

COMPARISON OF INJURIES BETWEEN MALE AND FEMALE HANDBALL PLAYERS IN JUNIOR AND SENIOR TEAMS

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Abstract

Physical activity is important in human life at any age, but unfortunately, many injuries happen during times of practicing sports. Sports injuries account for about 16% of all recorded injuries in emergency departments in Sweden. Injuries are a major issue in most team sports; therefore, all sport teams work on having prevention of injuries. Handball is a tough sport with a lot of clash among the players that causes several injuries.

The purpose of this study is to compare injuries between male and female handball players in the senior and junior teams, to see how much age and gender may affect the injury incidence.

This thesis has studied handball injuries by choosing and examining random patterns from Swedish handball teams in various levels of senior and junior teams of both sexes. The Survey has been done in spring 2012, and I have personally designed the questionnaire. The study comprised of 226 players, including 128 seniors (53 women and 75 men) and 98 juniors (47 women and 51 men).

The total number of the injured players was (145), and according to their responses of the survey, the total number of injuries was (220), meaning that 64% of the players were injured at least once during the season 2011-2012. Handball injuries are divided into two types: acute injuries and overloading injuries, and they can fall during training and matches.

Finally, I conclude that there are no significant differences detected between the different groups of age and gender concerning injuries, locations of injuries, types of injuries (acute or overload), times of injury (trainings or matches) and periods of absence from trainings and matches, in Swedish teams of handball. However, the distribution of males are statistically different, $p < 0.05$. That there are fewer injuries among seniors than juniors leading to absence 8-30 days from the times of matches and training, and more injuries among seniors leading to the absence >30 days. Therefore, I which proves no differences between genders and ages in injuries.

KEYWORDS: HANDBALL. INURY .PLAYER. SWEDISH. ABENTEEISM.

1. INTRODUCTION

Sports injuries are a major issue for athletes, coaches and sports clubs. Therefore, the International Olympic Committee has established a research center for the prevention of injuries in different sports. [26] Sports injuries are defined by Johnson as "all types of injuries incurred in connection with sporting activities". [24] The term injuries fall into three subgroups. These are short-term injury (1-7 days absence), medium damage (1 week to 1 month of absence) and long-term damage (more than one month's absence). It is a well-known fact that any kind of sport, physical activity or active lifestyle entails a certain risk of injury. [14] .

Regardless of activity level as constituting damage a major problem for the athlete and can result in a increased risk of future problems that result in inactivity [28]. The number of registered emergency department in Sweden in 2009 was 688 300. Searched Of these 110,400 emergency treatment of sports injury. Sports injuries account for about 16% of all registered acute injury [41]. Therefore, prevention a priority in every team. [16]

Handball is one of the team sports that have a high intensity with frequent and harsh physical contacts between the players. Handball has been an Olympic sport since 1972, and is one of the most popular sports in Europe after football. The number of affiliates of the International Handball Federation (IHF) is 167, which represents approximately 800,000 teams. [23] Handball is unfortunately a lot of damage afflicted sports. Among female handball player takes about 40 injuries per 1000 match hours. Over 90% of the injuries were traumatic and the biggest problem was the anterior cruciate ligament injuries. Among the male handball players, the incidence is lower, at around 14 injuries per 1000 match hours [46]. In a retrospective study in young female players (14-16 years) reported an incidence of 52 injuries per 1000 match hours. [47]

From literature review, it can be concluded that information about and study of injuries in handball is very limited. However, showed a comparative study of injuries in eight team sports during the 2004 Olympic Games in Athens that the incidence of injuries was highest in baseball and football. [25] Handball is one of the sports team that registered high rates of injuries, up to 15% of the athletes during the 2008 Summer Olympics. [3] In this context occurs most damage (84%) due to contact with another player [36].

The purpose of this study is to compare injuries between male and female handball players in the junior and senior teams, to see how age and gender may affect the injury picture.

Sending out a survey will be done where handball player (man and woman) in different teams in Sweden will fill in if they have been damaged during the 2011-2012 season. The survey is aimed at both junior players and senior players in Sweden. The results of the study will provide a picture of the injury incidence, injury location, type of injury (acute / overload), time during the season (practice / game) and absenteeism.

This study has the following hypotheses: Female players have a higher injury incidence than male players. Senior players have a higher injury incidence than junior players. Most injuries occur during the match, regardless of gender and age.

2. SELECTION

Through a stratified sample, contact was made with 401 of the 11 549 handball players of both sexes (6231 men and 5318 women) in the Swedish handball teams at various levels of senior and junior teams. [35] Criteria for participation in the study was that the player in 2011 playing in a handball, and that they must be 16 years or older. Eighteen years old is the boundary between youth players and senior players. In addition, the questionnaire filled out correctly. Then compared injuries in the different groups, but 168 of the 401 were excluded, however, because

no reply is received within the deadline. Of the 233 players who participated met seven players not meet the criteria required to participate in the survey.

3. RESULTS

Total number of respondents was 226 players, including 128 seniors (53 women and 75 men) and 98 juniors (47 women and 51 men). According to the survey responses, I have chosen to present and headlining the performance against the issues. The results will be reported by descriptive figures and then with adequate statistical calculation.

1. INJURY INCIDENCE.

More than half of the 226 players (145), i.e. 64% in different age and of both sexes were injured, and the total number of injuries was 220 during the 2011-2012 season.

Below in Table 1 shows the results for gender (men and women) to question 4; Were you injured at some point during the 2011-2012 season? Distribution of men and women show no difference in injury incidence (ChiSq = 0.74 and $P < 0.05$).

Table 1. Table shows the results for gender (men and women).

Number of injuries per group	Male	Female	Total
Injured players	36% (82)	28% (63)	64% (145)
Total injuries	59% (130)	41% (90)	100% (220)
Non-injured	19% (44)	16% (37)	35% (81)

From Table 2 shows the distribution of age (senior and junior) to question 4; Were you injured at some point during the 2011-2012 season? There is no significant relationship between seniors and juniors in the injury incidence (ChiSq = 0:55 and $P < 0.05$).

Table 2 shows the results for age group (senior and junior).

Number of injuries per group	Junior	Senior	Total
players injured	35% (80)	29% (65)	64% (145)
Total injuries	55% (122)	45% (98)	100% (220)
Non-injured	21% (48)	15% (33)	36% (81)

2. INJURY LOCATION

The body is divided into three major areas in order to clarify the statistics regarding injury location (arm, leg and body).

Below in Table 3 show injury location results for gender (men and women) under question 7, 11 and 15; in which part of the body were you hurt? T

Distribution of men and women show no difference in injury location. The results of the responses to question 7 on the basis of the survey show that the distribution of injury location is not significantly different between men and women (ChiSq = 0.24 and $P < 0.05$). The answers to question 11 show that the distribution of injury location is not significantly different between men and women (ChiSq = 0.57 and $P < 0.05$). The answers to question 15 shows that the distribution of injury location is not significantly different between men and women (ChiSq = 0.66 and $P < 0.05$).

Table 3 shows the injury location and total number of injuries by gender (men and women).

injury location	Male	Female	Total
arm	23% (50)	11% (24)	34% (74)
bone	29% (64)	23% (50)	52% (114)
body	7% (16)	7% (16)	14% (32)
null	54% (44)	46% (37)	(81)

From Table 4, the injury location results for age (senior and junior) under question 7, 11 and 15; In which part of the body were you hurt?

There is no significant relationship between seniors and juniors in injury location. The results of the responses to question 7 on the basis of the survey show that the distribution of injury location is not significantly different between seniors and juniors (ChiSq = 0.14 and $P < 0.05$). The answers to question 11 show that the distribution of injury location is not significantly different between seniors and juniors (ChiSq = 0.48 and $P < 0.05$). The answers to question 15 shows that the distribution of injury location is not significantly different between seniors and juniors (ChiSq = 0.85 and $P < 0.05$).

Table4, shows the injury location and total number of injuries per age group (senior and junior).

injury location	Senior	Junior	Total
arm	19% (42)	15% (32)	34% (74)
bone	31% (67)	21% (47)	52% (114)
body	6% (13)	9% (19)	15% (32)
null	59% (48)	41% (33)	(81)

3. TYPE OF INJURY

Below in Table 5 shows the defect type result for gender (men and women) under question 8, 12 and 16; about the defect type.

Distribution of men and women show no difference in the type of injury. The results of the types of answers to question 8 on the basis of the survey show that the distribution of type of injury is not significantly different between men and women (ChiSq = 0:54 and P <0.05). The answers to question 12 shows that the distribution of type of injury is not significantly different between men and women (ChiSq = 0:23 and P <0.05). The answers to question 16 show that the distribution of type of injury is not significantly different between men and women (ChiSq = 0:51 and P <0.05).

Table 5, shows the distribution of injuries according to type of injury by gender (men and women).

Type of injury	Male	Female	Total
Acute	36% (79)	24% (53)	60% (132)
Overload	23% (51)	17% (37)	40% (88)

From Table 6 shows the type of injury the result of age (senior and junior) under question 8, 12 and 16; about the type of injury.

There is no significant relationship between seniors and juniors in the type of injury. The results of the eight types of answers to questions based on the survey shows that the distribution of type of injury is not significant between the seniors and juniors (ChiSq = 0:38 and P <0.05). The answers to question 12 shows that the distribution of type of injury is not significant between the seniors and juniors (ChiSq = 0.66 and P <0.05). The answers to question 16 shows that the distribution of type of injury is not significant between the seniors and juniors (ChiSq = 0:53 and P <0.05).

Table 6 shows the distribution of injuries according to type of injury per årsgrupp (senior and junior).

The type of injury	Senior	Junior	Total
Acute	31% (69)	29% (63)	60% (132)
Overload	24% (53)	16% (35)	40% (88)

4. ABSENTEEISM

Distribution of men and women show no difference in absenteeism. The results of the responses to question 9 on the basis of the survey show that the distribution of absenteeism is not significantly different between males and women (ChiSq = 0.70 and P <0.05). The answers to question 13 show that the distribution of absenteeism is not significantly different between males and females (ChiSq = 0:32 and P <0.05). The answers to question 17 show that the distribution of absenteeism is not significantly different between males and females (ChiSq = 0.26 and P <0.05).

Table 7 the table shows absenteeism by gender (males and females).

Absenteeism	Males	Females	Total
1-7 days	31% (68)	19% (42)	110 (50%)

8-30 days	15% (34)	14% (30)	64 (29%)
Mer än 30 days	13% (28)	8% (18)	46 (21%)

Table 8 shows the result of absence of age (senior and junior) under question 9, 13 and 17; absenteeism (maximum participation) competition and training.

There is no significant difference between seniors and juniors in absenteeism according to the results of the responses to question 9 on the basis of the survey show that the distribution of absenteeism is not significant between the seniors and juniors (ChiSq = 0:14 and P <0.05). The answers to question 13 show that the distribution of absenteeism is not significant between the seniors and juniors (ChiSq = 0:49 and p <0.05), but the answers to question 17 showed that the absence of men, the distribution is statistically different, (ChiSq = 0.04 P <0.05). That is to say that fewer injuries occur among seniors than juniors, leading to an absence of 8-30 days. Many injuries occur among seniors than juniors, leading to an absence of more than 30 days.

Table 8: The table shows absenteeism per years group (senior and junior).

Absenteeism	Senior	Junior	Total
1-7 days	29% (64)	21% (46)	110 (50%)
8-30 days	12% (27)	17% (37)	64 (29%)
More than 30 days	14% (31)	7% (15)	46 (21%)

5. TIME DURING THE SEASON

Below in Table 9 shows the results for time sex (males and females) according to question 10, 14 and 18; injury occurred during training or match?

Distribution of men and women show no difference in time. The results of the answers to question 10 on the basis of the survey show that the distribution of time is not significantly different between males and females (ChiSq = 0:26 and P <0.05). The answers to question 14 show that the distribution of time is not significantly different between males and women (ChiSq = 0.88 and P <0.05). The answers to question 18 shows that the distribution of time is not significantly different between males and females (ChiSq = 0.75 and P <0.05).

Table 9: The table shows the injury distribution by gender (males and females) during matches and training sessions in the season.

Time	Males	Females	Total
Match	26% (57)	24% (53)	110 (50%)
Training	33% (73)	17% (37)	110 (50%)

Table 10 shows the timing results for age (seniors and juniors) under question 10, 14 and 18; injury occurred during training or match?

There is no significant difference in injury distribution between seniors and juniors in terms of timing of when the injury occurred. The results of the answers to question 10 on the basis of the survey show that the distribution of time is not significantly different between seniors and juniors (ChiSq = 0:22 and $p < 0.05$). Svaren to question 14 show that the distribution of time is not significantly different between seniors and juniors (ChiSq = 0.91 and $P < 0.05$). The answers to question 18 shows that the distribution of time is not significantly different between seniors and juniors (ChiSq = 0.83 and $P < 0.05$).

Table 10 the table shows the injury distribution by year group (senior and junior) during matches and training sessions in the season.

Time	Senior	Junior	Total
Match	29% (64)	21% (46)	110 (50%)
Training	26% (58)	24% (52)	110 (50%)

4. DISCUSSION

Injuries in handball is an area that is limited, therefore I believe that more research needs to be conducted. In the field of sports medicine, it is well known that handball has a high incidence of injuries and that these injuries are often difficult as has been shown by many researchers [5,11,31,33,44].

Based on my literature review, it seems that criteria related to injuries in handball player is not clearly defined [9,13,23]. The frequency of injuries in handball has been investigated in several studies and will vary depending on how you define harm and the group studied [4,17,18,20].

According to the results in Tables 1 and 2 show that 64% of the players of both sexes and of all ages have been injured at least once during the 2011-2012 season. This is consistent with Hoerberigs et al. [22] examined in their study involving surveys of 300 players (random) of the Dutch Handball Federation, that the damage is included in handball and compared the injured to non-injured players in terms of gender, age, somatotype and sports participation. Nearly 51% of all handball players get at least one injury during a year.

An interpretation I see that there are varying injury incidence between different ages and sexes. Because handball is one of the many sports that has contains tough physical game between players, as well as the physical requirements such as high jumps and hard landings on legs in different conditions and unsafe too sudden and fast movements and game rules to allow contact with an opponent, but also to a handball players use fast movements that vary in all parts of the body and the cause of most damage referred to in previous studies [2,12,31,44].

From my findings, there are no significant differences in the incidence of injury, whether between males and women or between junior and senior players. This is consistent with a study by [3]. In a previous study, which describes the percentage of damage (%) and the associated direct medical and indirect costs of sports injuries in Flanders, took 72 of 82 Flemish sports federations. The study showed that the frequency among male and female handball players was similar [14]. Another study found that injury rates in junior handball is as high as in the senior teams of both sexes [37]. A special feature of handball is the high frequency of injuries among senior and junior players [43,48].

The survey shows those parts of the body affected by injuries, and these are the head, neck, shoulder / shoulder, stomach, chest, back, arm, elbow, wrist, hand, fingers, hip / groin, thigh, knee, lower leg, ankle and foot. The body is divided into three sections (arms, legs and body) to injury location, with a view to illustrate the distribution of injuries.

According to the results in Tables 3 and 4 there is no significant difference in injury location between males and women or junior and senior players. Other studies have shown most damage in the lower limbs [2, 7, 10, 12, 25, 28]. Injuries to the lower extremities occur more frequently due to the dynamic, fast, and unexpected movements and jumps [6,8]. The cause of most injuries were in contact with an opponent. These results demonstrated the same as Langevoort [29], and Schulz et al. [39].

This is consistent with the perception of Oehlert et al. [36] the purpose of the study was to investigate the injury situations in European handball with a video method. They argue that handball is a högintensitetssport with frequent physical contact between players, where the arms and legs and chest and back are all vulnerable to injury regardless of gender and age.

An interpretation of why my results showed the opposite must take into account the relatively small number of players who participated in the study.

Tables 5 and 6 show the results for different types of injuries by gender (males and females) and year group (senior and junior). Distribution shows no difference in the type of injury (acute and overload). My result is found to be consistent with a study investigating the etiology, mechanism and anatomical localizations of injuries observed among male and female players during the tenth edition of the East and Central African Championships for Clubs (April 9 to 17, 1995) in Nairobi, Kenya. There were nine teams for males and females for five teams from Kenya, Uganda, Tanzania and Ethiopia, who played nineteen and ten matches which resulted in 52 (78%) and 15 (22%) injuries. It was found that the failure mechanism was the same for both male and female players. [1] Hagglund et al. [20] found that there was no significant difference between acute injuries and overload damage. The same results were reported also in a previous study that examined injury incidence and types of injuries among male and female junior handball players using two different prospective registration methods. The main results indicate that the types of injuries in both sexes among junior and senior players in handball are equal [37].

Tables 7 and 8 show the results for the period of absence for gender (males and females) and year grupp (senior and junior). The distribution shows no significant difference between both groups of absence. My results showed, however, not consistent with previous research, that is to say that the players at the highest level of play had largest share of players with long absence. The same is also reported in a study of Hatzimanouil et al. [21] that aimed to determine the prevalence and severity of injury in the Greek handball team and to correlate the endogenous factors and the type of exercise. The study sample consisted of 216 male handball players. Data on the personal characteristics of Greek handball play clean used in the statistics show that the majority of those were young or adults, with a lot of previous sports experiences. The results showed a high incidence and severity of injuries (42% and (64%) of young people and adults, and also showed that the higher the player's level, the greater number of injuries.

Among males, the distribution is statistically different in terms of absence from matches and training sessions. There were fewer injuries among seniors than juniors leading to an absence 8-30 days, and several injuries among seniors leading to an absence of more than 30 days. This is therefore a contradiction compared to Hatzimanouils study. Based on my study, I cannot connect game levels to the occurrence of serious injury.

I chose to do a retrospective study. The advantage of a retrospective study design is that data from a relatively long time period can be collected in a relatively short time. The time gain was the biggest reason why a retrospective method was chosen over a prospective in this study. The disadvantage of a retrospective study is the uncertainty that one will remember what injuries they had and how long you be away for their injuries.

A difficult but nonetheless interesting discussion, the surrounding factors, which in one way or another may have affected the players' way to report the damage. I therefore question how well the actual result reflects reality?

There is in fact, some factors that may have affected the players at the time the questionnaires were filled in. Example, stress, lack of interest, misinterpretations, failing memory of the previous season and unwillingness to question testleads if any uncertainty on the survey content be such factors.

In Tables 9 and 10 shows the distribution of injuries during the match or during training. There is no big difference in the timing of the injuries between the sexes (males 50% and females 50%) and year grupp (senior and junior 50%). during the 2011-2012 season. My results showed, however, not consistent with previous research that has shown that injuries during matches are more common than in the trainings according Myklebust et al. [34] The purpose of their study was to examine gender differences in the incidence of ACL injuries among prominent handball player. They also wanted to investigate injury mechanisms and possible risk factors for ACL injury. The study was done prospectively during the seasons 1993-94, 1994-95 and 1995-96. This study became the main findings that the incidence of injury was 30-fold higher among women than among males during matches. The second study was done to evaluate the damage in handball with total 186 male players from 16 teams. It was found that the injuries during trainings were fewer than injuries during matches. [40]

One explanation for this may be that during the game, players try to reach a level of high performance that is much more intense than during exercise, increasing the risk of injury. Meanwhile, I see that the number of training hours is much greater than the number of game hours, and this also increases the risk of injury during exercise. The high performance requirements and long workouts, I think is the reason for no significant differences in time (training, match) exhibited during the season. My assessment is supported by Myklebust et al [34] who argue that the risk of injury during exercise is the same as the game. The injuries were evenly distributed between 54% training and competitions 46%) $p = 0.18$). [30]

The players were, after all, courteous, and I also felt that they were in favor of completing the survey. Only in a few cases, players chose to forego participation. A proposal for future surveys is to allow all participants to answer under such similar circumstances as possible, preferably well before a workout, or at any separate occasion whether it is possible to solve practically. This may at least be a measure to minimize the number of sources of error in the survey. A prospective study would obviously be the best way to study these parameters.

5. CONCLUSIONS

There were no significant differences regarding the injury incidence, injury location, type of injury (acute / overload), and time of occurrence during the season (training / match) between male and female junior and senior players in this selection of Swedish handball player during the 2011-2012 season. There were no significant differences in absenteeism between female junior and senior players in the Swedish handball during the 2011-2012 season.

Among men, there was less injuries with 8-30 days absence, but several injuries and more than 30 days absence, were among seniors over juniors $P < 0.05$.

It would be interesting to conduct the same survey with several players, but any time a prospective study with a large number of participants.

REFERENS

1. Asembo JM, Wekesa M.(1998). Injury pattern during team handball competition in East Africa. *East Afr Med J*: **75**:113–116.
2. Andren-Sandberg, A. (1994). Injuries in team handball. In Clinical practice of sports injury prevention and care. *Blackwell Scientific Publications, (Edited by P. A. F. H. Renstrom), Oxford, pp. 354-359.*

3. Astrid Junge, PhD, Lars Engebretsen, MD, PhD, Margo L. Mountjoy, MD, Juan Manuel Alonso, MD, Per A. F. H. Renström, MD, PhD, Mark John Aubry, MD and Jiri Dvorak, MD, PhD. (2009). Sports Injuries During the Summer Olympic Games 2008. *Am J Sports Med November vol. 37* no. 11 2165-2172.
4. Backx FJ, Beijer HJ, Bol E, Erich WB (1991). Injuries in high-risk persons and high-risk sports. A longitudinal study of 1818 school children. *Am J Sports Med, 19*: 124-130.
5. Bak, K. and Koch, J.S. (1991). Subtalar dislocation in a handball player. *Br. J. Sp. Med., 25*: 24-25.
6. Bencke, J., Naesborg, H., Simonsen, E.B. and Klausen, K. (2000). Motor pattern of the knee joint muscles during side-step cutting in European team handball. Influence on muscular co-ordination after an intervention study. *Sc. J. Med. Sc., 10*: 68-77.
7. Benito, J.J.M. (1999). Injuries in Spanish handball. I.H.F. Periodical, 1: 42-44.
8. Bradford, S. (2000). Common Sports Injuries. In Conn's Current Therapy 2000. W.B. Saunders Company, (Edited by R. Rakel) St. Louis, pp. 975-978.
9. Conteduca, F., Ferretti, A., Mariani, P.P., Puddu, G. and Perugia, L. (1991). Chondromalacia and chronic anterior instabilities of the knee. *Am. J. Sp.Med., 19*: 119-123.
10. De Loes, M., Dahlstedt, L.J. and Thomee, R. (2000). A 7-year study on risks and costs of knee injuries in male and female youth participants in 12 sports. *Sc. J. Med. Sc., 10*: 90- 97.
11. De Loes, M. (1995). Epidemiology of sports injuries in the Swiss organization "Youth and Sports" 1987-1989. Injuries, exposure and risks of main diagnoses. *Int. J. Sp. M., 16*: 134-138.
12. De Loes, M., and Goldie, I. (1988). Incidence rate of injuries during sport activity and physical exercise in a rural Swedish municipality. *Int. J. Sp. M., 9*: 461-467.
13. Dirx, M., Bouter, L.M. and De Geus, H. (1992). Aetiology of handball. A case control study. *Br. J. Sp. Med., 26*: 121-124.
14. E Cumps, E Verhagen, L Annemans, R Meeusen (2008). Injury rate and socioeconomic costs resulting from sports injuries in Flanders: data derived from sports insurance statistics 2003. *Br J Sports Med; 42*: 767-772.
15. Fuller, C. W., Ekstrand, J., Junge, A., Andersen, T. E., Bahr, R., Dvorak, J., Häggglund, M., McCrory, P., Meeuwisse, W. H. (2006). Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. *Br J Sports Med; Vol. 40*. Sid: 193-201.
16. G. Langevoort, G. Myklebust, J. Dvorak, A. Junge (2007). Handball injuries during major international tournaments. *Scand J Med Sci Sports: 17*: 400-407.
17. Garrick JG, Requa R. (2005). Structured exercises to prevent lower limb injuries in young handball players. *Clin J Sport Med.: 15*: 398.
18. Gohlke F, Lippert MJ, Keck O. (1993). Instability and impingement of the shoulder of the high performance athlete in overhead stress. *Sportverletz Sportschaden.: 7*: 115-121.
19. Häggglund M, Walden M, Ekstrand J. (2009). UEFA injury study--an injury audit of European Championships 2006 to 2008. *Br J Sports Med.: 43*: 483-489.
20. Häggglund M, Walden M, Bahr R, Ekstrand J. (2005). Methods for epidemiological study of injuries to professional football players: developing the UEFA model. *Br J Sports Med.: 39*: 340-346.
21. Hatzimanouil, D., Oxizoglou, N., Sikaras, E., Hatzimanouil, A., Koronas, K., Tsigilis, N. & Abatzides, G. (2005). Factors related to the incidence and severity of injuries in team handball. *Journal of Human Movement Studies, 48*: 335-351.
22. Hoerbergs, J., van Galen, W. & Philipsen, H. (1986). Pattern of injury in handball and comparison of injured versus non injured handball players. *International Journal Sports Medicine, 7*: 333-337
23. IHF, (<http://www.ihf.info>), 2012-03-09.

24. Johnson U. Coping strategies among long-term injured competitive athletes. (1997). A study of 81 men and women in team and individual sports. *Scand J Med Sci Sports*: **7**: 367-372.
25. Junge A, Langevoort G, Pipe A, Peytavin A, Wong F, Mountjoy M, Beltrami G, Terrell R, Holzgraefe M, Charles R, Dvorak J. (2006). Injuries in team sport tournaments during the Olympic games 2004. *Am J Sports Med*: **34**: 565–576.
26. Kathrin Steffen, Torbjørn Soligard, Lars Engebretsen (2011). The IOC's endeavour to protect the health of the athlete continues. *Br J Sports Med*; **45**:551-552.
27. Kathrin Steffen, Lars Engebretsen (2010). More data needed on injury risk among young elite athletes. *Br J Sports Med*; **44**:485-489.
28. Langevoort, G., Myklebust, G., Dvorak, J. & Junge, A. (2006). Handball injuries during major international tournaments. *Scand. J. Med. Sci. Sports*, (Online Early Articles), doi:10.1111/j.1600-0838.2006.00587.x.
29. Langevoort, G. (2003). Euro 2002 / Denmark Injury report analysis. *I.H.F. Periodical*, **1**:217-219.
30. Lars Engebretsen, Kathrin Steffen, Juan Manuel Alonso, Mark Aubry, Jiri Dvorak, Astrid Junge, Willem Meeuwisse, Margo Mountjoy, Per Renström, Mike Wilkinson (2010). Sports injuries and illnesses during the Winter Olympic Games 2010. *Br J Sports Med*; **44**:772-780.
31. Leindinger, A., Gast, W. and Pforringer, W.W. (1990). Traumatology in indoor handball sports. A sports medicine analysis of the incidence of injuries and accident epidemiology of indoor handball sports in senior players in the Federal Republic of Germany after 1981. *Sportverletz Sportschaden*. 1990 Jun; **4**(2):65-8.
32. Mandelbaum BR, Silvers HJ, Watanabe DS, Knarr JF, Thomas SD, Griffin LY, Kirkendall DT, Garrett W Jr. (2005). Effectiveness of a neuromuscular and proprioceptive training program in preventing anterior cruciate ligament injuries in female athletes. *Am J Sports Med*: **33**: 1003–1010.
33. Myklebust G, Engebretsen L, Braekken IH, Skjølberg A, Olsen OE, Bahr R. (2003) Prevention of anterior cruciate ligament injuries in female team handball players: a prospective intervention study over three seasons. *Clin J Sport Med*; **13**:71-78.
34. Myklebust, G., Maehlum, S., Holm, I. & Bahr, R. (1998). A prospective cohort study of anterior cruciate ligament injuries in elite Norwegian team handball. *Scandinavian Journal of Medicine and Science in Sports*, **8**(3): 149-153
35. Nicklas Brunlöf. Tävlingskonsulent i Svenska Handbollförbundet. Enligt telefonsamtal och sedan skicka ett mejl (2012-11-21).
36. Oehlert K, Drescher W, Petersen W, Zantop T, Gross V, Hassenpflug J. (2004). Injuries in Olympic handball tournaments: a video analysis. *Sportverletz Sportschaden*: **18**:80–84.
37. Olsen OE, Myklebust G, Engebretsen L, Holme I, Bahr R. (2006). Injury pattern in youth team handball: a comparison of two prospective registration methods. *Scand J Med Sci Sports*: **16**: 426–432.
38. Olsen OE, Myklebust G, Engebretsen L, Holme I, Bahr R. (2005). Exercises to prevent lower limb injuries in youth sports: cluster randomised controlled trial. *BMJ*: **330**: 449.
39. Schulz, D., Henke, T. & Heck, H. (2005). Prevention strategies in professional handball *Br. J. Sports Med.*, **39**: 401.
40. Seil, R., Rupp, S., Tempelhof, S. & Kohn, D. (1997). Injuries during handball. A comparative retrospective study between regional and upper league teams. *Sportverletzung Sportschaden*, **11**(2): 58-62.
41. Socialstyrelsen. Skadehändelser som föranlett läkarbesök vid akutmottagning. 2011-05-05.
42. Tillämpad statistik – att samla och sammanfatta data. www.spssakademin.hv.se 2012-05-24.

43. Tittel, K., Schaetz, P. & Hagen, D. (1974). Zur Aetiologie, Diagnostik, Therapie und Prophylaxe von Verletzungen und Fehlbelastungsschaden bei Hallenhandballspielern. *Medicine und Sport*, **2**: 46-57.
44. Tyrdal, S. and Bahr, R. (1996). High prevalence of elbow problems among goalkeepers in European team handball- 'handball goalie's elbow'. *Sc. J. Med. Sc.*, **6**: 297-302.
45. Vetenskapsrådet. Forskningsetiska principer inom humanistisk-samhällsvetenskaplig forskning. Tillgänglig: <http://www.codex.vr.se/texts/HSFR.pdf> , 2012-03-29.
46. Wedderkopp, Kaltoft, Lundgaard, Rosendahl, Froberg (1997). Injuries in young female players in European team handball. *Scand J Med & Sci in Sports*; **7**:342-347.
47. Wedderkopp N, Kaltoft M, Holm R, Froberg K. (2003). Comparison of two intervention programmes in young female players in European handball – with and without ankle disc. *Scand J Med Sci Sports*: **13**: 371–375.
48. Wolf, G., Tittel, K., Doscher, I., Luck, P., Hierse, B., Kiess, Chr., Lippold, G., Tetzlaff, B., Kohler, E. & Schaetz, P. (1974). Statistische Analyse über Ursachen, Lokalisationen und Arten häufiger bei Training und Wettkampf aufgetretener Verletzungen und Fehlbelastungsschaden im Hallenhandball. *Medicine und Sport*, **3**: 77-80.

APPENDICES

Appendix 1

Information Form for participants

Dear participants!

You will now have the opportunity to become involved in a survey of the subject "Comparison of injuries in junior and senior handball players between male and female." The questionnaire is a part of my Degree (A level).

The purpose of this study is to investigate whether there are differences in injuries between male and female, and between junior and senior players. I will also examine the factors that contribute to differences in injury (if it exists) in different groups. The questionnaire consists of 19 questions and related responses. I hope that the results can help to prevent injuries specifically for handball players.

Participation is voluntary but your responses are important to get reliable and useful results. Your answers will be kept confidential and only poll managers and supervisors who take some of the answers. The results of the thesis are presented in the form of statistics where no individual answers can be deduced. Obviously, I can send you a copy of my essay if you want to read it when it's ready.

Informed consent

1. I have read the written information
2. I have had the opportunity to ask questions
3. I consent to participate in the study

The participant's signature.....

Date.....

Location.....

Project manager: Faleh Ali Salman

Phone: 0736327465

E-mail: dr.alifaleh@gcss.se

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Appendix 2

ATTENTION! The questions refer to the season 2011 to 2012.

Name: _____ the name will not appear in the paper.

Age: _____

Position: _____ (When changing the position, specify where you played most often)

Gender: Male Female

1. years group play handball? Youth team Senior teams
2. Estimate the number of matches you were complicit in the season 2011 to 2012: approx 10% approx
25% approx 50% approx 75% approx 100%
3. Estimate the number of workouts you were involved in:
approx 10% approx 25% approx 50% approx 75% approx 100%
4. Were you injured at some point during the season 2011 to 2012? Yes No
5. Number of training hours per week:
6. Number of matches season 2011 to 2012 (including training match):

If **yes** to question 4, continue with the next question. When **No**, submit the questionnaire.

Below you questions that have been damaged, one or more times. Answer so far as to agree with you. If you had one, two or three injuries.

First injury

7. In which body part you were injured? head / neck Axle / shoulder Stomach / chest back arm
elbow wrist / hand / fingers Hip / groin thigh Knee leg Ankle / foot
8. Type of injury: Acute, sudden injury with clear orsak Overload, damage has an insidious nature and
arises during the time
9. absenteeism (maximum participation) match and training:
1- 7 dagar 8-30 dagar more than 30 dagar
10. Did the injury occur during training or match?
Training Match

If you only had an injury last season, you are hereby completed the questionnaire.

Otherwise, please proceed.

Second injury

11. In which body part were you hurt?
Head / neck Axle / shoulder stomach / chest Back Arm Elbow Wrist / hand / fingers Hip /
Groin Thigh Knee Lower Leg Ankle / foot
12. Type of injury:
Acute, sudden injury with clear cause
Overload, damage has an insidious nature and arises during the time

13. Absence from (maximum participation) match and training:

1 -7days 8-30 days more than 30 days

14. Did the injury occur during training or match?

Training Match

Third injury

15. In which body part you were injured? head / neck Axle / shoulder Stomach / chest back arm
elbow wrist / hand / fingers Hip / groin thigh Knee leg Ankle / foot

16. Type of injury: Acute, sudden injury with clear orsak Overload, damage has an insidious nature and arises during the time

17. absenteeism (maximum participation) match and training:

1- 7dagar 8-30 dagar more than 30 dagar

18. Did the injury occur during training or match?

Training Match

19. If you had 3 injuries, you are hereby completed the questionnaire. Otherwise, describe other damage incurred by you, how many times and in what part of the body damage has occurred.

Thank you answered this questionnaire, and good luck during the season 2011- 2012!

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