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Neuropsychological outcomes in individuals with type 1 and type 2 diabetes

Aim: In this study the prevalence of neuropsychological outcomes and the association of diabetes status and micro- and macrovascular complications was evaluated in individuals with type 1 diabetes (T1D) compared to individuals with type 2 diabetes (T2D) and controls without diabetes.
Methods: Based on a national healthcare database of privately insured individuals (2001-2018), using ICD-9/10 codes, diabetes status, neuropsychological outcomes, and micro- and macrovascular complications were identified. Neuropsychological outcomes included mental health, cognitive, chronic pain, addiction, and sleep disorders. Micro- and macrovascular complications included retinopathy, neuropathy, nephropathy, stroke, myocardial infarction, peripheral vascular disease, and amputations. Individuals with T1D were matched to individuals with T2D and controls using propensity score matching. Logistic regression analysis was used to describe associations between diabetes status, micro- and macrovascular complications, and neuropsychological outcomes.
Results: A total of 184,765 individuals with T1D were identified and matched to 524,602 individuals with T2D and 522,768 controls. Micro- and macrovascular complications were independently associated with each neuropsychological outcome irrespective of diabetes status. After adjusting for the presence of micro- and macrovascular complications T2D was still associated with mental health, cognitive, and sleep disorders whereas T1D was not associated with a higher risk of neuropsychological outcomes.
Conclusions: Micro- and macrovascular complications were associated with a high risk of neuropsychological outcomes irrespective of diabetes status. Therefore, the prevention of these complications may decrease neuropsychological outcomes. In individuals with T2D, other factors beyond micro- and macrovascular complications may contribute to neuropsychological outcomes.

Comments: Multiple studies have suggested that individuals with diabetes are at an increased risk of developing neuropsychological complications such as depression (Chow YY et al Diabetes Res Clin Pract. 2022;185:109227), cognitive impairments (Li W et al J Alzheimers Dis. 2017;57:29-36.), anxiety (Mersha AG et al J Psychosom Res. 2022;162:110991), pain (Davies M et al Diabetes Care. 2006;29:1518-22) and dementia (Wang B et al Neurology. 2022 Sep 14). However, several of the available studies have not included assessments of micro- and macrovascular complications, which are common in individuals with diabetes.
This study conducted in US is one of the first and the largest examining the prevalence of neuropsychological outcomes and the independent effects of diabetes status and micro- and macrovascular complications among individuals with T1D and T2D and controls without diabetes. The major strengths of the study are the large sample size, the inclusion of individuals with both T1D and T2D and comparison to a control group without diabetes and lastly the inclusion of a wide spectrum of neuropsychological complications.
Future studies should include information on diabetes duration and diabetes severity, and should focus on the role of neuropathy and stroke as these complications had the highest odds of neuropsychological outcomes contrasting other studies. This study adds to the body of evidence demonstrating the importance of preventing micro- and macrovascular complications in diabetes.

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Reference. Putnam NM, Reynolds EL, Banerjee M, Mizokami-Stout K, Albright D, Lee J, Pop-Busui R, Feldman EL, Callaghan BC. Neuropsychological Outcomes in Individuals With Type 1 and Type 2 Diabetes. Front Endocrinol (Lausanne). 2022 Mar 4;13:834978. doi: 10.3389/fendo.2022.834978.

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