








ORIGINAL PAPER

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Most frequent injuries and their causes in Ultimate Frisbee players

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ABSTRACT

Introduction. Media publicity of sports and increased training have pushed the limits of the human body and have correspondingly led to an increase in the number of sports injuries. Incorrect play techniques, inadequate warm-up and other factors often lead to an increase in the number of injuries in Ultimate Frisbee.

Aim. Assessment of the impact of gender, age and training experience on the incidence of injuries in Ultimate Frisbee.

Material and methods. 110 people aged 16 to 35, regularly practising Ultimate Frisbee were included in the study. Of the 110 participants, 36 were women and 74 were men. The results were obtained by means of a questionnaire prepared by the authors which concerned sociodemographic data and questions about sports injuries. The incidence of injuries was analyzed in terms of the training experience, gender and age of the respondents. Statistical analysis was performed using STATISTICA 13.1.

Results. Our research showed a relationship between sex and the site and type of injury. Age affects the main cause of the injury, and training experience influences the site and type of injury ($p < 0.05$). The largest group of respondents were people training Ultimate Frisbee at least 3-4 times a week (62.73%).

Conclusion. Sex and the training experience have a significant impact on the site and type of injury. The main cause of the injury depends on age; in the study group the most common cause of injury occurred when respondents were not complying with the rules and technique of the game.

Keywords. injury, Ultimate Frisbee, sport

Introduction

The contemporary occurrence of injuries in sports are common phenomenon and difficult to avoid, even in the case of taking up only recreational activity. A constant chase after records, the desire to compete in sports and achieve better results leads to an increase in the number of injuries.¹

One of the sports in which a high level of injury occurs is American football. In Poland, it gained popularity in the second half of the twentieth century. According to Walczak et al., the most frequent injury site in this sport is the knee joint which is the most complicated structure of the human motor organ. This is mainly due to its specificity; it is mainly running and contact with

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Participation of co-authors: A – Author of the concept and objectives of paper; B – collection of data; C – implementation of research; D – elaborate, analysis and interpretation of data; E – statistical analysis; F – preparation of a manuscript; G – working out the literature; H – obtaining funds

Received: 05.10.2017 | Accepted: 17.11.2017

Publication date: December 2017

numerous falls, turns and clashes with the opposing team player.² Waldzinska et al. found that in tennis the most frequent injuries occur in hip joints, wrist and ankles.³ According to Ridan et al., athletes practising rock climbing most often suffer upper limb trauma.⁴

Prevention of musculoskeletal diseases, traumas and sports injuries is of key importance for sporting events and the athlete's career. Properly organized and planned control over sport injuries during the training process as well as during sport events are a valuable source of information pertaining to prophylaxis preventing injury. Thanks to them, it is possible to create new methods, means and techniques to prevent injuries in sport.⁵ The incidence of injury depends on many factors: the type of sports practiced, level of competition and sport rivalry, the level preparation, requirements set by trainers for athletes and the standard of the health care system for the athlete.^{5,6}

Ultimate Frisbee is a kind of contactless team sport with a flying disc (frisbee) which combines elements of team games such as football, volleyball, rugby and basketball. The match is played on a pitch of 100 by 37 meters between two seven-person teams. The goal of the game is to score a point that will be gained when a player from the same team catches a frisbee in the opponent's end-zone. The match ends when one of the teams scores 17 points.^{7,8} Ultimate Frisbee is a sport in which trauma is classified at the highest degree. Physical effort associated with this sport is characterized by high endurance, in-

tensity and the ability to carry out heavy and long-term training without a rapid loss of biological reserves and energy of the body. The main reason for the emergence of sports injuries in this discipline is direct training, that is a match on the pitch of two teams fighting to score in the zone. Constantly increasing popularity of Ultimate Frisbee leads to an increase in the number of sports injuries.⁹

Despite the ever growing interest in this sports discipline, the number of scientific reports that characterize the type and cause of injuries in Ultimate Frisbee sport is significantly limited.^{10,11} The aim of the study was to assess the impact of gender, age and length of sports training on the type, location and cause of injury in athletes who regularly train Ultimate Frisbee.

Material and methods

The research was carried out in south-eastern Poland in the period from April to June 2016. Thirty six women and 74 men participated in the study. The results were obtained by means of the questionnaire prepared by the authors, which concerned sociodemographic data and questions about sports injuries. The inclusion criteria were: belonging to a sports club, having the current consent of a sports medicine doctor for practicing sport, expressing a written consent for participation in the study. The exclusion criteria were: suffering the injury within 3 months from the examination, having current injuries and experiencing minor injuries not requiring a break in the training process in the period immediately pre-

Table 1. The characteristics of the study group

	Women (n = 36)	Men (n = 74)	Total (n = 110)
Age in yrs [± ; SD]	23.95 ± 3.62	23.33 ± 3.61	23.52
Weight in kg [± ; SD]	64.00 ± 8.12	73.89 ± 7.89	70.94 ± 7.57
Height in cm [± ; SD]	165.3 ± 9.04	176.96 ± 9.12	172.93 ± 8.24
BMI [%]			
Normal	100.00	81.08	87.27
Overweight	0.00	18.92	18.92
Obesity	0.00	0.00	0.00
Training experience [%]			
1-12 months	41.67	66.22	58.18
More than a year	58.33	33.78	41.82
Training frequency in a week [%]			
1/2x	16.67	17.57	17.27
3-4x	61.11	63.51	62.73
More than 4x	22.22	18.92	20.00
Participation in competition [%]			
yes	80.56	79.73	80.00
no	19.44	20.27	20.00
Injury due to play [%]			
yes	100.00	100.00	100.00
no	0.00	0.00	0.00
Injuries preventing from playing [%]			
yes	100.00	100.00	100.00
no	0.00	0.00	0.00

ceding the examination. All subjects received information about the study and its course and expressed their written consent to participate in them. The procedures applied were in accordance with ethical standards and the principles of the Helsinki Declaration.

Quantity and indicators of the structure were given for the qualitative variables. In order to compare parameters between the studied subgroups, the Pearson chi-square test was used. Statistical analysis was performed using the STATISTICA 13.1. The result of the statistical test is the test probability (p), which small values indicate the statistical significance of the considered dependence. In this article it was assumed that:

1. when $p < 0.05$, there was a statistically significant relationship
2. when $p < 0.01$, there was a statistically highly significant relationship

3. when $p < 0.001$, there was a statistically very highly significant relationship

Results

The study involved 110 people practising Ultimate Frisbee; 36 women (mean age 23.95 ± 3.62 yrs) and 74 men (mean age 23.33 ± 3.61 yrs). The largest group of the respondents were people who practised Ultimate Frisbee for less than 12 months (58.18%); 80% of the respondents took part in various types of competitions and matches. The subjects most often participated in trainings 2-4 times a week (62.73%). All athletes participating in the study suffered an injury during training or competition, and its degree made it impossible to continue practising sport until the injury was healed. Table 1 presents the characteristics of the study group.

Table 2. Relationship between gender and the site, type of injury and the main cause of injury

Variable	Woman		Man		p
	N	%	N	%	
Head injury					
Back of the head	2	66.67	12	20.69	p= 0.26
Nose	0	0.00	12	20.69	
Ear	0	0.00	14	24.14	
Teeth	1	33.33	20	34.48	
Upper limbs injuries					
Shoulder	0	0.00	3	33.33	p= 0.19
Elbow, forearm	3	37.50	2	22.22	
Wrist	0	0.00	1	11.11	
Metacarpals and phalanges	5	62.50	3	33.33	
Trunk injury					
Ribs	32	88.89	67	90.54	p= 0.78
Abdomen	4	11.11	7	9.46	
Spinal injury					
Cervical spine	2	5.55	0	0.00	p= 0.06
Thoracic spine	23	63.89	41	55.41	
Lumbosacral spine	11	30.56	33	44.59	
Lower limbs injuries					
Hip joint	4	11.11	2	2.70	p= 0.16
Knee	9	25.00	28	37.84	
Shin	15	41.67	34	45.95	
Ankle and metatarsals	8	22.22	9	12.16	
Phalanges	0	0.00	1	1.35	
Most frequent injury					
Dislocation	0	0.00	17	22.97	p= 0.00
Sprain	17	47.23	37	50.00	
Wound	3	8.33	6	8.11	
Muscle and ligament rupture	13	36.11	0	0.00	
Muscle strains	3	8.33	14	18.92	
Main reason of the injury					
Wrong technique of play	21	58.33	46	62.16	p= 0.03
Too intensive training	4	11.11	19	25.68	
No proper warm-up	11	30.56	8	10.81	
Inadequate sport equipment	0	0.00	1	1.35	

Table 3. Relationship between age and the site, type of injury and the main cause of injury

Variable	Age 16–25 yrs		Age 26–35 yrs		p
	N	%	n	%	
Head injury					
Back of the head	12	23.53	2	20.00	p= 0.97
Nose	10	19.61	2	20.00	
Ear	12	23.53	2	20.00	
Teeth	17	33.33	4	40.00	
Upper limbs injuries					
Shoulder	1	7.69	2	50.00	p= 0.26
Elbow, forearm	4	30.77	1	25.00	
Wrist	1	7.69	0	0.00	
Metacarpals and phalanges	7	53.85	1	25.00	
Trunk injury					
Ribs	77	91.67	22	84.62	p= 0.29
Abdomen	7	8.33	4	15.38	
Spinal injury					
Cervical spine	2	2.38	0	0.00	p= 0.70
Thoracic spine	48	57.14	16	61.54	
Lumbosacral spine	34	40.48	10	88.46	
Lower limbs injuries					
Hip joint	4	4.77	2	7.69	p= 0.32
Knee	31	36.90	6	23.08	
Shin	38	45.24	11	42.31	
Ankle and metatarsals	10	11.90	7	26.92	
Phalanges	1	1.19	0	0.00	
Most frequent injury					
Dislocation	13	15.48	4	15.38	p= 0.09
Sprain	43	51.19	11	42.31	
Wound	8	9.52	1	3.85	
Muscle and ligament rupture	6	7.14	7	26.92	
Muscle strain	14	16.67	3	11.54	
Main reason of the injury					
Wrong technique of play	52	61.91	15	57.69	p= 0.02
Too intensive training	21	25.00	2	7.69	
No proper warm-up	10	11.90	9	34.62	
Inadequate sport equipment	1	1.19	0	0.00	

Statistically significant differences were found between the groups with respect to the results concerning the site of the injury (injury of the spine), type of injury and the reason for the injury ($p < 0.05$). The most frequent injury sites among women and men were: ribs (women - 88.89%, men - 90.54%); thoracic spine (women - 63.89%, men - 55.41%); shin (women - 41.67%, men - 45.95%). Women most often suffered sprains (47.23%) and muscle and ligament ruptures (36.11%). In men, the most common type of injury was sprain (50.00%) and dislocation (22.97%). Both in women and men the main cause of the injury were wrong technique of play (Table 2).

In the group of people aged 16-25, the most frequent sites of injury were ribs (91.67%) and the thoracic spine (57.14%). 61.91% of the respondents indicated that the main reason for the injury was incorrect technique of play; 25.00% opted for too intense training; 11.90% reported lack of a proper warm-up as the main cause of

the injury. 57.69% of the subjects aged 26-35 got injured due to failure to comply with the proper technique of the play, while 34.62% of the respondents were not properly prepared for training due to lack of proper warm-up. Too intensive training was indicated by 2 people. Statistically significant differences were found between age groups and results concerning the main cause of the injury ($p < 0.05$) (Table 3).

Our research showed that the most common site of injury in people with training experience shorter than 12 months was the head area (teeth injuries - 50.00% of the respondents). In contrast, athletes with training experience longer than 12 months most often suffered nose and back of the head injuries (8 athletes). The most common site of injury in both groups were ribs, spine (thoracic and lumbosacral section), lower limbs (shin and knee). The majority of athletes surveyed indicated that the most common type of injury was sprain

Table 4. Relationship between training experience and the site, type of injury and the main cause of injury

Variable	Training experience ≤ 12 months		Training experience ≥ 12 months		P
	N	%	N	%	
Head injury					
Back of the head	6	16.67	8	32.00	p= 0.01
Nose	4	11.11	8	32.00	
Ear	8	22.22	6	24.00	
Teeth	18	50.00	3	12.00	
Upper limbs injuries					
Shoulder	2	15.39	1	25.00	p= 0.41
Elbow, forearm	5	38.46	0	0.00	
Wrist	1	7.69	0	0.00	
Metacarpals and phalanges	5	38.46	3	75.00	
Trunk injury					
Ribs	57	89.06	42	91.30	p= 0.69
Abdomen	7	10.94	4	8.70	
Spinal injury					
Cervical spine	2	3.13	0	0.00	p= 0.15
Thoracic spine	33	51.56	31	67.39	
Lumbosacral spine	29	45.31	15	32.61	
Lower limbs injuries					
Hip joint	5	7.35	1	2.17	p= 0.00
Knee	17	25.00	20	43.48	
Shin	36	52.95	13	28.26	
Ankle and metatarsals	5	7.35	12	26.09	
Phalanges	5	7.35	0	0.00	
Most frequent injury					
Dislocation	13	20.31	4	8.70	p= 0.02
Sprain	33	51.56	21	45.65	
Wound	7	10.94	2	4.35	
Muscle and ligament rupture	3	4.69	10	21.74	
Muscle strain	8	12.50	9	19.56	
Main reason of the injury					
Wrong technique of play	42	65.63	25	54.35	p= 0.40
Too intensive training	13	20.31	10	21.74	
No proper warm-up	9	14.06	10	21.74	
Inadequate sport equipment	0	0.00	1	2.17	

(subjects aged 16-25 - 51.56%, subjects aged 26-35 - 45.65%). Statistically significant differences were found between the groups with respect to the results concerning the site of the injury (head and lower limbs injuries) and the reason for the injury ($p < 0.05$) (table 4).

Discussion

Every year, several million injuries are registered in the United States while practicing sports at professional, recreational and school level. In Poland, there are no statistical data on the number and type of injuries suffered by athletes. Undoubtedly, sports injuries are an inseparable element of sport, and their type and character are closely related to the specificity of the discipline being practiced.^{12,13}

Ultimate Frisbee is a non-contact sport that combines elements of various team games. This sport is rap-

idly gaining popularity among young people (in 2011 the number of people practicing Ultimate Frisbee in the United States was 947 thousand.)⁸ Currently, 46 clubs are registered in Poland and national teams are appointed in various discipline categories. Poland is 23rd in the World Flying Disc Federation (WFDF) ranking among 47 countries.¹⁴

Proper playing technique, well-developed motor features and a high level of fitness and sport form prevent injury, both in Ultimate Frisbee and in other sports. This discipline is characterized by a high risk of injury, which is why the training process should be based on endurance and speed exercises and improvement of the ability to react quickly to the situation posing threat of injury. Gender, age, training experience, fitness level and physical and mental requirements that are placed on the player pose a real risk of injury. However, there

is limited information on trauma in Ultimate Frisbee in clinical trials.^{10,15,16}

Our research showed that 100% of athletes surveyed suffered an injury as a result of playing Ultimate Frisbee, similar data was obtained by Reynolds et al. indicating that among the respondents, 100% suffered musculoskeletal injuries while practising the same sport discipline.⁹ Based on questionnaires we indicated that the most common type of injury were sprains, dislocations and muscle strains. The General Practitioner Clinical Assistant Rheumatology reports are similar.⁷

The authors showed that less experienced athletes, with training experience shorter than 12 months, were more likely to suffer injuries than people with a higher level of training and longer training experience. Similar results obtained Peterson et al. who examined the relationship between gender, training experience and the incidence of injury in football players. The authors found a two-fold increase in the occurrence of injuries among younger athletes with shorter training experience and with a lower level of skills compared to more trained athletes. Chomiak et al. also showed that the shorter the training experience, the greater the risk of injuries.^{17,18} This indicates the relationship in Ultimate Frisbee and other sports with a similar nature to this sport that low training experience has an effect on the frequency of injury in athletes.

The results of our research indicate that the most common cause of the injury was an incorrect game technique. In the studies by Yen et al. the frequency of injury was also associated with improper tactical and technical preparation. The results suggest that one of the main measures to prevent injury is the proper education of young people's about game technique and control of the training and play of people with longer training experience.¹⁰ The analysis showed that the most common injury was the trunk (the majority of respondents had a rib injury and the thoracic spine). There are no scientific reports on this subject in current literature. In our study, the most common trauma to the lower limbs was knee and shin injury. The results of the research carried out by Yen et al. on a group of 107 athletes indicate, however, that the most common trauma to the lower limbs was shin and knee injury.^{10,13}

Our research shows that men are more likely to experience injury in Ultimate Frisbee than women. This may be due to the fact that in our research a larger number of respondents were men. Li et al. obtained different result showing that women were more likely to suffer sports injuries in this discipline, because it is related to the interaction between the movement strategy, body composition and human physiology. Women generally have lower body fat, less musculature and greater loosening of connective tissue, which additionally contributes to injury.¹⁹⁻²³

In the face of frequent sports injuries in Ultimate Frisbee it is necessary to take preventive measures with respect to athletes who have never suffered injury or whose injury occurred but the treatment process was successful and they could return to further training. It is important to emphasize the importance of correct, fast and effective treatment process and athlete rehabilitation after the injury.

Conclusion

1. The most common type of trauma experienced by athletes training Ultimate Frisbee is sprain and dislocation.
2. Gender affects the type of injury and the main cause of the injury. Men are more likely to be injured in Ultimate Frisbee than women.
3. Age affects the main cause of the injury. People with short training experience are more likely to suffer injuries than people with a higher level of training and longer training experience.
4. The length of the training experience affects the place of injury and the most common type of injury.

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