Badminton injuries

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In a one year period, from 1 January 1986 to 31 December 1986, 4303 patients with sports injuries were treated at Aarhus Amtssygehus and Aarhus Kommunehospital. The mean age was 21.6 years (range 7–72 years) and 2830 were men. Two hundred and seventeen badminton injuries occurred in 208 patients (136 men) with a mean age of 29.6 years (range 7–57 years), constituting 4.1 percent of all sport injuries in Aarhus. Joints and ligaments were injured in 58.5 percent of the patients, most frequently located in the lower limb and significantly more often among patients younger than 30 years of age. Muscle injury occurred in 19.8 percent of the patients. This type of injury was significantly more frequent among patients older than 30 years of age. Most injuries were minor. However, 6.8 percent of the patients were hospitalized and 30.9 percent received additional treatment by a physician. As the risk of injury varies with age, attempts to plan training individually and to institute prophylactic measures should be made.

Keywords: Epidemiology, sports injuries, badminton

Introduction

Badminton is one of the most popular sports in Denmark. More than 170 000 players are organized in 650 clubs (*Table 1*). Badminton is an individual, non-contact sport requiring jumps, lunges, quick changes in direction and rapid arm movements from a wide variety of postural postions. The physical demands of badminton suggest that injuries to the limbs may be a frequent occurrence.

Studies reporting epidemiological data of badminton injuries are sparse, but previous studies have shown that these injuries often are severe in character but of relatively low frequency[1,2].

The aim of the present study was to determine the frequency of badminton injuries in the Aarhus community of 253 753 inhabitants and to describe the epidemiology and traumatology of these injuries.

Material and methods

In a one year period, from 1 January 1986 to 31 December 1986 all patients resident in the community of Aarhus, consisting of 253 753 inhabitants (*Table 1*), who consulted the casualty department of Aarhus County Hospital and Aarhus Municipal Hospital for treatment of sports injuries acquired within 24 hours before the consultation, were registered on a standard case record by the doctor in charge of the examination and treatment.

The standard case record included the following parameters: type of sport, age, sex, time of trauma, type and anatomical site of injury, the mechanism of trauma, connection to clubs, schools etc., methods and time used for warm-up and training, use of prophylactic equipment and whether the treatment was concluded in the casualty department or if the patient was to receive further treatment.

The standard case records were analyzed in a computer database. Statistical analysis was carried out using Chi-square test with Yates correction. P-values less than 0.05 were considered to be statistically significant.

Results

A total of 4303 patients suffering from sports injuries were registered. The mean age was 21.6 years (range 7 to 72 years) and 2830 were men. Of these, 217 were badminton injuries having occurred in 208 patients of which 136 were men. The age and sex distribution of the injured patients, of the inhabitants of the Aarhus community and of the badminton players of the community is seen in *Table 1*.

The mean age was 29.6 years (range 7 to 57 years), significantly higher ($p<0.05$) than the mean age of the total group of sports injuries in which the mean age was 21.6 years (range 7 to 72 years).

Badminton injuries constituted 4.1 percent of the total number of registered injuries during the one year period. On average, the players spent two hours a week playing badminton. Most players (44.8 percent) had taken less than 15 minutes to warm up, and only 20.0 percent of the players had spent 30 minutes or more warming up before playing. It was found that patients over 30 years of age took significantly less time warming up than the younger group of players ($p = 0.04$).

Only 10 players had instituted any prophylactic measures. Four players used tape on the hand or wrist, and one player on the ankle joint. A knee bandage was used by one player, three players used shock absorbing insoles, and one player wore protective eye glasses.

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Table 1. Age and sex distribution of inhabitants, badminton players and badminton injured in the Aarhus community

	Male				Female				Total
	<18 years	18–25 years	>25 years	Total	<18 years	18–25 years	>25 years	Total	
Inhabitants of Aarhus	27164	19896	75901	122961	26013	20508	84271	130792	253753
Badminton players of Aarhus	1475	1304	3733	6512	830	790	1900	3520	10032
Badminton players injured	19	32	85	136	14	16	42	72	208

Most injuries occurred to the lower extremities (82.9 percent) (*Table 2*) whereas the upper extremities were involved in 11.1 percent of the cases. Eyes were injured in 2.3 percent of cases. As seen in *Figure 1* most injuries occurred to joints and ligaments as sprains and ligament ruptures (58.5 percent) while 19.8 percent of the players had muscle injuries. Injuries to the joints and ligaments were most frequently seen in the ankle joint (66.9 percent) as shown in *Figure 2*. Injuries to joints and ligaments occurred significantly more often in players younger than 30 years old ($p<0.01$). Muscle injuries (strains and tears) were most frequently seen in the leg (55.8 percent). The distribution of muscle injuries are shown in *Figure 3*. This type of injury was significantly more frequent among players over 30 years of age ($p<0.01$).

The injuries were, in most cases (62.0 percent), caused by the players falling or stumbling while attmepting to retrieve the shuttle. Injuries caused by being struck by the shuttle or the racket represented 8.1 percent of the cases.

In most cases the injuries were minor, and 62.2 percent of the players received treatment at the casualty department only. However 6.8 percent of the players were hospitalized. Of these, 11 players (5.3 percent) had Achilles tendon tears, and 3 players (1.5 percent) had injured knee ligaments. Further treatment was received by 26.1 percent of the players in the outpatients clinic, while 4.9 percent were discharged to their general practitioner for further treatment.

The registration of badminton injuries peaked in January and in September concomitantly with the opening of the official season. In this study no particular sex-related rises could be calculated.

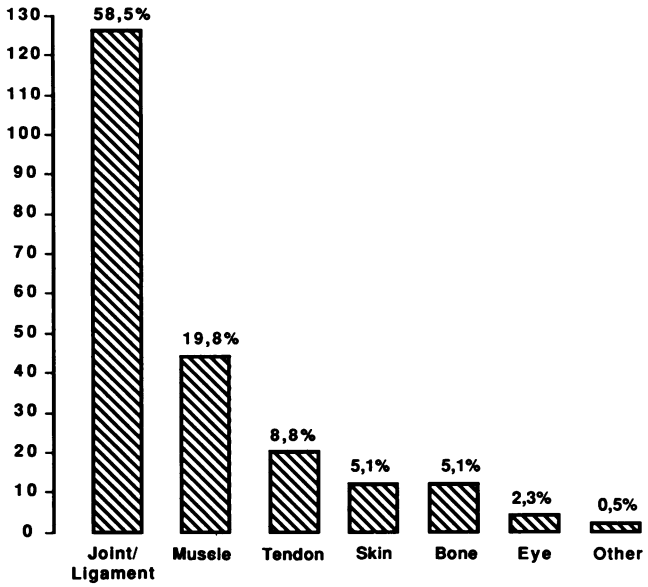

Figure 1. The distribution of badminton injuries in respect of tissues (n = 217)

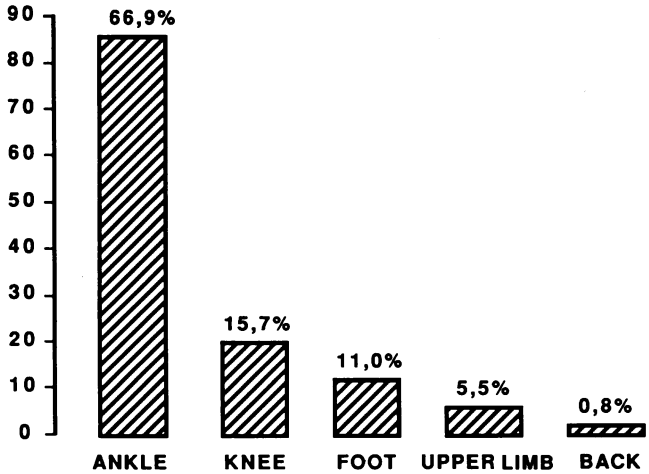

Figure 2. The distribution of badminton injuries in respect of tissues (N = 217)

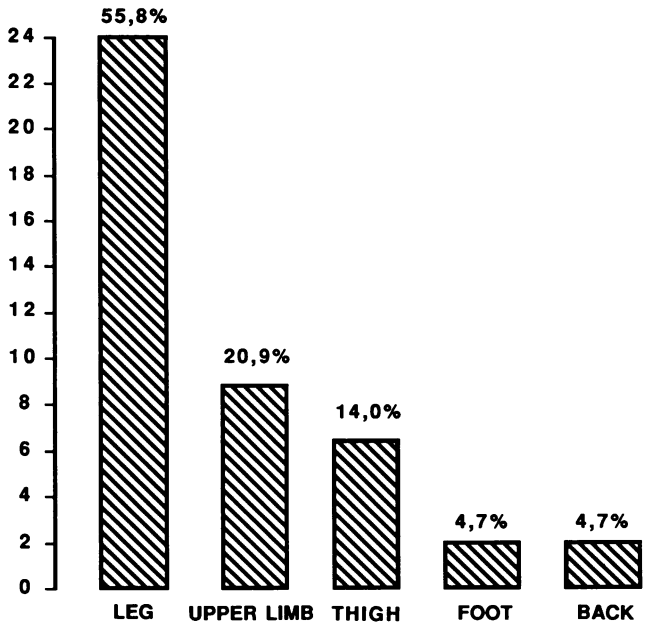

Figure 3. Distribution of injuries to muscles (n = 43)

Discussion

Several problems are related to epidemiological and traumatological studies of sports-related injuries. Only a few studies[2,3] have used methods of study and evaluation similar to our study. Comparison with other studies of badminton related injuries[1,4,5] is therefore difficult to perform.

The frequency of badminton injuries (4.1 percent) in this study is higher than previously reported from studies of comparable design. Axelsson *et al.*[3] reported 1.0 percent badminton injuries among 503 sport injuries, while Lorentzon *et al.*[2] reported 3.1 percent badminton injuries among 1316 sport injuries. These differences can be explained by variation in the number of active badminton players in the hospital uptake areas.

Soft tissue injury to the limbs, particularly the lower limbs, were the most prominent injuries among badminton players. There was no statistically significant difference in the anatomical site and the type of injury among male and female badminton players. This finding is in contrast to Hensley and Paup[1] who found that bruises were more frequent in female badminton players and muscle cramps more frequent in male badminton players. Since these injuries rarely need treatment in a casualty department, the differences are probably explained by this fact.

According to Izen[4] and Mills[5], prominent badminton injuries include fractures, lacerations, back and shoulder injuries. In our study no fractures or lacerations were recorded, and back and shoulder injuries were rare. This is consistent with findings reported by Hensley and Paup[1].

Surprisingly, the frequency of Achilles tendon tears is almost twice as high (5.3 percent) as the 2.6 percent reported by Hensley and Paup[1]. We found the frequency of eye injuries considerably lower (2.3 percent) compared to the 7.0 percent reported by the same authors. These differences might be explained by the fact that Hensley and Paup[1] only included competitive tournament badminton players in their study, whereas 75 percent of the badminton players included in our study were recreational players. They might therefore not be as fit and experienced as the competitive players who also tend to have a harder smash. This is often the dominant factor in the cause of eye injuries.

In this study, the mean age of the injured badminton players is significantly higher than the mean age for all the sport injured patients and this is consistent with Hensley and Paup[1].

The predominant cause of badminton related injuries was intrinsic in nature, such as moving to retrieve the shuttle or in the stroke action itself. In this study, only 8.1 percent of all injuries were caused by extrinsic factors such as collision with the partner or being struck by the racket or shuttle. This is in contrast to Hensley and Paup[1] who found that badminton injuries were caused by extrinsic factors in 35 percent of cases.

One might speculate that this difference could be explained by injuries being less severe when caused by extrinsic factors and more severe when caused by intrinsic factors.

The majority of injuries were minor and this corresponds with previous studies[1,2]. One third of the injuries were considered severe enough to demand hospitalization and further treatment by a physician. This is similar to that reported by Lorentzon *et al.*[2].

Prophylactic intervention should be applied in several fields to prevent the different types of injury among badminton players of varying age and experience. Few players had instituted any form of prophylactic intervention.

Sprains and ligament injuries occurred most frequently in the younger group of badminton players and almost only in the lower limb. More intensive and co-ordinated exercise for the muscles of the lower limb, taping and stabilizing orthoses probably could reduce this type of injury in the younger group of players[6].

Strains and tears of muscles occurred most frequently in the older age groups of badminton players. Most often the muscles of the lower limb were injured, but one out of five injuries occurred to the upper limb. Since most players only did warm-up exercises for less than 15 minutes, a longer warm-up period might reduce these types of injuries among the older group of players.

Since eye injuries are relatively frequent, protective eye glasses could probably minimize these injuries as recommended by Chandran[7] and Ryan[8].

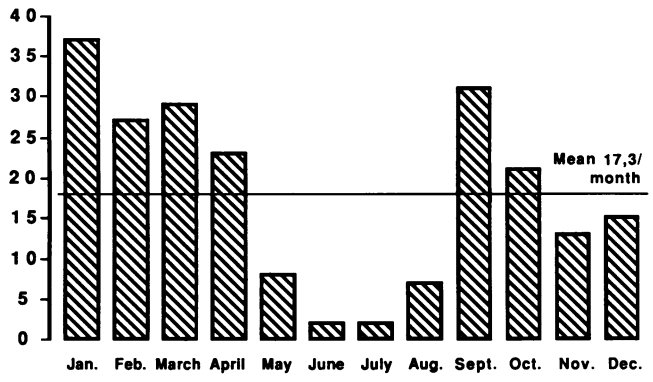

Figure 4. Seasonal variation of badminton injuries (n = 208)

Table 2. The distribution of badminton injuries

Head	1.8%
Eye	2.3%
Shoulder	1.4%
Arm	6.9%
Back	1.8%
Hand	2.8%
Thigh	2.8%
Knee	11.5%
Leg	14.3%
Ankle	44.2%
Foot	10.1%

As most injuries occur in the very beginning of the season and after the Christmas holidays, care should be taken in these periods through the prophylactic interventions mentioned above.

Conclusion

Soft tissue injuries to the lower limbs were the most frequent injury among badminton players. Badminton injuries occur to a relatively older age group than sport injuries as a whole. Although badminton injuries occur with relatively low frequency, the type of injury is often severe in character and demands a long period of treatment and rehabilitation. Sprains and ligament ruptures are most frequent among younger badminton players, whereas muscle injuries are most frequent among older badminton players. Individual training programmes and prophylactic interventions are recommended.

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