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Br. J. Sports Med. 1986;20;7-9
doi:10.1136/bjasm.20.1.7

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THE EPIDEMIOLOGY OF ICE HOCKEY INJURIES

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ABSTRACT

As part of the injury profylaxes in Denmark a questionnaire investigation was undertaken in 14 randomly chosen ice hockey teams — out of 266 players, 210 answered (79%).

The injury incidence per player per 1000 hours was 4.7, i.e. 1.5 in training and 38.0 in match. Half of the injuries were localised to the head (28%) and lower extremities (27%), 19% to the upper extremities and 7% to the back. Of these 48% were contusions. Knee and elbow injuries were of longest duration. The necessity for increased shock absorption in helmets and barriers as well as built-in rotational and collateral stabilisers in the existing knee protectors for injury prophylaxis is stressed.

INTRODUCTION

As part of a greater epidemiological investigation of sports injuries in Denmark (Jørgensen, 1981, 1983 and 1984), we have undertaken an investigation into the epidemiology of injuries in ice hockey.

The aim of this investigation is to get a description of the injury pattern and the frequency of ice hockey injuries, which should enable us to give better advice to the athlete and prevent injury.

METHOD AND MATERIAL

A questionnaire investigation was undertaken in 14 randomly chosen Danish elite hockey teams before the last match in each of two consecutive seasons.

After a uniform briefing the players themselves completed a questionnaire (previously tested and found valid — Jørgensen, 1981). The injury definition included injuries, acquired in connection with hockey training or matches, which hindered activity, and/or required special treatment to enable the injured to play or made play impossible.

The mean player group was 19 players, so 266 were included, of these 210 (79%) answered. The mean age was 22.7 years (range 16-34) with a mean training time of 5½ hours a week in 8 months, and a mean effective playing time of 50 minutes per player per week in 5 months.

In ice hockey a match is 3 times 20 minutes (effective playing time). In Denmark a mean of 18 matches is played each season. Of 19 players in the group only 6 can be on the ice at the same time (1 goalkeeper, 2 defenders and 3 attackers). There are free substitutions and two referees on the ice. All players have traditional ice hockey equipment, and a helmet is mandatory.

The results were computerised and statistically compared with chi square and Fishers exact tests, the level of significance being 5%.

RESULTS

The frequency and pattern of injuries were found statistically identical in the two seasons, with a player incidence of 0.9 injury per season. The incidence per 1,000 hours was 1.5 in training and 25 times more in matches (38.0) — with an overall incidence of 4.7 in ice hockey.

The injury pattern and duration (Table I) show that approximately half of the injuries were located to the head (53/189 = 28%) and lower extremities (51/189 = 27%), concussions (27/189 = 14.3%) and knee injuries being the most frequent (25/189 = 13.2%). There were 26 injuries to face and teeth (56% of these players did not have teeth protection). Injuries to the upper extremity were 19% (34/189), hand and shoulder injuries being most frequent.

TABLE I

Localisation and duration of disability of injuries in ice hockey. (210 players)

Injury	N.	%	Days						Mean
			0-1	2-7	8-14	15-21	22-30	>30	
Head	53	28%							
Concussion	27	0	10	9	1	2	5	21*	
Face	12	4	4	4				6½	
Teeth	14	5	4	1	1	1	2	16½	
Back	13	7%	2	2	4	2	2	1	16
Upper Extremity	36	19%							
Hand/fingers	14	2	2	3	2	1	4	28	
Elbow	7	0	1	3	0	1	2	33	
Shoulder	12	2	0	3	1	5	1	28	
Arm	3	1	0	0	1	0	1	18	
Lower Extremity	51	27%							
Foot/ankle	8	2	0	2	0	2	2	24	
Knee	25	4	3	3	3	6	6	31	
Groin	9	3	0	1	2	1	2	21	
Leg	9	0	3	3	1	2	0	13½	
Others	36	19%	10	7	6	1	6	6	61
Total	189	100%	35	36	42	15	29	32	29.5

*One injury lasted more than a year and was not included.

Knee and elbow injuries were of the longest duration in resolving (31 and 33 days — mean).

The pathology of the injuries (Table II) is dominated by contusions (46%), whereas 26% were sprains and 14% fractures (all being contact injuries, often from collision with the barrier). Muscular strains represented 14% of the injuries.

The head injuries were mainly caused by contusions, whereas knee injuries were due to ligament sprains.

MATCH/TRAINING

Of the injuries, 70% occurred during matches, but only 30% in connection with training (Table III).

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TABLE II
Site and type of injury.
(178 injuries — 11 not classified)

	Strain	Sprain*	Fracture	Concussion	Unknown**
Cranium			3	24	
Face			1	11	
Teeth			1	13	
Back	1			1	11
Hand/fingers		7	3		4
Elbow		1	1		5
Shoulder	3	4			5
Arm	1		1		1
Foot/ankle		2	2		4
Knee	1	13	2		9
Groin	3				6
Leg	6				3
Others		11			25

*including 6 dislocations

**representing conditions where the type was not clear

TABLE III
The ratio between injuries developed in training/match.
(177 injuries — 12 injuries not classified)

Injury:	Number	Developed in:	
		Training	Match
Head	43	17%	83%
Concussion	27	24%	76%
Face	12	12½%	87½%
Teeth	4	9%	91%
Back	12	45%	55%
Upper Extremity	36	28%	72%
Hand/fingers	14	18%	82%
Elbow	7	25%	75%
Shoulder	12	44%	56%
Arm (others)	3		100%
Lower Extremity	50	28%	72%
Foot/ankle	7	29%	71%
Knee	25	23%	77%
Groin	9	33%	67%
Leg (others)	9	37%	63%
Others	36	49%	51%
Total	177	30%	70%

Injuries to the back and shoulder were seen with the same frequency in matches and training, whereas all other injuries were more frequent in matches.

PLAYING POSITION

Goalkeepers had an injury frequency of less than half of that seen in the other positions (Table IV). Backs and attackers were injured equally often.

The goalkeeper injury pattern was dominated by knee injuries (4/14 = 40%).

In the defence head injuries were most frequent. Brain concussions being seen with 12 players and teeth injuries with 9.

The attackers also had many head injuries (26/102 = 25.5%), brain concussions being the most common (14/102 = 13.7%), but injuries to the knee were the most frequent finding (15/102 = 14.7%).

TABLE IV
Injuries with regard to playing position.
(189 injuries)

Injury:	Goal	Defence	Forward
Head	3	24	26
Concussion	1	12 (6)*	14 (5)
Face	1	3 (1.5)	8 (3)
Teeth	1	9 (4.5)	4 (1)
Back	1	4 (2)	7 (2) (1)**
Upper Extremity	2	17	17
Hand/fingers		7 (3.5)	7 (2)
Elbow	1	3 (1.5)	3 (1)
Shoulder	1	5 (2.5)	6 (2)
Arm (others)		2	1
Lower Extremity	4	10	36
Foot/ankle		1 (0.5)	6 (2) (1)*
Knee	4	6 (3)	15 (5)
Groin		1	8 (3)
Leg (others)		2	7 (2)
Others	5	15	16
Total	15 (15)	70 (35)	102 (34)

*The () with correction for the number of players in each group.

**Position unknown

If the injury pattern, with regard to playing position, is corrected for the number in each group, a significant difference can be seen in the frequency of concussion, these being equal in both defenders and attackers, and 5-6 times more frequent than with goalkeepers.

Teeth injuries were found 4.5 times more frequently with defenders. The frequency of knee injuries was the same in all three groups, whereas groin injuries were more frequent with attackers ($\times 3$).

MEDICAL ATTENTION

Only 63% of the injuries were seen by a physician (Table V), and of the potentially most serious, the head concussions, only 8% were seen by a physician, whereas 72% of the knee injuries were seen.

DISCUSSION

With the chosen method (questionnaire investigation), we seem to have a valuable tool to get information about all acquired injuries and not only those, which have been in contact with a physician (which were only 63%), and which did not represent the severity of the injuries

Similar investigations in other sports have shown player incidences (in injuries/1000 hours) of 8.2 in European handball, and 4.1 in football (Jørgensen, 1984). In ice hockey others (Folksam, 1985; Reilly, 1982; Feriencik, 1979; Hayes, 1975) have, when their different methods and materials are taken into account, found injury patterns and frequencies comparable with ours.

In Danish ice hockey which is located at C-group level, we found 25 times more injuries per match hour than per training hour, which gives an impression of the intensity during matches (Daffner, 1977), and a possibility to reduce the number of injuries by enhancement of the rules, with focus on the dominating injury type, namely contusions, often due to collision with the barrier or the ice. The great number of knee injuries was most often due to tackles, legal or illegal.

TABLE V

Treatment of the injuries (189) — by physician, physiotherapist or none at all.

Injury:	Treatment by:		
	None	Physiotherapist	Physician
Head			
Concussion	37%	55%	8%
Face	8%		92%
Teeth	21%	50%	29%
Back			
	38%	31%	31%
Upper Extremity			
Hand/fingers	14%	29%	57%
Elbow	43%	57%	
Shoulder	8%	25%	67%
Arm (others)	33%	33%	33%
Lower Extremity			
Foot/ankle	37%		63%
Knee	20%	8%	72%
Groin	12%	44%	44%
Leg (others)	44%	33%	22%
Others			
	6%	69%	25%
Total	24%	13%	63%*

*10 per cent had been treated by both physiotherapist and physician.

Head concussion was the most frequent injury, but also the one getting the least medical attention (only 8%). This must indicate a lack of knowledge concerning the severity

of the injury, the likelihood of complications and information to players and officials seems necessary. The number and severity of head injuries can be reduced by hardening the rules, and by making the helmet more shock absorbent. The use of face cover should reduce the great number of face and teeth injuries (Sutherland, 1971; Folksam, 1985; Hayes, 1978).

The other great problem, the frequent knee injuries, could probably be reduced by building in rotational and collateral stabilisers in the already existing knee protectors, and of course by hardening the rules, while especially attackers suffered knee injuries, probably due to tackles. Finally, a softer barrier should be tried out.

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