

Impairment of Balance in Elderly Subjects with Type 2 Diabetes

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Abstract. [Purpose] The purpose of this study was to investigate balance among elderly subjects with type 2 diabetes. [Subjects and Methods] Twelve subjects with type 2 diabetes and 15 age-matched controls were examined. Balance was assessed by a computerized device while the subjects were standing. [Results] Subjects with diabetes exhibited significantly more sway than control subjects while standing on a balance platform. [Conclusion] Our findings suggest that diabetes impairs balance when compared with that in normal elderly subjects.

Key words: Balance, Elderly, Type 2 diabetes

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INTRODUCTION

Human is aging, obesity rates are gradually rising, lifestyles are increasingly sedentary, and a large proportion of human comes from ethnic backgrounds at higher risk for the development of diabetes¹⁾. Today, nearly 38% of people 65 years and older have diabetes. Clinical parameters routinely available to the physiotherapist to evaluate diabetes and associated risk factors include blood pressure, age, BMI, and whether the patient is a member of a high-risk population^{2, 3)}.

Diabetes prevalence increases with age; people with diabetes aged 60 years or older are 2 to 3 times more likely to report an inability to walk 0.4 km (0.25 mile), climb stairs, do housework, or use a mobility aid compared with people without diabetes in the same age group³⁾. Little is known about the association of physical activity level and cardio-respiratory fitness with the development of diabetes. However, sedentary behaviors of the elderly were found to be associated with a significantly elevated risk of obesity and type 2 diabetes^{4, 5)}.

Therefore, we hypothesized that sedentary behaviors of elderly individuals with type 2 diabetes have a devastating effect on their balance function. The purpose of this study was to investigate the balance function between elderly individuals with type 2 diabetes.

SUBJECTS AND METHODS

Participants were recruited through advertisements (over 65 years of age with type 2 diabetes). None of the participants indicated any wearing off of medication during the test period. Participants were enrolled in this study after providing informed consent in accordance with the ethical standards of the Declaration of Helsinki. The balance level was evaluated with Bio Rescue (RM Ingenierie, Rodez, France), which was equipped with a safety bar. Subjects were excluded if they had other disorders causing balance limitation. The participants described the limit before the falls in eight cardinal directions. We calculated the area for each direction based on the farthest distance and added the areas together to calculate the gross area for all cardinal directions. Data were analyzed with a commercially available statistical software program (PASW 18.0, IBM Inc, Chicago, IL, USA). The independent t-test was used to compare values between groups. The level of significance was defined as $p < 0.05$.

RESULTS

Table 1 shows the general characteristics and the differences in balance function for the subjects.

DISCUSSION

Normal aging is associated with slower postural reactions and decreased muscle strength, both of which are essential for optimal balance^{6, 7)}. Subjects with diabetes displayed significantly more sway than that seen in control subjects while standing on a balance platform. The cause of these impairments may be related to deficits in the visual, vestibular, or somatosensory systems, all of which are im-

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Table 1. The general characteristics of the subjects

	Diabetes group (n=20)	Control group (n=20)
Sex (male/female)	8/12	9/11
Age (years)	69.9±3.7	71.3±3.5
HbA1c (%)	7.4±1.2	6.0±0.5*
Balance area (cm ²)	34.2±25.4	53.1±25.1*

*p<0.05

paired in diabetes⁸). The findings of this study were in a line with previous studies indicating that those type 2 diabetic patients were at greater risk of falls, confirming the view that increasing age, previous falls history, increased postural sway, and presence of diabetes are major risk factors for falling^{9, 10}). Petrofsky et al. also reported that the number of subjects greater sway during standing was 25% higher on average in a diabetic group¹¹).

One limitation of this study is that it did not consider other factors affecting balance function, such as the visual, vestibular, and somatosensory systems. The cause of balance impairments for patients with diabetes may be related to either deficits in the visual, vestibular, or somatosensory systems⁸). Another limitation of this study is the relatively small sample size. Therefore, the findings of this study should be interpreted with caution.

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