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Injury pattern in youth team handball: a comparison of two prospective registration methods

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The purpose of this study was to examine the injury incidence and pattern of injuries in youth female and male team handball players using two different prospective registration methods; match reports (90 teams, 1080 players) and coach reports (34 teams, 428 players). A total of 118 injuries were recorded by the coach report, of which 93 (79%) were acute injuries (incidence training: 0.9 ± 0.16 injuries/1000 player hours; matches: 9.9 ± 1.26; rate ratio vs training: 10.8 [95% confidence interval (CI) 7.0–16.6]; $P < 0.0001$) and 25 (21%) were overuse injuries. Knee (26%) and ankle (24%) injuries accounted for half of the acute injuries (training: 0.5 ± 0.12 injuries/1000/h; matches: 4.4 ± 0.84; rate ratio vs training: 8.0 (95% CI 4.5–14.5); $P < 0.0001$). No gender difference was found in the injury rate (rate ratio female vs male: 1.3 (95% CI 0.8–2.1); $P = 0.40$). Most of the injuries occurred in the attacking phase by back or wing players doing a plant-and-cut, landing or turning movement, and more than half in contact situations with the opponent. Similar results were observed for acute match injuries in the match report. These results indicate that the rate of injuries in youth team handball is as high as at the senior level, and prevention should focus on knee and ankle injuries. The coach report seems to be the best method to register injuries in youth team handball to provide a full spectrum of injuries according to their type, incidence and severity.

Team handball is one of the most popular sports in Scandinavian. In Norway, about 5200 teams and 128 000 members are registered by the Norwegian Handball Federation (NHF) (Norwegian Handball Federation, 2004). As in other team sports, such as football and basketball, injuries are common (Jørgensen, 1984; Nielsen & Yde, 1988; Fagerli et al., 1990; Lindblad et al., 1992; Kujala et al., 1995; Wedderkopp et al., 1997, 1999; Lereim, 1999; de Loës et al., 2000; Reckling et al., 2003) and some, such as ACL injuries, are serious, especially in young female players (Strand et al., 1990; Myklebust et al., 1997, 1998; Reckling et al., 2003).

The incidence of time-loss injuries (where the player is unable to take part in training or matches for some time after the injury) in youth team handball has been estimated to range between 8.9 and 14 injuries/1000 match hours and 1.7–4.3 injuries/1000 training hours (Nielsen & Yde, 1988; Backx et al., 1991). This appears to be as high as at the senior level, where the incidence has been estimated to 11.2–14.3 in matches and 0.6–2.4 in training (Nielsen & Yde, 1988; Seil et al., 1998; Myklebust G, personal communication, 2004). In the first study on team handball injuries, Nielsen and Yde (1988) followed players (7–18 years) in one Danish sports club prospectively, reporting an injury incidence of 10 injuries/1000 match hours (11 in girls and nine in boys). In contrast, Wedderkopp et al. (1997), based on a retrospective study in Danish team handball, suggest that young female players (16–18 years) have the highest injury incidence with up to 41 injuries/1000 match hours. In their more recent prospective intervention study, the incidence in the control group (the same players that were followed in the previous retrospective study) was 23 injuries/1000 match hours. However, as both of these studies include all injuries, not just time-loss injuries, the apparent difference in injury incidence between studies can be explained by methodological differences. As Wedderkopp et al. (1997, 1999) did not report time-loss injuries separately; their injury incidence estimates cannot be compared directly with the other aforementioned studies.

To prevent sports injuries in extent as well as in severity, a structured step-by-step approach is required (van Mechelen et al., 1992). The first step is to identify and describe the injury problem in terms of its incidence and severity. Second, the risk factors and injury mechanisms must be identified. The third step is to introduce measures to reduce the future risk and/or severity of injuries. The preventive measures

should be based on the information identified in steps one and two. The fourth step is to evaluate the effectiveness of the measures by repeating the first step (van Mechelen et al., 1992). To date studies have focused on ACL injuries in adult players. Furthermore, the influence of different methods for data collection on the incidence and pattern of injuries in youth team handball have not been analyzed. Therefore, the aim of this study was to examine the injury incidence and pattern of injuries in youth female and male team handball players using two different prospective registration methods.

Material and methods

Study design

This prospective cohort study covers one 7-month season (September 2001 to March 2002) of the youth female and male divisions in the NHF. The NHF league system for the 17-year group included 362 teams, which were divided into 12 regions (Norwegian Handball Federation, 2004). All the teams ($N = 90$) from four Eastern regions, 75 female teams (900 players) and 15 male teams (180 players), were invited to participate in a prospective injury registration. The players on these teams were all amateurs, and, depending on their ability and ambition, they practiced one to five times per week and played between 20 and 50 matches during the season. The matches were played with equipment and rules in accordance with the regulations of the International Handball Federation (International Handball Federation, 1997).

Information on injuries and exposure was collected using two different methods, one by match reports, which included all the 90 teams (1080 players), and the other by coach reports, which included a random sample of 34 (428 players) of these teams. We informed all the teams about the purpose and design of the study. Injuries reported from September 1, 2001 to March 30, 2002 were included. For each injury sustained by a player, the following information was collected: age, gender, team name, date of injury, type, location, severity, player position and the mechanism of injury (Table 1). The definitions used in the injury registration are shown in Table 2.

Table 1. Data collected in the standardized injury questionnaire

1. Age
2. Gender
3. Team name
4. Division
5. Date of injury
6. Whether the injury occurred during match or training
7. Type of match
8. Type of training
9. Which type of floor the injury occurred on (wooden, artificial)
10. How the injury occurred
11. Field position when the injury occurred
12. If there was any contact with an opponent when the injury occurred (this included all types of contact, direct contact with the injured body part as well as contact with other body parts)
13. Whether the injury was acute or overuse in nature
14. The location of the injury
15. Type of injury
16. Injury severity

Table 2. Operational definitions used in the injury registration

Reportable injury	An injury occurring during a scheduled match or training session, causing the player to require medical treatment or miss part of or rest of the match or training session
Player	A player is entered into the study if she or he was registered on the team roster by the coach
Return to participation	The player was defined as injured until he or she was able to participate fully in club activities (match and training sessions)
Type of injury	Acute – injury with a sudden onset associated with a known trauma
	Overuse – injury with a gradual onset without any known trauma
Severity	Slight – no absence, i.e., able to participate fully in the next match or training session
	Minor – absence from match or training for 1–7 days
	Moderate – absence from match or training for 8–21 days
	Major – absence from match or training for >21 days

Match report

Prior to the league matches the NHF sent a score card to the teams, which they had to complete and return to the NHF. As an attachment to this card, we developed a single-page injury report form to obtain information about injured players from these matches (Table 1). The scorekeeper was asked to complete this form at the end of the match and return it with the score card to the NHF. The information was usually provided by the coach without the assistance of medical personnel. The NHF forwarded the match reports every month to our research center.

An injury was registered if it occurred during the match, causing the player to require medical treatment or miss part of or rest of the match. Injuries were classified as either acute or overuse from the diagnosis, e.g., a sprain being an acute injury and "tendinitis" being an overuse injury (Table 2). Injuries were also classified into four categories according to their estimated severity (Table 2). Time-loss injuries were defined as injuries causing the player to miss 1 day or more of team activities following the day of injury (match and training sessions). The player was defined as injured until he or she was able to participate fully in team activities.

Match exposure was calculated as the number of matches multiplied by the duration of each match (2×25 min) multiplied by 14 players (two teams with seven players on each team), and the sum in minutes was then divided by 60 (to get match exposure in hours).

Coach report

Teams were recruited by mail/e-mail to the team coaches. The inclusion period was from August to September 2001. Forty randomly chosen teams (30 female teams and 10 male teams) were asked to participate, and 34 of these (25 female teams and nine male teams) with a total of 428 players (321 female and 107 male) agreed to take part in the study. Six teams declined the invitation to take part. Participants were entered into the study from the team roster provided by the coaches at the start of the study.

An injury was registered if it occurred during a scheduled match or training session. The same definitions were used for

injury, injury type and severity (exact duration of absence was recorded) as described above for the match reports (Table 2). For each injury sustained by a player, the coaches with the injured players completed a standardized injury questionnaire within approximately 2 weeks (range: 1 day to 4 weeks) after the injury (Table 1). In nearly all cases, players sustaining moderate or major injuries were examined by a physician. If there was any doubt about the diagnosis, the player was referred to a sport physician or a sports medicine center for follow-up, which often included an arthroscopic examination or imaging studies. In the case of a slight or minor injury, the player was in many cases only examined by a physical therapist or coach or no examination was done. None of the injured players were examined or treated by any of the authors, and we had no influence on the time of return to team activities.

Exposure was recorded on a special form from the coaches. The information requested from each team included the number of training hours, the average attendance for training sessions, and the number and duration of matches. Match exposure was calculated in the same way as described above. Monthly training exposure was calculated based on the number of training hours multiplied by the average training attendance.

During the season we contacted the coaches by telephone and e-mail at least every month to record injuries and exposure. The data were anonymously coded into a database.

Statistical methods

STATA (version 8.0, 2003, Stata Corporation, Lakeway Drive, Texas, USA) was used for the statistical analysis. Injury incidence (I) was calculated according to the formula $I = N/E$, where N is the number of injuries during the study period and E is the sum of exposure time expressed in 1000 player hours of match, training or the total sum. Injury incidence is presented as the mean ± SEM. A z-test based on the Poisson model was used to compare the rate ratio between the two injury registration methods (coach report vs match report), gender (female vs male), severity (time-loss vs not-time-loss injuries) and team activity (match vs training). Rate ratios are presented with 95% confidence intervals (CI). A chi-square test was used to compare injury characteristics of acute injuries between injury registration methods. Fisher's exact test was used to calculate the P-value in 2×2 tables. An α level of 0.05 was considered as statistically significant. All P-values are two-tailed.

Results

Match report registration

During the league season for the 90 teams, we received 339 score cards from the NHF, and the injury registration form was completed for 237 (70%) of these. A total of 50 injuries were reported, and all but one were acute injuries (the one overuse injury was a knee injury; Osgood–Schlatter's apophysitis). Table 3 shows the exposure, number and incidence of acute injuries. No gender difference was found in the injury rate (rate ratio female vs male: 1.8 (0.9–3.4); $P = 0.10$) (Table 3). The mean age of the injured players was 16.4 ± 0.5 (SD) years (range 15–17).

Table 3. Match report data (1080 players): exposure, number of injuries, and injury incidence for acute injuries in youth female ($N = 225$) and male ($N = 114$) matches during the 2001–2002 season

	Exposure (h)	Acute injuries		No. of overuse injuries
		No. of injuries	Incidence	
Female	2625	38	14.5 ± 2.35	0
Male	1330	11	8.3 ± 2.49	1
Total	3955	49	12.4 ± 1.77	1

Incidence is reported as the number of injuries per 1000 player hours.

Table 4. Distribution by body region of all injuries during matches or training sessions from match (1080 players) and coach (428 players) reports during the 2001–2002 season

	Match report		Coach report					
	Acute match injuries		Acute match injuries		Acute training injuries		Overuse injuries	
	N	%	*N*	%	*N*	%	*N*	%
Head	11	23	5	8	0	0	0	0
Neck	2	4	0	0	0	0	0	0
Shoulder	2	4	4	7	0	0	1	4
Elbow	0	0	2	3	2	6	0	0
Under arm	1	2	2	3	0	0	0	0
Finger	5	10	11	18	5	16	0	0
Chest	0	0	0	0	1	3	0	0
Abdomen	1	2	0	0	0	0	0	0
Back	0	0	6	10	1	3	4	16
Groin	1	2	1	2	1	3	0	0
Hip/pelvis	0	0	0	0	0	0	2	8
Thigh	0	0	1	2	2	6	0	0
Knee	14	29	15	25	9	28	4	16
Lower leg	1	2	2	3	0	0	13	52
Ankle	10	21	12	20	10	31	0	0
Foot/toes	0	0	0	0	1	3	1	4
Total	48*	100	61	100	32	100	25	100

*Body part was missing for one injury.

The distribution of acute injuries by body region is shown in Table 4. Knee and ankle injuries accounted for half of the injuries (6.1 ± 1.24 injuries/1000 player hours). The most common injury type was sprains (35%, 17 of 49), followed by contusions (33%, 16 of 49), wounds (8%, four of 49) and strains (6%, three of 49).

Table 5 shows the severity of acute injuries. In 31 of the cases (76%) the player only missed part of or rest of the match (7.8 ± 1.41 injuries/1000/h), whereas 10 injuries (24%) were estimated to be time-loss injuries (2.5 ± 0.80 injuries/1000/h).

Coach report registration

During the 7-month period, a total of 41 242 player hours of exposure during matches and organized training sessions were reported (Table 6). There

were 118 injuries affecting 97 (23%) of the 428 players that were covered by the study. Of these, 93 (79%) were acute injuries and 25 (21%) overuse injuries. The distribution of injuries by body region is shown in Table 4. The most common type of injury was sprains (38%, 45 of 118), followed by contusions (16%, 19 of 118), periostitis (10%, 12 of 118) and strains (6%, seven of 118). The mean age of the injured players was 16.4 ± 0.7 years (15–18).

Table 6 shows the exposure, number and incidence of acute injuries. The incidence of acute injuries was 2.3 ± 0.23 injuries/1000 h (2.4 ± 0.27 in females and 1.9 ± 0.45 in males). There was no difference in the incidence of acute match injuries between injury registration methods (rate ratio coach report vs match report; total: 0.8 (0.6–1.2); $P = 0.23$; female: 0.7 (0.5–1.1); $P = 0.13$; male: 1.0 (0.5–2.2); $P = 1.00$). The injury rate was significantly higher during matches than during training (rate ratio match vs training; total: 10.8 (7.0–16.6); female: 10.4 (6.5–16.7); male: 13.1 (4.7–36.8); all with $P < 0.0001$), whereas no gender difference was found (rate ratio female vs male; total: 1.3 (0.8–2.1); $P = 0.40$; in matches: 1.3 (0.7–2.3); $P = 0.46$; in training: 1.6 (0.6–4.1); $P = 0.35$).

Of the 93 acute injuries, 73 (78%) were time-loss injuries (1.8 ± 0.21 injuries/1000/h; 0.8 ± 0.15 in training; 7.4 ± 1.10 in match; rate ratio vs training: 9.6 (6.0–15.5); $P < 0.0001$; rate ratio vs match report: 2.9 (1.5–5.8); $P = 0.002$), whereas 20 injuries (22%) only caused the player to miss part of or rest of the match or training session (Table 5). Knee and ankle injuries accounted for half of the acute injuries (1.1 ± 0.16 injuries/1000/h; 0.5 ± 0.12 in training and 4.4 ± 0.07 in matches; rate ratio vs training: 8.0 (4.5–14.5); $P < 0.0001$; rate ratio vs match report: 0.7 (0.4–1.3); $P = 0.24$) (Table 4), and 41 (10%) of the 428 players injured their knee or ankle. The most common acute injury types were ankle sprains (23%, 21 of 93), knee sprains (14%, 13 of 93) and finger sprains (10%, nine of 93).

Of the 25 overuse injuries, 20 (80%) were time-loss injuries, whereas five injuries (20%) only caused the player to miss part of or rest of the match or training (Table 5). The most common overuse injury type was lower leg pain (periostitis) (48%, 12 of 25), low back pain (16%, four of 25) and knee pain (12%, three of 25).

Table 5. Severity of injuries according to absence from matches or training sessions in the match (1080 players) and coach (428 players) reports during the 2001–2002 season

	Match report		Coach report					
	Acute match injuries		Acute match injuries		Acute training injuries		Overuse injuries	
	N	%	*N*	%	*N*	%	*N*	%
Slight	31	76	15	25	5	16	5	20
Minor	5	12	12	20	11	34	4	16
Moderate	3	7	12	20	8	25	4	16
Major	2	5	22	36	8	25	12	48
Total	41*	100	61	100	32	100	25	100

*Severity was missing for eight of the injuries.

Injury mechanisms

A comparison of some characteristics of the acute injury situations from the two injury registration methods are shown in Fig. 1. The results from the match report and coach report data were similar, except for the proportion of attack vs defence injuries ($P = 0.03$, Fisher's exact test).

Discussion

The main findings of this study were that the injury rate in youth team handball is as high as at the senior level, and that knee and ankle injuries are the most common injury types. The match and coach reports showed similar results for incidence and body location of acute match injuries.

Methodological considerations

In an epidemiological study of sports injuries, the reliability and validity of the injury and exposure

Table 6. Coach report data (428 players): exposure, number of injuries, and injury incidence for acute injuries in matches and training sessions in youth female ($N = 321$) and male ($N = 107$) players during the 2001–2002 season

	Acute injuries						No. of overuse injuries
	Match			Training			
	Exposure (h)	No. of injuries	Incidence	Exposure (h)	No. of injuries	Incidence	
Female	4620	48	10.4 ± 1.50	27118	27	1.0 ± 0.19	19
Male	1573	13	8.3 ± 2.29	7931	5	0.6 ± 0.28	6
Total	6193	61	9.9 ± 1.26	35049	32	0.9 ± 0.16	25

Incidence is reported as the number of injuries per 1000 player hours.

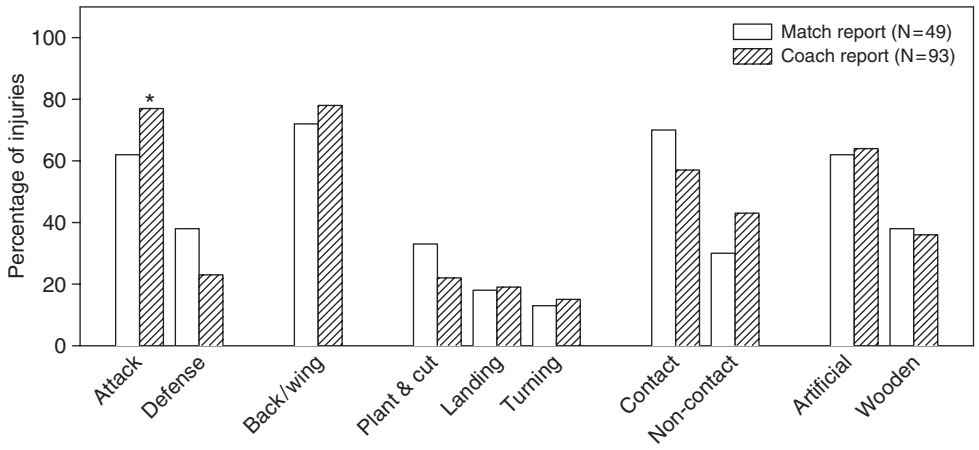

Fig. 1. Comparison of injury characteristics for acute injuries from the match report (open bars) and the coach report (hatched bars). $*P = 0.03$, Fisher's exact test.

registration are critical. In the present study, we have investigated two different prospective registration methods, one based on reports from the team coaches (coach report) and another based on reports from the scorekeeper (match report).

For the coach report, we remained in close contact with the coaches throughout the study period and limited the recall period by encouraging the team coaches to complete the standard injury questionnaire with the injured players as soon as possible after the injury. Even so, there is always a possibility that an injury may have been overlooked, especially slight and minor injuries. However, more serious injuries, such as knee and ankle sprains, usually cause pain, swelling, and disability. Therefore, it is unlikely that a player who has suffered a serious injury will have been able to continue playing without the need for some sort of medical follow-up. It is therefore unlikely that serious injuries were overlooked during the prospective study period. Also, in most cases moderate and major injuries were assessed by a physician, and the diagnosis for severe injuries was also subsequently confirmed by imaging studies, whereas slight and minor injuries were usually not examined further by medical professionals.

In the match report not all injuries were recorded, only acute injuries from league matches. Injuries occurring in other matches or training sessions, including most overuse injuries, were missed. Therefore, this method does not provide results on the full spectrum of injuries, it is less reliable (low number of injuries) and it takes longer time to get large samples e.g. in a trial to investigate the effect of preventive measures to reduce the future risk and/or severity of injuries. Also, there is in the match report always a possibility that an injury may have been overlooked, and all injury report forms may not have been returned. However, we found that the compliance for the match report was moderate to good with this procedure, as demonstrated by the response rate of 70%. Furthermore, it is not possible to estimate the severity exactly, and the diagnosis was based on the scorekeeper's registration, usually provided by the coaches, but not confirmed by further medical examination. At the youth level the scorekeeper is not an authorized person (there are no formal criteria for being selected as a scorekeeper, usually this is a person with knowledge of the rules of team handball, e.g., a coach, player or referee who does not participate in the match). This may be the reason that the majority of the reported injuries were estimated to not cause the player to miss the next match or training session, which could have led to an underestimation of the injury severity using the match report method.

With respect to the exposure registration, it was not possible to base this on individual attendance records for all matches and training sessions during the study period. However, in the match report it was possible to record the exact exposure for the league matches, as the information was obtained from the NHF referee score card. In the coach report, data on the number and duration of matches were obtained from the coaches (including tournaments and training matches) and the training data were adjusted for training attendance. Therefore, this should ensure good reliability and validity of the injury and exposure data for both injury registration methods, and also good reliability for comparing the data between the two methods.

Injury rate

Although, as acknowledged above, the two injury registration methods have different strengths and weaknesses, we found that the injury rate for acute match injuries was similar. Furthermore, our estimates

suggest that the injury incidence in youth team handball is similar as at the Norwegian female senior level, where an injury incidence of 11.2 injuries/1000 match hours has been observed (Myklebust G, personal communication, 2004). Our estimate is also the same as reported by one prospective study from Danish youth team handball (7–18 years), where Nielsen and Yde (1988) found an injury incidence of about 10 injuries/1000 match hours (11.4 in girls and 8.9 in boys), although perhaps slightly lower than observed at the Danish senior level (13.8 in females and 13.3 in males).

In contrast to these findings, Wedderkopp et al. (1997, 1999) have reported a considerably higher (extremely high) injury incidence in young female players (16–18 years). In a retrospective study they found an overall injury incidence of 40.7 injuries/1000 match hours (Wedderkopp et al., 1997), which is two to four times higher than any other recorded data from team handball. However, in their prospective prevention study the control group (the same players as in the retrospective study) had an overall injury incidence of 23.4 injuries/1000 match hours. Furthermore, in a recent study in young female players (14–16 years), they reported an incidence of 52 injuries/1000 match hours recorded using a retrospective questionnaire (Wedderkopp et al., 2003). However, the injury incidence reported in all of these studies includes not only time-loss injuries, but also minor injuries not necessarily causing time loss from matches or training, as an injury was recorded if it caused the player to play with "considerable discomfort" or required some form of medical follow-up.

We were not able to observe any gender difference in the injury rate, either in the match report or coach report. However, in the coach report we found an injury rate for acute match injuries of 9.9 injuries/1000/h, which is 11 times higher than in training (females: 10 × ; males 12 × , all with $P<0.0001$), a trend which has also been observed in previous studies (Nielsen & Yde, 1988; Wedderkopp et al., 1997, 1999; Myklebust G, personal communication, 2004).

Injury pattern

For both the match- and coach-collected data, the knee (29% and 26% in the match and coach reports, respectively) and ankle (21% and 24%) were the main body parts acutely injured – a pattern closely resembling that found in previous studies in team handball (Nielsen & Yde, 1988; Wedderkopp et al., 1997, 1999; Lereim, 1999; Reckling et al., 2003; Myklebust, personal communication, 2004). In contrast to previous studies, we found that the number of knee and ankle injuries was almost the same, whereas previous studies have reported 1.5–3 times more ankle than knee injuries. The reason for this is not known. However, knee and ankle sprains dominate the injury pattern for team handball, with an incidence of about four injuries/1000 match hours, accounting for approximately 50% of all acute time-loss team handball injuries. This suggests that the incidence of the two most common injury types is similar to that observed at the senior level (Nielsen & Yde, 1988; Myklebust G, personal communication, 2004).

When comparing the two methods used in the current study, the injury mechanisms for acute injuries were similar. Both methods show that the majority of the injuries occurred in the attacking phase by back or wing players doing a plant-and-cut, landing or turning movement, and more than half were contact situations with the opponent. This pattern closely resembles previous studies (Nielsen & Yde, 1988; Wedderkopp et al., 1997, 1999; Lereim, 1999; Reckling et al., 2003).

There was a difference in the types of injuries recorded using the two methods. All but one of the injuries in the match report were acute injuries, whereas in the coach report 79% were acute injuries and 21% overuse injuries. This is also similar to what have been observed at the senior level in Norway (83% acute and 17% overuse) (Myklebust G, personal communication, 2004), whereas the percentage of overuse injuries is higher than reported by Wedderkopp et al. (1997, 1999). The low frequency of overuse injuries in their studies (7–11%) is unexpected, as their definition included injuries causing "considerable discomfort". However, overuse injuries are difficult to register and classify, and the frequency of overuse injuries may have been underestimated in those and other studies.

An important finding in the present study was the differences in the severity of the reported injuries. In the match report, only 24% of the acute injuries were estimated to be time-loss injuries vs 78% in the coach report. This is probably because of an underestimation of the severity by the match report, perhaps as no medical staff examined the injured players, and/or there may have been an underreporting of the injuries not causing time loss in the coach report (recall bias). This difficulty to estimate injury severity is also probably the reason why severity was missing from eight of the match report injuries. As the injury severity in the match reports were based on estimated absence only, these figures are open for discussion. Another major finding was that the coach report recorded "all injuries", including injuries occurred in matches and training sessions, and both acute and overuse injuries. Therefore, the coach report seems to be the best method to examine the injury incidence and pattern of injuries in youth female and male team handball players.

Conclusions

The results indicate that the rate of injuries in youth team handball is as high as at the senior level, and prevention should focus on knee and ankle injuries. The coach report seems to be the best method to register injuries in youth team handball to provide data on the full spectrum of injuries according to their type, incidence and severity.

Perspectives

There is a need for an international consensus about the definition of sports injuries and design of studies, and these issues should be standardized to make it possible to compare results from different studies and across sports, gender, playing level, etc. The overall research goal in sports epidemiology is to prevent injuries, and studies are needed to identify and describe the injury problem as an important first step to prevent injuries and adjust equipment as well as rules. The next step is to develop effective methods for injury prevention, especially for the most common and serious injuries to the knee and ankle. Furthermore, prospective randomized intervention studies are needed to investigate the effect of intervention programs designed to reduce these injuries.

Key words: athletic injuries, adolescents, team handball, incidence, epidemiology.

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