

Injuries in Racket Sports among Slovenian Players

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ABSTRACT

On the sample of 83 top Slovenian athletes we have studied the frequency of injuries among table tennis, tennis and badminton players, types of injuries and severity of injuries – the latter based on data of players absences from training and/or competition processes. The most liable parts to injuries are shoulder girdle (17.27%), spine (16.55%) and ankle (15.83%), while foot (10.07%) and wrist (12.23%) are slightly less liable to injuries. The most frequent injuries in racket sports pertain to muscle tissues. According to this data, the majority of injuries occur halfway through a training session or a competition event, mostly during a competition season. The injuries primarily pertain to muscle tissues; these are followed by joint and tendon injuries. There are no differences between male and female players. Compared to other racket sports players, table tennis players suffer from fewer injuries.

Key words: racket sports, injuries

Introduction

The growth of sports science and the commercialization of racket sports in recent years have focused attention on improved performance and this has led to a more detailed study and understanding of all aspects of racket sports¹. Scientists worldwide say the findings show that as physical activity is increasingly promoted as a critical part of a healthy lifestyle, sports injuries are becoming an important public health issue for both children and adults^{2–5}. As a result, injury prevention efforts need to go beyond targeting children and start addressing the risks faced by physically active adults as well. Fortunately, most sports injuries can be treated effectively, and most people who suffer injuries can return to a satisfying level of physical activity after an injury. Even better, many sports injuries can be prevented if people take proper precautions^{6–9}.

The potential risk of injuries in sports seems to increase for all levels of athletes with increasing participation, intensity and demands, as well as longer training periods^{10–13}. As with any other sport, there are some injuries that are typical for racket sports. When comparing data injury from the racket sports from different studies we have to be very careful, because differences in injury definition, study design methods of data collection, population under study and observation period may lead to

substantial variations¹⁴. Sports medicine findings, along with medicine and science findings, inevitably contribute to injury prevention and injury treatment programs for all racket sports players. For effective prevention, it is important to understand the functional anatomy and patho-physiology of injuries of different tissues. For injury prevention it is also necessary to understand the importance of excessive load and how these loads are distributed, sports-injury mechanisms, and the biochemical response of body tissues to impact and overuse^{15,16}.

The number of top athletes in Slovenia is increasing which means that we are facing a problem of sport injuries. Because these injuries occur during sport activities (training and competition), the role of physicians goes beyond a mere diagnosis and injury treatment; physicians are required to take part in the rehab process, training advisory, they help athletes get back to practicing sport and help decrease the risk of potential injuries. Having this in mind, we must be aware of the problem complexity. Namely, we need not only to treat an injured athlete but the treatment must start as soon as possible as most athletes wish to return to training and competitions in the shortest time possible. As a result, sport physicians must have knowledge about the strains athletes are exposed to in a particular sport as well of the patho-

-physiology of sports injuries. It can be stated that a sports physician, who only treats the injured not offering help to get the athletes back to sports activities, is only doing half of his/her job^{17–20}.

Common injuries in racket sports are rotator cuff tendinitis (»dead arm«), »King-Kong« arm (over-development of dominant arm), tennis elbow, forearm nerve entrapments, low back pain, abdominal wall sprain, tennis leg and eye injuries²¹. Generally, sports injuries can be classified as trauma and overuse injuries. Trauma injuries occur as a consequence of a specific accident or event. Such injuries are sprains and dislocations. The aetiology of overuse injury is multifactorial, involving both intrinsic and extrinsic factors. Intrinsic factors are related to the athletes themselves, including anatomical, alignment, growth/age, muscle tendon imbalance, genetic endowment, general health, nutritional status and prior injury²². Extrinsic factors include training error, equipment inadequacy and environmental factors²³. The impact of each of these factors on the clinical presentation needs to be evaluated in order to gain an accurate diagnosis around which the treatment can be planned. It's important to get overuse injuries diagnosed and treated to prevent them from developing into larger chronic problems. A good knowledge of these factors and appropriate measures taken to solve them is a prerequisite to prevent a number of injuries, or at least to decrease the injury incidence and severity.

The incidence of injury levels needs to be reduced and it can be achieved by concentrating more on preventative measures.

The aims of this study were to establish the frequency of sports injuries among top Slovenian racket players, types of injuries and severity of injuries based on data of players absences from training and/or competition processes.

Methods of Investigation

Within the project Epidemiology of sports injuries in Slovenia, 83 top Slovenian racket players (table tennis 29, tennis 39 and badminton 15) were questioned. At the time when the questionnaires were distributed, these athletes had an international or national ranking (as per Slovenian Olympic Committee criteria).

For the purpose of this study, a questionnaire comprising 15 questions pertaining to sports injuries among

top Slovenian athletes was used¹⁶. The questionnaire was tested and evaluated for the needs of Slovenian Olympic Committee.

The data has been processed by the SPSS software for PC at the computer data processing department of the Institute of Kinesiology, Faculty of Sports. The basic statistical parameters have been calculated (mean, standard deviation, frequency of answers). To ascertain differences between individual sports, the analysis of variance ANOVA has been used.

Results and Discussion

In this project the questionnaires were mailed to top Slovenian racket sports athletes, to those athletes who were listed in the publication by The Slovenian Olympic Committee »Obvestila – seznam kategoriziranih športnikov v Republiki Sloveniji« ŠAnnouncements – list of categorized athletes in the Republic of Slovenia^Ć, and whose medical records were at the same time at the Clinic of sports medicine CMSŠ in Ljubljana. According to the instructions provided, all 83 athletes returned the questionnaires. The average age of the athletes questioned was 19.5 years.

Participation in competitive sports places the athlete in a situation in which injuries are possible at any given time. Based on the results of the study, it can be presumed which prevailing risk factors are causing an injury to occur, and plan the injury prevention measures accordingly.

The highest number of injuries in table tennis (21,05%), as expected, affected shoulder girdle, which confirms the findings of Shida, Shida, Suzuki, Murakami and Youza²⁴. However, interesting is the constellation that the number of these injuries is far lower in tennis and badminton than in table tennis. According to extreme loads of the shoulder girdle in all three racket sports it can be concluded that a higher number of injuries in table tennis is a result of short, abrupt and extremely rapid movements, particularly in forehand strokes with no swing phase. Through the swing we provide an optimal way to muscles and adequate angle of the involved joints (the shoulder, elbow and wrist). With the introduction of a bigger ball, these strokes have become even more abrupt¹⁶. The integrated functions of the rotator cuff muscles and the scapular stabilizers, coupled with the large multiplanar movements inherent in racket sports skills, make the shoulder

TABLE 1
BASIC DATA OF MONITORED ATHLETES (SOURCE: EPIDEMIOLOGIJA ŠPORTNIH POŠKODB V RS
[EPIDEMIOLOGY OF SPORTS INJURIES]¹⁹)

	Table tennis				Tennis				Badminton			
	N	Mean	Std. Error	Std. Dev.	N	Mean	Std. Error	Std. Dev.	N	Mean	Std. Error	Std. Dev.
Age	29	19.52	.78	4.21	39	19.23	.71	4.42	15	21.53	1.10	4.26
Height	29	177.34	1.19	6.40	39	178.64	1.36	8.47	15	174.67	2.21	8.57
Weight	29	66.93	1.23	6.64	39	68.59	1.32	8.22	15	67.00	2.10	8.12

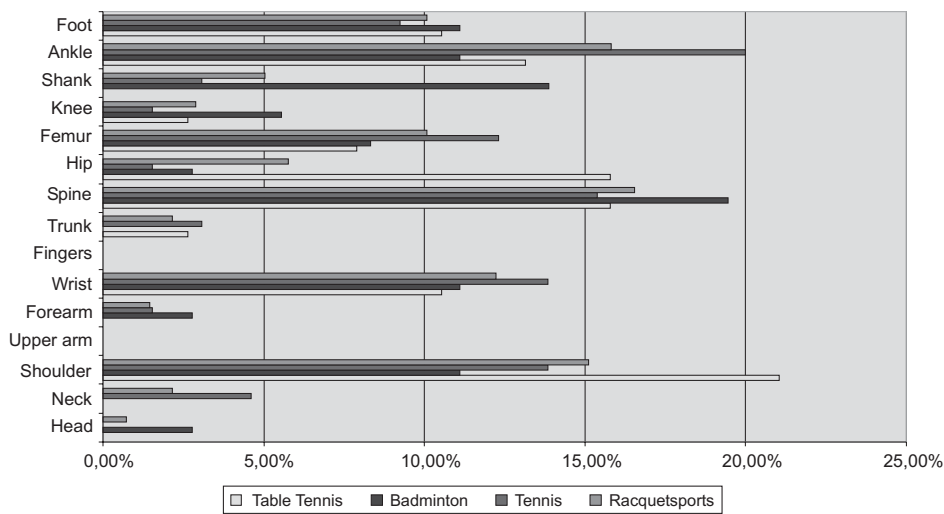


Fig. 1. Injury location.

complex vulnerable to injury. Successful rehabilitation programs for the shoulder complex injuries must be tailored to the individual, based on accurate diagnosis of the tissue damage and pathomechanics, clinical signs, stage of growth and specific skills demands. As many players experience pain only during specific skill execution, normal physical testing of the shoulder is often not sufficient to reproduce the player’s pain. Therefore, functional testing must be used in order to identify the pain-provoking position with estimation of the force, direction and magnitude of muscle activity.

Ankle and spine are the next most vulnerable parts of player’s body. The complex structure and function of the foot and ankle are essential for effective footwork of players. Like the wrist, the ankle has little local muscle support, relying for its function on mechanical efficiency of its capsular and ligamentous structures; and unlike the knee, the ankle joint has no major surrounding stabilizing muscles. The lateral collateral ligaments and the medial collateral ligament, or deltoid ligament, establish the ligamentous integrity of the ankle joint, and these structures limit and stabilize the range of motion at the ankle joint. Because of fast lateral movements in table tennis, and all-round movements in other racket sports, the integrity of the foot is essential, as shoe support and orthotic devices cannot be used to modify poor foot

biomechanics. A high percentage of injuries of ankle and foot joints (23.69% in total) indicates that players should pay more attention in choosing appropriate footwear to avoid those injuries. All muscles acting to move the foot at the ankle joint arise in the leg, and so the ankle joint is susceptible to injury in the frontal plane (i.e. inversion/eversion).

In tennis, the trunk is significantly involved in all strokes that players perform. Any factor that reduces the range of motion or impairs the muscle control of the trunk inhibits the efficient transference of force, leading to compensation and potential injury. Accurate figures for the incidence and nature of low back pain and injury in table tennis players are difficult to establish due to the limited prospective sport-specific research. There are various sites around the hip that are weak as a consequence of open physal plates. Quite large pieces of the bone can be torn off, particularly with sudden unexpected loads. The anterior-inferior iliac spine tends to tear off in racket sports when the front leg is suddenly blocked. Because of these abrupt blocking movements, the percentage of hip injuries is rather high 5.76%, mostly due to the table tennis players. Spine injuries (16.55%) more or less pertain to lower back pain or overuse injuries. Overuse injury to the pars interarticularis is quite common in young athletes²⁵.

TABLE 2
INJURY OCCURRENCE IN TABLE TENNIS DURING PREPARATION AND COMPETITION PERIOD

	Together 1	During practice			During competition		
		In the beginning	In the middle	At the end	In the beginning	In the middle	At the end
Preparation period	14	4 28.57%	4 28.57%	4 28.57%	1 7.14%	0 0.00%	1 7.14%
Competition period	25	4 16.00%	5 20.00%	4 16.00%	2 8.00%	6 24.00%	4 16.00%
Together 2		8	9	8	3	6	5

Legend for Table 2 (Together 1 – total number of injuries in preparation or competition periods Together 2 – number of injuries during a training session or a competition event – at the beginning, in the middle, at the end).

There are more injuries that occur during a competition period (table 2). The result is expected as the number of risk factors increases – such as considering the opponent, violation of fairplay, increased motivation – and consequently athletes are overdoing (enthusiasm), and considering all other factors putting players at risk outside the competitions. The majority of injuries occur in the middle of a training process or a competition event. This is particularly interesting because it could indicate inadequate warming up, lack of stretching exercises prior to training and similar. Unfortunately, even at major events such as World or European championships, it is evident that some top athletes are either not familiar or are not well informed about proper warm-up and stretching.

The most frequent injuries in table tennis pertain to muscle tissues, followed by joint and tendon injuries. These records more or less correspond to the epidemiology of sports injuries records in the world literature. Percentage wise, the shoulder joint injuries are ranked highest, which again corresponds to the world epidemiology records.

There are some differences among table tennis players and other racket players (Table 3). Table tennis players have fewer injuries. Injuries of table tennis players namely differ from injuries of other sports athletes.

TABLE 3
COMPARISON BETWEEN TABLE TENNIS PLAYERS AND OTHER PLAYERS (TENNIS AND BADMINTON) (ONE-WAY ANOVA TABLE)

	Sum of Squares	df	Mean Square	F	Sig
NUMBINJ Between Groups	10.378	1	10.378	5.262	.025
Within Groups	142.000	72	1.972		
Total	152.378	73			
TREATM Between Groups	.269	1	.269	4.919	.029
Within Groups	4.430	81	.055		
Total	4.699	82			
PAYMEN Between Groups	1.287	1	1.287	5.424	.022
Within Groups	19.219	81	.237		
Total	20.506	82			

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Conclusion

The high repetition of activity necessary to develop and perfect skills produces the potential for chronic overuse injury in racket sports. Poor technique, coupled with the anomalies of growth and improper equipment, produce skill errors, which may result in an increased stress on the musculoskeletal tissues and produces pain in response to micro trauma or overload. To minimize the pain response, the body adopts compensatory mechanisms, which ultimately add to the skill errors, and the never-ending circle of overload is established.

The poor recognition, localization and reporting of pain by young players can therefore often delay access to appropriate and timely intervention to prevent injury chronicity. The first requirement for effective management of injuries is therefore prevention, based on an understanding of the factors involved in overuse injuries generally, and racket sports injuries specifically.

One major responsibility of the trainer is to make the training and competitive environment as safe as possible to reduce the risk of injury. If an injury could have been prevented initially, then there would have been no need for first aid and subsequent rehabilitation. The trainer, in cooperation with the team physician and doctor, should obtain a medical history and conduct physical examinations of the athletes before participation as a means of screening for existing or potential problems. If the trainer knows at the beginning of the season that an athlete has a physical problem that may predispose that athlete to an injury during the course of that season, then corrective measures that may significantly reduce the possibility of additional injury may be implemented immediately.

In addition, the database records obtained in such studies contribute to health care planning and organization for top Slovenian racket sports athletes, who inevitably require a better and qualitative medical supervision primary care physicians could offer. From that point of view it is therefore very important that a trainer works closely with and under supervision of the team physician and team doctor.

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OZLJEDE KOD SLOVENSКИH IGRAČA U SPORTOVIMA S REKETOM

SAŽETAK

Na uzorku 83 vrhunskih slovenskih igrača stolnog tenisa, tenisa i badmintona analizirana je učestalost ozljeda, njihova vrsta i ozbiljnost koja je procijenjena kroz vrijeme koje su igrači proveli izvan treninga ili natjecanja. Pokazalo se da su najizloženiji ozljedama rameni pojas (17,27%), kralježnica (16,55%) i gležanj (15,83%), dok su stopalo (10,07%) i ručni zglob (12,23%) manje podložni ozljeđivanju. U sportovima s reketom najčešće su ozljede muskulature, a zatim slijede ozljede zglobova i tetiva. Prema podacima prikupljenim na vrhunskim slovenskim igračima tri sporta s reketom najveći se broj ozljeda javlja negdje u središnjem dijelu treninga ili natjecanja, najčešće za vrijeme natjecateljske sezone. Nije uočen spolni dimorfizam u pojavi ozljeda. U međusobnoj usporedbi sportova s reketom stolni tenis je onaj kod kojeg se ozljede pojavljuju u najmanjem broju.