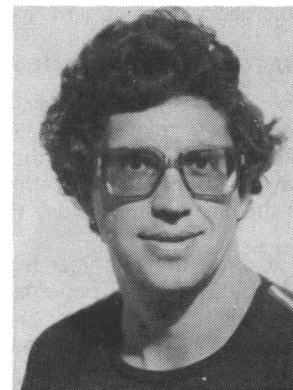


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### ACUTE SPORTS INJURIES IN OSLO: A ONE-YEAR STUDY

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#### ABSTRACT

All sport injuries treated at the Emergency Department, Ullevål Hospital in Oslo (OKL) were registered for one year. They accounted for 6.3% of the total number of patients treated at OKL in that period. 4673 patients were seen: 3292 males and 1381 females. The women were younger than the men, 55% were below 20 years of age; 41% of the males ( $p < 0.05$ ). Most of the men (64%) were injured in connection with competitive sports, but 52% of the women sustained their injury pursuing recreational sports. Football and skiing accounted for 49% of the total number of injuries. In males football caused most injuries — 35%. In females handball accounted for most injuries — 18%. Nearly ¾ of the injuries affected the extremities; the most common injury being the ankle sprain (16%). Almost ¼ of the patients had a fracture, and 218 patients (4.7%) were admitted to hospital, the rest being treated as outpatients. In all, the sports injuries required 7658 consultations.

Key words: Casualty department, Injury epidemiology, Sports, Sport injury.

#### INTRODUCTION

During the last decades sport participation has increased greatly at all levels in Norway. More people take part in competitive sports. They train more and compete more frequently than the athletes 20-30 years ago. However, the greatest increase in sport participation has occurred in recreational sports, well illustrated through the thousands of participants in various jogging events throughout the country. The "sport fad" is partly supported by the medical profession. Regular physical activity is advocated as an integrated and important part of most preventive health programmes. The Norwegian

Medical Association has dedicated two issues of their journal to "Physical Activity and Health" (12B/1980 and 5B/1983).

However, increased sport participation results in an increased number of sports related injuries. In the planning of treatment facilities for and in the prevention of sport injuries, it is important to know more about the aetiology of these injuries. Such data should reflect all sport related injuries, not only those seen in special sport injury clinics (Andersen et al, 1959; Garrick and Requa, 1978a; Jackson et al, 1980). In an investigation carried out in Oslo in 1946-48, sport injuries accounted for 8% of the total number of injuries seen (Johansen, 1955). Other authors have published similar data (Crompton and Tubbs, 1977; Lang-Jensen, 1982).

The purpose of this investigation was to study all sports related injuries which were treated at the largest

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emergency department in Oslo throughout one year.

## MATERIAL AND METHODS

Oslo City Hospital (Ullevål Hospital) has an out-patient emergency department (OKL) which serves about 650,000 inhabitants of the greater Oslo area 24 hours a day. In addition two emergency departments operate in the city during the day time (8 a.m. to 4 p.m.).

During the one year registration period (12/10-81 – 11/10-82) 74,708 patients were treated at OKL, 75.8% of the total number of patients seen in all three emergency departments in this period.

The records of the patients who had been engaged in sport activity when injured, were marked "SPORTS INJURY" and placed in a special file. The patients were treated according to standard hospital procedures by the regular staff. However, care was taken to ensure that all the relevant information was written down in the record. In addition to age and sex of the patient, day and month of the injury, diagnosis and treatment, information was collected on what sport was practiced and on what level (i.e. competitive or recreational). When treatment was finished, the case records were examined by one of the authors. All the information was coded and transferred on to special forms. In those cases where part of the information was lacking, the patient was contacted by letter or by phone to obtain the missing details.

The statistical analysis of the data on the 4,673 patients was performed in the EDP Center at Oslo University. A locally developed statistical package (DDPP) was used on a DEC-10 computer. In addition, when applicable, the Chi-square evaluation and student's t-test were used in analysis of the data.

## RESULTS

Altogether 4,673 patients were treated for injuries caused by sporting activity during the registration period, accounting for 6.3% of the total number seen at OKL. They required 7,658 consultations; the majority (66.2%) being seen only once. There were 218 (4.7%) admissions to hospital, and three were dead upon arrival at OKL, all from coronary artery disease.

When the patients were divided according to sex and age (Fig. 1), it was found that 70.4% were males and 29.6% were females. The injured females were somewhat younger than the males, 55% below 20 years of age compared with 41% of the males ( $p < 0.05$ ).

In males the majority of the injuries (64.8%) occurred in connection with competitive sports (i.e. during competition or while training for competition). Only 47.1% of the females were injured under these circumstances ( $p < 0.02$ ). No difference was observed in the relative distribution of injuries in competitive and

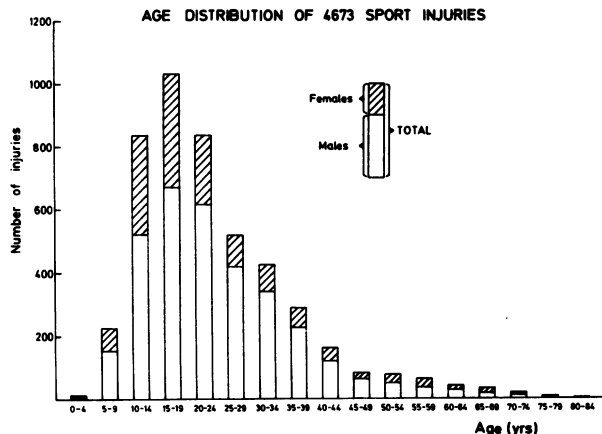


Fig. 1: Age distribution in injured males (open bars), females (hatched bars) and total material (open + hatched bars).

recreational sport between the two sexes in the group below 20 years of age (Table I). However, while in males older than 20 years, 70.1% of the injuries occurred in competitive sports, the corresponding figure for females was only 40.8% ( $p < 0.001$ ).

TABLE I

Relative distribution of sport injuries according to mode of occurrence, age and sex.

Injury situation	Males		Females	
	< 20 yrs (n = 1354)	> 20 yrs (n = 1938)	< 20 yrs (n = 754)	> 20 yrs (n = 627)
Competitive sport	55.8%	70.1%	52.4%	40.8%
Recreational sport	44.2%	29.9%	47.6%	59.2%
	100%	100%	100%	100%

The number of sports injuries per month varied from 574 in February to 143 in July (Fig. 2). In February sports injuries accounted for 11.1% of the total number of patients seen at OKL. In July 2.2% of the injuries resulted from sport. 20.2% of the injuries occurred on Sundays (Table II). Fridays had the smallest number of injuries (10.1%). Significantly more injuries were caused by recreational sports during weekends than during the rest of the week ( $p < 0.001$ ).

Football and skiing accounted for nearly 50% of the injuries in the total material. In the males more than 1/3 of the injuries occurred in football, with skiing being second accounting for 18.8% of the injuries (Table III). If alpine and nordic skiing are considered separately,

TABLE II

Distribution of total number of injuries and injuries in recreational sports throughout the week.

Day	Total number of injuries	Injuries in recreational sport
Monday	624	210
Tuesday	727	260
Wednesday	694	265
Thursday	620	223
Friday	470	223
Saturday	593	273
Sunday	945	455

TABLE III

Relative distribution of injuries in 8 major sports in males and females.

Sport	Number of injuries as per cent of total for each sex	
	Males (n = 3292)	Females (n = 138)
Football	35.4	11.7
Skiing	18.3	23.8
Alpine	9.4	9.5
Nordic	8.9	14.3
Handball	9.1	18.5
Bicycling	7.6	9.1
Icehockey	4.6	0.4
Basketball	2.3	5.0
Karate	2.8	2.7
Jogging	2.5	1.7
	100.9	96.7

the number of males injured is about the same as in handball, around 9%.

In females skiing caused 23.8% of the injuries (Table III). However, more females were injured in handball (18.5%) than in nordic (14.3%) and alpine (9.5%) skiing considered separately. Football caused 11.8% of the injuries in the females.

About  $\frac{3}{4}$  of the injuries affected the extremities (Table IV). Males had more injuries in the lower extremities than in the upper extremities. In females more injuries affected the arms than the legs.

Table V shows the relative distribution of injuries in the seven registered categories. Slightly more than 1/3 of the patients suffered a distortion. The most common injury was the ankle sprain, accounting for 16% of the total number of injuries. About  $\frac{1}{4}$  of the patients in both sexes had a fracture.

TABLE IV

Number of injuries in different body regions.

Body region	Injuries in males	Injuries in females
Head	382	95
Neck	26	19
Shoulder/Clavicular	255	80
Upper extremity	924	569
Thorax/Back/Abdomen	202	66
Pelvis/Hips	34	28
Lower extremity	1469	524
	3290	1381

TABLE V

Relative distribution of the different type of injuries in males and females.

Type of injury	Number of injuries in per cent of total for each sex	
	Males (n = 3292)	Females (n = 1381)
Distortion/Sprain	34.8	40.5
Contusion	22.3	19.1
Vulnus/laceration	10.3	5.2
Fracture	22.5	25.7
Luxation	2.2	2.5
Rupture	3.1	2.2
Others	4.7	4.8

## DISCUSSION

The total number of sport injuries per year observed in the present investigation was 54% higher than that seen during the 1946/48 study at OKL (Johansen, 1955). The population of the greater Oslo area increased by 30% during this time. The incidence of sports injuries accordingly increased from 60.2 inj/10,000 inhabitants in 1948 to 71.5 inj/10,000 inhabitants in 1982.

However, the real number of sports injuries in Oslo is higher. As mentioned, OKL treats about 75% of all patients in need of emergency care in Oslo. Since it is the only clinic open after 4 p.m., and since most sports are practiced in the evenings, OKL probably treats more than 75% of the sports injuries. Many people with minor injuries do not consult a doctor. In addition some of the best football, ice-hockey and handball teams in the city have their own physicians. We, therefore, have not registered all these injuries. It should also be mentioned that over-use or other chronic injuries are seldom seen at OKL. This is because OKL has a policy of only treating acute injuries which have occurred in the last 2-3 days. Finally, the most severe injuries are admitted directly to the hospital.

Thus it seems fair to assume that real number of acute sport injuries severe enough to warrant treatment is close to 6,000 on a yearly basis in Oslo. This makes it an important health problem.

Sport injuries accounted for 6.3% of the total number of injuries in our material; in agreement with previously published data (Burke et al, 1983; Crompton and Tubbs, 1977; Johansen, 1955; Lang-Jensen, 1982). Others have found a lower incidence of sport injuries (Garrick and Requa, 1978a; Sørensen et al, 1977). However, they have registered only patients participating in organised sports (Sørensen et al, 1977), only during summer (Holm-Nielsen and Justesen, 1973) or from open wards which also treat patients with chronic ailments not seen at OKL (Schulkind and March, 1982).

The high incidence of sports injuries in January and February is due to the fact that skiing is the major sport in Norway. The vast number of people skiing results in a large number of recreational ski injuries. This was also seen in 1946/48 (Johansen, 1955). In Denmark the main sport is football. Correspondingly the highest number of sport injuries is seen during the football season, while few sport injuries occur in January and February (Lang-Jensen, 1982). The small number of injuries in July in ours and other Scandinavian studies (Holm-Nielsen and Justesen, 1973; Johansen, 1955; Lang-Jensen, 1982) is due to the lack of organised sport activities during summer vacation in these countries. The fact that recreational sport injuries account for a very large proportion of the injuries in July (Fig. 2) supports this view.

Some 30% of the injuries occurred in females, this is slightly higher than that observed by others (Burke et al, 1983; Crompton and Tubbs, 1977; Holm-Nielsen and Justesen, 1973; Johansen, 1955; McRae and Topping, 1982; Sørensen et al, 1977). In agreement with others (Crompton and Tubbs, 1977; Lang-Jensen, 1982) we found that significantly more females than males were below 20 years of age. Whether this is because the females above 20 years participate less intensely, engage in less injury-prone sports or simply have quit sports, cannot be determined from the present data. It is interesting to note that the relative number of females injured increased again in the age-groups above 40 years.

The largest number of injuries, 22% of the total, was seen in the 15-19 years group. This is in agreement with results from other hospitals (Burke et al, 1983; La Cava, 1951; McRae and Topping, 1982) as well as from OKL (Johansen, 1955). However, while 40% of the patients in our material were between 10-20 years, only 28% were in this age-group in the previous OKL study. In addition 2.1% of the injuries occurred in patients above 60 years in 1981/82 as opposed to 0.6% in Johansen's study in 1955. The majority of the injuries in the younger patients of both sexes occurred in competitive

sports. All the injuries in patients above 60 years occurred during recreational sports. Thus it seems that compared with what was the case in 1946/48, the competitive athlete today tends to be younger. At the same time, people enjoy recreational sport to a higher age. Our oldest patient was an 84 years old skier.

Competitive sports accounted for 59% of the total number of injuries, lower than that observed by La Cava (1961), but in good agreement with others (Lang-Jensen, 1982; Weightman and Browne, 1975). The relative number of injuries in competitive sports varied with age and sex (Table I). In addition, it depended on the type of sport practiced. Thus, in football 87% of the injuries occurred during competition or while training for competition. The corresponding number in handball was 99%; in nordic skiing 23%. The large relative contribution of recreational injuries in nordic skiing, is reflected in the high percentage of recreational sport injuries in January and February (Fig. 2).

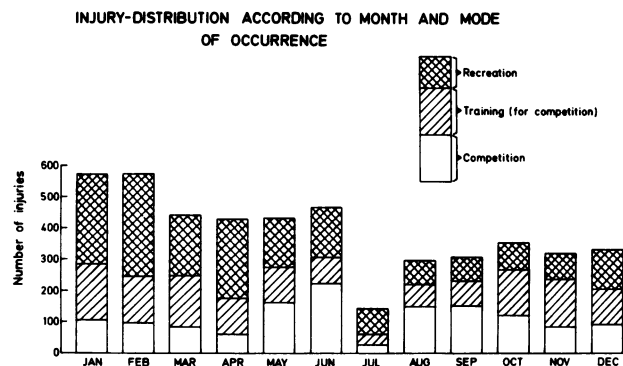


Fig. 2: Monthly distribution of injuries which occurred during recreational sports (double hatched bars), training for competition (hatched bars) and competition (open bars).

In agreement with most of the other authors already quoted, and including also Andrén-Sandberg and Lindstrand, 1982; Garrick and Requa, 1978 and Requa and Garrick, 1981), we found that a great majority of the injuries affected the extremities. To a large degree the sport performed determined the injury pattern (Andrén-Sandberg and Lindstrand, 1982; Burke et al, 1983; Andersen et al, 1959; Jørgensen, 1983; Requa and Garrick, 1981).

The finding that in males lower extremity injuries were more common than upper extremity injuries, can be attributed to the fact that football injuries dominated in men. Women had more arm than leg injuries because handball and basketball are important sports in females. In addition football accounted for only 11% of the injuries in females.



About 1/3 of the injuries were sprains; corresponding well with the 31% observed in 1946/48 by Johansen, reported in 1955 as well as with others (Jørgensen, 1983; Shively et al, 1981). Our finding that fractures account for nearly ¼ of the acute sport injuries also agrees with previous data but in one paper fractures accounted for only 4% of the injuries (Lange-Andersen and Holen, 1955). The authors, however, indicate that this was possibly caused by the fact that most of the fractures were taken directly to hospital.

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