How Could We Explain the Changes of the Plantar Muscle Tone in the Patients with Type I Diabetes Mellitus and Interpret These Findings

MD, PhD Mr. R. Kerpe, MD, PhD Mr. A. Krisciunas
Department of Rehabilitation, Kaunas University of Medicine, Eiveniu Str. 2, LT-44307, Kaunas, Lithuania e-mail: riciricardo@delfi.lt

PURPOSE: The investigators determined that thickening of the plantar fascia in diabetics concurs to develop a rigid foot, which poorly absorbs shock during loading. They concluded that the diabetic foot often undergoes abnormal plantar pressures, changing walking strategy and ulcerative processes [1; 2]. In our study, we investigated the muscle tone in patients with type 1 diabetes mellitus (DM). We hypothesized that the muscle tone in the foot could be partly influenced by the changes in the extracellular matrix.

METHODS: The study involved randomly selected 70 subjects with type 1 diabetes mellitus: 31 men (44.3%) and 39 women (55.7%) at the age of 32.4 ± 10.3 years. The duration of diabetes was 18.7 ± 8.3 years; it also involved randomly selected 31 healthy subjects as controls – 12 men (38.7%) and 19 women (61.3%) at the age of 33.3 ± 10.0 years. Assessment of the selected patients was performed using a standardized questionnaire and examination. An original method (myotonometry) and equipment, which makes it possible to measure the parameters of skeletal muscles, was used in this study.

RESULTS: It was estimated that the mean of the tone of the flexor digitorum brevis muscle in the patients with type 1 diabetes mellitus was increased compared with healthy controls.

CONCLUSIONS: In 2008, Bus Sicco A presented a publication in which he postulated that patients with DM could have more thickened plantar aponeurosis. This thickening contributes to a more rigid cavus like foot that bears increased forefoot loads during foot progression [3]. This supposition correlates with Elhadd TA et al. publication in which the thickening of the plantar aponeurosis in association with Dupuytren’s disease in the patient with DM was considered [4]. These two publications, together with the Schleip R. publication (Schleip R., 2006) on the possibility to influence the myofibroblast activity and physical properties of the connective tissue, enabled us to make the following conclusions:

1. Diabetes mellitus can cause thickening of the plantar aponeurosis similar to the one in Dupuytren’s contracture. The thickening is a result of the increased activity of fibroblasts.
2. The therapeutic application of the rehabilitation methods influencing fibroblast activity could prevent (postpone) the development of the thickened plantar aponeurosis and provide a normal development (especially in children and adolescents) of foot architecture in diabetes mellitus.

REFERENCES: