THE EFFECT OF STRENGTH TRAINING ON THE TORQUE OF THE ANKLE JOINT FOR A DOWN SYNDROME

Beeoh Lim[12], David O'sullivan[2], Chulsoo Jung[2], Insik Shin[2], Kewwan Kim[1], Gyesan Lee[3], and Young-Hoo Kwon[4]

***[1] Biomechanics Laboratory, University of Incheon, Incheon, Korea**
[2] Biomechanics Laboratory, Seoul National University, Seoul, Korea
[3] Biomechanics Laboratory, Kwan Dong University, Gangneung, Korea
[4] Biomechanics Laboratory, Texas Woman's University, Denton, TX, USA

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INTRODUCTION: People suffering Down syndrome have many problems that are associated with atrophy of their muscles. Because of this atrophy they tend to walk flat footed and over abduct during the initial part of the swing phase, also they tend to over-flex both at the hip and knee joint. The aim of this study is to examine the effects of strength training on the torque of the ankle joint for a Down syndrome.

METHOD: A 21 year old male with Down syndrome and an ordinary 12 year old boy participated in this study. 8 different exercises related to the muscles involved with gait and postures were trained over a period of 12 weeks. The training program consisted of training 3 times a week with 3 sets performing squats, leg extensions, leg curls, toe raises, abduction and adduction, back hyperextension and sit ups. The isokinetic muscle strength and ankle joint torque before and after the program was measured and compared.

RESULTS: After the program, the maximum average power for all the muscles gradually increased. This meant that the Down syndromes like normal people could benefit from strength training. The dorsal/plantar moment wasn't affected by the application of a training program. The timing of the abduction/adduction and the maximum rotational value recorded during gait became more like the pattern of normal gait.

DISCUSSION: Down syndrome patients have a completely different gait pattern to normal people. The reasons for this abnormal pattern are the change in the motor phenotypes, muscle hypertonia, tendon and ligament laxity and .a strange bone structure. Due to these various factors everybody's gait pattern is different (Park & Bronks, 1980; Cioni et al., 2001). Similarly in this research, the reason for the Down syndromes abnormal gait is due to first, tight Achilles tendon, second the instability of the ligaments, third muscle hypertonia and lack of flexible ligaments (Cioni et al, 2001). According to Landing & Shankle (1982) the muscle hypertonia, the difference in sketetal muscle fiber length was reduced. It is reported by Coini et al (2001) that as for the problem of saving the energy from extension and flexion of the tendon-muscle unit the creation of power is reduced Likewise the results of this study agree and the power of saved energy from the flexion and extension is reduced (figure 3). At the propulsion phase the plantar flexors' power is 45%, hip flexors' power is 30%, hip extensors' power is 20% (Ounpuu et al., 1991). Similarly in this study the Down syndromes plantar flexors moment and power was reduced. There is a need in the future research for the acquisition of more data from Down syndrome patients so to investigate the factors influencing gait speed, hip flexion/extension, moment and power and the injury mechanisms.

CONCLUSION: After the program, the maximum average peak torque and powers for all the muscles gradually increased and improve the timing of the abduction/adduction pattern of Down syndrome patient.