

[P25] DIABETES, ANKLE PLANTAR FLEXION AND FOOT ULCERS

Piergiorgio Francia¹, Alessandra De Bellis², Giuseppe Seghieri³, Mirca Marini¹, Sonia Toni⁴, Anna Tedeschi², Massimo Gulisano¹, Roberto Anichini²

¹*School of Human Health Sciences, Florence, Italy*

²*Diabetes Unit and Diabetic Foot Unit, Pistoia, Italy*

³*Ars Tuscany, Pistoia, Italy*

⁴*Diabetes Unit, Meyer Children Hospital, Florence, Italy*

Lower extremity ulcers represent one of the most ominous, dreaded, and costly complication of diabetes mellitus. Many factors contribute to the development of diabetic foot. Limited joint mobility, in particular in patients with peripheral neuropathy, is a major risk factor for ulcers. The aim of this study was to test the feasibility and usefulness to evaluate ankle joint mobility (AJM) in both plantar and dorsiflexion for monitoring the ulcerative risk.

AJM in plantar (PF) and dorsiflexion (DF) was evaluated in 99 patients with diabetes, type1/type2: 50/49, (58/41;M/F), and 59 healthy controls (32:27/M:F). Patients and controls were divided into 6 groups by age and neuropathy: 32 young patients without neuropathy (group YD), mean age 12.4 ± 2.0 yr, 29 young controls (group YC), mean age 11.4 ± 3.3 yr, 38 elderly patients without neuropathy (group ED), mean age 58.5 ± 10.3 yr, 15 neuropathic patients without history of foot ulcer (group ND), mean age 62.1 ± 7.9 yr, 14 neuropathic patients with history of foot ulcer (group NUD), mean age 64 ± 8.4 yrs, and 30 elderly healthy controls (group EC), mean age 60.3 ± 6.4 yr. Diabetes duration was respectively: group YD 5.5 ± 3.5 yr, ED 16.5 ± 10.6 yr; ND 18.2 ± 13.1 yr and NUD 13.7 ± 9.6 yr. AJM was evaluated by an inclinometer with the patient lying supine, the subtalar joint in neutral position and the ankle in the position freely taken at the beginning. The knee, corresponding to the ankle evaluated, was extended and put over a rigid 5-cm high support.

The AJM in plantar and dorsal flexion of different groups was: group YC $147.2^\circ \pm 19.17^\circ$, group EC $130.4^\circ \pm 15.1^\circ$, group YD $118.5^\circ \pm 19.7^\circ$, group ED $107.9^\circ \pm 24.9^\circ$, group ND $108.0^\circ \pm 28.8^\circ$, group NUD $78.1^\circ \pm 18.4^\circ$. Evaluated on the whole elderly patients (ED, ND, NUD) showed a significantly lower AJM in plantar and dorsal flexion than controls (EC group) ($p < 0.001$). Patients with neuropathy and history of foot ulcer (NUD group) showed a more significant AJM reduction in DF and PF than all other groups ($p < 0.005$). The total range of motion of ankle in NUD group was reduced of 40.1% compared to the EC group and of 46.9% compared to the YC group ($78.1^\circ \pm 18.4$ vs $147.2^\circ \pm 19.1$, $130.4^\circ \pm 15.1$). Only DF was significantly reduced in the NUD group compared to the ED group ($p < 0.001$). The YD had lower AJM in both movements compared to the young controls (YC) ($p < 0.001$) with PF lower than DF (30.9% vs 15.5%). Among patients and controls the elderly groups had a significant reduction of the only DF (EC vs YC, $p < 0.001$; ED vs YD, $p < 0.05$).

These results confirm that an AJM reduction of about 40% ($28-32^\circ$) in patients with diabetic neuropathy can be considered as a threshold for ulcer risk. The method used allows a direct evaluation of AJM in plantar flexion that seems to show an early reduction in diabetic subjects, thereby providing useful information for patient monitoring.