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Subjective memory complaints are not increased in type 2 diabetes: A matched cohort study

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ABSTRACT

Type 2 diabetes is associated with several cognitive syndromes but whether this generates subjective complaints remains unclear. In an age- and sex-matched study, subjective memory complaints were neither more prevalent nor more severe in those with type 2 diabetes, despite them having lower Mini-Mental State Examination scores.

1. Introduction

The association between type 2 diabetes and cognitive function has two distinct categories.[1] Soon after diagnosis, adults with diabetes often perform cognitive tasks including memory tests less well than contemporaries without diabetes.[2,3] The clinical significance of these diabetes-associated cognitive decrements remains unknown, although they were predicted to lead to subjective complaints.[4] In older adults, type 2 diabetes confers an increased risk of cognitive decline and dementia.[1,5] In this situation, an increase in subjective complaints could occur, potentially useful in risk prediction.[6] Few studies have studied subjective complaints specifically in type 2 diabetes. Several prevalence studies have included diabetes as a covariate and both positive,[7–9] and negative associations,[10–12] have been reported. The aim of the present study was to investigate whether type 2 diabetes was associated with subjective memory complaints.

2. Materials and methods

The Busselton Diabetes Study (BDS) is a matched cohort study that recruited age- and sex-matched participants with and without diabetes from the rural town of Busselton (population 31,000) in Western Australia. The present study is confined to matched pairs with type 2 diabetes. Recruitment and clinical assessments methods have been previously reported.[13,14] Study participants were identified from prior involvement with community-based Busselton Health Surveys (conducted in 1966, 1994/1995 and 2005/2007).[15] In 2009, all with identified diabetes from previous surveys and randomly selected age- and sex-matched residents without diabetes from the same source were invited to participate. World Health Organisation/International Diabetes Federation recommendations confirmed diabetes/normoglycemia classifications.[16]

All participants underwent a clinical assessment (questionnaire, physical examination, fasting urine/blood biochemistries), based on the Fremantle Diabetes Study protocol.[17] Diabetes type was assessed by clinical algorithm, depression was assessed with the 9-item Patient Health Questionnaire (PHQ-9),[18] and cognition was assessed only in those aged ≥50 years with the Mini-Mental State Examination (MMSE). Subjective memory complaints were assessed using the following questions: 1. Do you consider yourself to have difficulty/problem with your memory? (No/Yes). If so, do you have (a) word-finding difficulty? Or, (b) memory difficulty for new names/dates? 2. Has your memory become worse over time? (No/Yes). (a) Was it sudden? (No/Yes) or (b) due to illness, medical condition, accident or emotional trauma? (No/Yes). 3. How long have you thought your memory was a problem? The responses to individual questions were analysed individually and a subjective memory complaints score was constructed to investigate severity. To do this, the scores for questions 1 and 2 (1 point each if present) were summed plus 1 point was added if memory loss was reported due to any of illness, medical condition, accident or emotional trauma giving a possible range of 0–3.

Statistical analysis used the computer package IBM SPSS Statistics 22 (IBM Corporation, Armonk, New York, United States). For paired samples, two-way comparisons for proportions were by McNemar's test, for normally distributed variables by paired *t*-test, and for non-normally distributed variables by Wilcoxon signed ranks test. Comparisons of independent proportions and non-normally distributed variables used Fisher's exact test and Mann-Whitney *U* test, respectively. A two-tailed significance level of $P < 0.05$ was used.

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Table 1
Clinical characteristics including mini-mental state examination scores and subjective memory responses in 170 Busselton Diabetes Study participants with type 2 diabetes and age- and sex-matched adults without diabetes. Comparisons are paired tests unless otherwise stated.

	N pairs	No diabetes	Diabetes	*P*-value
Age (years)	170	71.2 ± 8.9	71.2 ± 8.8	0.93
Male sex (%)	170	50.6	50.6	>0.99
Education beyond primary level (%)	167	84.4	84.4	>0.99
Diabetes duration (years)		–	8.5 [5.0–13.8]	–
HbA_{1c} (%)	169	5.6 [5.4–5.8]	6.5 [6.1–7.4]	<0.001
Coronary heart disease history (%)	170	10.1	21.8	0.003
Stroke/TIA history (%)	170	5.3	7.6	0.52
Depression (%)	168	4.2	11.9	0.019
MMSE score	170	29 [27–30]	28 [27–29]	0.005
MMSE score ≤ 24 (%)	170	4.1	6.5	0.45
Difficulty/problems with memory (n (%) yes)	170	131 (77.1)	119 (70.0)	0.16
If yes:				
Word finding difficulty (n/N (% yes))		100/131 (76.3)	85/119 (71.4)	0.39[a]
Problems for new names/dates (n/N (% yes))		121/131 (92.4)	103/119 (86.6)	0.15[a]
Memory has become worse over time (n/N (% yes))		118/131 (90.1)	101/116 (84.9)	0.55[a]
If yes, was it sudden (n/N (% yes))		17/112 (15.2)	14/98 (14.3)	>0.99[a]
If yes, please specify reason:				
Illness (%)		6/17 (35.3)	6/14 (42.9)	0.72[a]
Medical condition (%)		9/17 (52.9)	6/14 (42.9)	0.72[a]
Accident (%)		7/17 (41.2)	11/14 (78.6)	0.07[a]
Emotional trauma (%)		0/17 (0)	1/14 (7.1)	0.45[a]
Duration of memory problem (months)		42 [24–84]	30 [15–60]	0.11[b]
Word finding difficulty (% overall)	170	58.8	50.0	0.14
Memory for new names/dates (% overall)	170	71.2	60.6	0.044
Memory worse over time (% overall)	167	68.9	60.5	0.12
Sudden memory loss (% overall)	159	10.1	8.2	0.70
Subjective memory complaints score	170	2 [1–2]	2 [0–2]	0.08

[a] Unpaired comparison;
[b] Unpaired comparison in 111 participants without diabetes and 101 with diabetes.

3. Results

Of 186 pairs, 170 with complete subjective memory and cognitive assessments comprise the study sample (6 pairs were excluded because of age < 50 years, 10 pairs with missing data were similar to the participants in age, sex, diabetes duration and HbA_{1c} levels). Comparative data between those with type 2 diabetes and no diabetes are presented in Table 1. They were aged 71.2 ± 8.8 years, 50.6% were men and they had equivalent education. Those with diabetes (median duration: 8.5 [5.0–13.8] years) had mostly satisfactory HbA_{1c} levels but they had more depression, more coronary heart disease, and slightly, but statistically significant, lower MMSE scores. There were no statistical difference between those with and without diabetes in subjective memory complaints which were reported by >70% in each group. There was no difference in the subjective memory complaints score or in most individual questions, except for problems remembering names/dates which were less frequently reported by those with diabetes.

There was no association between subjective memory complaints and MMSE scores or proportions with low MMSE scores (data not presented). In the combined sample, reports of sudden memory loss were associated with stroke/TIA history (Fisher's exact test, $P = 0.024$). With multiple logistic regression and entering the following variables into the model (age, sex, MMSE score, depression, cardiovascular disease, cerebrovascular disease and diabetes status), having any subjective memory complaint was negatively associated with both male sex (odds ratio (95% CI): 0.59 (0.36–0.99), $P = 0.044$) and type 2 diabetes (0.60 (0.36–1.00), $P = 0.050$). Repeating the regression with MMSE excluded produced similar results but the association between subjective memory and diabetes was weaker (odds ratio (95% CI): 0.62 (0.37–1.03), $P = 0.064$).

4. Discussion

Subjective memory complaints were common in our study but neither more common nor more severe in those with type 2 diabetes. In fact there was a negative association between type 2 diabetes and subjective memory complaints in the model that controlled for MMSE scores, which were lower in diabetes, and depression which was more prevalent. This unexpected finding may be a chance finding related to the relatively small sample size or some other methodological consideration. Alternatively, this could indicate reduced self-awareness of cognitive deficits, a phenomenon common in early dementia.[19] Cognitive awareness has not been studied in type 2 diabetes although it is closely related to apathy, another neuropsychiatric symptom possibly associated with type 2 diabetes.[20]

The main limitations are the cross-sectional design, the reliance on a simple measure of cognition and on memory questions rather that standardise subjective cognitive criteria.[6] The strengths include the close matching age, sex and education, the community origin of the participants and the comprehensive clinical assessment.

This study finds no support for the suggestion that subjective memory complaints are more common because of diabetes-related cognitive decrements.[4] The study also suggests that the increased risk of dementia in type 2 diabetes may not be accompanied by increased subjective complaints before the onset of cognitive decline.[6]

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