

Epidemiology of football – related injuries – part I

Epidemiologia urazów w piłce nożnej – część I

Grzegorz Adamczyk, Łukasz Luboiński

Carolina Medical Center, Warszawa

Summary

Football (soccer) is one of the most popular sports in the world. Currently FIFA unifies 203 national associations and represents about 200 million active players, of which about 40 million are women. The incidence of football injuries is estimated to be 10–35 per 1000 game hours. One athlete plays on average 100 hours of football per year (from 50 hours per player of a local team, up to 500 hours per player for a professional team). So every player will have minimum one performance-limiting injury per year.

High-velocity trauma and direct contact between sportsmen have made of football a kind of a combat sport, connecting both the consequences of chronic overuse and acute injuries. National Athletic Injury Registration System (NAIRS) in the USA precise „The reportable injury is one that limits athletic participation for at least one day after the day of onset”.

The review of literature suggests the following:

- the data of all studies are similar,
- the majority of injuries in prospective studies involve the lower extremity (75,4–93%), in retrospective studies (64%–86,8%),
- head/spine/trunk injuries occur more often than upper extremity injuries.

Data from prospective studies indicate, that the most frequently injured in the lower extremity were the ankle (17,0–26%), and knee (17–23%). In youth players the most affected by the injury was the lower extremity (61–89%), followed by the head/trunk/spine (9,7–24,8%) and the upper extremity (4,0–24,8%). The highest percentage considers ankle – 16,4 to 41,2%. The most common types of injuries are contusions, sprains and strains.

In majority of studies the incidence has been calculated in between 12 to 35 injury per 1000 hours of outdoor games for adult male players and 1,5 to 7,6 injuries per 1000 hours of practice. In indoor foot-

ball players, the incidence of injury seems to be higher.

The risk of injury in professional football is about 1000 times higher than that observed in other industrial occupations generally regarded as high risk (construction and mining 0,02 injuries/1000 hours).

About 60–74% of contusion are due to physical contact between players. In the 1994 World Cup, 29% of all injuries resulted from foul play as judged by the referees. In a regular season in England – only 18% of injuries was caused by foul, 86% out of them by an opponent, so in 14% of cases a fouling player contused himself, in 41% were caused by direct contact. Foul by opponents therefore represents only 10% of all injuries, indicating that, in general, violation by players do not represent a major case of injury.

In 49% of cases, when contusion was the cause of the end of the career, knee injuries, mainly anterior cruciate ligaments and menisci were responsible.

Conclusions:

1. The overall level of injury to professional footballers is about 1000 times higher than that found in industrial occupations more traditionally regarded as a high risk.
2. Fatal injuries are extremely rare.
3. Only 12% of injuries involves a breach of the laws of game, however this ratio reaches a 29% in a high-level competition
4. High level of muscle strains observed during training increases an importance of implementing effective fitness in training programs.
5. The number of reinjuries suggests, that rehabilitation programs in clubs are inadequate.
6. Playing professional football can impact on the health.
7. In 49% of cases, when contusion was the cause of the end of the career, knee injuries, mainly anterior cruciate ligaments and menisci, were responsible.

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Key words: Football, soccer, epidemiology, injuries

Streszczenie

Piłka nożna jest jednym z najpopularniejszych, jeśli nie najpopularniejszym sportem na świecie. FIFA jednoczy 203 organizacje narodowe i zrzesza ponad 200 milionów zarejestrowanych graczy, w tym 40 mln kobiet.

Mianem urazu sportowego określa się wszystkie uszkodzenia tkanek dokonujące się w czasie treningu sportowego lub gry. Najczęściej stosowanym kryterium uznania urazu sportowego jest konieczność zrezygnowania z minimum jednego dnia treningu lub gry. Koncepcja urazu sportowego różni się od standardowej, gdyż ludzie nie trenujący wyczynowo uznawani są za zdrowych, gdy mogą wykonywać bez przeszkód swoje codzienne obowiązki. Sportowiec musi być zdolny do gry czy treningu na najwyższym poziomie.

Dokładna liczba urazów sportowych jest często trudna do oceny, gdyż nierzadko zależy od wielu czynników, takich jak: motywacja, odnotowanie urazu przez lekarza ekipy (jeśli taki w ogóle jest), stopnia świadomości gracza i trenera. Prawdopodobnie wiele wypadków nie jest w ogóle odnotowywanych, gdy gracz obawia się, że zostanie uznany za nie w pełni sprawny, odsunięty od gry, itp.

Narodowy System Rejestrujący Urazy Sportowe w USA (NAIRS) uznaje za uraz „odnotowany uraz, który ogranicza możliwość treningu lub gry przez minimum 1 następujący dzień” i dzieli je na lekkie (1–7 dni), umiarkowane (8–21) i poważne (ponad 21 dni).

Rada Europy zaproponowała definicję urazu sportowego jako wynik uczestniczenia w zajęciach sportowych mającej jedną lub więcej z powyższych konsekwencji:

- zmniejszenie intensywności aktywności sportowych,
- potrzeba zasięgnięcia opinii medycznej lub leczenia,
- niekorzystne skutki finansowe lub ekonomiczne.

Częstość urazów sportowych bardzo wzrasta, w 1975 roku 5% kontuzji leczonych w oddziałach urazowych w Anglii to były wypadki sportowe, w 1990 już 17% (a tylko 7% urazy komunikacyjne), a w roku 2000 23–28%. W Europie 50–60% urazów sportowych i 3,5–10% urazów leczonych w szpitalach, to skutki gry w piłkę nożną.

Częstość występowania jest definiowana jako liczba nowych kontuzji w jednostce czasu, powinna uwzględniać czas ekspozycji zawodnika na grę kontaktową i czas spędzony na treningach. Częstość wypadków w piłce nożnej wynosi 12–35 urazów na 1000 godzin gry i 1,5 do 7,6 urazów na 1000 godzin treningów, w Anglii przeciętnie 8,7 urazu na 1000 godzin zajęć. Kobiety ulegają relatywnie częściej urazom niż mężczyźni. Większość kontuzji piłkarskich wymaga mniej niż 1 tydzień leczenia. Najczęściej długiego leczenia wymagają naciągnięcia mięśni i skręcenia sta-

wów. W ciągu 6 sezonów w USA zanotowano tylko 4 ciężkie urazy, ani jednego ze skutkiem śmiertelnym. Najczęstszym typem urazu są skręcenia stawów, głównie skokowego (27,6 – 35% kontuzji) i naciągnięcia mięśni (10–47%). 75,4% do 93% urazów sportowych dotyczy kończyn dolnych, w 17–26% stawu skokowego, 17–23% stawu kolanowego.

W 63 do 91% do urazów dochodzi w czasie gry, tylko 9 do 37% kontuzji, głównie o charakterze przewlekłym przytrafia się w czasie treningów.

Około 86% do 100% zawodników jest kontuzjowanych w trakcie sezonu. W 64 meczach Pucharu Świata 2002, stwierdzono 2,7 kontuzji na mecz, 37% było spowodowanych przez faule, 36% bezpośrednio starcie pomiędzy zawodnikami bez złamania zasad gry, 27% bez styczności z innym zawodnikiem.

Spośród urazów, które powodowały zakończenie kariery 49% to urazy kolan, głównie uszkodzenia więzadeł krzyżowych i łąkotek.

Urazy sportowe mają często odległe konsekwencje – w Szwecji spośród 180 zbadanych zawodników 13,3% – 28,9% miało niestabilność stawu skokowego, 9,3% – 17,2% zespół bólowy po przebytych skręceniach, 7,3% – 14,4% niestabilność stawu kolanowego. Choroba zwyrodnieniowa stawu kolanowego w populacji Szwecji w 40 roku życia rozpoznawana jest u 1,6% ludzi, 4,2% byłych graczy amatorów i 15,5% byłych piłkarzy wyczynowych.

Czynnikami sprzyjającymi urazom są: wiek, uprzednie, nie wyleczone urazy, szczególnie naciągnięcia mięśni, czas ekspozycji na grę kontaktową, zaniedbania w przygotowaniu ogólnie sprawnościowym, szczególnie w aspekcie niedostatecznego rozciągnięcia i elastyczności mięśni. Ocenia się, że za 42% kontuzji odpowiedzialne jest niedostateczne przygotowanie do sezonu.

Wnioski:

1. Całkowita liczba urazów w profesjonalnym futbolu jest około 1000 większa niż np. w górnictwie,
2. Urazy ciężkie stanowią niezwykle rzadkość,
3. Tylko około 12% urazów jest skutkiem fauli, aczkolwiek w zawodach o wysokiej randze ich częstość rośnie do 29%,
4. Wysoka częstość naciągnięć i zerwań mięśni dowodzi konieczności wprowadzenia do procesu treningowego znacznie większej ilości ćwiczeń typu stretchingu,
5. Wysoka częstość ponownych urazów w tej samej okolicy dowodzi, że programy diagnostyki urazów, ich leczenie i rehabilitacja dotychczas realizowane w klubach wymagają korekty,
6. Gra w piłkę nożną może mieć znaczący wpływ na stan zdrowia po zaprzestaniu treningów.
7. Spośród urazów, które powodowały zakończenie kariery, 49% to urazy kolan, głównie uszkodzenia więzadeł krzyżowych i łąkotek.

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Słowa kluczowe: piłka nożna, urazy, epidemiologia

Introduction

It is evident that sport, as well as health-giving aspect, may present a danger to health in the form of accidents and injuries. High-velocity trauma and direct contact between sportsmen have made of football a kind of a combat sport, connecting both the consequences of chronic overuse and acute injuries.

Definitions: „Sport injury” is a collective name for all types of damage received in the course of sporting activities. Incidence is defined as the number of new sports injuries occurring during a period of time in a particular group of sportsmen.

Sport injury may be defined in different ways. In majority of studies the definition is confined to injuries treated at a medical casualty or other medical department (28). In some studies, a sports injury is defined as one received during sporting activities for which an insurance claim is submitted (15). The most common criterion in the definition of an injury is an absence from training or a game followed by the need for medical treatment and the diagnosis of anatomic tissue damage (7, 24, 28). This criterion may be misleading, because absence from game is influenced by a strong subjective component, frequency of the games, availability of medical treatment, importance of a player to the team and the expected outcome of the game.

If sports injuries are recorded only through medical channels, a large percentage of serious, predominantly acute injuries will be observed and less serious and/or overuse injuries will not be recorded. On the other hand many medical decisions are made by a paramedical staff. Often a special atmosphere of „no pain no game” is created, particularly among young sportsmen and often a serious pain is neglected by a player, who is afraid of opinion of being appreciated as „a weak or fragile person”. An observation of a bad medical practice or an

unfortunate course of injury or treatment of a player provokes others to avoid a medical stuff and a sensation that a need for operations might mean an end of a career is created.

So a „tip-of-the-iceberg” phenomenon is commonly described in epidemiological research (28).

The definition of sport injury should be based on a concept of health other than that customary in standard medicine. In everyday life people are regarded as healthy if they are able to do their daily works. A player is not fully recovered unless he or she can take part in his or her training, competition or match. National Athletic Injury Registration System (NAIRS) in the USA precise „The reportable injury is one that limits athletic participation for at least one day after the day of onset” (24). According to the length of incapacitation NAIRS classifies injuries into „minor” (1–7 days), „moderately serious” (8–21 days) and „serious” (more than 21 days or permanent damage).

Council of Europe proposed a definition of sport injury as a result of participation in sport with one or more of the following consequences:

- a reduction in the amount or level of sports activity,
- a need for (medical) advise or treatment,
- adverse social or economic effects (29).

The overall data are somehow surprising. The representative nation wide study in the Netherlands revealed, on a total population of about 15 million, an allover sports incidence of 3,3 injuries per 1000 h spent on sports; 1,4 injuries per 1000 h spent on sports were medically treated. That gave 2,7 millions contusions, 1,7 millions out of it were medically treated (28).

There’s an evident tendency of increasing the percentage of sport-related injuries

with time. In 1975 Williams estimated, that 5% of injuries treated at casualty departments in Great Britain were related to sport (31). According to the Dutch Home Acci-

For this purpose injury incidence is expressed as the number of injuries per 1000 h of participation by many researchers (28, 19, 3).

$$\text{Incidence} = \frac{(\text{n sports injuries/year}) \times 10^4}{(\text{n participants}) \times (\text{average h of sport participation}) \times (\text{weeks of season/year})}$$

dents Surveillance System a total of 32 276 were recorded by casualty departments of hospitals participating in the study during 6 months of 1983 year. 28,6% were related to sport, 14,9% to games, 0,7% to occupational activities and 9,1% to road accidents. In 1990 de Loes reported 17% of sport-related injuries, 26% happened at home, 19% at work and 7% were traffic injuries, 31% not defined (11).

Unfortunately soccer is among the highest risk sports. A report by the Dutch ministry of Health, Welfare and Cultural Affairs expressed the risk of sports injuries per 1000 practitioners of each sport – the highest risk was found in soccer (4,2%) (28).

Van Galen and Diederics made a table league taking into account time spent on each sport and indoor soccer was ranked as a first with 8,7 injuries per 1000 h (11). Out of 945 registered injuries 30% were self-treated, 24% by a sports first-aid attendant, 29% by a GP and 9% by a hospital first-aid ward.

Incidence can be defined as the number of new sports injuries during a particular period of time divided by the total number of sports people at the start of the period (population at risk). It gives as also an estimation of risk. Multiplied by hundred may be expressed in percents. (28). A very important factor is exposure to sport (the number of hours during which the person actually runs risk of being injured). It makes a great difference in between a professional player and an amateur, between different sports.

Lindenfeld (18) proposed that the definition of incidence should be sharpened by using „actual exposure time at risk” rather than overall time spent on sports participation. This is rather impossible to calculate, however is probably true for top level football players, who participate much more often in a game, exposed e.g. to brutal fouls than others, who simply are in training. In team sports (in contrast to individual sports) more injuries are sustained during matches than during training (9).

In majority of studies the incidence has been calculated in between 12 to 35 injury per 1000 hours of outdoor games for adult male players and 1,5 to 7,6 injuries per 1000 hours of practice. In indoor football players, the incidence of injury seems to be higher (7, 16, 13).

In England (12) the overall injury ratio (IFR) was 8,5 injuries per 1000 h of competition and training. The overall ratio calculated for competition was 27,7 for professionals and 37,2 for youth players, mainly in between 30 to 45 min of a match and in between 60–90 min and for training 3,5 for professional and 4,1 for youth.

So the risk of injury in professional football is about 1000 times higher than that observed in other industrial occupations generally regarded as high risk (construction and mining 0,02 injuries/1000 hours).

Overall injury frequency rate for youth players were found to increase over the second half of the season, whereas they decreased for professional players. This emp-

hasizes the importance of controlling the exposure of young players to high levels of competition (12)

Ekstrand (8) stated that overuse injuries were most often seen during preseason training and that adductor tenosinovitis with Achilles tendinitis were the most common type of overuse injury among males, shin splints and iliotibial tract tendinitis – among female players.

Complaints without injury: Peterson (23) investigated 264 players from 8 different age and level groups and 91% of them suffered from complaints related to football, but not caused by trauma or overuse. Complaints were mainly located in the lower extremities and the lumbar spine. Most of them disappeared in 1 week, but 15% of them were lasting for more than 4 weeks.

Severity of sport injuries:

Six factors must be taken under the consideration: 1. Nature of sport injury, 2. Duration and nature of treatment, 3. Sporting time lost, 4. Working time lost, 5. Permanent damage, 6. Cost.

Time loss:

Table 1 a. Time loss according to Larsson (16)

STUDY TYPE	Ekstrand & Gillquist 1983 N- 180 Prospective	Nielsen & Yde 1989 N-123 Prospective
TIME LOSS (%)		
Total number of injuries	256	109
< 1 week	62	46
1 week – 1 month	27	19
> 1 month	11	35

Table 1 b.

STUDY TYPE	USA Nation League men 1991 – 92 N-105 teams Prospective	USA Nation League women 1991 – 92 N-61 teams Prospective
TIME LOSS (%)		
Total number of injuries	5179	2530
1 – 2 days	42	39,5
3 – 6 days	32	32
7 – 9 days	9	9
10 days	17	19

Time loss is an effective indicator of injury severity, but it's dependent on who makes the decision governing when the player is able to return to competition and by what criteria they make that judgement. Not always an athlete has the days off. So the data are were difficult to interpret. The majority of soccer injuries requires less than one week of time loss, however recent English data (12) indicate 14,6 days of absence, 15,2 for competition and 13,4 days for training.

Albert (1) in a study of 142 reportable injuries in one season in professional soccer, found that the predominant injuries causing a time loss of one week or more were strains and sprains. He recorded six major injuries (out for more than 21 days) with an average time loss of 36 weeks. The overall average time loss per injury was 2,38 games and 8,59 practices.

Yde and Nielsen revealed similar dates to college-age players and professionals. Of the 24% injuries in time loss of 4 weeks or more, four were fractures, seven were knee injuries and five were ankle sprains (22).

In the six seasons of men's and women soccer from 1986 to 1992, the NCAA Soc-

cer Injury Surveillance System recorded only four catastrophic injuries (0,05% of all injuries), none of them was fatal (20, 21).

Nature:

After Thorndike (after 28) nine categories of medical diagnoses are generally accepted:

- Sprain (of joint capsule or ligaments)
- Strain (of muscle or tendons),
- Contusion (bruising),
- Dislocation or subluxation,
- Fracture (of bone)
- Abrasion (graze),
- Laceration (open wound),
- Infection or inflammation,
- Concussion.

Table 2. Nature of injury according to Hopkins (12)

NATURE OF INJURY	All injuries (%)	Match injuries (%)		Training injuries (%)	
	Pro + Youth	Pro	Youth	Pro	Youth
Strain	41	37	28	53	53
Sprain	20	21	20	18	19
Contusion	20	24	32	5	16
Overuse	4	5	1	5	2
Fracture	4	4	6	4	2
Laceration	2	2	5	1	0
Other	9	7	9	14	9

The most common injuries in adult soccer are sprains (27,6 – 35,0%), strains (10,0 – 47%) and contusions (8,3 – 21,3%), in youth soccer player on the other hand, the most common type of injury appears to be contusion (32,9 – 47%), sprains (19,4 – 35,3%) and wounds (6,5 – 39%) (8).

Location:

Table 3. Location of injuries according to Hawkins (12)

LOCATION OF INJURY	Strains (%)		Sprains (%)	
	Pro	Youth	Pro	Youth
Thigh	37	60	0	0
Ankle	0	0	62	100
Groin	31	20	0	0
Lower leg	23	10	0	0
Knee	0	0	30	0
Other	9	10	8	0
Total	100	100	100	100

Soccer-related injuries in 75,4 to 93% affect lower extremities (13). The most common types of injuries are contusions, sprains and strains.

The review of literature suggests the following:

- the data of all studies are similar,
- the majority of injuries in prospective studies involve the lower extremity (75,4 – 93%), in retrospective studies (64% – 86,8%),

– head/spine/trunk injuries appear to occur more often than upper extremity injuries

- data from prospective studies indicate, that the most frequently in the lower extremity were the ankle (17,0 – 26%), and knee (17 – 23%).

In youth players the most affected by the injury was the lower extremity (61 – 89%), followed by the head/trunk/spine (9,7 – 24,8%) and the upper extremity (4,0 – 24,8%).

The highest percentage considers ankle – 16,4 to 41,2%.

Table 4. Localization of injuries according to Larsson (16)

STUDY TYPE INJURY (%)	Ekstrand & Gillquist 1983 N-180 Prospective	1991 - 92 USA National League men N-105 teams Prospective	1991 - 92 USA National League women N- 61teams Prospective	Brynildsen and all 1990 N-150 Retrospective
Total number of injuries	256	1221	595	248
Head/trunk	5	14	11	5
Upp. extremity	0	6,5	6	5,5
Low. extremity	88	76	81	87
Hip/groin	13	5,5	5,5	3,6
Upper leg	14	17	18	6
Knee	20	18	17	20
Lower leg	12	6,5	9	14
Ankle	17	21	22	39
Foot/toe	12	8	9,5	3,6
Other	7	3	1,5	3

Table 5. Location of injury among young players according to Larsson (16)

STUDY TYPE INJURY (%)	Backous et all 1988 N-1139 Prospective	Schmidt-Olsen et all 1985 N-6600 Prospective
Total number of injuries	216	169
Head/trunk	10	10
Upp. extremity	5	15
Low. extremity	68	75
Hip/groin	3	2,5
Upper leg	8	15
Knee	12,5	13,5
Lower leg	15	9,5
Ankle	19	29
Foot/toe	10	5
Other	17	0

Table 6. Mechanism of injury according to Hawkins (12)

MECHANISM	All injuries Pro+Youth (%)	Match injuries		Training injuries	
		Pro (%)	Youth (%)	Pro (%)	Youth (%)
Tackled	23	28	29	10	19
Running	19	18	7	30	12
Tackling	14	17	17	5	12
Shooting	10	6	8	17	21
Turning	8	5	3	13	19
Overuse	8	10	6	6	4
Landing	5	5	6	5	2
Collision	4	4	12	1	4
Heading	2	2	4	1	0
Jumping	2	2	0	3	2
Other	5	3	7	9	5
Total	100	100	99	100	100

Most football injuries are traumatic and proportions of these caused by overuse varies in between 9 – 34% (22). English data suggest 67% of injuries as a result of game (12).

86 – 100% of players are injured during each season. Reinjury accounted for 22% of all injuries (12).

Head injuries have been shown to account for 4% to 22% of all football accidents (16, 14). Neuroelectrophysiological and MRI study of Jordan did not revealed any chronic encephalopathy as a result of repetitive heading of a ball. But concussion resulting from collisions with another player is a common phenomenon occurring in about 50% of players. And the basic incidence is 0,96 cases per team per season.

171 injuries were reported during the 64 matches of the 2002 FIFA World Cup Korea/Japan, at an average 2,7 injuries per match, (in France at the 1998 World Cup were 2,4) – 37% caused by fouls, 36% by player-to-player contact that did not violate the Laws of the game, 27% happened without any contact with another player (6). That is a relatively high ratio – last English data indicate, that only 18% of injuries are the results of foul, although player-to-player contact was the cause in 41% of cases (12).

During the 2-year study 5% of adolescents in Columbia experienced 1 or more sports-related injury events in 6 game sports, that made 17% of all injury events in the surveillance (4).

Age and skill:

Table 7. Relations in between age, skill and number of soccer-related injuries according to Peterson (23)

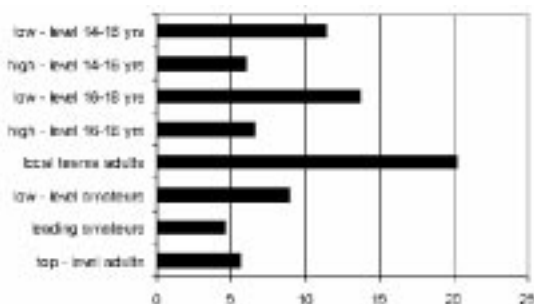
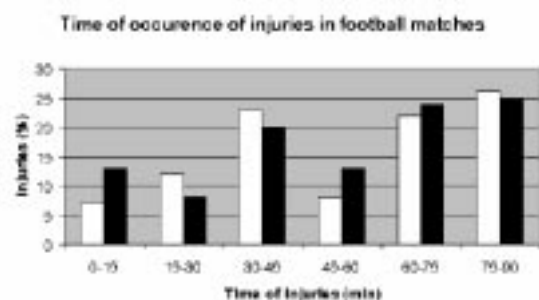


Table 8. Relation between time of the game and occurrence of injuries according to Hawkins (12)



Late consequences:

Serious injuries in soccer may result in persistent symptoms and cause a permanent physical damage. Of 180 players examined by Ekstrand and Gillquist (9, 16, 8) 52 players (28,9%) had clinical instability, and 31 (17,2%) had persistent symptoms from previous ankle injury. Twenty six players (14,4%) also had persistent knee instability from past injury.

Brynhildsen (2) report that 22% of the players had sustained an overuse injury during their career. Half of those who had suffered shin splints and 100% of those who had patellofemoral pain or iliotibial tendini-



Ryc. 1. Football is the most popular sport in the world

tis continues to have a chronic pain. Of those, who sustained an ankle injury, 13,3% had mechanical instability and 9,3 had persistent symptoms. Eleven players (7,3%) with a previous knee sprains had residual symptoms and four players had mechanical instability and positive Lachman test.

Roos reported, that the prevalence of gonarthrosis was 15,5% among elite former football players, 4,2% among non-elite players and 1,6% among age-matched controls (25). Lindberg compared the occurrence of coxarthrosis among 286 former soccer player with age matched group of 55 years old cohort and found hip arthritis in 5,6% of players compared with 2,8% in a control group (17).

Roos concluded from his review of literature (25) that long-term professional career increases a risk for early development of arthritis of lower extremity in two ways: increased risk for knee injury as ACL tear



Ryc. 2. The incidence of football – related injuries is 12 – 35 per 1000 h of play and 1,5 to 7,6 per 1000 h of practice

or meniscus damage and second – due to excessive loading on the hip and knees that occurs during the game.

Table 9. Distribution of osteoarthritis in respondents from five Former Players Associations according to Turner (27)

DISTRIBUTION OF OSTEOARTHRITIS	(%)
Right knee	60
Left Knee	45
Right hip	13
Left hip	17
Right ankle	24
Left ankle	14
Right foot	4
Left foot	4
Back	18
Neck	16
Other	10

English recent data coming from five Former Players Associations (27) indicate,

that since retiring from professional football 32% responders reported having surgery on at least one occasion.

Of 75 responders 48 had knee surgery, of which 10 were knee replacements. 15 responders reported having had hip surgery, of which 12 were hips replacements. Six responders having two joint replacements. Twenty four (9%) respondents were currently awaiting surgery, 13 for joint replacements. 43% of respondents having had at least one non-surgical treatment (physiotherapy, acupuncture, massage during their career). 28% were currently taking medication to alleviate symptoms.



Ryc. 3. Great majority of contusions considers knee and ankle



Ryc. 4. 60% of muscular sprains are in the region of a thigh

Predisposing factors

Predisposing factors are subdivided into two categories:

- intrinsic, related to individual biological or psychosocial characteristics of a person such as age, joint instability, muscle strength asymmetry, previous injuries, inadequacy of rehabilitation or fitness, stress.

- extrinsic, related to environmental variables, such as the level of play, exercise load, position played, standard of training, equipment, playing field conditions, rules and fouls.

The incidence of soccer injuries appears to increase with age (16), probably mainly due to injuries from players contact, because increased strength, speed and aggressiveness led to higher impacts in collision. In younger age group, a higher incidence of head, face and upper extremity

was documented, possibly of more frequent falls on outstretched hands, illegal ball contacts, mechanical weakness of growing tissues, insufficient technique and increased ratio ball-weight to head-weight (16).

Nielsen and Yde (22) reported, that all players who sprained an ankle while running had a previous history of a sprain. They also claimed, that in 59% of reinjuries the players had no completely recovered from previous injury and 56% of ankle sprains occurred in athletes with history of ankle sprains. Ekstrand and Trop (10) report, that soccer player with previous ankle problems are at 2,3 times higher risk for ankle injuries (48% of players).

Gender: may be also related to injury risk – elite female soccer players sustained a higher injury rates, this is especially truth in youth soccer, probably due to the females unfamiliarity and inferior technique when compared with males of the same age (16, 13, 22). However NCAA Injury Surveillance System reported similar injury rates among male and female athletes (20, 21). UEFA in his last report stated, that on a high level of competition like a european championship 2002 in female soccer the number of contusions was much lower, because game is not so physical. Over half the injuries concerns muscles of the thigh and knee joint. Due to different elasticity of woman ligaments there's much more of cruciate ligaments tears than in men. What considers distribution of injury, during the last European championship, happened 158 injuries among woman: 42% ligaments, 25% muscles, 12% menisci, 10% tendons, 3% head. Mechanisms were also a bit surprising – 50% of contusions happened in shooting, 10% jump in duel, 30% kick in duel, 10% due to overload (32).

Exposure: teams with a higher practice-to-game ratio have fewer injuries, possibly because of superior physical condition-

ing. There's no strong evidence, that high level players sustained much more often injuries than those of low-level (8).

Position: Players are exposed to different situations based on their relative field positions, but there's no significant differences between injury rates. Goalkeepers of course have more head, neck, face and upper extremity injuries than field players.

Environment: In both women's and men's NCAA soccer, the rate of injury occurrence on artificial surface is higher than on natural surfaces (20, 21). The college-age men sustained 11,45 to 7,65 injuries per 1000 h exposures and college-age females incurred 9,99 and 7,71 injuries per 1000 h of exposure on artificial and natural surfaces respectively.

Equipment: Failure to wear shin guards (13) notably increases proportion of leg injuries. According to Ekstrand and Gillquist all traumatic leg injuries occurred in players who wore inadequate or no shin guards. Traumatic injuries, such as knee sprains, are usually caused by twisting of the knee that occurs when the shoe with screw-in studs stuck in the ground (7, 13) an up to 2/3 of overuse injuries are attributed to poor quality footwear.

Rules and fair play: About 60 – 74% of contusion is due to physical contact in between players. In the 1994 World Cup, 29% of all injuries resulted from foul play as judged by the referees (16, 8). In a regular season in England – only 18% of injuries was caused by foul, 86% out of them by an opponent, so in 14% of cases a fouling player contused himself, in 41% were caused by direct contact (12). Foul by opponents therefore represents only 10% of all injuries, indicating that, in general, violation by players do not represent a major case of injury.

Health support system: Ekstrand (8) suggests preseason examination, including measurements of flexibility and muscle

strength so that any deficiencies may be corrected on time. The exam should focus on lower extremity with test of stability of ankle, knee and hip. Players with instability should be recommended for taping or bracing.

In a regular season in four professional clubs in England a total of 41% of all injuries were classified as muscular strains, which represented twice the level of injuries classified as sprains (20%) or contusions (20%). Reinjuries accounted in this study for 22% of all injuries, but 76% of them were strains (49%) or strains (27%); of the 32 recurrent thigh strains, 86% were the posterior aspect. The level of reinjury is during competition is significantly higher for pros (22%) than for young players (10%) (12).

Many authors agreed, that musculoskeletal deficiencies contribute to soccer injuries. Ekstrand and Gillquist found, that 42% of all injuries were due to players factor such as joint instability, muscle tightness, inadequate rehabilitation and lack of training. Flexibility exercises for the lower extremity should be included in the warm-up and cool-down, and players with a lack of flexibility should be given additional exercises. In particular shooting at



Ryc. 5. 37% of contusions is due to tackling

the goal before warm-up should be avoided because it is related to quadriceps strain.

Minor injury is often followed within two months by a major one at the same area.

The medical and coaching staff insist upon controlled rehabilitation and strict adherence to programs for rehabilitation.

In Sweden a prophylactic program was introduced (8). Twelve team in male senior soccer division were randomly divided into two groups, six teams each. Program was administered in one group and comprised: a) correction of training, b) provision of optimum equipment, c) prophylactic ankle taping, d) controlled rehabilitation, e) exclusion of players with a knee instability, f) information about the importance of disciplined play and the increased risk of injury at training camps, g) correction and supervision by doctor and therapist. The reduction of rates of injuries during six months of program was 75% fewer than controls.

Unfortunately other data suggested (30) that the subject is much more complicated. Watson in his study revealed, that incidence of injury was not found to be related to the number of general clinical defects detected during a clinical examination in high level sport. This result is important, because general test from internal medicine are routinely performed. In contrast, results do suggest that a clinical examination that concentrates on the detection of musculo-skeletal defects is likely to be useful in the prediction of future injuries. Pre-participation physical assessment should emphasize the detection of musculoskeletal defects such as: muscle imbalances, weakness of muscle groups protecting and stabilizing joints, joint stability and signs of lack of full recovery from previous injury. The interpretation of results is nor easy, e.g. good acceleration over 10 meters distance is directly proportional to the force developed to

the athlete, presumably it equates with greater stress on tissues and thus increases a risk of injury. The ability to accelerate is highly desirable in field games („multiple sprint activities”), but player who posses it is in a group of a higher risk than others.

As it was said previously football (soccer) is one of the most popular sport in the world (7, 16). Currently FIFA unifies 203 national associations and represents about 200 million active players, of which about 40 million are women. The incidence of football injuries is estimated to be 10–35 per 1000 game hours. One athlete plays on average 100 hours of football per year (from 50 hours per player of a local team, up to 500 hours per player for a professional team). So every player will have minimum one performance-limiting injury per year (7).

At the moment in Polish Football Association are registered:

Table 10. Number of officially registered football players in Poland

Regional Football Associations	16
Teams	5794
only U – 18	1950
Players	381 553
only Juniors U-19	217 068
Trainers, coaches, instructors	7393
Coaches international	35
I st class trainers	475
II nd class trainers	1554
Instructors	5329

Data concerning indoor football players (like myself) are difficult to collect.

Conclusions:

1. The overall level of injury to professional footballers is about 1000 times higher than that found in industrial occupations more traditionally regarded as a high risk.

2. Fatal injuries are extremely rare.

3. Only 12% of injuries involves a breach of the laws of game, however this ratio reaches a 29% in a high-level competition

4. High level of muscle strains observed during training increases an importance of implementing effective fitness in training programs.

5. The number of reinjuries suggests, that diagnostic measures, treatment and rehabilitation programs in clubs are inadequate.

6. Playing professional football can impact on the health.

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Address for correspondence: Grzegorz Adamczyk, Carolina Medical Center, ul. Broniewskiego 89, 01 – 876 Warszawa, Phone /Fax. (48 22) 633 36 65, Mob. Phone: (48) 602 353 227, E-mail: grzegorz.adamczyk@carolina.pl