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Keywords: Epidemiology, sprain, fracture, sports medicine

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Manuscript Region of Origin:

Abstract: Introduction: This study investigated the sport-related ankle injuries attending an accident and emergency (A&E) department during a one-year period.

Methods: A total of 1,715 sports injuries cases attending an A&E department from 1 January 2005 to 31 December 2005 were prospectively recorded. Details of each classified case were recorded in a computerized record system by the triage nurse. At the end of the study period, all sport-related ankle injury cases were analyzed.

Results: A total of 240 sport-related ankle injury cases were reported. Most cases were sustained from basketball (32.9%), soccer (31.7%) and hiking (5.8%) sports. The majority of the cases was ligamentous sprains (81.3%) and fractures (10.4%). The mean age of all patients was 24.6 years (SD = 12.3). Four fifths (80.4%) were male patients. All cases were not life threatening. Most cases (99.2%) were referred to Orthopaedics specialty. Radiography was routinely employed in 99.2% of the cases. Ligamentous sprains

were mostly sustained in basketball (37.4%) and soccer (28.7%), and were often treated with bandaging (60.0%) and analgesics (48.7%). Most cases were discharged with or without referral to physiotherapy and specialty clinic (95.4%). Fractures were mostly sustained in soccer (52.0%), basketball (20.0%) and hiking (16.0%), and were very often admitted to hospital wards (84.0%). The estimated A&E attendance rate for all sports injuries, ankle injuries, ligamentous sprains and fractures were 1.68, 0.24, 0.19 and 0.02/1000 person-year.

Conclusions: The results of this study together with the previous study on ankle sprain epidemiology suggested the following sports ankle injury pattern in Hong Kong - major and serious ankle ligamentous sprains and fractures were sustained from basketball, soccer and hiking, leading to A&E attendance, while minor sprains were sustained in running and jogging and racquet sports. We suggested that the Sports medicine specialists in Hong Kong should emphasize the ankle injury prevention strategies in these sports.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest, including financial and personal relationships with other people, or organisations, that could inappropriately influence (bias) our work, all within 3 years of the beginning the work submitted.

Cover Letter

Dear Editor of Injury,

REF: Submission of manuscript titled “Sport-related ankle injuries attending an accident and emergency department”.

We would like to submit the mentioned manuscript as an Original Article to Injury. Prof Kai-Ming CHAN (email: kaimingchan@cuhk.edu.hk) will be the corresponding author. We declare no conflict of interest, including financial and personal relationships with other people, or organisations, that could inappropriately influence (bias) our work, all within 3 years of the beginning the work submitted. The material within has not been and will not be submitted for publication elsewhere except as an abstract.

This paper was submitted before on May 30, 2007, and was rejected on July 16, 2007. However, the editor Steve Krikler commented that he would consider a new re-submission of this paper. Please refer to the attached letter at the end of this cover letter.

Daniel Tik-Pui FONG, Chi-Yin MAN, Patrick Shu-Hang YUNG,
Shui-Yuk CHEUNG, Kai Ming CHAN

Oct 10, 2007.

-----Original Message-----

From: Injury [mailto:editor@injuryjournal.com]

Sent: Monday, July 16, 2007 5:41 PM

To: kaimingchan@cuhk.edu.hk

Subject: Your Submission

Ref.: Ms. No. JINJ-D-07-00458

Sport-related ankle injuries attending an accident and emergency department Injury

Dear Prof Chan,

Thank you for submitting your paper for publication. Regrettably our reviewers have found it unsuitable on this occasion for publication in INJURY. I am sorry about this as I realise how much work has gone into the preparation of this paper.

Listed below are some of the comments made by the reviewers/editors which may help to explain why your paper has been rejected. These comments are sent to you in the hope that you will find them helpful.

I will consider a submission of a revised paper, but this would be considered as a new submission and would be re-reviewed accordingly, not necessarily by the same reviewers, and therefore acceptance would still not be guaranteed.

Yours sincerely

Steve Krikler

Editor in Chief

Injury

Title	Sport-related ankle injuries attending an accident and emergency department		
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Sport-related ankle injuries attending an accident and emergency department

Introduction: This study investigated the sport-related ankle injuries attending an accident and emergency (A&E) department during a one-year period.

Methods: A total of 1,715 sports injuries cases attending an A&E department from 1 January 2005 to 31 December 2005 were prospectively recorded. Details of each classified case were recorded in a computerized record system by the triage nurse. At the end of the study period, all sport-related ankle injury cases were analyzed.

Results: A total of 240 sport-related ankle injury cases were reported. Most cases were sustained from basketball (32.9%), soccer (31.7%) and hiking (5.8%) sports. The majority of the cases was ligamentous sprains (81.3%) and fractures (10.4%). The mean age of all patients was 24.6 years (SD = 12.3). Four fifths (80.4%) were male patients. All cases were not life threatening. Most cases (99.2%) were referred to Orthopaedics specialty. Radiography was routinely employed in 99.2% of the cases. Ligamentous sprains were mostly sustained in basketball (37.4%) and soccer (28.7%), and were often treated with bandaging (60.0%) and analgesics (48.7%). Most cases were discharged with or without referral to physiotherapy and specialty clinic (95.4%). Fractures were mostly sustained in soccer (52.0%), basketball (20.0%) and hiking (16.0%), and were very often admitted to hospital wards (84.0%). The estimated A&E attendance rate for all sports injuries, ankle injuries, ligamentous sprains and fractures were 1.68, 0.24, 0.19 and 0.02/1000 person-year.

Conclusions: The results of this study together with the previous study on ankle sprain epidemiology suggested the following sports ankle injury pattern in Hong Kong – major and serious ankle ligamentous sprains and fractures were sustained from basketball, soccer and hiking, leading to A&E attendance, while minor sprains

were sustained in running and jogging and racquet sports. We suggested that the Sports medicine specialists in Hong Kong should emphasize the ankle injury prevention strategies in these sports.

Keywords: Epidemiology, sprain, fracture, sports medicine

INTRODUCTION

Sports injuries are comparable to traffic, home, and occupational accidents in the attendance to an accident and emergency (A&E) department⁹, and are more commonly sustained by male¹² and adolescent¹ athletes. Ankle injury accounted for more than 10% of all sports injuries¹¹, in which 80% or more were ligamentous sprain injuries¹⁰. A study in UK² reported the attendance rate to A&E units for patients with ankle ligamentous sprain to be 5.27/1000 person year. Among sports, a survey in Hong Kong reported that most ankle sprains were sustained while pursuing running and jogging activities (25%), racquet sports (20%) and ball games (19%)²⁸.

Up-to-date epidemiology studies reveal the current injury patterns and suggest directions for injury management and prevention. In Hong Kong, previous sports injury epidemiology studies were conducted on university students⁶, competitive and recreational athletes²⁸, paediatrics¹⁸, sports injury clinic attendants⁷ and A&E department attendants⁵ more than 10 years ago. This study aimed to collect current epidemiology data on sport-related ankle injuries attending an A&E department.

MATERIALS AND METHODS

The study was conducted at the Accident and Emergency (A&E) Department of the

Prince of Wales Hospital in Shatin, Hong Kong, China. The hospital serves approximately a population of 1,020,900 from Shatin and Sai Kung districts, which accounts for 14.8% of the total population of Hong Kong, 6,890,300²². All attendances during a one-year period from 1 January 2005 to 31 December 2005 were prospectively recorded. The triage nurse on duty classified every case by the category of injury, which could be either sports, common assault, indecent assault, batter, traffic, industrial, domestics or self-inflicted. Cases with inadequate information were unclassified. Details of each classified case were recorded in a computerized record system. At the end of the study period, all sport-related ankle injury cases were retrieved and analyzed.

Descriptive findings were presented for all sport-related ankle injuries, and also for ligamentous sprains and fractures separately as these two injury types dominated. Skewness test was performed to show the distribution pattern among age of the patients. Attendance rate was calculated for all sports injuries, sport-related ankle injuries, ligamentous sprains and fracture injuries.

RESULTS

A total of 23,569 A&E attendances were recorded during the study period, in which 14,290 records were classified with the category of injury. Among, 12.0% (1715/14290) were in the sport-related, which ranked fourth in the eight categories (Table 1). A total of 14.0% of the sport-related cases were ankle injuries (240/1715), with 81.3% ligamentous sprains (195/240) and 10.4% fractures (25/240). While a population of 1,020,900 was in the service area during the one-year study period, the attendance rate for all sports injuries (1715 cases), sport-related ankle injuries (240 cases), ligamentous sprains (195 cases) and fracture injuries (25 cases) were calculated to

be 1.68, 0.24, 0.19 and 0.02/1000 person-year respectively.

The mean age of the 193 male (80.4%) and 47 female (19.6%) patients was 24.6 years (SD = 12.3 years). The age distribution was positively skewed, indicating that there were more young patients (Figure 1). All patients were alert at attendance and all cases were not life threatening. Most cases (218/240, 90.8%) were classified as semi-urgent at triage, while 21 (8.8%) and one (0.4%) were classified as urgent and non-urgent respectively. Most cases (238/240, 99.2%) were referred to orthopaedics specialty. Figure 2 showed that most cases were ligamentous sprains (195/240, 81.3%) and fractures (25/240, 10.4%). The numbers of all sport-related ankle injuries, ligamentous sprains and fracture injuries in each sport were shown in Table 2.

Almost all cases (238/240, 99.2%) were sent to radiography examination. The two exceptions were both ligamentous sprains, sustained by a 29-year old female from hockey, and by an 18-year old male from basketball. No computer tomography scan, blood test, electrocardiography test, visual acuity test, urine test and ultrasound scanning were performed in all 240 cases. Table 3 and 4 showed a summary of the treatment and the attendance outcome.

DISCUSSION

The results of this study was comparable to most of the previous studies, with sports injuries accounting for 12.0% of all A&E attendances³, ankle injuries accounting for 14.0% of all sport-related injuries⁷, ligamentous sprains accounting for 81.3% of ankle injuries¹⁰, male patients (80.4%)¹⁶ and young patients aging between 11 and 32 years old dominating (79.2%)¹, and majority of the cases being referred to orthopaedics

specialty for subsequent treatment (99.2%)²⁰. Most of the ankle injuries were ligamentous sprains (81.3%) sustained in basketball (37.4%) and soccer (28.7%), followed by fracture injuries (10.4%) sustained in soccer (52.0%), basketball (20.0%) and hiking (16.0%). These sports are those with highest popularity in Hong Kong²³, resulting in a higher attendance number in A&E department.

An extensive use of radiography for sport-related ankle injuries was reported but only one tenth (10.4%) of the cases were with fractures. This suggested a room to reduce the costly radiographic examination use by certain scoring protocol, such as the Ottawa Ankle Rules²⁴ or the Packer's protocol²¹, while maintaining accurate diagnosis of fractures. Bandaging was being widely applied to ankles with ligamentous sprains in A&E department (60.0%) but its effect was still controversial²⁶. The other treatment to ankle ligamentous sprains were analgesics (48.7%) and plaster (8.7%). Cryotherapy, or ice therapy with compression, which was often applied in on-field emergency treatment of ankle sprain¹⁴, was rarely applied in A&E attendances in this study (1.0%). Most ligamentous sprains were discharged to home (95.4%) with or without referral to physiotherapy or specialty clinics. For fracture injuries, the majority (84.0%) were admitted to the hospital wards.

The attendance rate of sports injury attendance to A&E department was found to be 1.68/1000 person-year, which was less than the figures published from previous study, i.e., 16.9 in Australia⁴. The attendance rate to A&E for sport-related ankle injuries, ligamentous sprains and fractures were 0.24, 0.19 and 0.02/1000 person-year, which were also less than those recorded by two previous studies at the A&E department – 7 in Denmark¹⁵, and 5.27 in UK². In Hong Kong, a previous study²⁸ investigating ankle ligamentous sprains on competitive and recreational athletes reported that most

sprains were sustained in running and jogging (25%). Another study also showed that lower extremity injuries at the ankle and foot are the major medical problem in running⁸. Since running sport was not dominating in this study, it is suggested that those athletics may sustain only minor injuries and did not attend A&E department.

In another previous study surveying 1714 university students⁶, about half of them (47.5%) chose to have self treatment after sustaining sports injuries. For the remaining half, seeking bone setters (15.9%) was as common as seeking Western medical doctors (13.7%), however, attending A&E department was not common. In Hong Kong, there is a strong traditional background of seeking traditional Chinese medicine method, such as herbs, massage and acupuncture, for managing sports injuries, especially in treating ankle sprain²⁵. The habit applies to general public as well as professional or amateur sports teams. The effectiveness was already widely published in the Chinese literature^{19,27,29}, and was also reported in some studies in the English literature on its analgesic effect to relieve pain¹⁷ and its reduction effect to edema after acute ankle sprain¹³. This may also be a reason for the relative low attendance rate to A&E when compared to the statistics in other countries. This also suggested that while A&E records are important in understanding injury profile as they allow prospective and daily collection of injury data, we should also consult epidemiology data in other settings in order to understand the whole injury pattern.

CONCLUSION

This study reported the current epidemiology data on sport-related ankle injuries attending an Accident and Emergency department. The most common types of sport-related ankle injury were ligamentous sprains (81.3%) and fracture injuries (10.4%). The results of this study together with the previous study on ankle sprain

epidemiology suggested the following sports ankle injury pattern in Hong Kong – major and severe ankle ligamentous sprains and fractures were sustained from basketball, soccer and hiking, leading to A&E attendance, while minor sprains were sustained in running and jogging. We suggested that the Sports medicine specialists in Hong Kong should emphasize the ankle injury prevention strategies in these sports.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest, including financial and personal relationships with other people, or organisations, that could inappropriately influence (bias) our work, all within 3 years of the beginning the work submitted.

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Figure and table legends

Figure 1 – Number of attendances in ages

Figure 2 – Distribution of ankle injury types (6/240 cases with inadequate information omitted)

Table 1 – Number of attendances in each category of injury

Table 2 – Number of admissions in each sport for all ankle injuries, ligamentous sprains and fractures

Table 3 – Treatment applied to the all ankle injuries, ligamentous sprains and fractures

Table 4 – Attendance outcome for all ankle injuries, ligamentous sprains and fractures

Date: 28 Jan 2008

To: "Kai-Ming Chan" kaimingchan@cuhk.edu.hk

From: "Injury" editor@injuryjournal.com

Subject: Your Submission

Ref.: Ms. No. JINJ-D-07-00801

Sport-related ankle injuries attending an accident and emergency department
Injury

Dear Prof Chan,

Thank you for submitting your paper to Injury. The reviewers have now commented on your paper and you will see from the attached comments that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision.

For your guidance, reviewers' comments are appended below.

If you decide to revise the work, please submit a list of changes or a rebuttal against each point which is being raised when you submit the revised manuscript.

To submit a revision or decline to revise, go to <http://ees.elsevier.com/jinj/> and log in as an Author. You will see a menu item call Submission Needing Revision. You will find your submission record there.

Finally, I would appreciate if you could submit your revised paper by 28 Mar 2008.

Yours sincerely

Ian Civil
Deputy Editor
Injury

Reviewers' comments:

Reviewer #1: The authors have described the epidemiology of ankle injuries in emergency departments. Nice description but lengthy. Could possibly be published if reduced to letter to editor format

Reviewer #2: This is a readable paper with a message of interest to some readers. You mention the introduction of rules for X-ray - are these the Ottawa ankle rules? The paper needs to be shortened - there is quite a lot of repetition throughout. In short, there is a message for readers but we can shorten this and cut out repetition. One could argue that the whole thing could be covered in a letter.

Response to Editor:

I have tried by best to significantly reduce the length of the manuscript. Before doing this, I checked the format of a letter to editor, and found that it does not fit the current paper, since the current paper is best to be presented in a structured full-paper format, with some figures and tables to present the results. Therefore, after trimming the vague discussion and detailed information throughout the paper, the length is reduced from 2700 words to 1300 words.

The Ottawa Ankle Rules suggested by reviewer #2 is included.

I hope that the editor could re-consider accepting this paper as a full paper, so that the study could be presented in a structured way with tables and figures. Thank you.

Figure 1
[Click here to download high resolution image](#)

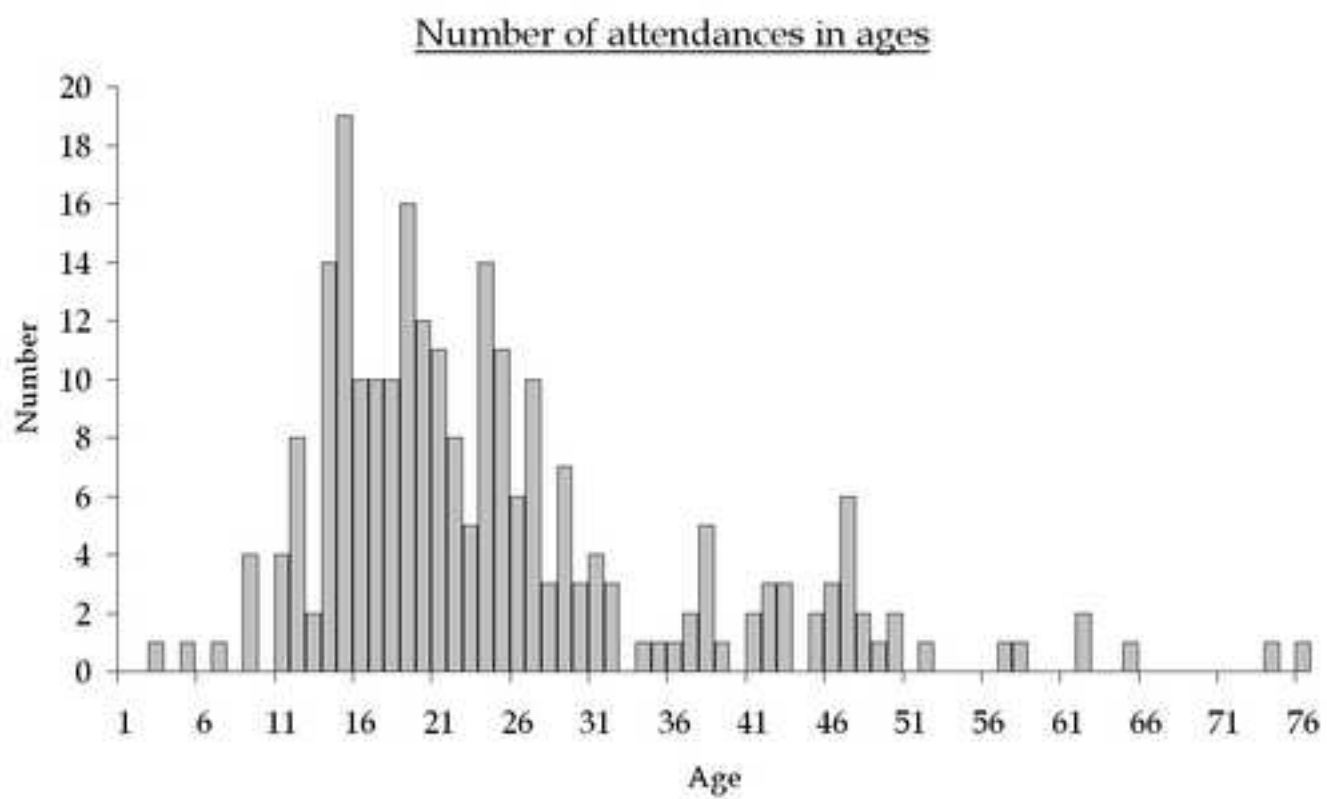


Figure 2
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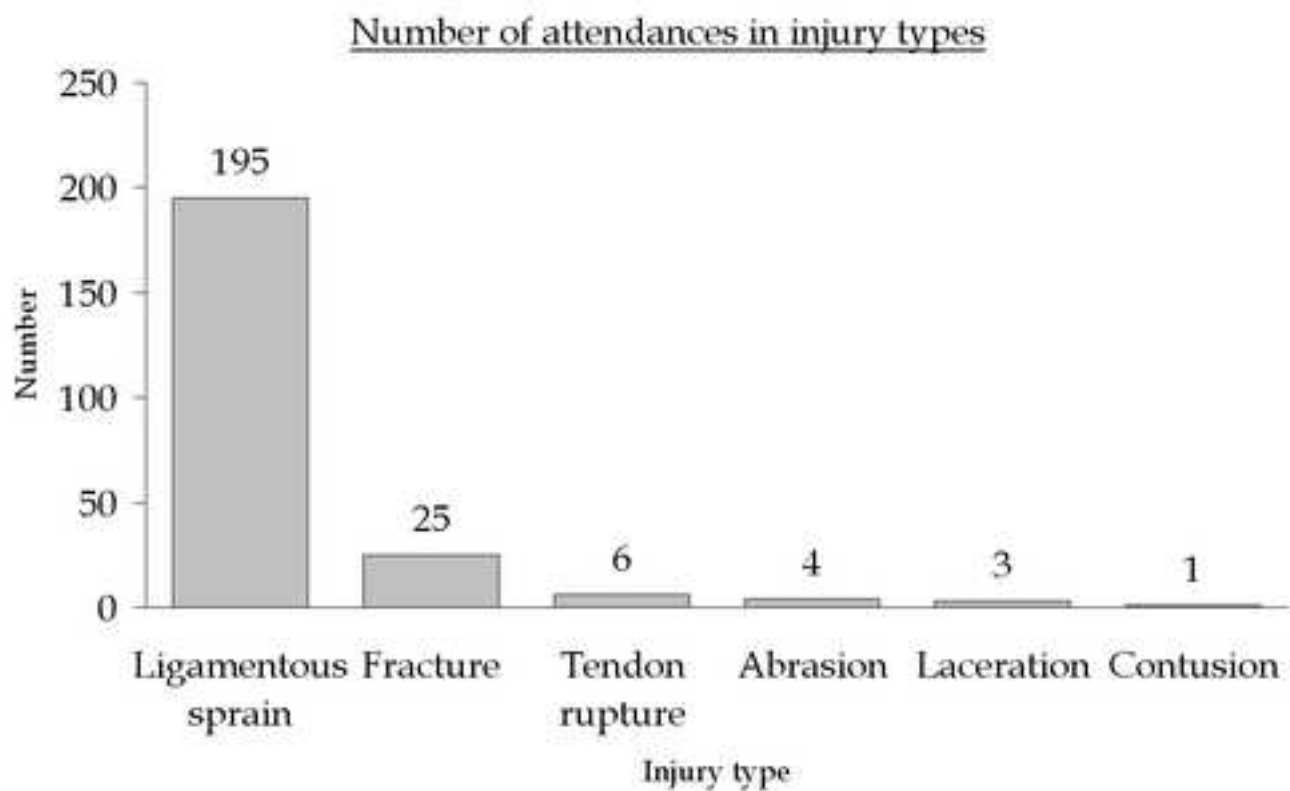


Table 1 – Number of attendances in each category of injury

Category of Injury	Number	Percentage
Domestics	5076	35.5%
Industrial	4005	28.0%
Traffic	1781	12.5%
Sports	1715	12.0%
Common assault	880	6.2%
Self-inflicted	756	5.3%
Batter	71	0.5%
Indecent assault	6	<0.1%
Total classified cases	14290	100.0%
Unclassified cases	9279	
Total cases	23569	

Table 2 – Number of admissions in each sport for all ankle injuries, ligamentous sprains and fractures

Sports	All sport-related ankle injuries	Ligamentous sprains	Fractures
Basketball	79 (32.9%)	73 (37.4%)	5 (20.0%)
Soccer	76 (31.7%)	56 (28.7%)	13 (52.0%)
Hiking	14 (5.8%)	8 (4.1%)	4 (16.0%)
Cycling	10 (4.2%)	1 (0.5%)	1 (4.0%)
Athletics	8 (3.3%)	7 (3.6%)	1 (4.0%)
Volleyball	6 (2.5%)	6 (3.1%)	0 (0.0%)
Jogging	5 (2.1%)	5 (2.6%)	0 (0.0%)
Badminton	4 (1.7%)	3 (1.5%)	0 (0.0%)
Table Tennis	3 (1.3%)	3 (1.5%)	0 (0.0%)
Handball	2 (0.8%)	2 (1.0%)	0 (0.0%)
Swimming	2 (0.8%)	1 (0.5%)	0 (0.0%)
Tennis	2 (0.8%)	2 (1.0%)	0 (0.0%)
Squash	1 (0.4%)	1 (0.5%)	0 (0.0%)
Water Sports	1 (0.4%)	1 (0.5%)	0 (0.0%)
Skating	1 (0.4%)	1 (0.5%)	0 (0.0%)
Rugby	1 (0.4%)	1 (0.5%)	0 (0.0%)
Shot Put	1 (0.4%)	1 (0.5%)	0 (0.0%)
Hockey	1 (0.4%)	1 (0.5%)	0 (0.0%)
Taekwondo	1 (0.4%)	1 (0.5%)	0 (0.0%)
Dancing	1 (0.4%)	1 (0.5%)	0 (0.0%)
Other sports	21 (8.8%)	20 (10.3%)	1 (4.0%)
All	240 (100.0%)	195 (100.0%)	25 (100.0%)

Table 3 – Treatment applied to the all ankle injuries, ligamentous sprains and fractures

Treatment	All sport-related ankle injuries	Ligamentous sprains	Fractures
Bandaging	122 (50.8%)	117 (60.0%)	2 (8.0%)
Plaster	20 (8.3%)	17 (8.7%)	3 (12.0%)
Dressing	13 (5.4%)	6 (3.1%)	0 (0.0%)
Sling	2 (0.8%)	1 (0.5%)	0 (0.0%)
Splint	1 (0.4%)	1 (0.5%)	0 (0.0%)
Analgesics	109 (45.4%)	95 (48.7%)	8 (32.0%)
Analgesics + antibiotics	1 (0.4%)	1 (0.5%)	0 (0.0%)
Cryotherapy	2 (0.8%)	2 (1.0%)	0 (0.0%)
Intravenous fusion	1 (0.4%)	1 (0.5%)	0 (0.0%)
Suturing	3 (1.2%)	1 (0.5%)	0 (0.0%)
Reduction	0 (0.0%)	0 (0.0%)	0 (0.0%)
Removal of foreign body	0 (0.0%)	0 (0.0%)	0 (0.0%)
Minor surgery	0 (0.0%)	0 (0.0%)	0 (0.0%)
Referral to physiotherapy	35 (14.6%)	32 (16.4%)	2 (8.0%)
Referral to occupational therapy	0 (0.0%)	0 (0.0%)	0 (0.0%)

Note: Each case may have one or more kinds of treatment.

Table 4 – Attendance outcome for all ankle injuries, ligamentous sprains and fractures

Outcome	All sport-related ankle injuries	Ligamentous sprains	Fractures
Discharged to home	202 (84.2%)	186 (95.4%)	4 (16.0%)
- no referral	144 (60.0%)	133 (68.2%)	2 (8.0%)
- referral to physiotherapy	42 (17.5%)	38 (19.5%)	2 (8.0%)
- referral to specialty clinics	8 (3.3%)	8 (4.1%)	0 (0.0%)
- follow-up in A&E	7 (2.9%)	6 (3.1%)	0 (0.0%)
- against medical advice	1 (0.4%)	1 (0.5%)	0 (0.0%)
Admitted to hospital wards	37 (15.4%)	8 (4.1%)	21 (84.0%)
Disappeared	1 (0.4%)	1 (0.5%)	0 (0.0%)
All	240 (100.0%)	195 (100.0%)	25 (100.0%)