

# A Survey of Sports Injuries among a Convenience Sample of Israeli Athletes

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**Key words:** sport, risk, injury, prevention

## Abstract

**Background:** Israel lacks a systematic surveillance of sports injuries, and knowledge of risk factors and specific patterns of injury is inadequate. In order to promote prevention of sports-related injuries, the magnitude of the problem must first be identified and the incidence and severity of sports injuries described.

**Objective:** To conduct a survey on previous sports injuries among a sample of Israeli athletes.

**Methods:** A convenience sample of Israeli amateur athletes participating in the 1997 15th Maccabiah Games was randomly selected. The study group answered an anonymous self-administered questionnaire that included sociodemographic data, and information regarding their sports activity and sports-related injuries that had occurred during the previous 2 years.

**Results:** The study group, aged 12–73 years (median age 21), comprised 301 consenting athletes in 28 different sports. Of these athletes 56.1% reported having had at least one injury. Most injuries (75.6%) involved the upper and lower extremities, and 37.8% of the injured sportsmen had received medical attention from a physician. Half of the athletes participated in contact sports – both collision and limited impact. This group had a much greater proportion of reported injuries in all age groups.

**Conclusion:** Surveillance of sports injuries should be expanded in order to develop appropriate prevention programs in Israel.

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As sports participation increases, so does the incidence of both acute and overuse sports-related injuries [1]. Moreover, the incidence further rises as the sport becomes increasingly more violent and aggressive [2]. In order to promote prevention of sports-related injuries, the magnitude of the problem must first be identified and the incidence and severity of sports injuries described [3]. In Israel, systematic surveillance of sports injuries does not exist, and knowledge of the risk factors and the specific patterns of injury is inadequate.

The Maccabiah Games are organized by the Israeli Olympic

Committee and are held in Israel every 4 years. They are directed towards Jewish amateur-competitive sportsmen at all athletic levels from all over the world. This event offered an opportunity to survey a large number of athletes in various types of organized sports in a given environment, thereby providing retrospective data on sports injuries occurring in a population participating in a multi-sport event.

## Materials and Methods

The Israeli team for the 15th Maccabiah Games included 1,229 participants in 28 different sports. The athletes participating in the Games are selected by sports associations according to their own criteria. In general these are amateur sportsmen and sportswomen who are active in organized sports.

Three hours before the opening ceremony of the 1997 Games the athletes were gathered in a confined area waiting for the ceremony to begin. They were naturally grouped in their sports teams, together with the teams from other countries. In this festive atmosphere, we randomly handed out our questionnaire and a pencil to consenting Israeli athletes. We then went around and collected the questionnaires, thus creating a convenience sample of athletes in the Israeli teams. The anonymous self-administered structured questionnaire included questions on sociodemographic characteristics, information regarding the major type of sport activity, the level of professionalism, and the time spent training.

A sports injury was defined as an injury that occurred during a sports activity and necessitated treatment by medical personnel, or caused limitation of the sport activity. Information on any acute sports-related injuries occurring during the previous 2 years included: the type of injury, anatomical site of the injury, type of activity in which the injury occurred, the nature of the medical treatment required, consequences of the injury as indicated by the number of days without sports or competitive activity or days lost from school/work, and residual disability.

Since the survey population represented 28 different types of sports that vary significantly in nature, they were grouped according to the amount of contact, the chance of collision, and the strenuousness level of the sport, as suggested by the American Academy of Pediatrics [4]. This categorization enabled us to relate to the population as a whole.

## Statistical analysis

SAS software [5] was used to examine the data. The non-parametric Chi-square test was used to compare the difference between the five sports categories and to compute risk ratio and its confidence interval.

## Results

The sample included 301 athletes, 71.4% of whom were males. The median age was 21 years (range 12–73). A breakdown of the study group revealed that 51.5% of the athletes participate in contact sports, a third in strenuous non-contact sports, and 10.6% in moderately non-strenuous non-contact activities. Women were represented in all sport categories, with somewhat fewer women in the contact sports (not shown). A significant difference ( $P=0.05$ ) in age composition characterized the sport categories. Overall, 30% of the athletes had more than 10 years experience in their principal sport, and 66% had more than 5. Table 1 shows the injury events within the past 2 years as reported by 257 athletes (85.4%) who responded to the sport injury questions.

The 2 years age-specific injury rate for respondents aged 10–17 years was 66.0%, 71.7% for those 18–29 years old, 78.9% for the 30–49 age group, and 73.9% for those aged 50 or more. Altogether, there were 238 sports-related injuries reported by the surveyed athletes, a rate of 790.7 per 1,000 sportsmen. The percent of athletes reporting at least one injury during the past 2 years was similar in all age groups. In all age groups athletes participating in contact sports reported having been injured 1.4 times more than those in non-contact sports (95% confidence interval 1.1;1.6). The risk ratio of contact vs. non-contact sports was highest in the 22–29 year olds (RR = 3.2, 95% CI 1.5;7.0). In the age groups 12–17, 18–21, and 30 or more years, the RR of contact vs. non-contact sports was (1.6, 95% CI 0.81;1.7), (1.3, 95% CI 0.8;2.0) and (1.3, 95% CI 1.0;1.8) respectively.

Figure 1 demonstrates that as the amount of contact and collision decreases in certain types of sport, so does the percent of athletes reporting more than one injury event. A total of 42.1% of athletes participating in collision sports reported having one injury and 35% reported having two or three.

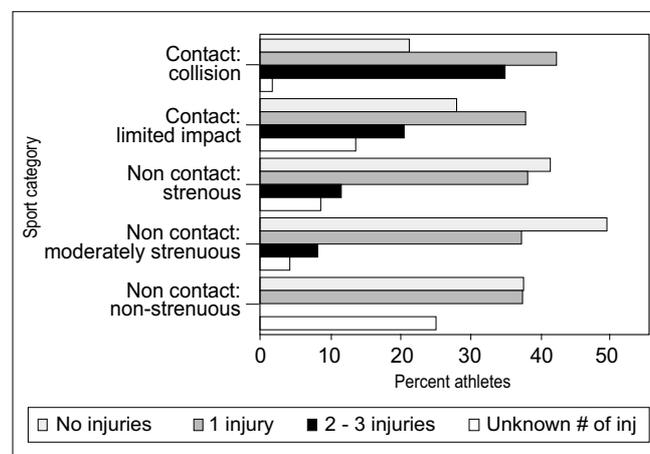
Muscle strains and sprains accounted for 25.2% of reported injuries (not shown). An additional 10.5% of athletes each reported lacerations and fractures, 8% reported trauma in multiple sites, and less than 1% each reported loss of consciousness or having had a penetrating wound. Injuries of the lower extremity accounted for 50.8% and the upper extremity for 25%. Of all injuries 44.5% occurred during training and 26.9% during a competition or game. Among the athletes participating in contact/collision sports, 39% of injury events took place during competitions or games.

### The nature of treatment

About 40% of the reported injuries were medically treated. Approximately 16% received treatment in the hospital, which

**Table 1.** Injury events reported for the previous 2 years

No. of injuries	No. of athletes (%)	No. of events
No injury event	100 (33.2)	
At least 1 injury event	<b>169 (56.1)</b>	
1 event	115 (38.2)	115
2 events	39 (13.0)	78
3 events	15 (5.0)	45
Unknown	32 (10.6)	–
Total	301 (100.0)	238



**Figure 1.** Number of injury events (%)

included surgery, inpatient care, or treatment by emergency room personnel. Another 22% received treatment from a physician outside the hospital.

There was some difference in the type of treatment given when the injury occurred during a game or competition compared to training. Physiotherapy was given to 45% of those injured during a game or competition compared to only 28% injured while training, while more athletes injured during training were treated in a hospital (25%) than those injured in a competition (11%).

Table 2 presents the differences in injury rates by sport category and different levels of severity. Thirty-one athletes (10.3%) reported missing school or work due to their injuries: 6 of these were below the age of 18. As to the long-term consequences of injury and chronic injuries, 96 athletes (31.9%) reported suffering from back pain during the previous 2 years, 11 (3.7%) reported stress fractures and 22 (7.3%) reported other aches and pains.

## Discussion

More than half of the athletes in this survey reported having sustained injuries within the 2 preceding years: 4 out of 10 of those injured reported medically attended injuries, i.e., possibly more severe injuries. The 2 year incidence of sports injuries is reportedly high, as is the incidence of the more serious injuries, which is similar to that reported by DeHaven [6] among

RR = risk ratio

**Table 2.** Injury event rate for the previous 2 years by type of treatment and sport category (per 1,000 sportsmen)

Type of treatment	Sports category				
	Total*	Contact		Non-contact	
			Collision	Limited impact	Strenuous
	(n = 301)	(n = 58)	(n = 97)	(n = 105)	(n = 32)
Inpatient care	53.2	122.8	41.2	28.6	31.2
Treated at hospital**	126.2	280.7	72.2	95.2	125.0
Treated by physician +	299.0	456.1	257.7	295.2	218.7
Any treatment ^	561.5	807.0	649.5	457.1	312.5
All injury events (238)	790.7	1,258.6	845.4	628.6	500.0

\* Includes 9 athletes with category unknown

\*\* Treated at hospital – either hospitalized or treated in outpatient clinics or emergency department

+ In addition to athletes treated at hospital, includes those treated by non-hospital physicians

^ Includes physiotherapy, acupuncture and other treatments

adolescents. Minor injuries and those that caused only some pain and discomfort were taken care of at home and were most probably under-reported. Since many of the injuries were medically unattended (60%), the number of injury events was probably under-reported due to recall bias.

Participation in contact sports increased the risk of injuries among all age groups. No consistent pattern was noted by age; and since it was confounded by the type of sport, age was not an independent risk factor for sports injuries.

Our study has several limitations. The use of a convenience sample of Israeli athletes who participated in the 15th Maccabiah Games and attended the opening ceremony resulted in response rates of about 25%. The relatively high percentage of athletes (38%) who were medically attended by a physician is probably due to under-reporting of minor injuries. There is probably also under-representation of the more severe injuries, since severely injured athletes were unable to participate in the Games and were probably still recovering from their injuries or no longer participating in competition. A prospective study design is needed to fully identify all injury events and preventable risks, while maintaining the quality of sporting events.

A review of the epidemiological literature on sports injury reveals that no common operational definition of sport injury exists [7,8]. There are two broad categories of injury onset that differ markedly in their etiology [9] – acute injuries that occur suddenly, and overuse or chronic injuries that develop gradually. This survey was aimed at revealing the acute injuries, however the questionnaire contained questions regarding back pain during the previous 2 years (answered positively by 31.9%), stress fractures (3.7%), and other aches and pains (7.3%).

The level of treatment following an injury is usually used as an approximation to reflect severity. However, the availability of treatment on site might be the crucial factor to determine the type and level of treatment received and is not necessarily related to severity of the injury.

In conclusion, the surveillance of sport injuries and populations at risk in Israel should be expanded in order that appropriate prevention programs be designed.

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*Old age isn't so bad when you consider the alternative*

*Maurice Chevalier, French actor, 1966*