

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

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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 I 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.

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