SPECIFIC TRAINING CAN IMPROVE SENSORIMOTOR CONTROL IN TYPE 2 DIABETIC PATIENTS

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INTRODUCTION: Diabetes mellitus often is associated with proprioceptive and sensory deficits as a result of distal diabetic polyneuropathy (DPN). The aim of this prospective controlled longitudinal trial was to evaluate a specific sport intervention program regarding sensorimotor capabilities in type 2 diabetic patients compared to healthy controls. A higher incidence of fall-related injuries is given in the literature (Allet et al.2008; Allet et al 2009).

METHODS: 15 type 2 diabetic patients (7 female, 8 male; age 64 +/-10 years) whose disease is known since 9.5 years, and 14 healthy volunteers (7 woman, 7 men; age 56 +/-7 years) participated in this study. Using Semmes-Weinstein-Monofilaments (SMW, NorthCoast™) 5.07 log10(g) the diabetic patients were divided into diabetic PN as well as diabetic non PN group (non-DPN group n=9, DPN group n=6). 5 different measuring systems were used in test and retest: Sensibility threshold testing using SWM, postural balance testing with force plate (Kistler, type 9261A) with a sampling frequency of 40hz, active angle-reproduction test of the ankle using a custom made device with a Penny & Giles goniometer (ADU301), plantar foot pressure measuring (Emed ST, Novel) dynamic stability testing (Biodex-Stability-System, Biodex). A 90-minute special training program focusing on enhancing proprioceptive capabilities has to be completed once a week over an 8 month period. Statistics: Using SPSS v12.0, non parametric testing based on wilcoxon-test, mann-whitney-u-test, as well as kruskal-wallis-test were applied.

RESULTS: Comparing test-retest results of the sensibility threshold testing with SMW all plantar measuring points showed a slight increasing sensibility in the DNP group. Significant changes in threshold testing could be demonstrated in lateral forefoot and hallux area. Joint position sense measured with the angle reproduction test showed significant reduction of reproduction error in the diabetic group. For all other measuring methods no significant changes could be found.

DISCUSSION & CONCLUSION: A specific training can lead to positive changes in sensorimotor capabilities in type 2 diabetic patients. These results demonstrate the possibility of modulating proprioceptive deficits in diabetic patients during therapeutic intervention. Basic cause of this modulation could be found in an increasing cerebral processing using the given reafferent sensory input. This could result in a better management of ADL and could even be used as fall prevention because patients with diabetes are at higher risk of experiencing fall-related injuries when walking than healthy controls.

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