Half of the teams were asked to perform the 11 exercises prior to each training and match play over a whole season. No differences in injury risk were observed in the *F-MARC 11* group compared with the control group. However, compliance in this study was found to be low as the teams in the intervention group performed the programme in only half of their training sessions during the first half of the season. This may indicate the importance of compliance and the minimum activity required to prevent injury, or rather that less than 50% compliance will not reduce injury incidence.

In a consequent study, the effect of *The 11+ - a complete warm-up programme to prevent injuries* was assessed (Fig. 3).<sup>40</sup> Based on the previous experiences, *The 11+* programme was developed to improve both the preventive effect of the programme and the compliance of coaches and players. The programme includes key exercises from *The 11* and the PEP programme, but also additional exercises to provide variation and progression. Further, it includes structured running exercises that make it a comprehensive warm-up programme for training and matches. In a cluster randomised controlled trial, 125 football clubs in Norway corresponding to about 2 540 female players aged 13 - 17 years (approx. 1 320 players in the intervention and approx. 1 220 players in the control group) were followed for one league season of 8 months. Coaches were asked to perform the complete exercise programme as a warm-up prior to each training session, and to perform the running exercises as part of their warm-up prior to each match. During the season there was a significantly lower risk of any injury, overuse injuries and severe injuries in the intervention group compared with the control group. The reduction of match

injuries, training injuries lower extremity injuries, knee injuries, and acute injuries ranged from 26% to 38% but was not statistically significant.

## In football, studies have shown that upper limb to head contact in heading contests accounted for approximately 50% of concussions.

### Head injury and concussion

In football, studies have shown that upper limb to head contact in heading contests accounted for approximately 50% of concussions. Fair play and respect for opponents are ethical values which must be encouraged, not only with players, but also coaches, parents and managers. This will go a long way in reducing concussion in football.

The reader is referred to the 'Consensus Statement on Concussion in Sport - The 3rd International Conference on Concussion in Sport' held in Zurich, November 2008<sup>41</sup> and the article covering this topic in this journal edition.

References (41) available on request.

### In a nutshell

- The incidence of injuries in football is 12 - 35 injuries per 1 000 hours of match play and 1.5 - 7.6 injuries per 1 000 hours of exposure.
- Injury rates in training are lower than in matches.
- Most injuries occur at the lower extremities.
- Previous injury represents an important risk factor for another injury.
- The tackle in football is a direct extrinsic cause of injury, and Fair Play is important in reducing such injuries.
- Preventive strategies with specific training programmes significantly reduce the incidence of injuries.
- Prevention of injuries should always be a priority and is even more important when treatment possibilities are restricted, as in many parts of Africa.