THE SPORTS INJURIES EPIDEMIOLOGY AND WELLNESS IN SILESIAN BASKETBALL TEAM PLAYERS

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Key words:

Abstract:

•	trauma,	Introduction. The human body is subjected to various strains
•	regeneration,	associated with a natural need to move, improving fitness, sports exploitation or profession requirements. In addition to the positive
•	team games.	 exploitation or profession requirements. In addition to the positive effects of physical activity, a presence of increased number of traumatism (mainly within the musculoskeletal system) can be observed. The probability of suffering an injury is almost an inherent part of sport practicing. The aim of the work. The aim of the study was to analyze sports injuries among the basketball athletes from different classes of League in the Upper Silesia area. The material and the methodology. The research group consisted of 79 athletes playing basketball professionally, recruited from six clubs of the Silesia Basketball Association. The research device used in the study was especially prepared questionnaire, which allowed bringing forth the respondents who while their sports career, suffered from musculoskeletal injuries. Results. Players suffered from the total 218 (an average of 2.76 different types of injuries on each player) injuries. The sprain accounted for about 30% of all injuries, strain - about 21% and nearly 18% was bruise injury. Most injuries occurred within the ankle and foot - 39.6%, hand - 26%, and knee - 21%. The most common circumstance, while which the athletes suffered the injury, was bad landing which accounted for 48.6% in the third division, 37.5% in the second division and 34.2% in the I League. The second one was running (24% of the total amount) and the third playing against the rules - fouling (17.4%). Conclusions. The most common injury in basketball players was sprain and the part of the body prone to a damage - ankle joint. The player who was the most exposed to an injury was the point guard. Complication which was occurring in the greatest number of cases wasa limitation of mobility. The wellness treatments used most

INTRODUCTION

Up to the present no method has been found to prevent premature "wear" of the musculoskeletal system as a result of self over-exploitation. In case of a young person the huge reserves of regeneration in tissues enable nearly perfect "self-repair". In adults the problem is much serious when may be an aggregation of the overloads and micro-injuries [4]. The supra-maximal overloads often lead to the damage of the athletes' body structure which excludes them for a short or long time from practicing the discipline. However, the

tremendous advances in medicine contribute to a quick return of players. After a short time from getting injured they achieve scores which have been recorded before the contusion [3].

The epidemiological data suggest that sports injuries account for 10% of all types of injuries. Approximately ever 14th accident or injury occurs on the field or the other sports areas [17]. World statistics indicate that number of high leveled players undergoing major musculoskeletal dysfunctions as high as 70%. According to the statistics from the Polish centers of the treatment of sport injuries, about 19% of all injuries involved people practicing and playing basketball [5].

BASKETBALL

The basketball players of each team moving around the field with or without the ball try to give as many precise throws to the opponent's basket as possible. Also they must prevent the opponent team from scoring. Described game applies a variety of movements around the designated area: walking, running forward, running backward and sliding. In accordance with the game regulations the ball can be: dribbled, passed, thrown and bounced.

Characteristic feature of the basketball as a physical exercise is the complexity in effecting the body. During the training or playing matches each basketball player uses his strength while running, breaking, jumping, landing, dribbling, passing and throwing the ball [12].

For the efficient and effective rivalry on the field the athletes should have a high speed and coordination of movements. Most of the throws are performed while jumping which puts an additional load on player's leg locomotion apparatus but also forces athletes to a maximum concentration and integration of motor skills and also causes a significant increase in energy expenditure. Another factor increasing the involvement of all mental and physical capabilities in the game is the presence of the opponent who often comes into direct contact with the player. The levels of intensity often achieved in this game are: submaximal or maximal.

Basketball is characterized by a variability of movements and its intensity. Performing operations are variety in relation to the direction, speed and the amplitude of the movements as well as connections. The basketball games require from the player agility, endurance, cooperation in the attack and defense, assessing the situation correctly as well as making an appropriate decision in the extreme game situations. Basketball player is active within 39% of the total playing time. The distance run during this period is from 2.5 to 7.3 km. Significant parts of the movement on the pitch are different types of outbursts: short 3-5 m, medium 6-15 m and long - 16.28 m. During the game the player takes on an average of 50 jumps with the ball and towards the ball and 80-90 stops after starts and accelerations which subject the lower limb segment to heavy loads and exploration. This can expose the basketball player to having a trauma [12].

TRAUMA AND SPORTS INJURY

Physical activity has pro-health impact but it can also pose some health risks, causing the traumas and accidents. Primarily direct contact between players means that basketball becomes a spectacular and much more traumatic sport. The contusions are the results of overtraining but there are also severe injuries as a result of direct sport competition. In sport, trauma is defined differently than in everyday life.

The definition of the "sport trauma" is a common name for all types of traumas experienced during a sport activity and can be understood in various ways. In the literature inter alia can be found definition that prescribes the sports trauma as: "(...) such that takes place during a sport character physical activity, mainly during trainings and competitions resulting the occurrence of sports injuries which consequence is temporary or permanent exclusion from further participation in sports activities" [18].

It is customary to say that an athlete has suffered a damage or an injury to a joint or the body part. However, often there is a misinterpretation of the trauma word and the damage or the injury. The first of this concept have been defined and described above. Damage or injury in turn, results from a mechanical force on the body, as a consequence of the damage to the structures subjected to trauma. The type and extend of injury or damage is dependent on the size of the trauma, the mechanical strength and the tissue resistance which worked on [8].

Traumatic surgery section indicates several basic types of musculoskeletal system injuries which are caused by mechanical traumas: bruises, tendon-muscle unit damages, wounds, sprains, subluxations and dislocations of joints and fractures. These injuries can be acute or chronic.

Contusion (or bruise) is a subcutaneous soft tissues damage with vessels burst and blood spout but without breaking the skin, which is formed under the influence of external factors.

The tendon-muscle unit damage refers to the muscle injuries (active stabilizers) and might include main part of the muscle or tendon. Depending on extent of muscle damage is distinguished by I, II, III degree of damage [2,9,13].

Wound is the type of damage linked to the skin discontinuity and often tissues or organs lying deeper as a result of mechanical trauma.

Sprain (or twist) is called a joint injury which is a result of acute indirect trauma when the force of injury exceeds the strength of joint capsule as well as ligament system and the range of motion in the joint is greater than physiological. A characteristic feature of mentioned acute injuries is the presence of varying external-articular damages (outer capsule, ligaments) and intra-articular lesions (synovial membrane, articular cartilage) with the hematoma presence.

Subluxation in turn, is an incomplete dislocation consisting in the articular surfaces moving relatively to each other, without the total loss of contact with each other.

Dislocation is called a type of breakage, in which there is a temporary or permanent loss of articular surface contact, displacement in the bones joint capsule or the total draw of the bones. Dislocation might be associated with the damaging of intra-articular structures (ligaments, meniscus) and stretching or tearing of the joint capsule. The joint is unstable and might lead to further arteries or nerves oppressions [10].

Fracture is a suddenly break in the bone tissue covering the whole cross section of it combined with tenderness and limitation of the functions and changes in a shape of the bone. The mechanism of fracture depends on the location and direction of the force of trauma. Very strong direct traumas cause bone crushing or rolling otherwise a comminuted fracture. As a result of indirect trauma in turn, occur fracture caused by pulling, bending, twisting and crushing [6].

WELLNESS AND ITS TASKS

The "wellness" term came permanently into the issue of competitive sport and the widely known recreation. This expression should be understood as conscious action on the organism using a variety of natural or artificial resources and environmental conditions in order to optimize the physiological processes of rest, health care and to maintain relatively elevated psychophysical player's endurance. Such understanding of the wellness process is mainly used in sport - especially for the coaches and players. If considered necessity for rest and intensification of it in general public meaning, the term wellness is often replaced by the term "bioregeneracja"[7].

In the contemporary sports definition of wellness has been greatly expanded and includes a number of loosely related issues with the classic process of restitution. Wellness has theoretical and practical foundation called wellness systems. These are distinguished educational resources system, the physiological and the medico-biological system. Wellness

systems generate specific actions called tasks. The aims which are set for the process of wellness can be divided into associated directly with training and associated indirectly - preventive and complementary. Contemporary wellness process has to complete tasks such as: interact with the training process, optimization of restitution, prevention and reducing the impact of diseases resulting from an overload of sports and treatment after sports traumas [7].

THE AIM OF THE STUDY

The aim of the study was to analyze sports injuries among the athletes playing basketball professionally in different class Leagues in the region of Upper Silesia.

Typical traumatic lesions knowledge allowed identifying areas of the body vulnerable to damage and using prevention aimed at minimizing the risk of traumatic lesions of the body.

To analyze the problem thoroughly the following research questions were asked:

- 1. What was the most frequent type of sports injury occurred in athletes practicing basketball, depending on the type of class they played in?
- 2. What area of the body was most vulnerable to an injury?
- 3. Which basketball players were the most exposed to an injury in connection with the position they occupied on the field?
- 4. What were the most common complications after sports injury recovery?
- 5. How often and which one of wellness treatment were use by the basketball players in I, II and III League?

MATERIAL AND METHODS

The research material was a group of 79 athletes practicing basketball professionally, recruited from 6 clubs in the area of Silesia Basketball Association. The study was conducted from March to May 2011 at the sports facilities in the cities where they practiced. Surveyed athletes belonged to the sport clubs which train and play league matches in: Dąbrowa Górnicza (MKS Dąbrowa Górnicza), Gliwice (GTK Fluor Britam Gliwice), Katowice (KS AZS AWF Katowice, KŚ AZS Katowice), Sosnowiec (MKKS Zagłębie Sosnowiec) and Tychy (GKS Tychy).

Basketball players represented the highest level of sports in the playing class due to the fact that they were the highest classified in Silesia area (in the class of league) after playing essential round of games. The subjects were divided into three groups.

The first group consisted of the players appearing in the first men's League - 23 players, whose average age was 26 years (18 to 32 years), trained 7 times week, an average of two hours at a time. The number of years of experience was 13 years.

The second group was represented by athletes playing basketball in the second men League. The number of the study group was 31 individuals, with an average age of 24 years (19 to 36 years), respondents had five workouts per week for 2 hours each time, and the number of years of experience was 12 years.

The third group consisted of the players appearing on the fields' men's third league - 25 athletes. In this particular class league performed players with an average age of 23.5 years (18 to 34 years), those athletes trained five times a week, and the training time was 1.5 hours each time. Average number of years practicing basketball in this group was equal to 12 years.

The research device used in the study was the author's specially prepared questionnaire, which allowed to bring forth the respondents who, while their sports career, suffered from musculoskeletal injuries. The questionnaire included general questions about age, time of experience, hours of training per week, their usual position on the field and the class league in which the contestant played in season 2010/2011. The overall survey was complemented by questions about the frequency of attendance for wellness, specific questions related to a severity of injuries, the causes and the locations of them, the time of training absence caused

by a trauma and an injury treatment. Additionally in the questionnaire there were questions about the incidence of re-injury to the same area of the body, orthopedic supply and complications in movement system after trauma. Respondents' answers were categorized and obtained figures and percentages presented in tables and charts.

To make a statistical analysis of the underwent traumas a database has been created. Basing on the data, the number of injuries relating to specific body areas and the individual class leagues was established. The obtained results were presented as mean and standard deviations.

RESULTS

After analyzing 79 basketball player's questionnaires it was found that traumatism in the study group was high, as 76 players had experienced one injury at least in the course of sports career. Respondents suffered 218 injuries, the one player accounted for an average of 2.76 different types of body's damage. In respect of this the lowest injury rate were characterizing the third League players - 2.28 damage per 1 person, in the second League injury level was 2.52 damage for basketball player, while the highest injury rate were characterizing basketball athletes from the I League - 3.61 injury per each person.

The data shows that as many as 97% of the basketball population surveyed had suffered an injury thorough their career. The highest percentage of basketball players with injuries took place in the first division basketball (100%), in the next place second division players were ranked (97%), in the third place - were III League basketball athletes (92%) (Table 1). The results are related to the system of competition, which in the I League is the longest and lasts from September to early May. The II League players begin playing in October and end in April and the third League athletes, start the season in mid-October and finish in February.

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Class division	Number of players affected injury	Number of players without injury	Number of suffered injury				
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III League	23 (92%)	2 (8%)	57				
II League	30 (97%)	1 (3%)	78				
I League	23 (100%)	0 (0%)	83				

Table 1. Number of injuries suffered by basketball players in sports career including class division

Basketball players were injured in their career 218 times. The consequences of these damages were: soft tissue bruising and joint pain, muscle and tendon injuries, sprains and dislocation of joints, fractures and wounds. The percentages summary of individual types of injuries in athletes from different classes' of divisions was shown in table 2.

Table 2. Number of different types	s of injuries sustained by basketball players
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	Class division						
Sort of injury	III League n=23		II League n=30		I League n=23		
Bruise	9	15,8%	14	18%	17	20,5%	
Sprain	19	33,4%	26	33,3%	20	24,1%	
Dislocation	5	8,8%	5	6,4%	9	10,8%	
Fracture	12	21%	12	15,4%	9	10,8%	
Rapture muscle/tendon	0	0	1	1,3%	6	7,25%	
Strain muscle/tendon	12	21%	18	23,1%	16	19,3%	
Others (wounds, infections)	0	0	2	2,5%	6	7,25%	
All	57	100%	78	100%	83	100%	

n – number of respondents

Most commonly experienced injury in the entire studied population was joint sprain (about 30% of all injuries), muscle or tendon strain (around 21%), muscle or joint bruise

(nearly 18%). Slightly fewer players reported bone fracture (roughly 15%), dislocation (approximately 9%) and muscle or tendon rapture (about 3%). Other damages than these reported above were indicated by the 4% of athletes. The relative frequency of injuries throughout the research group was illustrated by the graph 1.



Graph 1. Percentage distribution of injuries among basketball players

The respondents' answers indicated that the most widespread injury happened in the vicinity of the ankle and foot (39.6%) (Table 3). These damages were the most common in the I and II League players, where accounted for 40% of injuries. The second most vulnerable part of the body subjected to an injury was the hand (26%), the most frequent hand injuries were reported in the third League players (35%). The third most vulnerable localization to damage was the knee joint or its bones and tissues (more than 20% of all respondents). The knee was the area mostly injured among the second League players. The shoulder girdle injuries accounted for 5% in the third and second class division, 7% in the I League. Head injuries were reported in the competition of the first and the second League and forearm damages - only in first League.

	Class division						
Localization of injury	III League		II League		I League		
	n=23		n=30		n=23		
Ankle/foot	14 38%		16	40%	23	40%	
Knee	8	22%	10	25%	11	19%	
Hand	13	35%	10	25%	12	21%	
Forearm	0	0%	0	0%	2	3.5%	
Shoulder	2	5%	2	5%	4	7%	
Head	0	0%	2	5%	5	9,5%	
All	37	100%	40	100%	57	100%	

Table 3. Localization	of iniuri	es in each	class division
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n – number of respondents

Table 4 shows the circumstances in which most athletes had suffered an injury. The basketball players' answers show that the most common cause of the injury was a bad landing on the ground, what was respectively 48.6% in the third division, 37.5% in the second division and 34.2% in the first League. The second most common situation in the group overall while which the injury occurred was running (approximately 24% of the total) and on

third place as a cause of damage players mentioned irregular opponent's playing (over 17%). During the jump injury were suffered by 23.7% I League players, by 12.5% II League players and by 8.6% III League basketball players.

	Class division						
Circumstance of injuries	III League		II League		I League		
	n=23		n=30		n=23		
Run	9	25,7%	13	27.1%	7	18,4%	
Jump	3	8,6%	6	12.5%	9	23,7%	
Landing	17	48,6%	18	37,5%	13	34,2%	
Fauls	4	11,4%	9	18,8%	8	21,1%	
Another	2	5,7%	2	4.1%	1	2,6%	

Table 4. Circumstance of injuries occurrence

n – number of respondents

Graph 2 shows the number and type of injuries that have been experienced by players playing on different field positions. The questionnaire answers indicate that the point guard was mostly exposed to injuries. Then - small forward and shooting guard. Positions under basket - the power forward and center were characterized by the lowest incidence of injury.



Graph 2. The division of suffered injuries due to the basketball players position on the court PG - point guard, SG - shooting guard, SF - small forward, PF - power forward, C – center

In the vast majority of the surveyed basketball athletes complications due to the fact of a suffered injury were observed (Graph 3). The most frequently reported complication was limitation of movement after the joint immobilization Contractures were also reported. Scaring was noted in 28% of cases. In the I League player rare case of ossification of the interphalangeal further small finger joint (on the vertical graph as other) was observed.



Graph 3. Types of post-injury complications

Also, the players' answers indicated that only in the first and second teams of the League wellness treatment was used. Regenerative treatments were organized under the supervision of professionals (physiotherapist direction, the possibility of consulting a doctor) in the majority of cases. Only one of the teams from the second League conducted wellness care without programming and supervision. Unfortunately, the wellness treatment was not mandatory for all competitors. The largest treatment intensification was present in the main period. Outside the starting period the wellness were treated marginally in the second division. Only 5 players from the first division clubs have benefited from regeneration treatments taken regularly.

The most common treatments used in the range of wellness were: cold compresses (ice or gel) which were used after each practice and competition. Treatments such as: vibration massages, dry partial massage, dry and steam saunas were used once week. Treatments less available or the ones requiring sacrifices in the form of a greater amount of time to complete were used less often, usually once a month or they were completely ignored. Wellness procedures and the frequency of their execution are listed in Table 5.

	Class division						
Wellness treatments	II League		I League				
	Number of players used	Frequency	Number of players used	Frequency			
Vibration massage	6	1 x week	8	1 x week			
Dry partial massage	8	1 x week	10	1 x week			
Dry overall massage	0	-	4	1 x month			
Vacuum massage	0	-	3	1 x month			
Underwater massage	1	1 x month	7	1 x month			
Whirpool	0	-	5	1 x month			
Bubble bath	0	-	2	1 x month			
Brine baths	1	1 x month	month 3				
Contrasting thermal spraying	0	-	1	1 x month			
Scottish whips	1	1 x month	1	1 x month			
Exposure to light	0	-	1	1 x week			
Dry sauna	21	1 x week	19	1 x week			
Steam sauna	15	1 x week	12	1 x week			
Cold compresses	19	daily	18	daily			

 Table 5. Frequency of wellness treatment

DISCUSSION

Basketball, as a team game, requires constant contact with the opponents on the field. The frequency of training and direct contact during sparring and league games causes significant risk of injury. The traumatism of this discipline is related to the specificity of sport, in which contact with the opponent under the rules of the game is sometimes an integral part of the game and blocking throws, dynamic defense or attack are situations contributing to the injury.

Practicing of competitive sports activity unfortunately involves the possibility of different types of injuries and accidents. They refer mostly to the young, fully active professionally people in the best physical condition. The epidemiological data suggested that approximately 10% of all injuries are sports one, and approximately every 14 accident or injury occurs on the field or other sports arena [18].

Most regularly experienced trauma in the entire population of the Upper Silesian athletes was sprain of the joint (about 30% of all injuries). In the first division twisting of the joint was 24.1% of all injuries, in the second division was 33.3% and in the third division 33.4% of all injuries. Also the Pfeiffer et al study indicates that twisting joints were the most common injury. The results of this author show that the percentages of these injuries among German basketball players were accounted to 40.7% of the total researched injuries [14].

In surveyed basketball athletes muscle and tendon strains accounted for 21% of all reported injuries. The Borowski and others analysis shows that 11% (injuries sustained during the practice) and 19% (injuries sustained during competition) of all sports injuries in male practicing basketball were muscle and tendon strains. According to the authors overall percentage is 17.7% [1]. In our study tendon and muscle unit strains (first of all strained during the competition) were concerned 21% of third League athletes, 23.1% second division players and 19.3% first League players which is similar to results obtained by Borowski et al authors [1].

The obtained results indicate that the most vulnerable part of the body to become injured was vicinity of the ankle and foot (39.5%). The lesion in this part was most common in I and II League players, it accounted for 40% of injuries. In the third division players accounted for 38%, which is compatible with the reports of other authors. Restrom suggests that the damage to the ankle accounts for 43% of all sports injuries occurring in basketball [18]. According to Bergfel in turn, ankle injury accounts for 40% of sports injuries in basketball [18]. Borowski and others consider as the most frequent area of injury ankle or foot, with the percentage occurrence in basketball players at the level of 39.7% [1]. It is worth noting that according to Świerczewski the torsional ankle injuries are the most common traumas among athletes and represent 25% of the causes of absenteeism in sports [15]

The second mostly exposure to trauma part of the body was hand (26%). Hand injuries were the most reported in the third League players (35%) less in the second (25%) and third (21%) League athletes. Such high percentages are differed from other reports, in which the hand and wrist injuries only accounted for 2% [17] or 9.6% [1] however, before completing the questionnaire respondents were informed that any injury of finger "breaking" had to be reported as an arm injury.

The third most vulnerable location of damage was the knee joint or bones and tissues included in the structure of this joint (21% of all respondents). The area of the knee article was the most injured in the second League players - 25%, less in III divisions' athletes - 22% and in 19% of the I League basketball players. In a study conducted by Wawrzyńczak-Witkowska knee joint injury was found in 30% of the basketball players [17], in turn, in Borowski et al were amounted to 14.7% [1].

The shoulder girdle injuries occurred from 5% in the third and second division to 7% in the I League. The Borowski and others study indicates that incidence of upper arm / shoulder

injuries were low and accounted for 2.8% only [1]. Injuries of the forearm were reported only in the first League (3.5%), injuries of the head in turn, just in I and II League competition (respectively 9.5%, 5%). The head injuries were dominated by the eyebrow incision which can be a result of a direct contact with the player. In addition to the eyebrow injury a case of a tooth break was also noted in the I League player. In the literature that problem constitutes 1.5-3.5% of the total injuries [11]. The head, face and neck injuries accounted for 12.8% of all injuries in the Borowski et al study [1]. Greater percentage which they obtained, may be due to the fact of aggregation three regions (head, face, neck), comparing with our research where we took into account only head injuries of players from Silesia.

Analyzing the causes and circumstances of the injury in each class divisions it can be said that most of players succumbed to injury at the time of landing after jump. In the first division were 34.2%, in the second division - 37.5% and in the third League were 48.6% of cases. While running 25.7% of third League athletes suffered injuries, 27.1% of second division players and 18.4% of first League athletes. It is worth noting that fouls, as a cause of an injury, were reported by 11.4% athletes of the third League, 18.8% of II League players and 21.1% of first division basketball players. These results differed from the Walentukiewicz report who noted this rate from 35% to 41% [16]. Respondents confirmed that they got injured during the main part of the match or training: respectively 73.1%, 70.6% and 62.5% in the third, second and first division.

The questionnaires answers analyze indicate that the point guard was mostly exposed to injuries from all players from the field. These results are similar to outcomes obtained by Borowski et al, where in both cases girls' and boys' basketball players the guard position accounted for the most injuries (50.3% and 45.9%, respectively) [1]. In our study the power forward and center were characterized by the lowest incidence of injury. Correspondingly, the analysis of mentioned authors indicate that the followed by forward player (34.7% and 40.8%, respectively), and center (14.1% and 13.0%, respectively) had the lowest occurrence of injury [1].

Wellness involves a process of return to exercise capacity to the initial level (or close to it) after physical and mental high strains. One of the many tasks of wellness is the prevention of injury and the musculoskeletal system overloads [16]. Knowing the importance of wellness in sport, competitors were asked the question whether the use of wellness and if so, how often and in which periods of the training cycles used the regenerative treatment. It turned out that the wellness benefited only players from I and II League. Unfortunately, even in the clubs in which the treatments are used, renewing procedures are voluntary and often ignored by competitors. In the second League clubs greatest intensification of treatment occurred during start period, unfortunately, before and after this period the wellness was treated in a disrespectful and marginal way. The situation was not much better in the first division clubs where, despite of increased participation in wellness treatments in different periods of preparation, only 5 players regularly attended these treatments. The wellness procedures used most commonly were: ice or gel compresses, which were used every day after training or competition. To some extent less frequently, once a week dry massages were used, underwater massages, dry and steam sauna. Other authors' publication shows that only 15% of the athletes regularly use wellness and 30% of them used regeneration treatments only during the most intense periods of training [16].

CONCLUSIONS

- 1. The most common type of a sports injury suffered by the athletes playing in the Silesian District Basketball Association was sprain of the joint.
- 2. The part of the player's body most vulnerable to injury (regardless of class League) was the ankle joint.

- 3. The point guard player was the most exposed to an injury.
- 4. The most frequent health complication after suffering an injury was limited mobility of the joint, in the structure which concerned.
- 5. The most frequently treatments in the field of wellness used by players were cold compresses (with ice or gel), which were applied after each workout and competition.

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