THE RELATION BETWEEN MUSCLE STRENGTH AND MOBILITY IN PATIENTS WITH TYPE 2 DIABETES AND DIABETIC POLYNEUROPATHY PATIENTS

T.H. IJzerman[1], T. Melai[1,2], K. Meijer[1], N.C. Schaper[3], P.J.B. Willems[1], A.L.H. De Lange[2] H.H.C.M. Savelberg[1]

[1] Nutrition and Toxicology Research Institute Maastricht, Faculty Health, Medicine and Life Sciences, Maastricht University,

[2] Fontys University of Applied Sciences, Eindhoven, The Netherlands and

[3] Cardiovascular Research Institute Maastricht, Academic Hospital; email: Herman.IJzerman@bw.unimaas.nl

INTRODUCTION

Patients with diabetic polyneuropathy (DPN) have several clinical symptoms. A distinguished feature is the loss of sensory and motor nerve functions. This can lead to athrophy of the muscles of the lower leg and foot [1].

Also type 2 diabetes (DM2) patients without DPN often experience a decrease of muscle strength and these patients have higher odds of an impaired physical function [2].

The purpose of the present study was to compare the mobility and muscle strength in DPN and DM2 patients and to investigate whether these two variables are related. Based on previous studies [1,2] we expect that DM2 causes a decline of muscle strengh and that DPN will enhance this process. Moreover, it has been hypothesized that muscle weakness is an important factor in limitation of the mobility.

METHODS

DPN patients (n=27), age matched DM2 patients without DPN (DC) (n=16) and healthy age matched subjects (C) (n=19) performed maximal, voluntary, isometric knee-joint extensor and flexor and ankle plantar and dorsal flexor strength tests in a dynamometer. Mobility was determined from a timed 'get up and go' test (TGUG), a six minute walk test (6MWT) and the physical activity scale for the elderly questionnaire (PASE). During the 6MWT the subjects were instructed to walk as far as they could in six minutes without running.

RESULTS AND DISCUSSION

With respect to mobility a decreasing trend from C to DC and from DC to DPN was found (Table 1). The 6MWT showed significant differences between every single group (p<0.01). The TGUG test resulted in significant difference between the DPN and C group (p≤0.05); no significant differences were found between the three groups regarding to the PASE questionnaire. Yet, a clear tendency in decreased mobility was observed in the DC and DPN group, where DPN showed the lowest mobility scores.

Muscle strength was significantly higher in healthy elderly than in both DC and DPN groups (p<0.01). This was found for both ankle plantar and dorsal flexion and knee flexion and extension (table 1). No significant differences were found between the DC and DPN group. The degree of muscle weakness was strongly correlated with the level of mobility (figure 1).

These data suggest that polyneuropathy has no additional effect on muscle strength above diabetes itself. But yet, patients with DPN walk less far in spite of relative similar muscle strength. These data suggest that the decreased mobility in DPN patients, compared to DM2 patients, is not due to muscle weakness but to other features like diminished sensory and motor nerve functions. [3].
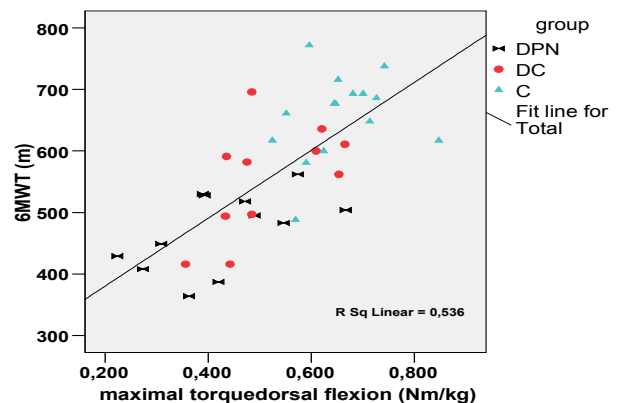

Figure 1: Correlation between maximal dorsal ankle torque and 6MWT.

CONCLUSIONS

Muscle weakness itself is associated to the decline in mobility. Moreover it seems that DPN does not lead to a larger decrease of muscle strength compared to patients with DM2.

More research is needed to determine the influence of nerve damage in DPN patients on muscle strength and to find an explanation in a reduced mobility in DPN subjects compared to DM.

REFERENCES

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Table 1: Differences in mobility and maximal torques of the ankle and knee joints.

	6MWT	TGUG	PASE	Max dors flex	Max plant flex	Max knee flex	Max knee ex
DPN	455 (+/- 117) *#	9.86 (+/- 3.17) *	136.6 (+/-79.4)	0.42 (+/- 0.13) *	0.58 (+/- 0.21) *	1.58 (+/- 0.32) *	0.91 (+/- 0.24) *
DC	555 (+/- 89) *	8.35 (+/- 1.03)	155.0 (+/- 116)	0.47 (+/- 0.12) *	0.64 (+/- 0.23) *	1.69 (+/- 0.50) *	0.95 (+/- 0.36) *
C	660 (+/- 68)	7.16 (+/- 0.93)	191.5 (+/- 72)	0.62 (+/- 0.11)	0.93 (+/- 0.35)	2.07 (+/- 0.35)	1.27 (+/- 0.32)

*Different from Control (p≤0.05). #Different from DM (p<0.01)