

Factors associated with pain intensity and physical limitations after lateral ankle sprains



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ARTICLE INFO

Article history:

Accepted 7 September 2016

Keywords:

Ankle sprain
Pain self-efficacy
Depression
Ankle

ABSTRACT

Background: Swelling, tenderness, and ecchymosis don't correlate with time to functional recovery in patients with a lateral ankle sprain. It is established that psychosocial factors such as symptoms of depression and low pain self-efficacy correlate with pain intensity and magnitude of limitations in patients with musculoskeletal disorders.

Objective: We studied the correlation between pain self-efficacy or symptoms of depression and (1) ankle specific limitations and (2) pain intensity in patients with a lateral ankle sprain. Further we explored the correlation between estimation of sprain severity (grade) and (3) pain intensity or magnitude of ankle specific limitations.

Design: Eighty-four patients with a lateral ankle sprain prospectively completed the Pain Self Efficacy Questionnaire, the Olerud Molander Ankle Score, Ordinal scale of Pain and the Patient Health Questionnaire-2 at enrollment and the Olerud Molander Ankle Score and the Ordinal scale of Pain three weeks after the injury. Factors associated with higher ankle specific limitations and symptoms were investigated in bivariable and multivariable analysis.

Results: When accounting for confounding factors, greater self-efficacy ($p = 0.01$) and older age ($p < 0.01$) were significantly associated with greater ankle specific symptoms and limitations three weeks after the injury and explained 22% of the variability in ankle specific limitations and symptoms. There was no correlation between the grade of the sprain and pain intensity or ankle specific limitations or symptoms. **Conclusions:** Psychosocial factors (adaptiveness in response to pain in particular) explain more of the variation in symptoms and limitations after ankle sprain than the degree of pathophysiology. The influence of adaptive illness descriptions and recovery strategies based on methods for improving self-efficacy (i.e. cognitive behavioral therapy) might enhance and speed recovery from ankle injuries and merit additional investigation.

Level of evidence: Level 2 prospective cohort study.

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Introduction

Ankle sprains are a common injury accounting for approximately 4% of all injuries seen in the emergency department and 30% of all sport related injuries [1]. Most injuries, approximately 85%, are lateral ankle sprains [2].

Recovery after an acute ankle sprain focuses on adequate protection of the ankle ligaments to ensure stability, decreasing

swelling and tenderness followed by exercises to regain motion and strength [3–5]. It is well established that short-term immobilization is beneficial regardless of severity and long-term immobilization should be avoided [4,6,7]. The ability to begin movement as early and safely as possible is beneficial to the resolution of symptoms associated with a lateral ankle sprain [7,8]. At initial presentation, it can be challenging to identify ankle sprains that might benefit from more prolonged immobilization [9,10]. Previous studies found that the severity of swelling, grade of the sprain, ecchymosis, tenderness, and instability do not correlate with time to resumption of normal activity [9].

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For many musculoskeletal injuries, psychosocial factors such as symptoms of depression and effective coping strategies (e.g. self-efficacy) explain most of the variation in pain intensity and degree of limitations [11–22]. If these relationships also apply to ankle sprains, awareness of them might help prevent unnecessary tests, immobilization, injections, or surgery. Screening for ineffective coping strategies and psychological distress could help speed recovery using interventions based on cognitive behavioral therapy [23].

The objective of this study was to evaluate whether ankle specific limitations and pain intensity correlate with psychosocial factors, such as 1) self-efficacy in response to the ability to sense potential harm and 2) symptoms of depression. Our primary null-hypothesis is that there is no correlation between ankle specific limitations three weeks after injury and pain self-efficacy or symptoms of depression at the time of enrolment in patients with an ankle sprain. Secondary hypotheses were 1) that there is no correlation between pain intensity three weeks after the injury and pain self-efficacy or symptoms of depression in patients with ankle sprains; and 2) that there is no correlation between estimation of sprain severity (grade) and pain intensity and magnitude of ankle specific limitations.

Materials and methods

Our Institutional Review Board approved this single center cross-sectional observational study. The study was described in detail and one of the treating physicians or study staff obtained informed consent. Patients were enrolled between August 2014 and October 2015. Patients were screened for eligibility and asked to consider participation one week after their ankle injury during their visit with the treating physician. All patients between 16 and 65 years of age visiting our outpatient clinic with a lateral inversion ankle sprain with adequate x rays of the ankle were eligible for inclusion. Patients were excluded when a fracture of the foot or ankle was observed or patients experiencing recurrent ankle sprains. All patients received our standard protocolled care of: Rest/Immobilization (compression bandage)/Compression/Elevation (RICE) for the first few days after which patients could start weight bearing as tolerated. Patients were advised to take over the counter analgesics if necessary.

After the consult with the treating physician, including a physical examination, the patients provided demographic information and completed a questionnaire about physical function of the ankle (Olerud Molander Ankle Score (OMAS) and grade of the injury) [24], coping strategy (Pain Self Efficacy Questionnaire (PSEQ)), symptoms of depression (Patient Health questionnaire-2 (PHQ-2)) and pain intensity (ordinal scale of pain).

Three weeks after the injury, during a routine follow up check; patients completed the same questionnaires again, except the PSEQ and PHQ-2. If patients could not return to the office, they were contacted by mail, email, or telephone to complete the questionnaire (Fig. 1).

Outcome measures

The Olerud Molander Ankle Score (OMAS) is a 9 item functional ankle score designed to assess limitations in patients with ankle fractures [25]. It has also proven validity in other acute ankle injuries such as ankle sprains [26,27]. It was developed specifically as a comparative research measure to improve consistency, uniformity, and responsiveness in ankle injury research [25]. The OMAS is a valid outcome score ($r=0.70-0.82$) to detect short-term improvement in ankle status in patients with acute lateral ligament injury [26,28]. The overall score is scaled to range from 0 (most severe disability) to 100 (no disability). There were seven

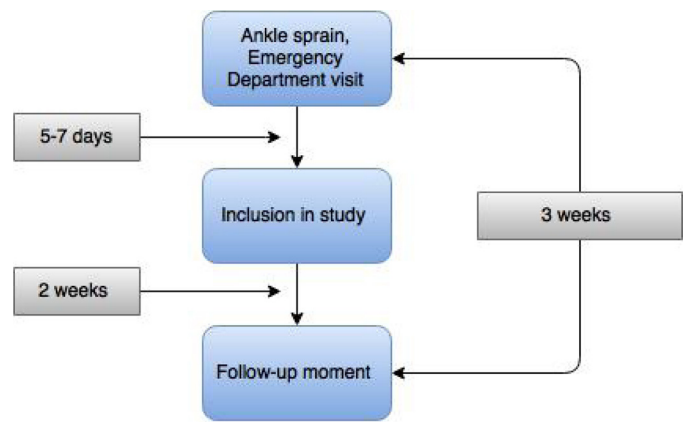


Fig. 1. Flowchart of study timeline.

patients had an incomplete OMAS. Mean score imputation of the other patients was used for these missing values.

The Pain Self Efficacy Questionnaire (PSEQ) is a 10-item patient-reported outcome questionnaire to assess both the strength and generality of a patient's confidence in the ability to accomplish a particular task or behavior in their daily activities despite pain [29,30]. The questionnaire consists of 10 questions on a 7-point Likert scale ranging from 0 ("not at all confident") to 6 ("completely confident"). The total score is the sum of all individual questions and ranges from 0 to 60. The PSEQ is both reliable and valid with a test-retest reliability of $r=0.79$ and internal consistency of 0.92 [29,30]. There was one missing question in the PSEQ questionnaire of one patient. We used mean score imputation of the other patients for this invalid questionnaire.

The Patient Health Questionnaire-2 (PHQ-2) is a shortened and validated version of the PHQ-9 (test-retest reliability $r=0.84$) to screen for symptoms of depression. It has an excellent correlation with the original PHQ-9 ($r=0.87$) [31,32]. The PHQ-2 quickly assesses the two major symptoms of depression on a 4-point Likert scale [31,33].

The ordinal scale of pain is a scale measuring pain intensity on a scale from 0 (no pain) to 10 (worst pain ever) [34].

Statistical analysis

Data analysis was performed with SPSS version 20 (IBM Corp., Armonk, NY) for Macintosh. An a priori power analysis showed that for our primary null hypothesis (that there is no correlation between ankle specific limitations at three weeks and pain self-efficacy) with a medium effect size of 0.3, and $\alpha=0.05$, 84 patients are needed for 80% power, based on a bivariate correlation model. Accounting for 5% loss to follow up or incomplete data, we planned to enroll 88 patients. The data was not normally distributed according to the Kolmogorov-Smirnov test, and therefore non-parametric tests were used.

Internal consistency was determined by calculating the Cronbach's alpha for the PSEQ. In the bivariable analysis Spearman correlation was used for continuous variables such as self-efficacy and depression. The Mann-Whitney U test was used for dichotomous variables such as sex. Kruskal-Wallis was used for categorical variables such as trauma mechanism and grade of the sprain. Variables that were near significant ($p < 0.10$) were inserted in a backward, stepwise, multivariable linear regression analysis to explain their correlation with ankle specific limitations. In multivariable linear regression analysis only patients with complete data for all variables were included. When categorical variables were inserted in a multivariable analysis, dummy codes were generated when there were more than two categories.

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