Official Title: Is hamstring flexibility affected in chronic ankle instability

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Flexibility Deficit in Chronic Ankle Instability

On Anatomical and Joint Physiological point of view. The ankle complex comprises 3 articulations: the talocrural joint, the subtalar joint, and the tibiofibular joints. These joints work in concert to allow coordinated movement of the rearfoot **(Hertel, 2002; levangie, 2005).** Proximal and distal tibiofibular joints closely linked to each other and to the talocrural joint movements **(Levangie, 2005).** Proximal and Distal tibiofibular is plane synovial joint allow gliding movement and the fibula can move upward, downward and rotate **(Sperber, 2006).**

This suggests that investigating alterations in arthrokinematics such as the proximal tibiofibular joint (mechanical impairment) and its associated structure as biceps femoris (functional impairment) may provide greater insight into meaningful changes associated with CAI.

Payne et al., 1997 conducted that there is lack in the studies that consider the aspect of flexibility in CAI cases , Most prospective studies on flexibility and injury have focused on larger muscle groups and other types of injuries, such as muscle strains Therefore the third purpose of this study is to assess the flexibility status in CAI.

Purposes of the Study

This study is aiming to compare the flexibility Deficit between patients with Chronic Ankle Instability and non-injured ankle participants

Hypothesis of the study :

There will be no flexibility deficit of hamstring in CAI

Methodology

This study will be conducted at outpatient clinic in faculty of physical therapy in Cairo University.

Design of the study:

Observational- Case control study

Subjects:

This study will be conducted on 42 participants, 21 subjects as study group had inversion ankle sprain and followed criteria of instability and recruited from outpatient clinic at faculty of physical therapy, Cairo University and 21 subjects as control group. Their age range from 18-35 years old. All subjects will be asked to sign a consent form for confidential issues which approved by research ethical committee of faculty of Physical Therapy Cairo University under number P.T.REC/012/001312.

Inclusion Criteria: Based on functional ankle instability questionnaire that was modified from one developed by Hubbard and Kaminski, 2002.

- Generally healthy between age of 18-30 years old.
- Self-report a past history of unilateral ankle inversion injury within previous 2 years which had required a period of protected weight bearing and/or immobilization
- The subject perceives that the ankle was chronically weaker, more painful, and/or less functional than the other ankle or than before first injury
- The subject reports a tendency for the ankle to give way or repeatedly turn over during functional activity and/or recurrent ankle sprain.

Exclusion Criteria:

- No significant history of lower extremity conditions, knee injury, or low back dysfunction that required medical or surgical intervention within the last year**.**
- Current participation in supervised physical rehabilitation**.**
- History of hamstring strain injury
- Bilateral ankle sprain injury
- Ankle injury within 3 months of participation
- History of ankle fracture

Instrumentation used for evaluation during the study:

Flexibility assessment

Inclinometer

The pendulum (gravity) dependent goniometer was used to measure the angular displacement of the hip or knee, depending on the test **.**The inclinometer was set total knee extension recorded as 0 **(fig.1)**

Assessment procedures

All subjects will be assessed for Hamstring flexibility using knee extension test knee extension test has been shown to be a reliable measure of hamstring flexibility **(Sullivan et al., 1992)** found the intratester reliability of the knee extension test to be 0.99 by using the inclinometer method. **Webright et al., 1997** also found high intratester (0.98) and intertester (0.98) reliability with the knee extension test by using a universal goniometer. (fig.2)

The subjects will be in the supine lying position and hip joint will be maintained while an inclinometer was placed on the leg 5 cm below the inferior border of the patella in line with the tibia (**fig.2**). The examiner then slowly and passively extend the leg while maintaining the thigh against the vertical wooden board. The lower extremity not being tested was maintained flat on the table. The range of restricted extension in the knee joint was measured by reading the inclinometer (ie, total knee extension was recorded as 0").End point is firm resistance to further motion will felt and the subject stated that maximum knee extension has been reached. **(Cajdosik, 1993).** The test will be repeated 3 times and take highest score **(fig.3).**

Fig 2. O'Sullivan, K., Murray, E., & Sainsbury, D. (2009). The effect of warm-up, static stretching and dynamic stretching on hamstring flexibility in previously injured subjects. *BMC Musculoskeletal Disorders*, *10*(1), 37. http://doi.org/10.1186/1471-2474-10-37

Fig.3 measuring the end point by inclinometer

Statistical analysis:

Data will be checked for normality using Shapiro-Wilk test and homogeneity. Independent t-test will used to analyze the difference in hamstring flexibility between the tested groups. Statistical analysis was conducted using the statistical package for social studies (SPSS) for windows, version 21 (SPSS, Inc., Chicago,

IL). The data are presented as Mean ±SD. Significance will determined at $p < 0.05$. and power will set 80.