Sports-related injuries in elderly men still active in sports

M. Kallinen, MD*†, M. Alén, MD PhD†

*LIKES-Research Centre for Physical Culture and Health, Jyväskylä, Finland, and †Peurunka-Rehabilitation and Physical Exercise Centre, Laukaa, Finland

By means of a questionnaire with a complementary interview and physical examination, the site and nature of sports injuries were investigated over a 10-year period (1977–1987) in 97 elderly athletes (age range 70–81 years). The athletes were still active in training and competition with a mean competition background of 15 years. Of the subjects studied 30 were strength/power athletes and the remaining 67 endurance athletes. Altogether we found 273 sports-related injuries (169 acute and 104 overuse injuries). Of the injuries 75% had occurred in the lower extremities. The most commonly injured part of the body was the knee (20% of all cases). Sprains of the thigh and knee were the most frequent types of acute injury. In most cases the treatment prescribed was rest and physiotherapy. Surgery had been necessary in ten cases (3.7% of all injuries). Mean withdrawal from normal sporting activity had, in general, been 2–3 weeks. Of the injuries, one in five had, however, lasted over several years causing some disability during sporting activities.

Keywords: Sports injuries, elderly men, physically active

It is well known that physically active children commonly sustain sports-related overuse injuries associated with the growth and development of their musculoskeletal system. The proportion of acute sports-related injuries seems also to be high among prepubertal children[1]. In adult athletes a greater variation in the pattern of injury in relation to the changing nature of sports with age has been reported. Among ageing athletes the incidence of inflammatory overuse injuries is higher than acute injuries[2,3].

Ageing causes many structural and functional changes which may increase the risk of injuries. On the other hand, since ageing also retards healing, elderly athletes would be expected to sustain a greater proportion of the injuries associated with the ageing process itself[4]. There is, however, limited data on the sports-related injuries prevalent among competitively active elderly athletes aged 70 years and over.

The purpose of this study was to describe the frequency, mechanisms and nature of sports-related injuries in elderly men (aged over 70 years) still active in competitive sports. To elucidate the effect of sports event and type of training on the nature of injuries, strength/power and endurance trained athletes were compared.

Materials and methods

The study was performed as part of a larger research project on health and functional capacity in elderly athletes and sedentary men. The initial group of subjects consisted of 287 elderly men athletes drawn from a register of Finnish sport organizations. Of this number, 220 responded to the first questionnaire. The most active athletes (112) were selected for further study. The second questionnaire was then mailed to the 112 selected athletes and drew a response rate of 88% (99 of 112). Of these subjects 98% (n = 97) came to the laboratory for measurements. Thus, the final study group comprised 97 competitively active men (age range 70–81 years). The subjects were divided into two subgroups on the basis of their sport events: endurance (n = 69) and strength/power (n = 28) athletes (*Table 1*). The subjects all had a life-long training history (range 31–68 years) and all were still active in competitive sports.

The second mailed questionnaire elicited information about each subject's training and competition background, injury dates during the past 10-year

Table 1. Sports event distribution of 97 elderly athletes aged 70–81 years

Sports event	*Frequency (%)*
Strength/power athletes (n = *28*)	
Track and field, sprinters/jumpers	13
Track and field, throwers	12
Other (bowler 1, power lifter 1, tennis-player 1)	3
Total	28
Endurance athletes (n = *69*)	
Cross-country skiers	28
Orienteers	25
Endurance runners	1
Other (walkers 2, cyclist 1)	3
Total	72
Overall total	100

Address for correspondence: M. Kallinen, Peurunka-Rehabilitation and Physical Exercise Centre, SF-41350 Laukaa as., Finland

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Table 2. Physical characteristics, competition background and training volume (hours during preceding week) in 70–81-year-old strength/power athletes ($n = 28$) and endurance athletes ($n = 69$)

Variable	*Strength/power athletes**	*Endurance athletes**
Age (years)	74 (3) (70–81)	74 (3) (70–81)
Weight (kg)	74 (15) (52–112)	70 (9) (57–93)
Height (cm)	172 (7) (160–182)	171 (6) (159–184)
Training background (years)	52 (16) (5–70)	48 (17) (7–70)
Competition background (years)	7 (6) (2–35)	18 (13) (0–53)†
Training volume (hours $week^{-1}$)	6 (7) (0–35)	7 (5) (0–35)
$\dot{V}O_{2\,max}$ (ml kg^{-1} min^{-1})	28 (7) (18–40)	32 (5) (22–46)†
Anaerobic capacity (W)	15 (3) (10–22)	14 (3) (7–23)

*Values are mean(s.d.) (range); †significant ($P < 0.05$) differences between the groups; Student's t test

period, and the mechanism and nature of injuries together with contributory factors, treatment, healing time and resultant permanent disabilities. When the subjects entered the laboratory they were all interviewed by the same physician about their sports-related injuries and other past medical problems, on the basis of their responses to the second questionnaire which thus was checked and completed. Special attention during the physical examination was paid to musculoskeletal signs of complications relating to current and/or past injuries. The laboratory investigations consisted of various anthropometric, physical and physiological measurements. Cardiorespiratory capacity was assessed by an ergometer test directly measuring oxygen uptake[5]. Anaerobic power was measured by a jumping test on a contact mat[6].

All the athletes gave their written informed consent and the Ethical Committee of the University approved the study protocol. Statistical analysis consisted of the χ^2 test and Student's t test (two-tailed) evaluations for independent samples. The non-parametric Wilcoxon matched-pairs signed-ranks test and Mann-Whittney U test were also used[7].

Results

The physical and the training characteristics of the subjects are described in *Table 2*. The endurance athletes had a longer competition background and higher maximal oxygen uptake than the strength/power athletes.

Of the athletes 81% had had at least one sports injury. Altogether, 273 sports-related injuries were reported during the 10-year period (1977–1987) of which 62% (169) were acute and the remaining 38% (104) were overuse injuries.

The mechanisms of acute injuries are described in *Table 3*. There were significantly more falls/slips among the endurance athletes than among the strength/power athletes for whom sprains were more common (85%).

The anatomical distribution of all injuries is represented in *Table 4*. Only 13% of all injuries were located in the upper extremities, while 75% were sustained in the lower extremities. The most frequently injured body site was the knee (20%). Ankle and foot injuries represented 19% of all injuries. The frequency of overuse injuries in the upper extremities was higher ($P < 0.05$) among strength/power athletes than endurance athletes. Acute injuries, on the other hand, were located significantly more often in the lower extremities among the strength/power athletes than among endurance athletes (91% and 59%, respectively). The endurance athletes had, however, significantly more acute upper extremity injuries than the strength/power athletes.

Among both study groups for both types of injury, muscle was the most commonly injured tissue. Injuries to tendons and joints were also quite

Table 3. Mechanisms of acute injuries ($n = 159$)

Mechanism	*Frequency of acute injuries*		
	All athletes (%)	*Endurance athletes (%)*	*Strength/power athletes (%)*
Fall/slip	35	50	12*
Sprain	57	39	85†
Traffic accident	3	4	2
Other	5	7	1
Total	100	100	100

Statistical significance: *($P < 0.05$), †($P < 0.01$) between the groups; Student's t test

Table 4. Anatomical distribution of all injuries ($n = 273$) in elderly athletes ($n = 97$)

Anatomical site of injury	*Frequency (%)*
Head and neck	2
Back	10
Upper extremity	13
Shoulder	7
Antebrachium	3
Fingers	3
Lower extremity	75
Groin	5
Hip	6
Thigh	12
Knee	20
Leg	13
Foot and ankle	19
Total	100

Table 5. Tissue distribution of all sports-related injuries (n = 273) in endurance and strength/power athletes

Injured tissue	*Frequency of injuries*	
	Endurance athletes (%)*	*Strength/power athletes† (%)*
Muscle	27	46
Tendon	6	10
Tendon insertion	3	14
Bone	5	1
Joint	28	12
Fascia	0	1
Nerve	5	0
Skin	3	3
Bursa	5	1
Others (nails etc.)	1	2
Unspecified	17	10
Total	100	100

*No. injuries = 177; †No. injuries = 96

common (*Table 5*). Muscle injuries were, however, more common ($P < 0.01$) among acute injuries than overuse injuries (44% as against 16% respectively). Also a significantly higher proportion ($P < 0.05$) of acute injuries occurred in the joints (29% *versus* 13%). Of overuse injuries 34% could not be located in any specific tissue, for example diffuse pain in the leg. Bone fractures represented 5% of acute injuries but there was not a single stress fracture among the overuse injuries.

The most widely used treatments were rest, physiotherapy and oral drug treatment. Surgery was needed in 2% of the acute and in 7% of the overuse injuries. A physician was involved in treating acute injuries (64%) significantly more often than overuse injuries (48%). There was, however, no difference between the endurance and strength/power athletes in the participation of physicians in treatments.

Sixteen percent of the overuse and 15% of the acute injuries healed within 1 week. Almost one-fifth of the symptoms of overuse and acute injuries lasted for several years. Healing time did not differ significantly between overuse and acute injuries. There were generally no significant differences in injury healing time between the study groups.

Permanent disability in training and competition occurred in 33% of overuse injuries and 27% of acute injuries. Activities associated with daily life, excluding sport, were disturbed by a permanent disability caused by overuse injuries in 9% of cases and by acute injuries in 6% of cases.

Discussion

We asked the elderly athletes to list all injuries sustained during the preceding 10-year period. These athletes were selected citizens – their functional capacity was in excess of that of nonathletes in the same age group. Since they kept detailed training diaries it was possible to obtain a fairly complete account of their injuries. We also used a multiphased study protocol to verify responses to the questionnaires and, by means of a clinical examination, to identify signs of current and past musculoskeletal problems.

Of the athletes 81% had experienced a sports injury of some kind. The remaining 19% had sustained no sports-related injuries during the 10-year period. In agreement with our study, Kavanagh and Shephard[8] reported in 1977 that during the preceding year more than half of a sample of veteran track competitors had sustained an injury which prevented them from training for at least 1 week.

However, in contrast to earlier studies[2,3] of sports-related injuries among elderly athletes, we found the frequency of acute injuries to be higher than that of overuse injuries. The sports event distribution of our subjects might have contributed to the higher frequency of acute injuries. Of our subjects 53% were cross-country skiers or orienteers who train and compete on rough terrain which may increase the risk of acute injuries (sprains, strains etc.). This would also seem to explain why the mechanisms of acute injury among endurance athletes (orienteers, cross-country skiers) included more falls and slips. Korpi *et al.*[9] found that athletes aged over 50 years, who participated in the orienteering event, visited the first-aid station twice as often as their younger counterparts. Some authors have collected data from the patient registers of relatively large sports polyclinics and found a higher number of overuse injuries among elderly athletes[3]. We believe that this difference may be due to the method of data collection. Most of the acute injuries may have been treated in local health centres, and consequently will not appear in the registers of sports polyclinics. It is also likely that long-lasting injuries (overuse injuries) will accumulate in centres specializing in the treatment of sports injuries.

The number of injuries to the lower extremities seems as high as expected. Also the high frequency of the injuries to joints and muscles is not surprising. Comparing the injury pattern of the two study groups we find that acute injuries seem to be related to falls and slips during skiing and orienteering. This may be due to the greater risks and/or the nature of skills (coordination, balance, reaction time) involved in these sports events.

Most injuries were not protracted and were treated by rest and physiotherapy. The number of injuries treated surgically was low. In general, injuries were not serious. We must, however, remember that it is possible that athletes with more serious injuries have terminated their athletic careers and thus do not appear in the database of this study. There were few differences between the strength/power athletes and endurance athletes in the nature of injuries and they were based mainly on the type of sports event. The frequencies of acute and overuse injuries did not, however, differ between the study groups. Although there were no serious injuries in this study, the overall duration of some injuries causing some disability during training and competition seems rather long.

The best treatment for sports injuries generally is prevention. Careful warming up before physical exertion is particularly important. Also better protection against falls by improved control over movement and, perhaps, balance training could help in injury prevention. Quick and active treatment of injuries is also important among elderly athletes as ageing tissue has a lower healing capacity. In this way we can diminish the complications and duration of injuries and make sport more enjoyable and safer for elderly people.

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