

# SOCCKER PLAYERS' INJURIES AT DIFFERENT LEVELS OF THE SPORT

## KONTUZJE PIŁKARZY NOŻNYCH O RÓŻNYM POZIOMIE ZAAWANSOWANIA SPORTOWEGO

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**A** – przygotowanie projektu badania | study design, **B** – zbieranie danych | data collection, **C** – analiza statystyczna | statistical analysis, **D** – interpretacja danych | interpretation of data, **E** – przygotowanie maszynopisu | manuscript preparation, **F** – opracowanie piśmiennictwa | literature review, **G** – pozyskanie funduszy | sourcing of funding

### ABSTRACT

**Background:** Soccer players are injury prone, and increasing competition - especially at the highest level - leads to increasing training loads, and these may contribute to more injuries to players. Hence, the aim is to increase preventive measures and treatment in this field.

**Aim of the study:** The paper examines soccer players' susceptibility to injuries occurring at different levels of the sport's development, and describes the accompanying conditions.

**Material and methods:** The study involved 215 players of different levels, of which 105 came from the II and III league clubs (group I) and 110 from IV league clubs (group II). The conducted research was based on a diagnostic survey using an anonymous questionnaire containing 15 questions developed by the authors.

**Results:** Similar traumas (injuries) were observed among respondents of both groups. Group I had suffered injuries in the case of 92 (87.62%) respondents, while Group II contained 87 (79.09%) subjects who had suffered injuries. Group I trained harder than Group II, but the nature of the injuries was similar for all the players. The surveyed Group I had 100% access to physio-therapeutic help; in Group II this was the case for only 48 (43.64%) subjects. Group I also applied preventive anti-injury measures to a greater extent than Group II, in the form of pre-training warm-ups and post-training stretching and loosening.

**Conclusions:** Among the more advanced soccer players there was a trend toward more traumas with similar kinds of sustained injuries, despite the greater availability of physiotherapy care and their use of more anti-injury prevention techniques than in the group representing the lower levels of sport advancement in soccer. This adverse effect is associated with the more intense training and training loads of the more advanced players.

**KEYWORDS:** soccer, injuries, treatment, prevention

### STRESZCZENIE

**Wstęp:** Piłka nożna jest sportem powodującym wiele kontuzji a wzrastająca rywalizacja – szczególnie na najwyższym poziomie – prowadzi do zwiększania obciążeń treningowych, które mogą się przyczyniać do powstawania większej ilości uszkodzeń ciała piłkarzy. Stąd dąży się do zwiększenia działań prewencyjnych i terapeutycznych w tym zakresie.

**Cel pracy:** Zbadanie częstości pojawiania się kontuzji, przyczyn i skutków ich występowania oraz stosowanych sposobów prewencji urazów u piłkarzy nożnych o różnym poziomie zaawansowania sportowego.

**Materiał i metody:** W badaniu wzięło udział 215 piłkarzy nożnych, z których 105 pochodziło z klubów II i III-ligowych (grupa I), a 110 z klubów IV-ligowych (grupa II). Przeprowadzono je w oparciu o metodę sondażu diagnostycznego z zastosowaniem anonimowego kwestionariusza ankiety własnego autorstwa zawierającej 15 pytań.

**Wyniki:** W obydwu grupach zaobserwowano podobieństwa w zakresie odniesionej urazowości. W grupie I występowała ona u 92 (87,62%) ankietowanych, a w II grupie u 87 (79,09%) osób, przy czym grupa I trenowała intensywniej niż II, a charakter urazów był podobny u wszystkich piłkarzy. Badani grupy I mieli 100% dostępność do pomocy fizjoterapeutycznej, a w grupie II miało ją tylko 48 (43,64%) osób. Grupa I również w większym stopniu niż grupa II stosowała środki prewencji urazów w postaci rozgrzewki przed treningiem oraz rozciągania i rozluźniania mięśni po treningu.

**Wnioski:** W grupie bardziej zaawansowanych piłkarzy nożnych występowała jedynie tendencja do większej urazowości przy podobnym rodzaju odniesionych uszkodzeń ciała, pomimo większej dostępności do pomocy fizjoterapeutycznej i stosowania przez nich w większym stopniu prewencji przeciwurazowej niż w grupie reprezentującej niższy poziom sportowy. To niekorzystne zjawisko związane jest z większymi obciążeniami treningowymi i startowymi bardziej zaawansowanych piłkarzy.

**SŁOWA KLUCZOWE:** piłka nożna, urazy sportowców, leczenie, prewencja

## BACKGROUND

The International Federation of Association Football (FIFA – Fédération Internationale de Football Association) reported that in 2006 about 270 million people in the world's countries registered in the Federation played football [1]. Complementing the above data, it should be noted that in Switzerland in recent years, there were 226 000 licensed soccer players and 600 000 who played football occasionally [2]. Football has grown on the professional and amateur levels. In light of the division of the league made in 2016 in Poland, lower leagues for amateurs can be regarded as level IV of competition, and teams playing in the third league and higher should be classified as professional teams. Soccer training at each level of the practice extensively develops the human body due to the improvement of: metabolism, cardiovascular and respiratory functions, and improving the efficiency of skeletal muscle [3,4]. However, due to the fact that football is a direct contact sport, and that the dynamic development of the sport has made training and competition more intense and aggressive [5], the sport is characterized by a high proneness to injury [6]. Injury in this popular sport is significant. Hawkins and Fuller [7] showed that soccer players have more than 1,000 times the number of injuries encountered in industrial professions at high accident risk. This large trauma rate entails high losses, not only in sports, but also financial, health and moral losses. So, for example, in the English soccer league in the 1999–2000 season a total loss of 118 million Euros was sustained due to injuries [8]. Similarly, in Switzerland these losses for the year 2003 amounted to 95 million Euros and 500 000 lost working days [2], and in the Netherlands in the year 2008, medical costs and absenteeism from work due to soccer injuries reached 1.3 billion Euros [9]. Injuries in soccer are concentrated mainly in the lower limbs [10], and the time of their occurrence is associated with the periods of the annual training cycle [10], the position of a player in the field, a player's experience [11], along with many

other contributing factors. Therefore, in order to prevent injuries and their adverse consequences various preventive strategies were introduced. According to Van Mechelen et al. [12] this is a comprehensive system and should be carried out in four stages. "The first should be to identify the size of the problem and describe it. Secondly, reveal the factors and mechanisms of sports injuries. Thirdly introduce a preventive strategy, and in the fourth stage assess the effects of this strategy and return to the first stage". FIFA also proposes its anti-injury prevention programs in football, for example FIFA 11+ [13].

## AIM OF THE STUDY

The aim of this study is to investigate the frequency of the occurrence of injuries, the causes and consequences of their occurrence, and the methods of anti-injury prevention for soccer players at different levels of the sport.

## MATERIAL AND METHODS

In order to carry out the study it was first approved by the Bioethics Committee of the Public Medical Higher Vocational School in Opole, approval number 222/2015. The study was carried out between January and August 2016, and involved 215 players from the Silesian province and the city of Lodz, with 105 athletes (22.42±2.87 years) representing the second and third leagues (Group I - professional), and 110 respondents (23.37±3.36 years) representing soccer players in Division IV (Group II - amateur). The study was performed by a diagnostic survey using an anonymous questionnaire of our own design consisting of 15 questions, of which 3 were included in specifications: the age of respondents, the level of competition (represented leagues), the respondent's position on the field. Further questions include one or multiple choice and in the order 4–15 related to:

- the kind of injury sustained,

- the situation in which the injury occurred,
- the number of training sessions performed in a week, excluding played matches
- return to full fitness after the injury,
- the consequences of the injury,
- the soccer player's relation to training during the time of injury,
- the player's participation in regular medical examinations,
- the possibility of the use in a sports club of a physiotherapist and wellness center,
- the possibility of a physiotherapist's help during convalescence,
- the ability to obtain a physiotherapist's instructions concerning the possibility of injury prevention,
- the ability to practice a chosen form of warm-up before training,
- the ability to do stretching and loosening exercises after training.

The results were expressed in absolute terms, and/or as a percentage. After checking the normal age distribution of the respondents with a skewness test (value = -0.421) and a kurtosis test (value = 1.498), the t-Test for unrelated values was used for analysis. Differences in the responses between the two groups differing in their level of sport has been demonstrated by the use of the test structure ratio (fraction test). Values at  $p < 0.05$  were taken as statistically significant.

## RESULTS

The results of the study are presented in tables and descriptively, grouping them into similar thematic issues. The number of respondents and the age of the two groups did not differ statistically ( $p > 0.05$ ). Injuries

in group I constituted 87.62% (92 athletes), and 79.09% in the second one (87 players), and did not differ significantly ( $p = 0.094$ ). The number of competitors in terms of positions on the soccer field was similar in both groups, and also did not differ statistically – table 1.

In Group I and Group II there were 292 injuries in total, of which Group I had 152 cases, and Group II 140 cases, and the difference between the two groups was not statistically significant ( $p = 0.321$ ). Studies have shown that the most common injuries were related to muscles and ankles. Injuries occurred more frequently during the preparation period in Group II than in Group I ( $p = 0.006$ ), while Group I more often succumbed to injuries during matches when compared with respondents of Group II ( $p < 0.001$ ). These data are contained in table 2.

Group I players trained harder, because a greater number of players from this group performed six workouts per week ( $p < 0.001$ ) than in Group II (table 3). With regards to participation in clinical tests, subjects in Group II more often did not participate ( $p < 0.001$ ) compared to athletes from Group I, and the ambivalent response „not always” to this question was more often given by players from Group I ( $p < 0.001$ ) than from the second group. The availability of a physiotherapist for players at the clubs' facilities in Group I was 100%, while in Group II it was only 43.64%, which in absolute terms was a statistically significant difference ( $p < 0.001$ ). This significant difference in the availability of physiotherapists for players in both groups determined the significant intergroup difference in terms of the answer to this question ( $p < 0.001$ ).

83.24% of the respondents returned to good pre-injury condition after the sustained injuries, of which Group I constituted 79.35% and Group II, 87.36%, with a recurrence of injury which occurred earlier, on aver-

Table 1. Characteristics of soccer players

Group	Subjects [n;%]	Age [years] [x; ±SD]	Position on the field [n;%]			
			Striker	Midfielder	Defender	Goalkeeper
I	105 (48.84)	22.42±2.87	16 (15.24)	51 (48.57)	26 (24.76)	12 (11.43)
II	110 (51.16)	23.37±3.36	22 (20)	51 (46.37)	29 (26.36)	8 (7.27)
I & II (total)	215	22.89±3.11	38 (17.67)	102 (47.45)	55 (25.58)	20 (9.3)

Table 2. Type and duration of the annual cycle in which the injury occurred

Type of injury/ Group	Group I	Group II	Period of Injury	Group I	Group II
	[n; %]	[n; %]		[n; %]	[n; %]
Muscles	47(30.91)	40(28.58)	PR	53(34.87)	71(50.71)**
Ankle joint	40(26.32)	38(27.15)	PT	21(13.81)	29(20.71)
Fractures	19(12.50)	20(14.29)	Match	53(34.87)	21(15.00)***
Meniscus	19(12.50)	17(12.14)	Training	25(16.45)	19(13.58)
Ligaments	11(7.24)	10(7.14)			
Other	16(10.53)	15(10.71)			
Total in each Group	152(100)	140(100)		152(100)	140(100)
I & II gr. (total. n=292)	152(52.05)	140(47.95)		152(52.05)	140 (47.95)

\*-comparison between Groups I & II; \*\*- $p < 0.01$ ; \*\*\*- $p < 0.001$ ; TR – training in the preparatory annual cycle; TP – training in the prestart annual cycle.

age, at 55.31%, and in both groups this figure reached similar values, which did not differ statistically. Players' awareness of the acquired injury was higher in group I because those subjects less often ignored acquired injuries ( $p = 0.039$ ) and were more likely to be fostered neglected existing injury ( $p = 0.007$ ), although at the same time athletes from this group more often committed errors by training despite medical contraindications ( $p=0.021$ ) than Group II players (table 4).

After an injury physiotherapy care was provided in 74.30% of cases, of which more frequently it was afforded in Group I (89.13%) than in Group II - 58.62%, as compared with the absolute values it showed a statistically significant difference ( $p<0.001$ ). Similar differences existed between the groups in terms of providing information to the players tested by physiotherapists

on how to prevent injuries. In Group I it was 85.87%, while in Group II it was only 62.07% ( $p<0.001$ ). Negative responses to both questions also differed between the groups ( $p<0.001$ ), as shown in table 5.

Also, the preventive effect was more intense in Group I, since they always warmed up before training (72.38%), and post-exercise stretching, loosening and relaxing was performed by 60.0% of the athletes in this group (table 6). Those in Group II who warmed up and loosened up were 48.18% and 20.9%, respectively, and statistical procedures for a description of these values in absolute numbers showed significant differences between the groups ( $p<0.001$ ). Group II more often provided answers on pre-workout warm-ups as „usually done” ( $p=0.005$ ) and post-workout stretching performed „sometimes” ( $p<0.001$ ) than in group I.

Table 3. Training loads and medical care of surveyed players [n; %]

Group	Number of training sessions in a week [n;%]				Participation in medical research [n;%]			Accessibility to a physiotherapist [n;%]	
	3	4	5	6	yes	no	not always	yes	no
I (n=105)	0.00	35(33.34)	22(20.95)	48(45.71)	76(72.38)	10(9.52)	19(18.1)	105(100)	0,00
II (n=110)	30(27.28)***	54(49.09)*	20(18.18)	6(5.45)***	70(63.64)	36(32.72)***	4(3.64)***	48(43.64)***	62(56.36)***
I & II (n=215)	30(13.95)	89(41.41)	42(19.52)	54(25.12)	146(67.9)	46(21.4)	23(10.7)	153(71.16)	62(28.84)

\* comparison between Groups I & II; \* $p<0.05$ ; \*\*\* $p<0.001$

Table 4. Effects of experienced injury and players' behavior during its treatment

Group	Return to form after injury Group I (n=92) Group II (n=87) Total (n=179)		Injury Recurrence Group I (n=92) Group II (n=87) Total (n=179)		Behavior during injury Group I (n=103), Group II (n=98), Total (n=201)				
	yes	no	yes	no	Ignored injuries	Training with pain	Training in spite of contraindications	Injury concealment	Lack of neglect of existing injury
I	73(79.35)	19(20.65)	51(55.43)	41(44.57)	47(45.63)	32(31.07)	12(11.65)	0.00	12(11.65)
II	76(87.36)	11(12.64)	48(55.17)	39(44.83)	59(60.20)*	34(34.70)	3(3.06)*	0.00	2(2.04)**
I & II	149(83.24)	30(16.76)	99(55.31)	80(44.69)	106(52.73)	66(32.84)	15(7.46)	0.00	14(6.97)

\* comparison between Groups I & II; \* $p<0.05$ ; \*\*  $p<0.01$

Table 5. Inter group difference in the area of accessibility to posttraumatic physiotherapy care and information on injuries prevention [n; %]

Group	Physiotherapy help [n;%]		Information on injuries prevention [n;%]	
	yes	no	yes	no
I (n=92)	82(89.13)	10(10.87)	79(85.87)	13(14.13)
II (n=87)	51(58.62)***	36(41.38)***	54(62.07)***	33(37.93)***
I & II (n=179)	133(74.30)	46(25.70)	133(74.30)	46(25.70)

\* comparison between Groups I & II; \*\*\*  $p<0.001$

Table 6. Intergroup difference of anti injury training methods [n;%]

Group	Warm up before training [n;%]				Stretching and relaxing exercises [n;%]			
	always	usually	sometimes	probably not	always	usually	sometimes	probably not
I (n=105)	76(72.38)	26(24.76)	3(2.86)	0.00	63(60.0)	26(24.76)	16(15.24)	0.00
II (n=110)	53(48.18)***	47(42.73)**	9(8.18)	1(0.91)	23(20.90)***	27(24.55)	57(51.82)***	3(2.73)
I & II (n=215)	129(60.0)	73(33.95)	12(5.58)	1(0.47)	86(40.00)	53(24.65)	73(33.95)	3(1.40)

\* comparison between Groups I & II; \*\* $p<0.001$ ; \*\*\* $p<0.001$

## DISCUSSION

It has been observed that the age of soccer players may determine the severity of the resulting injury [14]. It was also shown that susceptibility to the occurrence of injury increases with the player's age and is highest in the range of 29–30 years [11]. In the cases studied by us of soccer players, this factor was not important because the two groups did not differ in age ( $p > 0.05$ ). In the search for other factors determining the formation of injuries in sport Kristenson et al. [11] indicate that the position in which the sportsman plays is also associated with the incidence of injury, and the lowest level of injury was observed in among goalkeepers. In the course of this study the soccer players in both groups sustained similar amounts of injuries in relation to the position occupied on the field, but the results could be unreliable due to the small number of respondents in each group. For example, in Group I only 12 goalkeepers were tested, and in Group II – 8 (table 1).

The obtained results also show that although the number of injuries in both groups was similar, in group I, representing a higher sport level, there was a tendency for more injuries. This trend is confirmed by the research of Peterson et al., [14] and is associated with the fact that in recent decades the sport has required players to achieve better physical and mental preparation. Athletes are playing more and more matches, and their sport is much more intense and, unfortunately, more aggressive, than previously [15]. Kristenson et al. [11], extending the issue, found that experienced players often struggle with injuries, including even bone lesions associated with fatigue.

In our study the most common injuries were muscle and ankle contusions, which occurred in similar proportions in both groups (table 2). Herrero et al., analyzing more than 134,000 amateur players registered with the Spanish Football Association, showed that the most frequently injured body parts in these studies were knees and ankles that underwent twisting or ligament rupture [16]. Of all the described injuries in these studies 67.2% resolved spontaneously, while 32.8% required medical intervention. 87% of them were injuries which eliminated the athlete for a minimum of 1 match. In our study the majority of injuries occurred in the second group, representing the lower level of sports, and with less availability of physiotherapy care mainly during the preparatory training period. In Group I, in which physiotherapy care was provided in 100% of cases, injuries during training (more than in Group II) were significantly lower (table 3). This statement indicates that during the training periods the presence of physiotherapy care reduces the amount resulting injury to a greater extent than the size of the applied loads at the time. This principle does not operate during competition when matches are played in higher sport leagues, which are more dynamic and injury prone than in the lower leagues. Therefore, in our study we had a significantly greater amount of injury sustained during matches and training in group I than

in group II, despite the provided sufficient medical and physiotherapy care. A conclusion could be drawn that the intensity of sport involvement, and not the quality medical-cum-physiotherapy care determines the number of sustained injuries. Van Beijsterveldt et al., observing for one season 456 amateur and 217 professional soccer players from Dutch leagues, confirmed our observations, and noted an increased number of injuries among amateur rather than professional soccer players in the preparation period, and the inverse relationship of a larger proneness to injury during matches and training among professional football players relative to amateurs [17].

It was also shown that there is a correlation between the number of completed training sessions and a team's success [18], which is confirmed by our survey, in which nearly half of the players representing a higher level of sports (Group I) trained six times a week, while nearly half of the Group II players trained only 4 times a week (table 3). It also described the opposite relationship between the number of days without training as a result of injury and lack of team success [19].

Also, previous injury which was insufficiently cured is a factor conducive to the emergence of new injuries, and hence the proper rehabilitation and consideration of a preexisting injury, and prevention are important factors in the formation of subsequent injury [20]. In the present study it was shown that earlier injuries influenced the formation of new injuries later with the same frequency in groups I and II - (table 4). This comparison shows that the level of sports players had no effect on the recurrence of the injury. However, van Beijsterveldt et al. suggest that injuries frequently recur in the case of players at lower levels of sports [17]. It turns out that an important factor in the prevention of an injury is the athlete's relation to that newly occurred injury. In our research Group I respondents were presented who approached existing injuries with more respect than athletes in Group II, which also indicates the higher anti-injury consciousness of players representing more advanced level of sport. It has been demonstrated that 5 untreated minor injuries ultimately caused the players equally long absence from training (days without training), which entails serious injury [20]. Therefore, minor injuries should not be neglected, and awareness should be raised among players. Neglecting minor injury is often due to the fact that doctors and physiotherapists are always available only during competition, and less frequently during workouts, which are far more common sports activities, and it is during these regular activities that most minor injuries occur.

The effectiveness of the physiotherapy process is conditioned by other problems formulated in parts of the questions from the questionnaire used in our research. These questions include: the systematic participation of athletes in medical research, the possibility of using physiotherapists in sports clubs every day and during the occurrence of injury, and physiotherapists providing information about possible preven-

tion to a soccer player after his recovery from injury (Tables 3 and 5). A positive response to such questions is to demonstrate the extent to which soccer players sustained injuries after returning to good pre-injury sport and health condition.

It has been shown in our study that good sport fitness and good health condition with a history of injury was achieved to a similar extent in both groups, suggesting that the sustained injuries were of a similar type and severity. The number of sustained injuries is one of the most important factors determining the success of a sports team. Therefore, in a soccer team, in order to reduce the number of injuries, various special programs for their prevention have been introduced [21,22], which in the past have included only small groups of players, fewer than 200 people [2]. A recently introduced anti-injury prevention program, FIFA 11+, addressed many thousands of players and coaches [13,23]. This program is based on a duly performed warm-up and promotes a focus on stabilizing the body, eccentric thigh muscle training, proprioceptive training, dynamic stabilization and plyometric exercises. In our research in the field of anti-injury prevention, respondents were asked only whether before training they perform the selected forms of warm-up, and after the main training they perform stretching exercises and relaxation. Within these ranges differences were also observed between the players of both groups (table 6). The surveyed subjects in group I much more frequently performed warm-up (72.38%) and stretching-cum-relaxation exercises, while lower level soccer players (amateurs) did not appreciate the

value of these activities, and consequently performed them relatively infrequently. In our opinion, these differences result from higher anti-injury awareness and better physiotherapy care in the case of more advanced soccer players (professionals in higher leagues), and reveal far-reaching differences between professional and amateur sport.

## CONCLUSIONS

1. Players with different skill levels in soccer experience injuries to similar parts of the body with similar frequency.
2. Increased proneness to injury occurring in players with a higher level of playing skills took place during competition, in spite of better physiotherapy care in this group, and more anti-injury prevention, indicating that the main factor in proneness to injury in these conditions is the intensity of sport competitiveness.
3. For athletes with lower levels of sporting skills injury occurred most frequently mainly during the preparatory training period, which is associated with inadequate physiotherapy care, lower awareness, and lower anti-injury prevention.
4. The high level of injuries in soccer compels those involved to seek preventive measures, which in this study were presented as the availability and attitude of physiotherapists, as well as the attitude and behavior of athletes.

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Word count: 4732

• Tables: 6

• Figures: –

• References: 23

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**Sources of funding:**

The research was funded by the authors.

**Conflicts of interests:**

The authors reports that there were no conflicts of interest.

**Cite this article as:**

Pilis K, Miarczyński, Pilis A, Stec K, Letkiewicz S, Pilis W. Soccer players' injuries at different levels of the sport. *MSP* 2017; 11, 2: 10–16.

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Received: 19.11.2016

Reviewed: 17.01.2017

Accepted: 27.03.2017