

## SOCCER INJURIES OF YOUTH

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## ABSTRACT

During a soccer tournament with participation of 6,600 boys and girls (9-19 years) all injuries were evaluated, 5.2% of the players were injured; out of these 51% had "slight injuries", 42% "moderate injuries" and 7% "severe injuries". For the individual player the incidence of injury was 19.1/1,000 playing hours including all degrees of injuries; if "slight injuries" were excluded the incidence was 9.4/1,000 playing hours. The incidence rose with increasing age, girls were injured more often than boys.

There were 81% of all injuries localised to the lower extremity, especially the ankle and foot. Contusion was the most frequent diagnosis, amounting to a third of all injuries. Blisters and exoriations amounted to nearly a fifth, 4% of the injuries were fractures, especially in the upper extremity; overuse injuries were seen only in 5.2% of the cases. Based on examination of the injury pattern in these children, injuries of youth seem to be relatively rare and mostly of a non-severe character.

**Key words:** Soccer injuries, Sports epidemiology, Tournament

## INTRODUCTION

After its dissemination on the North American Continent soccer is probably the most popular organised sport in the world with about 40 million registered players, approximately one per cent of the population of the world, according to the FIFA news (1982).

Up to now we have seen many investigations of the injury pattern of adult soccer players. Most of them have been undertaken retrospectively and have been based on casualty records (Roas and Nilsson, 1979; Jørgensen, 1981; Thorseth, 1972). A few recent investigations have been undertaken prospectively (Peterson and Renström, 1980; Ekstrand, 1982; Hinge and Brassøe, 1984).

Soccer injuries in children have hardly been examined and only in a retrospective way (Nilsson and Roas, 1978). We have, therefore, found it of interest to register and examine the injury pattern connected with two large international soccer tournaments for youth during the summer of 1984.

## PURPOSE

The purpose of this investigation was to estimate the incidence, type, severity and site of soccer injuries by direct registration of all injuries at the playing field and to form an impression of the need of medical services at international tournaments for youth of both sexes.

## METHOD

At the end of July, 1984, international youth soccer tournaments were held in two Danish towns at a distance of thirty-five km from one another.

The participants were 9-19 years old. Altogether there were 6,600 players, representing most parts of the world including many European countries, North and South America, Asia and Africa and comprising all in all 410 teams. In the course of five days 945 matches were played in altogether 821½ hours.

Conditions of the games and the medical services were identical in the two places.

The tournaments were organised with opening matches on

the first two days, thereafter as a cup tie with a final round on the last three days. With the exception of a mild drizzle on the last day, the weather was dry, calm and sunny with temperatures around 20°C (68°F); all matches were played on grass.

On the playing fields were first-aid tents where the primary diagnosis and treatment of injuries were attended to. The tents were manned by Home Guard members who were trained in first-aid and constantly there was a doctor at hand. Injuries which demanded further treatment or X-ray examination were sent to local hospitals; the majority of the injuries could be handled at the playing fields.

All treatments were registered, and case records of the patients sent to hospital were examined. Only injuries connected with soccer figure in the investigation. The degree of the injuries was estimated by the following scale:

"Slight injury": Injury which only requires minor first-aid and for which no advice of reduced activity is given.

"Moderate injury": Injury which requires medical care, but no hospitalisation and for which advice of reduced activity is given.

"Severe Injury": Injury which requires hospital treatment and for which advice of reduced activity is given.

Of the active players 5.2% suffered from a soccer injury, 2.6% had moderate and/or severe injuries; 0.4% had serious injuries. All in all an incidence of 19.1 injuries/1,000 playing hours was found, and with slight injuries excluded the incidence was 9.4 injuries/1,000 playing hours. It was observed that the oldest girls had the greatest injury incidence, 47.2 injuries/1,000 playing hours, compared with that of the boys, 20.6 injuries/1,000 playing hours, whereas the youngest girls have the lowest incidence. Totally the girls are twice as often injured as the boys, 29.9 injuries/1,000 playing hours for girls, 16.1 injuries/1,000 playing hours for the boys; expressed in percentages the distribution was 8.83% compared to 4.34% (Table II). For both sexes the frequency of injury increased with increasing age.

Injuries to the lower extremities predominated, amounting to 80.9% of the total number (Table III); but severe injuries were mainly located in the upper extremities; the majority of the fractures appearing here (Table IV). Injuries in ankle joints and feet amount to 43.9%. There are only few injuries to the head and face, 4.9%. Injuries to the body were rare, 3.8%.

The most frequent diagnosis was contusion, which amounted to 33% of all cases. Blisters and exoriations

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**TABLE I**  
Number of injuries and the degree of these in relation to age and sex.

Age	Active players		Injuries						Total injuries
	boys	girls	slight	boys moderate	severe	slight	girls moderate	severe	
17-19	1,292	232	36	31	6	17	11	2	103
14-16	1,932	732	65	39	6	26	44	5	185
12-13	1,554	361	22	10	5	5	6	1	58
9-11	497		6	3	0				
	5,275	1,325	129	83	17	48	61	8	346

There was a significant difference in number of injuries between boys and girls; and between different age groups.

X<sup>2</sup>-test. P < 0.01

**TABLE II**  
Incidence of injuries and the relation to age and sex (injuries per player/1,000 hours of play).

Age	boys				girls				total
	slight	moderate	severe	total	slight	moderate	severe	total	
17-19	10.1	8.7	1.7	20.6	26.8	17.8	3.1	47.2	
14-16	11.3	6.8	1.0	19.2	13.3	22.6	2.6	38.6	
12-13	5.9	2.7	1.3	9.9	0.4	0.45	0.07	0.92	
9-11	5.3	2.6	0	7.9					
All degrees "moderate + severe"	7.4			16.1	17.6			29.9	

**TABLE III**  
Localisation of injuries.

	Boys				Girls				%	
	slight	moderate	severe	total	slight	moderate	severe	total		
Head and face	3	5	3	11	2	4		6	17	4.9
Shoulder	1		1	2	1	1	2	4	6	1.8
Arm	4	2		6		1	1	2	8	2.3
Trunk	2			2	1	4		5	7	2.0
Back	4	1		5			1	1	6	1.8
Hand and fingers	5	7	8	20		2		2	22	6.3
Groin and hip	2	1	1	4	1	2		3	7	2.0
Thigh	21	15		36	5	10		15	51	14.8
Knee	10	13	2	25	2	7	1	10	35	10.1
Lower limb	16	12		28	3	3	1	7	35	10.1
Ankle	5	22	2	29	1	23	2	26	55	15.9
Foot and toes	56	5		61	32	4		36	97	28.0
	129	83	17	229	48	61	8	117	346	100

**TABLE IV**  
The severe injuries.

Fractures	
clavicular	3
supracondylar humerus	1
hand	6
fingers	2
malleoli	2
Dislocation of hip joint	1
Knee sprain	1
Ankle sprain	1
Rupture of the medial collateral knee ligament	2
Rupture of ligament talo-fibulare	1
Contused wound of thigh	1
Cerebral concussions	3
Facet syndrome	1
	25

amounted to a little less than 20%; 13% of the injuries were foot joint distortions of all degrees. There were only few overuse injuries (e.g. tendinitis) 5.2% (Table V). Altogether 14 fractures were found, of which only two were in the lower extremities, both being malleolus fractures (Table IV). In addition there were three ruptures of ligaments of which two were ruptures of the medial collateral ligament of the knee and one was a talofibular rupture. Altogether there were 4 concussions of which three were considered rather serious and were admitted to hospital for observation.

The total number of consultations to the medical services was 392, of which the soccer injuries amounted to 346. The remaining 46 were due to ordinary illness and other accidents on and around the playing fields, including those to officials and spectators. So the soccer injuries amounted to 88% of the registered injuries. In the 46 non-soccer injuries traumas made up about 54% of the cases, 46% were due to illness (e.g. otitis, gastroenteritis, etc.).

TABLE V  
Diagnosis of injuries.

	slight	Boys moderate	severe	slight	Girls moderate	severe		%
Blisters	36			24			60	17.3
Skin abrasions and cuts	15	3		5		1	24	6.9
Contusions	40	37		11	26		114	32.9
Sprain								
Upper extremities	4	7			1		12	3.6
Knee	1	6	1		4		12	3.6
Ankle	6	19		1	18	1	45	13.0
Rupture of ligament with dislocation			3			1	4	1.1
Muscle strain	15	9		4	6		34	9.8
Overuse	9	2		2	5		18	5.2
Fractures								
Clavicular			1			2	3	0.8
Upper extremities			8			1	9	2.6
Lower extremities			1			1	2	0.6
Concussions			3		1		4	1.2
Others	3			1		1	5	1.4
	129	83	17	48	61	8	346	100

## DISCUSSION

The incidence of injury found in this investigation is lower than that found by other authors, both when compared with investigations of adults (Roass and Nilsson (1979), Jørgensen (1981), Thorseth (1972), Peterson and Renström (1980), Ekstrand (1982), Hinge and Brassøe (1984)) and investigations of young players (Nilsson and Roaas (1978)). Only a few investigations, however, can be compared, as different definitions of a soccer injury have been used, and most investigations are based on injuries occurring during an entire season, so the total time of exposition is greater than that of this examination.

Nilsson and Roaas (1978) found in children participating in a 6 days' tournament a somewhat higher incidence of injury. The girls had 44 injuries per 1,000 playing hours and boys had 23 injuries per 1,000 playing hours. The number of matches per team was not essentially different from the tournament in question; no difference of incidence was found between the age groups.

Ekstrand (1982) found in adult tournament players a total incidence of 16.9 injuries per 1,000 playing hours, but here injury was defined exclusively on the basis of the duration of the period of inactivity. We found for all degrees of injuries an injury incidence per player of 19.1 per 1,000 playing hours.

If slight injuries in our investigation are excluded a rough comparison can be made. On this basis, we found an injury incidence per player of 9.4 per 1,000 playing hours, which is lower than that found by Ekstrand (1982). There is better agreement with Hinge and Brassøe's (1984) investigation of injuries in "old boys" players; they found 13.2 moderate and severe injuries per 1,000 playing hours.

The frequency of fractures was about 4% of the total number of injuries, which corresponds to what was found by Nilsson and Roaas (1978) and Ekstrand (1982) whereas Peterson and Renström (1980) found a frequency of 9%. So apparently children incur fractures just as frequently as adults. Direct comparison of the investigations must be taken with reservations, however.

Localisation of injuries in children does not differ from the pattern in adults. We found that 80.9% affected the legs especially the ankles and feet, and this corresponds quite well with other examinations. Overuse injuries were relatively rare

in children, only 5.2% of the total number of injuries.

Most of the injuries at these tournaments were insignificant, only 3.7‰ were considered to be serious and required hospital examination and/or treatment. The cause of the low number of injuries in our investigation compared with others' might reasonably be explained by the good conditions for the games; most of the matches were played on grass in pleasant, dry summer weather.

Also the skilled referees, all licensed, who did not allow foul play, contribute to the low number.

In this investigation and others (Ekstrand, 1982; Hinge and Brassøe, 1984) it is seen that the injury incidence and the degree of injuries rise with increasing years; in addition it is seen that overuse injuries are relatively rare in children. This lesser incidence of injury in young people can perhaps be due to smaller mass and lesser velocity with resultant lesser force.

The flexibility of children's bodies might be an explanation of the relative absence of overuse injuries; furthermore, it was only a short tournament so the short time of exposure might be of importance. It is possible that young soccer players do have overuse symptoms, but in our experience they do not contact the medical services for overuse injuries in the same degree as for acute trauma. The differences in incidence of injury between boys and girls can be due to the lack of tradition for girls' soccer; the technical standard is less fully developed. Not all players used shin-guards. It is certain that some of the injuries could have been avoided by a consequent use of such. At the next tournament use of shin-guards will be compulsory.

Our investigation suggests the following conclusions. Soccer injuries in children are less frequent than in adults. The frequency of injury increases with increasing years. Girls have a higher incidence of injuries than boys. Injuries are most frequent in the legs — especially in the feet and ankles. Fractures are seen most frequently in the upper extremities; severe injuries are rare. The relative frequency of injury at large youth tournaments is about 5%.

## References

- Ekstrand, J., 1982 "Soccer injuries and their prevention". Linköping: Medical Dissertations no. 130, Linköping University.  
FIFA News 1982. 235: 528-9.

Hinge, H. H. F. and Brassøe, J. O. K., 1984 "Fodboldskader hos old boys fodboldspillere". Ugeskrift for Læger 146 (16): 1253-56.  
 Jørgensen, U., 1981 "Skademønstret i dansk divisionsfodbold". Ugeskrift for Læger 143 (34): 2185-88.  
 Nilsson, S. and Roaas, A., 1978 "Soccer injuries in adolescents". Am. Journ.Sports Med. 6 (6): 358-361.

Peterson, L. and Renström, P., 1980 "Fotbollskader — frekvens och art". Läkartidn. 77: 3621-3.  
 Roaas, A. and Nilsson, S., 1979 "Major injuries in Norwegian football". Brit.Journ.Sports Med. 13: 3-5.  
 Thorseth, K., 1972 "Ildrætslæsioner". Dissertation, Copenhagen University. F.a.d.L.s forlag.

## OBITUARY

### Dr. James Henry Cyriax, MD, MRCP

With the sudden death of Dr. Cyriax on June 17th at the age of 80, orthopaedic medicine has lost its founder and principal practitioner, and a man who has had an important influence on sports medicine. He qualified with MRCS, LRCP in 1929, having trained at Caius College, Cambridge and St. Thomas' Hospital, London and gained MB, BChir Cantab in 1931. In 1938 he obtained the MD Cantab, and MRCP in 1954. His interest in soft tissue and joint diseases led to the award of the Heberden prize in 1943. He served St. Thomas' Hospital for 40 years from qualification in 1929 until retirement in 1969 but he continued in private consultant practice almost until the time of his death.

He established a department devoted to massage and manipulation at St. Thomas' Hospital in 1938 which became the "department of orthopaedic medicine" and pioneered methods of manipulation which could be carried out by physiotherapists, and carried these ideas further when, with other enthusiasts, he founded the Association of Manipulative Medicine, a society in which he was rightly President for some time. He held many other part-time appointments — to the King Edward Memorial Hospital, Ealing and St. Andrew's Hospital, Bow, as well as Civilian Consultant to the Ministry of Aviation and to British Airways. Besides these UK commitments he was Visiting Professor to the University of Rochester, USA and in 1966 was awarded the Gold Medal by the University of Verona. In recent years he established the Cyriax Foundation for promotion of education by lecture-demonstrations, video tape recordings and other means. He was known world-wide for his various textbooks of Orthopaedic Medicine, some of which have in the past been reviewed in this journal.

Dr. Cyriax joined the British Association of Sport and Medicine in 1957 and kept up his membership until the end of 1971, several years after his retirement. He participated in several of our meetings and no-one who was present can forget his masterly simultaneous translation feat of all speeches in both languages when our Association entertained a large group of Italian football doctors at the Royal Society of Medicine in 1966 during the Football World Cup.

I last spoke to Dr. Cyriax a couple of years ago at a meeting of the Society of Orthopaedic Medicine at Nottingham. His enthusiasm for his life interest had never waned and he was telling me about the Cyriax Foundation and its objects. He was still keenly interested in medicine right up to the moment of his death.

Medicine, especially orthopaedics and rheumatology, is a family tradition for him. Both his parents were doctors, his mother, Dr. Annjuta Kellgren-Cyriax, was a descendant of the Swedish therapist who, together with Ling, virtually founded the profession of physical education, based on anatomical and physiological principles rather than the military type of drill and exercises then in vogue. Dr. James Cyriax' sister — Dr. Anna Violet Kellgren Cyriax, now living in New Zealand, was a founder member of BASM, and qualified in both medicine and physical education. His aunt, Dr. Hedvig Kellgren-Cyriax was the Newcastle Medical School's oldest graduate and I was privileged to sit opposite to her at an official banquet in Newcastle last year, soon after she had celebrated her 100th birthday, but we regret died in January 1985. Her daughter Enid Houghton was in general practice in Birmingham, and her grand-daughter, Helga, is a venereologist in London.

We extend our deepest sympathy to Dr. Cyriax' widow and their children who are keeping his memory alive with their involvement in the Cyriax Foundation.

H. E. Robson