



# Acute Injuries in Handball

P. Luig & T. Henke  
Department of Sports Medicine, Ruhr-University Bochum, Germany

## Introduction

Research highlights the handball players' urgent need to establish a proper athletic condition with regard to endurance, strength and flexibility. Moreover, highly pronounced capabilities in acceleration, deceleration, jumping and throwing power are essential to cope with the demands of competitive gameplay. In addition, the game holds intensive loads for the locomotor and sensorimotor system as players have to brave a high load of legal and illegal physical contact during frequent one-on-one situations. One can conclude that the physiological and technical requirements in handball are pretty high, calling for perfectly prepared athletes. By implication, athletes with a bad athletic condition and limited techniques will be at greater risk for acute and chronic injuries. In fact, it is roughly estimated that in Europe at least 320,000 handball injuries occur each year at a cost for medical treatment of approx. € 250 to 400 million. The purpose of this poster is to display the basic aetiology of handball injuries as described in recent literature and supplemented by data from own surveys and injury databases, and to conclude with potential key areas for injury prevention.

## Methodology

### (1) Database & Literature Research

Pubmed, BiSp, SportDiscus and Google were browsed for relevant articles. Additionally, reference lists of retrieved articles were browsed for further information.

### (2) Surveys on Sports Injuries in Handball

The Department of Sports Medicine of the Ruhr-University Bochum owns datasets on sports injuries, which have been built up in the framework of research projects in collaboration with the ARAG Sports Insurance (Dusseldorf, Germany) and the VBG (Hamburg, Germany). These datasets contain:

- Data from a continuous survey among German sports clubs. Athletes, who report an injury, receive a questionnaire asking for details of the accident, injury onset and its treatment. In addition, information on sports activities (club sports and recreational sports) and general information on surveyed athletes is collected (total n ≈ 180,000, handball n ≈ 25,000).
- Data from a survey among German professional handball players, who have been analysed during one single season by means of a purpose-designed questionnaire (n=293) complemented by basic data of all injured players (n=1,636)

## Results

### (1) Injury Incidence / Injury Rate

Acute injury incidence rates in handball are at about 1.5 – 2.0 injuries per 1000 hours of exposure. Although one should consider minor methodical distinctions in calculating training and match exposures, there is a general consensus that match incidences are at least ten times higher than training incidences.

Study	Training (injury/1000 h)		Match (injury/1000 h)	
	Male	Female	Male	Female
Wedderkopp et al.	1997		3.4	40.7
Seil et al.	1998	0.6	14.3	
Wedderkopp et al.	1999		1.2	23.4
Petersen et al.	2002	2.6	12.1	
Olsen et al.	2006	0.6	8.3	10.4
Henke et al.*	2005	0.7	46.5	8.9
Junge et al.*	2005		40	36
Langevoort et al.*	2007		34	19
Holdhaus et al.*	2008		33.3**	
Holdhaus et al.*	2009			31.9**

Tab. 1. Time-loss injury incidences; \*studies on professionals only; \*\* calculated

It is striking that professional athletes show notable higher incidences than semi-professionals or amateurs. It cannot be proved beyond doubts if sex plays a decisive role regarding overall incidences even though it is absolutely clear that women are significantly more vulnerable to specific injuries than men. At least Henke et al. (2005) indicate higher overall incidences – in training and match – for male professionals compared to elite female athletes (cf. Tab.1). Generally speaking, about 2/3 of all injuries occur in competition and 1/3 during training. As table 2 shows, injuries in competition gain more significance with advanced age and performance level, even though more time is being spent in training compared to time spent in competition.

Age	<14 years		15-21 years		22-35 years		professionals	
	male	female	male	female	male	female	male	female
Match	49.1	53.6	64.2	66.7	73.7	73.5	85.0	74.0
Training	50.9	46.4	35.8	33.3	26.3	26.5	15.0	26.0

Tab. 2. Share of match and training injuries in % with regard to age and gender (n = 5,689)

With respect to specific injuries some studies reveal, that in particular knee injuries seem to have a plainly higher match incidence compared to training. Regarding men, Myklebust et al. (1998, 2003) report an 8 times higher match incidence which is even topped by a 53 to 93 times higher match incidence among women.

### (2) Injury Topography / Anatomical Location

The analysis of 8,520 handball injuries among 14 to 45 year old athletes revealed that handball injuries can essentially be attributed to four main body regions: Regarding the upper body head and hand/wrist are considerable core regions, whereas when talking about the lower extremities knee and ankle joints are mainly affected. In general female athletes have higher shares of knee and ankle injuries, whilst among male athletes the head is more frequently injured (cf. Fig. 1.)



Fig. 1. Localisation of acute injuries among male and female athletes (n=8,520, 14-45 years)

Going more into details, younger athletes seem to be more prone to injuries of the upper body regions, especially finger injuries. With advancing age there is an increase in injuries of the lower extremities, in particular in knee injuries. Almost half of all injuries in the group of players under 14 years of age relate to hand/wrist or head. In contrast nearly one third of all injuries in adults relate to knee injuries. In female professionals even every second injury is a knee injury (cf. Tab. 3).

	<14 years		15-21 years		22-35 years		professionals	
	male	female	male	female	male	female	male	female
Head/Neck	18.5	11.9	18.6	16.9	18.4	16.3	10.3	7.5
Trunk	2.8	1.1	1.7	1.4	1.9	1.2	-	-
Shoulder	2.4	1.5	7.1	4.1	8.2	2.7	-	-
Arm	12.3	4.8	3.1	1.0	0.6	0.9	-	-
Elbow	3.6	2.6	1.9	2.3	0.9	1.2	-	-
Hand/Wrist	27.6	33.9	19.2	15.4	18.7	19.5	14.1	13.2
Hip	-	0.7	1.2	0.9	0.3	0.3	-	-
Thigh	0.4	-	0.8	-	1.3	0.7	-	-
Knee	9.5	12.3	24.4	35.2	28.2	34.1	24.9	49.1
Lower leg	2.0	1.1	2.1	1.1	7.6	5.1	-	-
Ankle	15.8	27.9	16.6	19.7	11.5	16.8	18.9	17.0
Foot	4.0	1.1	1.4	0.5	1.7	1.0	-	-

Tab.3. Localisation of match injuries in % with regard to age and gender (n = 3,777)

### (3) Injury Types

The most common acute injuries are sprains, with knee, ankle and fingers being the most affected body parts followed by contusions and strains. Fractures and dislocations are quite rare. However, younger athletes are typically more vulnerable to fractures, in particular finger, wrist and forearm fractures, than older athletes. Strikingly, during important elite tournaments contusions become more frequent.

### (4) Injury Situations & Risk Factors

Studies commonly differentiate between contact situations, whether legal contact or foul play, and non-contact situations, typically running with quick direction changes, cutting and pivoting, starts and stops as well as jumping and landing on one or both feet.

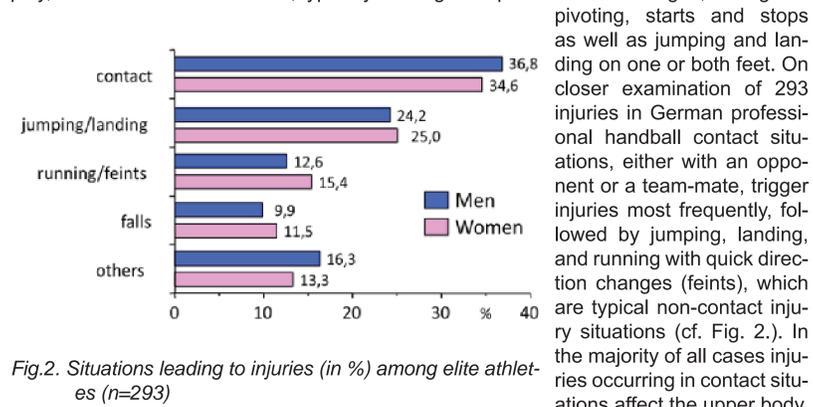


Fig.2. Situations leading to injuries (in %) among elite athletes (n=293)

In the majority of all cases injuries occurring in contact situations affect the upper body, in particular head and fingers. In contrast, non-contact injuries mostly are related to the lower extremities. Our data show that attacking backcourt players are mostly affected by injuries, followed by attacking pivot players and central defenders. Strikingly, pivot players have the highest share of head injuries. Moreover, our data and recent research states that previous injuries increase the risk for recurring injuries, in particular with regard to-

## Conclusion

Handball is a physical sport with a noticeable injury risk, in particular during matches. Even though the highest share of injuries is due to contact, in particular the severe non-contact injuries are a key area for targeted injury prevention.

Contact injuries are commonly less severe. Contact injuries, especially those that cannot be attributed to unfair play, are somehow evitable. Passive protection such as mouth guards and prophylactic finger tapes may assist in reducing the incidences of minor contact injuries (e.g. finger sprains, soft tissue injuries). In case of previous injuries, the wearing of protective devices (e.g. external ankle stabilization) is explicitly recommended.

It is of vital importance to tackle the more serious non-contact injuries. The various facets of training and physical preparation (e.g. functional strengthening, core stabilization, agility training, neuromuscular and proprioceptive training) are seen beneficial, if applied regularly and correctly. This includes technique training for crucial handball movement patterns that typically lead to match injuries (i.e. jumps, landings, feints).

Despite increasing efforts to propel this issue, the handball community is still not fully aware of the potential of smart injury prevention. It is not so much the knowledge how to prevent injuries that fails, but the challenges are in particular to get these measures being accepted.

Federations, clubs and coaches are certainly in charge to protect their athletes. This also includes sufficient preparation and regeneration, especially prior to and after major international events in professional handball.

Reinforcing the coaches' education is a promising approach to promote available know-how on handball injuries and how to prevent them.

## References

For the list of references please contact the author.

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Email: Patrick.Luig@safetyinsports.eu

Thomas.Henke@safetyinsports.eu

Website: www.safetyinsports.eu