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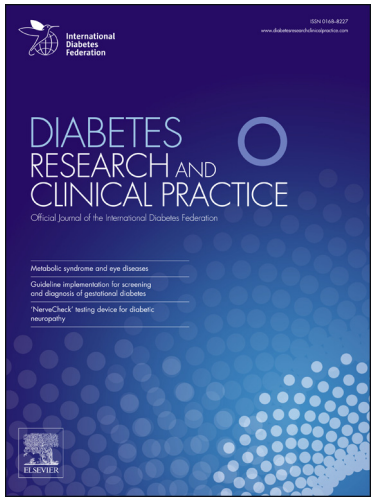

Physical activity does not inevitably improve quality of life in young adults with type 1 diabetes

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Physical activity does not inevitably improve quality of life in young adults with type 1 diabetes

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SUMMARY

Relationships between exercise, glucose control and diabetes dependent quality of life (DDQoL) are not straightforward. We investigated the DDQoL of 99 persons with type 1 diabetes and linked it to individual amount of weekly physical activity and HbA1c. Physically active lifestyle was not associated with better DDQoL or glucose control.

Keywords:

exercise; physical activity; young adults; quality of life questionnaire.

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1. Introduction

Perpetual self-care of type 1 diabetes mellitus is stressful and may cause exhaustion and anxiety over the years [1]. Quality of life appears lower among people with type 1 diabetes and they report three times more depression and anxiety compared to healthy population [2]. Physical activity (PA), even though highly recommended, is one additional factor in alreadydemanding self-management of this condition [3]. Our motivation for this study was to examine if PA is emotionally beneficial in type 1 diabetes. The purpose of the present pilot study was to investigate the diabetes dependent quality of life (DDQoL) of young persons with type 1 diabetes and link it to individual amount of average weekly PA. We hypothesized that more PA may be unrelated tobetter DDQoL. We also investigated the relationship between amount of PA and glycemic control.

2. Methods

This cross-sectional study was performed with 99 persons who were affected by type 1 diabetes. A specific questionnaire was developed and piloted before the present study. All data were collected in collaboration with three diabetes nurses in two central hospitals serving in diabetes outpatient clinics during seven weeks in the spring 2015. The questionnaires were filled by participants at the beginning of their individual outpatient clinic visit. Participants provided a written informed consent and the study was approved by the local ethical committee. Inclusion criteria for participation were: type 1 diabetes, age 18-45 y and native language Finnish. Exclusion criteria were: diagnosed depression or other mental health problem or other chronic diseases preventing exercise.

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The questionnaire included three separate sections: background information (including e.g. blood glucose control), diabetes dependent quality of life and physical activity. Blood glucose control was measured as glycated hemoglobin (HbA1c %). DDQoL was measured with DDS-17 (Diabetes Distress Scale) [4] which was translated into Finnish and the translation was approved by a group of health personnel before the study. DDS-17 was also piloted with several small groups of patients with and without diabetes. Four separate subscales from DDS-17 were used following Polonsky et al 2005 [4]: emotional burden (5 statements), regimen-related distress (5 statements), physician-related distress (4 statements) and diabetes-related interpersonal distress (3 statements). The range of answers to each statement was 6-point Likert scale from 1 (totally disagree) to 6 (totally agree).

Assessment of physical activity (PA) was based on the self-reported physical activity questionnaire originally developed by the Finnish National Institute for Health and Welfare [5]. It contained six categories defining participant's exercise habits: low active aerobic exercise (2.5 MET), moderately active aerobic exercise (3.8 MET), vigorous (9 MET) aerobic exercise, muscle conditioning (4.5 MET) and balance training (3.25 MET). The metabolic equivalent of task, MET, is a physiological measure which expresses the energy cost of physical activities. Subjects were asked to state the number of days per week they did each type of the exercises mentioned above and the combined duration (hours and minutes) of each type of exercise. The sixth section was "Not having any regular physical activity every week" (0 MET). MET values from all categories were added up and final value was each subject's total PA level defined as MET hours per week. Subjects were divided into three different physical activity levels according to total MET values: sedentary (PA < 10 MET h/week), moderately active (PA 10–40 MET h/week) and active (PA > 40 MET h/week). Differences between PA groups were statistically evaluated (Kruskall-Wallis test,

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Mann-Whitney U-test) using SPSS 22.0 software. Spearman correlation coefficients were applied to evaluate reciprocal relationships and significance was set at $p<0.05$.

3. Results

Participants' median age was 22 (SD 6.9) years, mean BMI for women was 23.8 (3.7) and for men 24.8 (4.0) kg/m2, 61% were women. The median duration of diabetes was 13.7 (7.6) years. Data on physical activity levels showed that 22.4% were sedentary (mean BMI 24.30 kg/m2), 45.9% moderately active (mean BMI 24.02 kg/m2) and 31.6% were active (mean BMI 24.25 kg/m2) persons and there were no differences between PA groups in BMI ($p=0.95$). Total PA was associated neither with gender, age, duration of diabetes, marital status nor with employment status. There were no significant differences between PA groups in HbA1c ($p=0.80$). In addition, no correlation was obtained ($r=-0.03$, $p=0.76$) between the duration of exercise in one week and HbA1c.

We found no significant differences between different groups of weekly PA level and measured diabetes dependent quality of life ($p=0.5$) or any of the DDQoL subscales ($p>0.05$), see Table 1. "Feeling that I will end up with serious long-term complications, no matter what I do" was the only specific statement in DDQoL scale that showed a tendency toward significance ($p=0.07$): the sedentary PA group disagreed with the statement more than the other groups, contrary to our hypothesis.

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4. Discussion

Our finding, that groups who clearly differed in their PA levels did not differ in their glucose control, was not surprising. Current literature is inconsistent whether exercise has a meaningful effect on HbA1c [6-8]. Beraki et al. (2014) reported lower HbA1c levels in active persons with diabetes than in sedentary ones in a large cohort [6]. Additionally, two recent meta-analyses found different results of whether exercise improves glucose control or not [7, 8]. Yardley et al. (2014) found a significant reduction in post-treatment HbA1c in four out of six studies but there was also one trial which showed no decrease at all [8]. Another even larger meta-analysis could not find evidence for a glycaemic benefit of exercise when followed by HbA1c [7], thus the issue remains unsolved.

Our data suggests that physically active lifestyle may not be associated with better DDQoL in type 1 diabetes. Contrary to general expectations exercise might have an opposite effect on DDQoL. Previous studies have typically focused on the general health related quality of life (HRQoL). DDQoL and HRQoL may not in essence be the same [9, 10]. Hart et al. (2007) found no correlation between HRQoL (RAND-36) and diabetes-specific instruments [9]. Recent results of DDS showed no association with depression, anxiety or general HRQoL in persons with type 1 diabetes [10]. HRQoL measures multidimensional aspects of health including physical, psychological and social factors, but DDS is a unidimensional measure of disease-specific distress. One explanation for our result might be that exercise is seen as another complicating factor in constant controlling one's blood sugar level. Exercise is one of the many factors influencing daily blood sugar and insulin intake [11] and it may cause more emotional stress on some of our participants than on others.

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Declaration of interests: The authors have no conflict of interests to report.

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Table 1. Participants of the study were divided into three different categories of physical activity and their answers in a modified Diabetes Dependent Quality of Life (DDQoL) questionnaire are given. Significances were tested with Kruskall-Wallis Test.

	Physical activity level	
	Sedentary	Moderately active
	mean (SD) median	mean (SD) median
HbA1c ,%	8.99 (2.26) 8.5	8.63 (1.75) 8.2
DDQoL, n=92	2.20 (0.76) 2.03	2.35 (0.67) 2.30
DDQoL emotional burden, n=95	2.41 (0.96) 2.1	2.72 (1.02) 2.6
DDQoL regimen-related distress, n=97	2.72 (0.97) 2.6	2.74 (0.89) 2.6
DDQoL physician-related distress, n=97	1.47 (0.75) 1.13	1.52 (0.60) 1.5
DDQoL diabetes-related interpersonal distress, n=96	1.94 (1.13) 1.50	2.20 (1.04) 2.0

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Highlights

- Diabetes dependent quality of life of in persons with type 1 diabetes was compared to amount of physical activity and glycemic control.
- Third of the participants gave high marks on emotional burden and regimen-related distress.
- No differences in glygemic control were found between three groups with different levels of physical activity.

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