

The Relationship between Hamstring Flexibility and H: Q Co Activation Ratio, Pelvic Alignment and Lumbar Range of Motion of Recreational Athletes with Non-Specific Low Back Pain

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Low back pain (LBP) has become one of the most widespread public health concerns and majority of the worlds' population (80%) suffer from LBP at any point in their lives. Only 8-15% of patients with LBP are identified through patho-anatomical diagnosis while the majority (90%) of LBP cases is diagnosed as "non-specific low back pain" (NSLBP). Nevertheless, among athletes and physically active population NSLBP is one of the most common complains thus accounting for 1% to 30% of athletic injuries. Etiology of NSLBP is multifactorial and complicated. Impaired bio-mechanical factors of lower limbs and pelvis are the known causes for development of NSLBP. This study was conducted to identify if hamstring flexibility had an impact on the hamstring to quadriceps co activation ratio, pelvic tilt, lumbar flexion and extension range of motion for developing NSLBP among recreational athletes. This experimental cross-sectional study consisted of a convenient sample of thirty five (35) collegiate recreational athletes from Tongji Medical College. 18 NSLBP athletes {(Female = 10(age =23.2±3.05 years, BMI= 23.26± 2.8) ; (Male= 08) (age =24.88 ±2.9 years, BMI= 22.56± 2.11)} who engaged in recreational sports for more than six (06) months and had LBP for more than 4 weeks without any patho-anatomical origin and a pain score of > 2 on a 0 to 10 cm visual analogue scale (VAS scale) were recruited to the NSLBP group. 17 asymptomatic healthy counterparts { (Female = 09(age =23± 2.59 years, BMI= 22.96± 1.77)); (Male= 08(age =28.25±4.33 years, BMI= 24.97± 3.65) who engaged in recreational sports for more than six (06) months in the absence of lower limb injuries were in the healthy group. Demographic data were gathered and functional disability level was rated using self-administered questionnaire and Oswestry disability index respectively. Anthropometric measurements (height, limb lengths and body weight) were measured. Clinical tests were performed to identify the deformities, neurological lesions and muscle strengths of Gluteus maximus, Gluteus medius and abdominal muscles. Active lumbar extension and flexion range of motion were measured using modified schober method. Active Knee Extension (AKE) test was performed to measure the hamstring flexibility of both limbs. Static pelvic alignment was assessed using phogrammetry technique by Global Postural System (GPS). Maximum Voluntary Isometric Contractions (MVIC) of Hamstrings, Quadriceps and Erector Spinae, MVIC H:Q ratio, H: Q co activation ratio and Erector Spinae activation were assessed by surface electromyography. According to the results, a strong positive and a moderate negative linear relationship of AKE angle with functional disability level (cc = 0.7941) and lumbar extension (cc = - 0.5379) among NSLBP men respectively were seen. There was a moderate negative linear relationship between pelvic tilt and lumbar flexion (-0.4295) in NSLBP women. Moreover, AKE angle showed a significant variation (p < 0.05) among NSLBP and healthy subjects (p=0.0198), NSLBP women and healthy women (p=0.0128), NSLBP men and healthy men (p=0.039), NSLBP women and men (p=0.0079) and healthy women and men (p= < 0.0001). There was a significant difference of lumbar extension (p=0.0409) among NSLBP women and healthy women. Within the confines of this study, Hamstring flexibility had an association on the development of NSLBP and reduction the lumbar extension range of motion in male athletes. When the hamstring flexibility was higher, lumbar extension ROM decreased in male recreational NSLBP athletes. Moreover, level of hamstring flexibility significantly varied among female and male recreational athletes despite having NSLBP.

Keywords: Hamstring flexibility, H: Q co activation ratio, Lumbar Range of Motion, Non - specific low back pain, Pelvic tilt, Recreational athletes