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Research Article

Injuries in Young Professional Soccer Players: Epidemiological and Prevention Topics

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Abstract

Soccer is the most popular sport worldwide and is known to be correlated to high risk of of injuries, which negatively influence the performance of the single player and team: higher positions in league or cup standings are achieved by clubs with injury-prevention programs. Prevention is fundamental for athletes allowing them to play at the highest level in complete safety: however, only a few studies reported the effectiveness of preventive programs especially in young players.

The aim of this study is twofold: firstly, reporting season injuries in young professional footballers and assessing their risk factors; secondly, demonstrating how a specific prevention program reduce injuries incidence. 32 professional footballers («Primavera» under-19 Italian league 2014/2015) were included and compared with the previous season («Allievi» under-17 Italian league 2013/2014) because of 95% of the team was formed by the same players.

An injury-prevention program was introduced: core training, active warm-up, static stretching and cryotherapy were inserted into a program of football technical, tactical and physical exercises, co-operated by technical and medical staff. For each injury we collected: type, days of absence, severity, body segment, match or training features, pathogenesis, recurrence, therapy. Therefore, incidence, burden injury and availability were calculated. Analysis was made by MedCalc® (P-value <0,05).

We collected 45 injuries: 5 contusions, 9 overexertion-related disorders, 10 sprains, 6 tendonitis, 8 muscle tears, 1 knee ligament strain, 5 bone fractures and 1 skin wound. Injuries mostly occurred during training (60.00%) than matches (33.33%) and 3 extra-soccer activities (6.67%). Incidence was 5,6/1000hs, burden injury of 72.92 days of absence/1000hs and average availibility 87%. Prevention program was significantly effective: injuries were similar (46 vs 45) in the two consecutive seasons even though a doubled-time sport performance (3847.40hs vs 8050.18) (p=0.01). Injuries prevention is relevant for footballers. Our proposals resulted very effective, decreasing predictable injuries.

Keywords: Epidemiology; Injuries; Prevention; Soccer; Young adult

Introduction

Soccer is the most popular sport worldwide with 265 million practisers and 200 thousand professional players [1-5]. Football is known to be correlated to high risk of of injuries as other contact sports (rugby, boxing and fencing) [3]. The incidence of injuries is 1000 times higher in professional players than industrial employments generally regarded as high risk [6,7]. Furthermore, the total amount for their management in USA is calculated to be about 30 billion dollars /year [8,9].

Faude reported in his review an incidence of 1-5 injuries/1000h during training sessions and 15-20/1000h during official matches, while Akoi1 16.6-34.8 injuries/1000h in national Japanese league [10,11]. The UEFA (Union of European Football Associations) performed a wide study from 2001 to 2012 with the participation of 30 top-level european clubs: every professional team can expect approximately 50 injuries per season, 2 injuries for each footballer. Alhough half of injuries are low grade (47%),

37% are moderate and 16% severe, leading to a long-time absence: thus every day 12% of players are expected not to be at coach's disposal. Muscular lesions are the most frequent [7]. Those data are confirmed by other studies showing that abductors, hamstrings, quadriceps femoris and triceps surae are mostly affected [7,12-14].

Injuries negatively influence the performance of the single player and consequently of his team: higher positions in league or cup standings are achieved by clubs with injury-prevention programs [7,12]. Heidt demonstrated that a specific prevention program (strengh, agility, flexibility) introduced throughout the entire season induces a significant reduction of injuries in female footballers compared to athletes without a pre-conditioning training-program [15]. The importance of prevention is remarked by two questions: first, most of injuries are foreseeable and only 10% of them are unexpectable; second, higher the intensity, the duration and the frequency of workout, greater the possibility of injury [16].

A Belgian 10-year-study concluded that the introduction of prevention programmes, associated to specific warm up, cancellation of the match in case of adverse weather and promotion of fair play, lead to significant reduction of injuries especially during the winter season [8]. Recently FIFA (Fédération Internationale de Football Association) introduced its own protocol Fifa 11+ to reduce the number of injuries during football games [8,17].

Prevention is fundamental for athletes allowing them to train and develop their skills at the highest level in complete safety: however, only a few studies reported the effectiveness of preventive programs without defining the superiority of one program over another. Fewer studies estimated the incidence of injuries in young players, expecially in southern Europe [1]. The aim of this study is twofold: firstly, reporting season injuries in young professional footballers and assessing their risk factors; secondly, demonstrating how a specific prevention program reduce injuries incidence.

Methods

Epidemiological Data

32 professional footballers, partecipating to «G. Facchetti» under-19 Italian league, were included in the study. Team consists of 2 goalkeepers, 11 defenders, 8 midfielders and 11 forwards. Anthropometric data of the team are shown in (Table 1). Data were collected during the league 2014/15 (July 24th, 2014 - May 23, 2015), for a total of 43 weekes. Season consisted of pre-season, training sessions (5 per week, approximately 2 hs each), friendly matches, official League matches (26) and National Cup matches (2).

	Season start (Jul 2014)	Mid-season (Dec 2014)	Season end (May 2015)
Weight (kg)	71.7 (58.0- 86.5)	70.7 (57.0 - 85.0)	71.6 (55.3 - 90.5)
Stature (cm)	180 (167 - 196)	180 (167 - 196)	181 (167 - 196)
BMI kg/cm^2	22.06 (18.79 - 25.06)	21.74 (18.87 - 24.11)	21.90 (18.99 - 23.88)

Table 1: Anthropometric data of players during the season.

Data Collection and Risk Factors

First, «injury» term should be clarified: developing the definition introduced by Hagglund [13], we recorded in this study only any adverse event that can be defined as «negative unpredictable event involving the impossibility to partecipate in two consecutive training sessions and/or matches or requiring instrumental investigations and/or therapies». Therefore, exclusion criteria were:

- Events determing one single day absence;
- Events determing multiple not-consecutive absence from training sessions or matches;
- Events not resulting in absence, neither requiring therapies or instrumental exams.

Whenever an injury occurred, different informations were collected:

- Type of injury (contusion, overexertion disorder, tendinosis/ bursitis, articular sprain or dislocation, minor/moderate partial muscle tear, subtotal/ complete muscle tear, postural disorder, menisci tear, knee ligament tear, fracture, head trauma, wound);
- Number of days the player was not available (return to sport was defined as capacity to perform the whole training session with the team);
- Severity of injury: low grade (< 7 days), moderate grade (7-21 days), severe grade (> 21 days);
- Body segment and side (dominant or not);
- Match or training session features: location of the match (home or away), weather situation (sunny, cloudy, rainy, snowy), football pitch (natural, sintetic, mixed), time of the match (0-22', 23-45+', 46-67', 68-90+'), training exercise

(warm up, tactics or soccer technique, force and endurance work, friendly game);

- Pathogenesis: traumatic or overexertion;
- Injury recurrence: first injury or recurrent;
- First aid treatment ad drugs administered.
- Perception of pain by VAS (Visual Analogic Scale).

Injuries were reported in a specific Microsoft Excel® file created by the medical staff, allowing to define:

- Incidence of injury (injury/1000 hs);
- Burden injury (number of days lost/1000 hs): it estimates the player's tendency to injure;
- Availability of the players at coach's disposal during the season, expressed in percent.

Preventive Programme

The staff planned an articulated injury-prevention program consisting in four specific protocols: core training, active warm-up, static stretching after work, cryotherapy. Obviously, these four interventions are not enough by themselves to decrease injuries at all: prevention is inserted into a program of football technical, tactical and physical exercises, co-operated by technical and medical staff. Regular updating and monitoring by CR10-Borg scale (training load) is fundamental to achieve the reduction of accidents. The protocols were chosen according to their effectiveness demonstrated by several studies. At the end of season 2014/2015, collected data were statistically compared with the ones recorded during the previous season («Allievi» under-17 Italian league 2013/2014) because of 95% of the team was formed by the same players: thus, the efficacy of the preventive programme could be assessed.

Core Training: players performed core stability and strenghtening exerecises for 20 minutes, 2-3 times per week; staff proposed a progressive-difficulty work during the season. According to the definition proposed by Kibler, core stability is «the ability to control the position and movement of the trunk to allow the correct production, transmission and optimal control of strength and motion to the distal segments in athletic activities» [18].

The core is fundamental to maintain the barycenter during movements and activation of the core muscles is crucial in all situations of instability: both for static and dynamic balance, landing from a jump, passing or controlling the ball, freeing from the marker, hitting the ball with the head, shooting or changing direction. Hence, core training has been recently introduced as an essential element for prevention and rehabilitation of injuries of the extremities in different sports, including football [19]. A high demand for different physical abilities (aerobic performance, speed, agility and explosive force) is required in professional soccer. So it is easy to understand why core stability training has even a greater importance in professional teams

The effectiveness of core stability is widely demonstrated [20-22]. A hip muscle weakness can result in an alteration of the position of hips/trunk and consequently in improved risk of knee injury. An inadequate level of core stability can lead to various level injuries over time, such as low back pain, pubic pain, knee traumas, iliotibial syndrome [18]. Leetun observed 149 athletes concluding that core weakness is associated to frequent injuries throughout regular [23].

Active warm up: before matches and trainings, athletes performed a mix protocol of active mobilization, active proprioception, active stretching and soccer-specific functional exercises. F-MARC introduced warm up FIFA11+ protocol, which effectiveness has been documented by several studies: performing FIFA11+ at least twice a week leads to 30-50% reduction of injuries [8,17,24]. AC Fiorentina medical staff tested new methodological indications about stretching and compared them to those of international literature [25]. They assessed the relationship between application of some usual warm up programs and footballers muscle performance. Streching played a central role. Comparing extended static stretching, PNF, and dynamic active stretching, authors concluded that dynamic warm up was the most suitable for pre-match or before maximal or submaximal exercises, where an optimal neuronal activation and high stiffness (strength-speed) are necessary.

During active stretching, active agonists' contraction contributes to elongate antagonists because of the reciprocal inhibitory phenomenon; every external intervention is avoided. Active stretching is primarily used for obtaining a passive flexibility of tendon and antagonist muscle, achieved by the intensity and regularity of the training. Thus, the benefits of active stretching are multiple: firstly, muscular stretching is more similar to that performed during matches or trainings; secondly, it is the sport-specific. The disadvantage is the activation of the myotatic reflex, also known as stretch reflex [26].

Static stretching after work: players performed an 8-minutes static stretching protocol at the end of every training session and match (league or national cup). Exercises were planned for trunk and lower limb muscles: once the position had been slowly obtained, it was maintained for 20-30 seconds (principles of stretching are expressed in (Table 2). It was demonstrated that static stretching is suitable after a prolonged physical activity [27-30]. Muscle stiffness increases at the end of a training session or competition because of isometric, concentric and eccentric contractions: Magnusson affirmed that stretching myotendon units after the match could reduce the stiffness without changing the viscoelastic properties of the interested tissues. Trained and extensible muscles

and tendons perform in the best condition during sport activity: their elongation is basic for an optimal preparation [31]. We chose not to propose static stretching before training or match in order to avoid the *«creeping effect»:* a re-organization of collagen fibers occurs during stretching, resulting in decreased shock absorption and muscolar overload. This phenomenon, although reversible, has a fairly long latency phase (>1hour) and the time between warm up and activity may be insufficient to full recovery: consequently, risk of injuries is highere during short-term activity [32,33].

Post-activity passive stretching has different advantages: if compared with active stretching, ROM is wider and its efficacy is higher onto hyposthenic muscles; it reduces muscle tension and causes a general perception of psico-physical comfort. The main disadvantage of static stretching is its lack of sport-specifity [34].

Mantain steady stretching, whithout bouncing
Feel no pain
Adjust the position to own proper needs
Continue to breathe regulartly
Alternate stretching of agonist and antagonist muscles

Table 2: Static stretching principles.

Cryotherapy: Cold Water Immersions (CMI) were performed at least twice a week (mid-week and post-match): players bathed into 12˚C water for 6 minutes. Analgesic effect is obtained by the decrease of temperature of skin and underlying tissues: this occurs even more effectively in water-rich tissues, such as muscles where temperature can be reduced up to 4 centimeters depth from the skin. The efficacy of cryotherapy depends on some primary factors (temperature, area and duration of application of cold source) and secondary factors (blood flow, local metabolism, individual variability, properties of teguments, vasomotor reflex) [35]. Literature is not clear about its effectiveness and a lot of different protocols have been described: variations about duration of the immersion, water temperature and part of the body to dip. Although these types of treatments are extensively used to ensure rapid recovery from intense exercise, worldwide guidelines to obtain optimal therapeutic effects are not being defined yet [35-39]. Hence, in our team, temperature and time had been decided on the tolerance of most of the team.

Statistical analysis

Assessment was performed by the means of the statistical programme MedCalc® (Version 15.11.4 - ©1993-2016 MedCalc Software bvba). P-value was defined as $p<0,05$.

Results

The amount of hs of sport performance was 8050.18hs (7586.03hs trainings and 464.15hs official matches). Footballers played for 1525.03hs in pre-season (July-August), 3060.11hrs during the first round (September- January) and 3465 hs during the second round (February- May).

Total injuries were 45: 5 contusions, 9 overexertion-related muscle disorders, 10 articular sprains, 6 tendonitis or bursitis, 8 minor/moderate muscle tears, 1 knee ligament strain (knee medial collateral ligament), 5 bone fractures and 1 skin wound. No articular dislocations, muscolar structural injuries, meniscal disorders or cranic traumas occurred (Table 3). 27 injuries occurred during training sessions (60.00%), 15 during official matches (33.33%) and 3 during extra-soccer activities (6.67%)

The overall incidence of injury was 5,6/1000hs of performance, 3,6/1000hs during training (one every 281 hs) and 32,3/1000hs (one every 31 hs) during matches. Burden injury was calculated in 72.92 days of absence/1000hs (range 0 to 230 days). At average availibility of the players was 87%. Bone fractures deeply influenced these data; we collected: tibial malleolus (ORIF with two cannulated screws; return to official match after 69 days); third metatarsal bone stress fracture (conservative therapy; return to official match after 62 days); displaced fracture of lateral extremity of the clavicle (eight-brace; return to official match after 74 days); radius styloid non displaced fracture (plaster cast; return to official match after 74 days); carpal scaphoid displaced fracture (CRIF with Acutrak screw; return to official match after 42 days).

	Training				Match		Extra	Total	Incidence (case/1000hs)
	Warm up	Tactics/ technique	Force/ endurance	Friendly games	Home	Away			
Contusions				1	2	1	1	5	0,6
Overexertion disorders	1	1	5		2			9	1,1
Tendinosis/ bursitis		4	1		1			6	0,7
Sprains		1	1	4	3		1	10	1,2
Dislocations								0	0,0

Minor/moderate partial muscle tears	1	3	1		1	1	1	8	1,0
Subtotal/ complete muscle tears								0	0,0
Postural disorders								0	0,0
Menisci tears								0	0,0
Knee ligaments					1			1	0,1
Fractures			1	1	1	2		5	0,6
Head traumas								0	0,0
Wounds		1						1	0,1
SUBTOTAL	2	10	9	6	11	4	3	45	5,60
TOTAL	27				15		3		

Table 3: Injuries during the season 2014/15 and their incidence.

(Chart 1) illustrates the seasonal course of injuries: in official matches a peak is shown in November while trend was quite uniform during other months; in trainings, the trend was quite similar till November, and a bit lower by December. Excluding three extra-soccer events, the incidence was higher during pre-season (7 accidents, incidence 7.90/1000hs) than first round (22 accidents, incidence 5.33/1000hs) and second round (16 accidents, 4.59/1000hs). Most of the injuries were classified as mild injuries (67%), followed by severe (18%) and moderate (15%) ones. No recurrence was collected. Over training sessions, 10 accidents (39%) occurred during technical-tactical exercises, 9 (29%) during force or endurance work, 6 (25%) during friendly matches and 2 (7%) during warm up. Over official games, injuries occurred mostly in-home matches (11, 69% percentage) than away (4, 31%). The second (22-45+) and forth (67-90+) quarters seemed to be mainly concerned and articular sprains were usual. Artificial turf was associated to injuries more than natural (26 vs 17). Nevertheless, this result should be correlated to the amount of time spent on artificial (8027.63hs, all the training session and thirteen official matches) than natural pitches (22.50hs, 15 official matches): consequently, incidence was higher on natural (every 1.32hs) than artificial grass (208.76 hs). Overexertion soreness and muscular injuries were frequent, mainly on artificial turf. 23 injuries occurred in sunny, 17 in cloudy and 3 in rainy days. Dominant side was affected in 49% of cases, while not-dominant in 51%: in (Table 4) the different types of injuries are shown. Defenders suffered frequently (20 injuries, 44%) compared to midfielders (12 injuries, 27%), forwards (10 injuries, 22%) and goalkeepers (3 injuries, 7%) (Table 4). Injury-prevention program efficacy was assessed by the comparison between 2013/14 (under-17 league) and 2014-15 (under-19 league): the former reported 46 injuries while the latter 45 injuries (Table 5). During 2013/14 the overall incidence of injury was 2,5/1000hs of performance, 3,76/1000hs during training (one every 11 hs) and 10,4/1000hs (one every 6 hs) during matches. Burden injury was calculated in 71.5 days of absence/1000hs. At average availibility of the players was 86%. However, the comparison should be correlated to the amount of soccer activity (under-17: 3847.40hs while under-19: 8050.18): exposure to injury has more than doubled; as official matches remained almost equal (26 vs 28), training time was hugely increased (3808.40hs than 7584.13hs). Injury reduction is significant (p=0.01; Fisher's exact test).

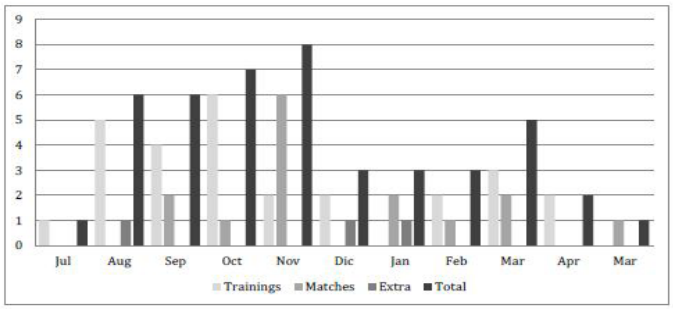
	Players				**Side**			**Total**
	Goalkeepers	**Defenders**	**Midfielders**	**Forwards**	**Dominant**	**Not**	**n.d**	
Contusions		1	2	2	4	1		5
Overexertion disorders	1	7	1		4	1	4	9
Tendinosis/ bursitis	1	1	3	1	4	2		6
Sprains	1	5	3	1	2	8		10
Dislocations								0

Minor/moderate partial muscle tears		4	2	2	4	4		8
Subtotal/ complete muscle tears								0
Postural disorders								0
Menisci tears								0
Knee ligaments		1			1			1
Fractures			1	4	1	4		5
Head traumas								0
Wounds		1				1		1
TOTAL	3	20	12	10	20	21	4	45

Table 4: Injuries suddivided by players' role and affected side.

	Season 2013/2014				**Season 2014/2015**			
	Trainings	**Matches**	**Extra**	**TOT**	**Trainings**	**Matches**	**Extra**	**TOT**
Contusions	6	2	2	10	1	3	1	5
Overexertion disorders	11	1		12	7	2		9
Tendinosis/ bursitis	6			6	5	1		6
Sprains	1	3		4	5	3	1	10
Dislocations				0				0
Minor/moderate partial muscle tears	6			6	5	2	1	8
Subtotal/ complete muscle tears	1	1		2				0
Postural disorders			2	2				0
Menisci tears	1	1		2				0
Knee ligaments				0		1		1
Fractures	1			1	2	3		5
Head traumas		1		1				0
Wounds				0	1			1
TOTAL	32	9	4	46	27	15	3	45

Table 5: Comparison between seasons 2013/14 and 2014/15.



Discussion

Prevention programs are fundamental for young footballers to allow them for training in complete safety: nevertheless, only a few studies are present in literature and fewer estimated the incidence of injuries in young players, expecially in Southern Europe [1]. Our amount of accidents (45) and their incidence (5.60 injuries/1000hs) are similar to other studies [7,13,40,41]: Salces reported an incidence of 5.65/1000hs, Stubbe 6.20/1000hs, Mohib 5.60/1000hs [4,5,42].

About temporal distribution, we observed a decreasing trend from pre-season (7.19 injuries/1000hs, 5 weeks) to the first round (5.33 injuries/1000hs, 16 weeks) and lastly to the second round (4.59 injuries/1000hs, 22 weeks). We have two hypotheses to explain this trend: on the one hand, the higher number during pre-season (mostly overexertion-related muscle disorders and tendonitis) is related to the agonistic re-start after the summer break, as muscles and tendons have to face the pre-season featured by huge workloads; on the other hand, the effects of injury-prevention program gradually appear. The staff should plan and organize the prevention program before seasonal start in order to reduce the exposure to injuries since first trainings and young athletes should be educated in performing preventive exercises during summer break too. Staff ought to monitor day-by-day training proposals to avoid excessive workloads above all during pre-season. Since league has begun, we collected traumatic injuries (contusions, sprains and fractures) mainly realated to higher performance level and tackles in official matches and whose only prevention is based on players' fair-play [10,43-45]. The first round showed the most number of injuries maybe referred to colder climate. Walden compared Northern Europe (UK and the Netherlands) to Southern Europe (France, Spain, Italy): he documented a significant difference about traumatic and overexertion-related muscle disorders, more common in colder regions; authors suggested the stiffer playing surface could cause a greater reaction force and load to muscles and tendons too [46]. However, this suggestion is not confirmed by our assessment between the coldest months (October-February, incidence 5.90 injuries/1000hs) and the hottest ones (July-September plus March-May, incidence 5.90 injuries/1000hs) ($p<0,05$). Results show a higher exposure to accidents during matches, according to previous literature [4,5,7,10,42]: incidence is 3.6 injuries/1000hs in trainings and 32.3 injuries/1000hs in official matches. Studies about elite professional footballers reported an incidence of injuries during competition ranging from 24.6/1000hs to 88.7/1000hs in international tournaments [47,48].

We recorded 9 muscular overexertion-related diseases: mostly of them (33%) occurred in August (pre-season). Trunk muscles (low back) and thigh muscles (adductors and hamstrings) are the most affected. Data agree with those observed by Ekstrand [49]. Regarding back muscles, we should consider that football is an asymmetric sport: even if kicking and ball movements are clearly unilateral and require a motor pattern that creates forces acting differently in right and left side, expecially in young players undergoing growth. These forces are likely to cause incongruous solicitations of lumbar region and consequently overexertion-related muscle disorders, expecially in case of untrained core [50].

Half of tendonitis concerned the patellar tendon that's hugely stressed in soccer: running, kicking the ball, jumping generate important forces over this structure. Hagglund and Ekstrand in 2011 [7] have already documented that patellar tendon disease are quite common and have a high risk of recurrence in professional football players: authors suggested how the large number of tendon strain was an important risk factor, while the playing surface (natural or artificial) doesn't seem to facilitate the developement of tendonitis [14].

We reported a considerable number of severe injuries (18%), a bit higher than other studies: the frequency of severe injuries (more than 21 days) varies from 3-4% in young professional football players to 11% in adult footballers [16,51,52]. Our data deeply influenced injury burden (72.92days of absence/1000hs) and average absence per injury (16 days). In our case, the five fractures mostly represent severe injuries and cause long-period absence from the agonistic activity: in fact, excluding them, injury burden decrease to 39.25 days of absence/1000hs and absence decrease to 7days/injury.

About injuries during training sessions, 39% occurred in technical/tactical exercises while 25% in friendly matches: higher demand, velocity, competition during these works increase exposure to injuries. At the contrary, overexertion problems are prevalent during force/endurance proposals. The variability of exercises and related injuries could suggest that planning meticulously training sessions, balancing a building up workout with adequate recovery time, with a daily control by the means of CR10 Borg Scale and a co-operation between technical and medical staff is necessary to prevent possible adverse events and increase athletes' performance.

We assessed a peculiar trend overall matches: while there's no difference between the first and the second half time, most of accidents occurred in 2nd (23-45+) and 4th (67-90+) quarter ($p<0,05$). We suppose exposure to injury could increase during the second quarter of each half-time as muscular fatigue has raised and consequently footballer has less control, attention and quality of technical gesture. These data confirm results obtained by Hawkins [14] but differ from Rahnama, who stated that the risk of injury was higher in the first and last 15 minutes of the game: author assumed this was a possible effect due to the greater intensity of the initial part of the match or to players' fatigue in the last 15 minutes [53]. Accidents are frequent during home match than away; Studied are limited: in fact, although playing at home or away is an important factor determining tactical and technical performances, some authors didn't demonstrate a real association between home/away games and injuries [53].

Artificial turf is significantly related to onset of injuries. We couldn't compare the effects of artificial and natural grass, as our team played mostly onto second generation syntetic turf, rather rigid and outdated (8027.63hs on artificial vs 22.50hs on natural). About positions, defenders are more susceptible to injuries as they repeatedly move the ball, tackle, compete with opponent strikers, and they are seldom substitute and play regularly overall the season. Also forwards show a high tendency to injuries, for the same motivations: our hypothesis is confirming by the number of fractures (4/5 occurred in strikers). These data agree with literature [54-56].

We observed differences about injuries in dominant/non dominant side without statistical significance ($p>0.05$): articular dislocations are more frequent in non dominant side. We suppose the less coordination, proprioception and stability of non dominant side compared to dominant one may be the reason. Overexertion-related muscle disorders have an opposite trend with a higher proportion in the dominant side: these results confirm that footballers use more frequently the dominant side for running and kicking the ball.

By comparing seasons 2013/14 and 2014/15 we assessed the injury-prevention program planned by medical staff and its effectiveness. At first sight, the incidences are increased in the second season; nonetheless, we must consider that the amount of accidents remained the same in the two consecutive seasons 2013/14 and 2014/15 despite of the doubled time of sport activity (3847.40hs vs 8050.18): so the exposure to possible injuries is consequently huger. Passing from 3 to 5 training days a week, footballers increased the exposure not only in terms of hs on the pitch, but also in lesser recovery time between two consecutive trainings. On the basis of the incidences in season 2013/14 and time of activity in season 2014/15, we expected about 92 injuries during the second season, by far higher than the 45 occurred. Excluding non-predictable injuries (fractures, contusions, sprains) that fluctuated between the two seasons, we obtained satisfactory results by analyzing specific types of predictable injury; overexertion-related muscle disorders decreased from 2013/14 to 2014/15 despite of heavier workloads: they passed from 3.1 injuries/1000hs to 1.1 injuries/1000hs (from 26.67% of all injuries to 20%) (Fisher exact test, $p = 0.01$). Bursitis and tendonitis remained almost equal, identifying 5 and 6 in season 2013/14 and 2014/15 respectively. We compared injuries occurred during match and training: the formers increased from 9 to 15 (60% increase) while the latters decreased from 32 to 27 (16% decrease) (Fisher exact test, $p = 0.01$). During matches we observed mostly non-predictable traumas our injury-prevention program is unuseful. These results confirm literature [10]. Lastly, we considered only those types of injuries most susceptible to this preventive programme by excluding contusions, fractures, cranic trauma and wounds: 27 in 2013/14 season and 24 in the following (Fisher exact test, $p=0,03$).

Conclusions

Injuries prevention is relevant for footballer's health, clubs and healthcare. Data collection and their analysis should be essential for the medical staff in order to develop preventive programs: our proposals resulted very effective, decreasing predictable injuries. Limits of this study were the small population and short follow up. Further results will be expected from assessment of next seasons.

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