ASSESSMENT OF HIP ABDUCTORS DEFICIENCY IN THE RECURRENT LATERAL ANKLE SPRAIN

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ABSTRACT

Background: Lateral ankle sprains are one of the most common injuries among athletes and other young, active adults, and the history of at least one pervious ankle sprain is the most common predisposing factor for recurrent lateral ankle sprain. **The Purpose** of this study was to examine the hip abductors (mainly gluteus medius) deficiency in the recurrent lateral ankle sprain. **Methods:** thirty patients with recurrent lateral ankle sprain (group I) and thirty normal subjects (group Π), with an age ranging from eighteen to thirty years old participated in this study. Each subject stood on a designed ankle inversion platform which led to sudden ankle inversion of tested foot, and at the same time the amplitude and the latency of right and left gluteus medius muscles responses were measured and recorded by electromyography unit.

Results: the results revealed that there were no statistically significant differences between patients group (I) and control group (Π) regarding amplitude and latency of right and left hip abductor muscle responses. In addition, no statistically significant difference was found in comparison between right and left gluteus medius regarding amplitude and latency within patients group (I) after assessment of patients with recurrent ankle sprain.

Conclusion: on the basis of the present data, it was possible to conclude that there is no significant deficiency of right and left hip abductor muscle in patients with recurrent ankle sprain.

Key words: Hip abductors, Gluteus medius muscle, Recurrent lateral ankle sprain.

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List of Abbreviations

AP : **A**ntero**p**osterior

ATFL : **A**nterior **T**aloFibular **L**igament

CAI : **C**hronic **A**nkle **I**nstability

CFL : **C**alcano**F**ibular Ligament

COM : **C**enter **O**f **M**ass

EMG : **E**lectro**m**yo**g**raphy

GM : **G**luteus **M**edius

Lt : **L**eft

ML : **M**edio**L**ateral

γMNs : **G**amma **M**otor **N**eurons

ms : **M**illi**s**econd

MUAP : **M**otor **U**nit **A**ction **P**otential

PTFL : **P**osterior **T**aloFibular **L**igament

Rt : **R**ight

SR : **S**tochastic **R**esonance

μV : **M**icrovolt

CHAPTER I
INTRODUCTION

Lateral ankle sprains are one of the most common injuries among athletes and other young, active adults **(Hale and Hertel, 2005)**. The history of at least one pervious ankle sprain is the most common predisposing factor for recurrent lateral ankle sprain. The recurrent rate for lateral ankle sprain is reported to be as high as 80% and functional instability becomes evident in as many as 33% to 42% of the patients who suffering from an acute ankle injury (**Freeman, 1965**; **Bernier and Perrin, 1998**).

Freeman et al., (1965) defined the functional instability of the ankle sprain as "a tendency for the foot to give way after an initial ankle sprain". Recently it is defined as the occurrence of recurrent ankle instability, and the sensation of joint instability due to the contributions of proprioceptive and neuromuscular deficits **(Hertel, 2000)**. The Contributing factors to functional instability are: firstly, the decreased range of motion, secondly, the decreased strength of ankle evertors **(Bernier and Perrin, 1998**) and finally, the decrease in joint propriception (**Freeman, 1965).**

The concept of ankle stability contains three neuromechanical elements, and their coordinated inter-relationships with respect to movement. These elements

include passive mechanical, active (or muscular) and neural systems. The passive mechanical system includes non contractile structure (ligaments) and passive muscle tension. The active system includes the contractile elements which are crossing the ankle to provide controlling tension, and active muscles for the control of the ankle, the postural stability and the neural system, which organize information from mechanoreceptors of the joint **(You et al., 2004).**

Freeman et al., (1965) proposed that ankle injury may cause disruption of joint afferents, that are located in the supporting ligaments and capsule thus, leading to impairment of the postural control system. They proposed a partial deafferentiation of joint mechanoreceptors in the functionally unstable ankle which contribute to symptoms of functional instability. There are numerous mechanoreceptors present in joint capsule, ligament, muscle and skin. Mechanoreceptors are sensitive to joint pressure and tension caused by both dynamic movement and static position. When afferent input is altered after injury, appropriate corrective muscular contractions may be altered. Thus, damage to mechanoreceptors surrounding the ankle joint with a lateral ankle sprain may contribute to functional impairment and chronic ankle instability subsequent to initial injury **(Freeman, 1965; Michelson and Hutchins, 1995; Hertel, 2000).**

According to **Gribble et al., (2004)** balance is important for postural control, as it allows the body to sustain in

equilibrium and balance which can be static or dynamic.

Postural control involves controlling the position of the body in space for the dual purposes of stability and orientation **(Cook and Woollacott, 2001).** Deficits during quiet standing after acute lateral ankle sprain and in those with chronic ankle instability have been frequently reported **(Freeman, 1965; Riemann, 2002).**

Several studies have found that control at the hip is vital for maintaining control at the ankle**.** Hip abductors work together, mainly the gluteus medius, to maintain the level of the pelvis in single leg stance. The effect of the lateral ankle sprain is not limited to its structures only, but its effect may be directed toward more proximal joints such as hip muscles **(Mackinnon and Winter, 1993; Beckman and Buchanan, 1995; Sadeghi et al., 2001)**. **Friel et al. (2006),** reported Weakness of hip abductors in the involved limb of people with chronic ankle sprain**.**

Beckman and Buchanan, (1995) reported the presence of altered onset of latency of hip musculature (gluteus medius) in response to ankle inversion perturbation in cases of inversion ankle sprain, so may be there is a correlation between the pathologic changes that occur in the hip abductors and lateral ankle sprain.

Statement of the Problem:

- Was there any deficiency of hip abductors muscles (right and left gluteus medius) in patients with recurrent ankle sprain?

1. Would the latency period of hip abductor muscle (Gluteus Medius) be delayed in patients with recurrent ankle sprain?
2. Would the amplitude of hip abductor muscle (Gluteus Medius) be decreased in patient with recurrent ankle sprain?

Significance of the Study:

To our knowledge, the relationship between the hip abductors muscles deficiency and recurrent ankle sprain after completing the rehabilitation program of ankle sprain is not well established yet. However, recently, studies like **Bullock-Saxton,(1994); Beckman and Buchanan, (1995)** reported that there is deficiency in the latency of hip muscles responses mainly gluteus medius muscle in recurrent ankle sprain. The correlation between the amplitude of hip abductors (gluteus medius) and recurrent ankle sprain is not established yet, and it was recommended by **Lehman, (2006); Friel et al.,(2006) and McHugh et al. , (2006)** to establish a relationship**.**

So, if latency of hip abductors is found to be delayed and its amplitude is decreased after recurrent ankle sprain, thus rehabilitation protocols may be needed to address the proximal regions strengthening exercises, especially hip abductors, to allow for optimal balance and efficient biomechanical