

# INPLASY PROTOCOL

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**Review Stage at time of this submission:** The review has not yet started.

**Conflicts of interest:** None.

## Does force sense deficits exist in individuals with chronic ankle instability?

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**Review question / Objective:** Does impaired force sense existed in individuals with Chronic ankle instability compared with healthy control or contralateral healthy limb?

**Condition being studied:** Lateral Ankle sprain (LAS) is one of the most common sport-related lower extremity musculoskeletal injury. Over 2 million ankle sprains are treated in emergency departments in the US and UK each year, resulting in about \$2 billion of healthcare costs. In long-term prognosis, more than 30 % of patients reporting repetitive bouts of ankle giving way and recurring sprains, termed as chronic ankle instability (CAI). For the patients suffering from persistent symptoms, surgery is usually suggested and most of them can obtain good outcomes, while some still end up poorly and fail to return to sport. One possible reason can be the sensorimotor deficits, including impaired force sense.

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 22 April 2020 and was last updated on 22 November 2020 (registration number INPLASY202040147).

### INTRODUCTION

**Review question / Objective:** Does impaired force sense existed in individuals with Chronic ankle instability compared with healthy control or contralateral healthy limb?

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sprains are treated in emergency departments in the US and UK each year, resulting in about \$2 billion of healthcare costs. In long-term prognosis, more than 30 % of patients reporting repetitive bouts of ankle giving way and recurring sprains, termed as chronic ankle instability (CAI). For the patients suffering from persistent symptoms, surgery is usually suggested and most of them can obtain good outcomes, while some still end up poorly and fail to return to sport. One possible

reason can be the sensorimotor deficits, including impaired force sense.

**Rationale:** The results of studies on force sense in CAI patients were in conflicts.

## METHODS

**Search strategy:** Search strategies for PubMed () : Ankle-related terms: (ankle\* OR talo\* OR tibiofib\* OR tibio-fib\* OR “lateral ligament” OR “lateral ligaments”) Injury-related terms: (“ankle injuries”[MESH] OR unstable OR instabilit\* OR strain\* OR sprain\* OR rupture\* OR tear\*) Force-sense-related terms: (propriocep\* OR sensor\* OR sensa\* OR sense\* OR feedback\* OR movement\* OR motion\* OR kinetic\* OR kinematic\* OR kinesthe\* OR force\* OR match\* OR reproduct\*) Search ‘Ankle-related terms’, ‘Injury-related’ terms and ‘Force-sense-related terms’ linked with “AND”.

**Participant or population:** Individuals with chronic ankle instability.

**Intervention:** None.

**Comparator:** Healthy control or Contralateral healthy limb.

**Study designs to be included:** Observational Studies.

**Eligibility criteria:** The inclusion criteria were as follows: peer-reviewed human studies in English that investigated deficits of force sense in individuals with a history of ankle sprain and one of the symptoms, including “giving way”, recurrent sprains and self-reported instability, compared with either the uninjured contralateral side or healthy controls. For the studies with interventions (e.g. taping, treatment or fatigue), the data without any intervention (e.g. baseline or non-intervention control) should be reported. If the studies mixed the joint movement directions of tests, or included bilateral injured people in between limbs comparison, or enrolled participants with other lower limb pathologies or neurological disorders, they would be

excluded. The inclusion criteria were extended from peer-reviewed papers to peer-reviewed and conference abstracts on 22 November 2020 due to the lack of the searched studies.

**Information sources:** Seven electronic database, including Embase, Web of Science, SPORTDiscus, PubMed, Scopus, CINAHL and Cochrane Library. The reference lists of each included paper were also checked manually. The authors were contacted if the full text was not available.

**Main outcome(s):** Force sense in force matching test.

**Additional outcome(s):** The correlation between Force sense and other measurements, including questionnaires and tests.

**Data management:** Studies were reviewed independently by two authors (XX, TM). If disagreements couldn't be resolved through discussion, the third reviewer (YH) would be consulted. Following information from included articles: demographic data, sample size, selection criteria, methodology (e.g. comparison type, devices, test posture, joint movement direction, target angle, angular velocity), force sense test results (means and standard deviation) and test reliability. The authors were contacted if numerical data were confusing or not reported.

**Quality assessment / Risk of bias analysis:** All the authors discussed the standard of each item in detail before formal rating, and two authors (XX, TM) rated the included studies independently. The inter-rater agreement of the initial rating was calculated, and the disagreements was also consulted by the third reviewer (YH). To assess the quality of studies, the epidemiological appraisal instrument (EAI) was applied. The EAI tool included 33 items for observational studies, and each item was scored as ‘Yes’ (1 point), ‘Partial’ (0.5 points), ‘No’ (0 points), and ‘unable to determine’ (0 points). An average score would be calculated as the overall quality. To evaluate the risk of bias, a standardized

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tool recommended by the Non-Randomized Studies Group of the Cochrane Collaboration was applied, and the following items were judged: performance bias, detection bias, attrition bias, selection bias and control of confounding for details of tests and analysis. Publication bias would be quantitatively assessed by Egger's regression test.

**Strategy of data synthesis:** A meta-analysis of the random-effects model would be performed by Stata V.14 (Stata Corp LP, College Station, TX, USA) for the studies similar in comparison type (e.g. between groups) and movement direction (e.g. inversion). All extracted and pooled data would be presented as standardized mean difference (SMD) between controls and the injured ankle with 95% confidence intervals (CI). Higher SMD represented larger force sense deficits in CAI, with 0.2~0.5 as weak, 0.5~0.8 as moderate, >0.8 as large-sized effect. To evaluate heterogeneity, Q and I<sup>2</sup> statistics were calculated, with p 0.8 as almost perfect strength of agreement.

**Subgroup analysis:** Comparison type and target force.

**Sensitivity analysis:** Sensitivity analysis would be conducted through removing single study at a time and then evaluating the pooled results again.

**Language:** English.

**Country(ies) involved:** China.

**Keywords:** Chronic ankle instability, force sense.

**Contributions of each author:**

**Author 1** - Study design; literature search and selection; data collection; quality rating; statistical analysis; writing of the manuscript.

**Author 2** - Study design; literature search and selection; data collection; quality rating; reviewing of the manuscript.

**Author 3** - Study design; reviewing the manuscript.

**Author 4** - Study design; supervision of literature search, data collection and quality rating; reviewing the manuscript.