

PREVENTION OF INJURY IN KARATE

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ABSTRACT

The purpose of the study was to analyse the effect of knuckle protection on the type and incidence of injuries in traditional karate contests.

Knuckle protection was mandatory at the Danish karate championships 1983 and 1986 (290 matches, 0.26 injuries per match), and prohibited at the championships 1984 and 1985 (620 matches, 0.25 injuries per match). Head injuries were more common in the tournaments where fist pads were used. The incidences of transitory psychomotor disturbances following blows to the head were comparable. The severity of head injuries, however, decreased; minor head injuries dominated when fist pads were used (66%, compared with 44% without fist pads, $p < 0.01$) and there were fewer lacerations and fractures. Injuries to the fingers or hands were also fewer — 1.3% compared with 11% without protection ($p < 0.01$). The use of fist pads reduced considerably the number of injuries requiring treatment (from 42% to 16%, $p < 0.01$).

In conclusion; fist pads offer some protection against injuries, especially to the hands, but additional measures are needed.

Key words: Karate injuries, Injury prevention, Knuckle protection, Protective equipment.

INTRODUCTION

Karate as a competitive combat sport has become increasingly popular in Denmark and in many other countries during the past few decades. Karate contests are governed by a variety of rules mainly differing with respect to the degree of contact allowed. In the traditional sport — which is by far the most popular in Denmark and internationally — no contact is allowed. Recently traditional karate has been recognised as an Olympic discipline. At present there are more than 6000 active members of the Danish Karate federation — the official governing body of traditional karate in Denmark.

In several previous studies it has been found that the majority of injuries sustained at traditional karate contests are head injuries, most often caused by punches (McLatchie, 1976; Noerregaard and Johannsen, 1986; Stricevic et al, 1983). Based on these findings mandatory use of knuckle protection has been suggested (Johannsen and Noerregaard, 1986; McLatchie, 1976, 1981; Stricevic et al, 1983). The actual effect of this safeguard, however, is not sufficiently elucidated in the present literature.

The aim of this investigation was to analyse the effect of protective knuckle padding on the pattern and incidence of injuries at karate contests.

MATERIALS AND METHODS

All injuries sustained in matches at the Danish individual and team championships in karate from 1983 through 1986 were registered. Protective knuckle padding was mandatory at the individual championships in 1983 and at the individual and team championships in 1986. At all championships in 1984 and 1985 the use of fist pads was prohibited.

All matches were supervised by one of the authors, who also examined and registered every injury. An injury was defined as any lesion that was seen by the attending physician. The protective padding consisted of a cotton glove enclosing a 1.5 cm thick foam-rubber pad covering

the knuckle area (Fig. 1). Matches lasted two minutes. Kicks, punches and strikes had to be stopped just prior to contact with the opponent. "Light contact" was allowed to the trunk though. In the head, face and neck areas only "skin touch" was allowed. The penalty for disregarding these rules was either a warning or, in graver cases, disqualification.

The diagnosis of cerebral concussion (= Technical Knock Out (TKO)) was made when there was disorientation, amnesia or loss of co-ordination for more than ten seconds following a blow to the head. The term "groggy" was used if the disturbance of consciousness or loss of co-ordination lasted less than ten seconds.

RESULTS

The overall incidence of injuries at tournaments where knuckle padding was used (0.26 injuries per match) did not differ from the incidence of injuries at the tournaments where knuckle protection was prohibited (0.25 injuries per match). Table I shows the number of matches, participants, injured participants, injuries and the anatomical distribution of the injuries.

TABLE I

Number of matches, participants, injured participants, injuries and the anatomical distribution of the injuries

Knuckle protection:	Used (1983 and 1986)	Not used (1984 and 1985)
Matches	290	620
Participants	270	403
Injured participants	65	121
Injuries	74	153
Head, face and neck	92%	78%
Extremities	4%	18%
Trunk	4%	4%

In both cases the majority of injuries were to the head, face or neck. Head injuries were more common in tournaments where fist pads were used — but the difference is not statistically significant (Table II). The use of knuckle protection did not influence the frequency of knocked-out or groggy contestants (Table II). The pattern of head injuries, however, was clearly different when knuckle protection was used; there were considerably more minor

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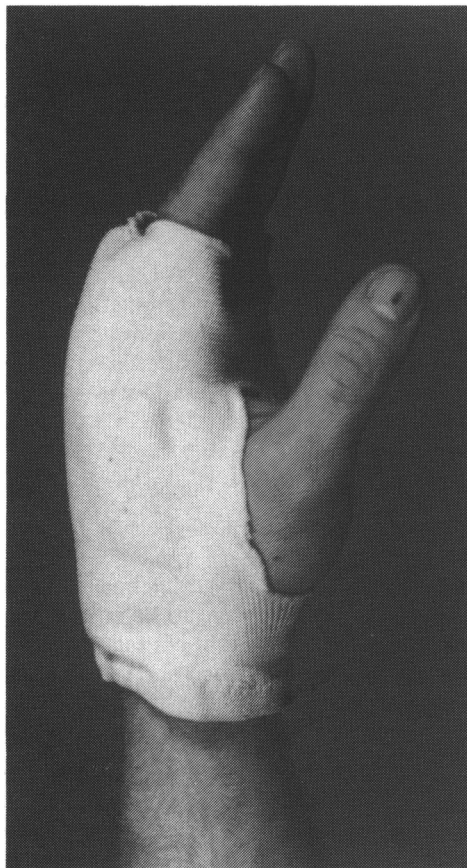


Fig. 1



TABLE II
Head injuries classified by diagnosis

Knuckle protection:	Used (1983 and 1986) (0.234)	Not used (1984 and 1985) (0.194)
Contusions	66% (0.16)	44% (0.085)*
Lacerations	12% (0.028)	24% (0.047)*
Epistaxis	10% (0.024)	12% (0.023)
TKO/groggy	10% (0.024)	11% (0.021)
Fractures	1.4% (0.003)	9% (0.018)*

Figures in parentheses; incidence of injury (injuries per match)

*Statistically significant difference (Student's t-test, $p < 0.01$)

injuries (contusions) — 0.16 compared with 0.085 per match, and fewer lacerations and fractures (Table II). Only one nasal fracture was registered in 290 matches with fist pads, compared with 11 facial fractures (eight nasal fractures, two tooth fractures and one fractured malar bone) in 620 matches without protection (Table II). In both cases head injuries were almost exclusively caused by punches — 97% with fist pads, 95% without — the rest were caused by kicks. Also, all cases of cerebral concussion were caused by punches.

Injuries to the extremities decreased dramatically from 0.045 to 0.010 per match when knuckle protection was used (Student's t-test, $p < 0.01$). This was mainly due to a reduction in the number of injuries to the fingers or hands which were almost non-existent using knuckle protection. Only one injured finger was registered compared with 17 finger or hand injuries where fist pads were not used (eight

contusions, six lacerations, two fractures and one distorsion) — the difference is significant (Student's t-test, $p < 0.01$). With one exception, all injuries to the fingers or hands were self-inflicted — caused by punching into the opponent's blocks or bony prominences.

In parallel with the reduced severity of head injuries and the decrease in the number of finger or hand injuries, a considerable decrease in the number of injuries requiring treatment by the attending physician or admittance to the casualty ward was found — from 42% to 16% of all injuries respectively (Student's t-test, $p < 0.01$, Table III).

TABLE III
Treatment of the injuries

Knuckle protection:	Used (1983 and 1986) N = 74	Not used (1984 and 1985) N = 153
No treatment necessary	84%	58%
Treated by the attending physician	9%	22%
Admitted to the casualty ward	7%	20%

DISCUSSION

In previous studies it has been found that punches are the predominant cause of injuries in traditional karate and in particular, by far the main cause of the most common types of injuries — lesions to the head, face or neck (McLatchie, 1976; Noerregaard and Johannsen, 1986; Stricevic et al, 1983). Based on these findings mandatory use of knuckle protection was introduced in an attempt to reduce the incidence and severity of karate injuries.

In a study on the effects of protective equipment McLatchie and Morris (1977) found that optional use of protective padding for fists, arms, feet and shins, as well as a headguard, groin guards and gum shields reduced the incidence of injury from one in four matches to one in 22 matches. The equipment was used by 75% of the participants. Internationally, however, the majority of karate organisations have rejected the use of this type of protective clothing as being too extensive — possibly interfering with freedom of movement — and also because heavily padded competitors lessen spectator appeal. Therefore, at present, in international and most national traditional karate tournaments, either no protective equipment or only fist pads are used.

A further argument used by opponents to the introduction of a more extensive use of protective equipment — in particular helmets — is that these could actually cause an increase in the number of potentially serious injuries such as cerebral concussions. By using protective equipment the competitor's risk of being disqualified due to heavy facial contact could be diminished, because the equipment may prevent the occurrence of obvious signs of excessive contact such as lacerations or fractures. A resulting gradual increase in the degree of contact accepted might then be feared, as well as a possible increased incidence of cerebral concussion. These arguments, however, were only partly substantiated by our study. A possible explanation of the increased incidence of head injuries where fist pads were used could be that competitors delivered harder or less controlled blows, trusting in the ability of the fist pads to prevent obvious outer signs of trauma in cases of accidental excessive contact thereby reducing their risk of disqualification. The increased incidence of head injuries was modest though, and not statistically significant (Table II). The incidence of groggy or knocked out contestants did not decrease with the use of knuckle protection.

CONCLUSIONS

Although we did not find as dramatic a reduction in the frequency and severity of injuries as McLatchie and Morris (1977) using their more extensive protective equipment, we

did, on the whole, find several beneficial effects of knuckle protection. The severity of head injuries was reduced, injuries of the fingers or hands were practically non-existent when fist pads were used and a substantial reduction in the number of injuries requiring treatment was found. On the basis of these findings we recommend knuckle protection.

Further research on methods of injury prevention, focusing on the prevention of head injuries, should however be initiated. In particular, protective covering for the head and face, in a design acceptable to the competitors, should be tested thoroughly with respect to shock absorbing capacity and actual efficacy. In addition, the design of fist pads could probably be improved upon.

Regardless of the types of protective equipment used the successful introduction of a higher standard of safety in karate competitions can only be achieved with the co-operation of referees and competitors. Strict enforcement of the rules prohibiting contact with any target area and prohibition of dangerous uncontrolled techniques is essential. Protective equipment should be seen as a supplement, not as a substitute for proper control. Referees as well as competitors should be aware of the medical implications of landing heavy blows or kicks to the trunk or head. This could be achieved through an education programme.

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