

Early age of type 1 diabetes diagnosis linked to shorter life expectancy, compared to later diagnosis

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Life-expectancy for individuals with younger-onset disease is on average 16 years shorter compared to people without diabetes, and 10 years shorter for those diagnosed at an older age

Being diagnosed with type 1 [diabetes](#) at a young age is associated with more cardiovascular complications and higher risk of premature death than being diagnosed later in life, independent of disease duration. The findings, published in *The Lancet*, come from a large observational study in Sweden that followed over 27,000 individuals with type 1 diabetes and more than 135,000 matched controls for an average of 10 years. With around half of individuals with type 1 diabetes diagnosed before the age of 14, the authors stress the need to consider wider and earlier use of cardioprotective measures such as statins and blood pressure lowering drugs in this high-risk population.

"Although the relative risk of [cardiovascular](#)

[disease](#) is increased after an early diabetes diagnosis, the absolute risk is low", says Dr. Araz Rawshani from the University of Gothenburg in Sweden who co-led the research. "However, age at disease onset appears to be an important determinant of survival as well as cardiovascular outcomes in early adulthood, warranting consideration of earlier treatment with cardioprotective drugs."

The new estimates suggest that individuals diagnosed before the age of 10 have a 30-times greater risk of serious cardiovascular outcomes like [heart attack](#) (0.31 cases per 100,000 person years for participants with diabetes vs 0.02 cases in every 100,000 person-years for controls) and [heart disease](#) (0.5 vs 0.03) than those in the general population, whilst risk levels are around six times higher for people diagnosed between ages 26 and 30 (0.87 vs 0.25 and 1.80 vs 0.46 respectively).

People with younger-onset type 1 diabetes are four times as likely to die from any cause (0.61 vs 0.17), and have more than seven times the risk of dying from cardiovascular disease (0.09 vs 0.02) than their diabetes-free counterparts. In contrast, people first diagnosed between ages 26 and 30 face a lower (three-fold) risk of dying from any cause (1.9 vs 0.6) and cardiovascular disease (0.56 vs 0.15) compared to their peers without diabetes.

Professor Naveed Sattar, co-author, University of Glasgow (UK), explains: "While the absolute risk levels are higher in individuals who develop diabetes when older, simply due to age being a strong risk factor, the excess risk compared to healthy controls is much higher in those who developed diabetes when younger. If this higher excess risk persists over time in such individuals, they would be expected to have highest absolute risks at any given subsequent age. Indeed, those

who develop type 1 diabetes when under 10 years of age experience the greatest losses in life expectancy, compared to healthy controls. This is something we did not fully appreciate before."

The impact of type 1 diabetes on younger people should not be underestimated, and there is a need to consider adding recommendations about age of onset in future guidelines, say the authors.

Type 1 diabetes mellitus is the second most common chronic disease in children, accounting for 85% of diabetes in the under 20s. But it's not unusual to develop the disease as an adult. Worldwide, the incidence of type 1 diabetes in children aged 14 years and younger has risen by 3% a year since the 1980s.

It's well known that people with type 1 diabetes are at increased risk of health problems and have shorter life expectancies, partly due to premature cardiovascular disease. But, until now, the impact of age of diagnosis on this excess mortality and cardiovascular risk was unclear.

To provide more evidence, the researchers calculated the excess risk of all-cause mortality, cardiovascular mortality, acute [heart](#) attack, stroke, cardiovascular disease, [coronary heart disease](#), heart failure, and atrial fibrillation in 27,195 individuals from the Swedish National Diabetes Register compared to 135,178 controls matched for age, sex, and county from the general population (average age 29 years).

Individuals with diabetes, who registered between Jan 1988 and December 2012, were divided into groups by age at diagnosis—0-10 years, 11-15 years, 16-20 years, 21-25 years, and 26-30 years—and followed up for an average of 10 years.

The researchers adjusted for a range of factors that may have influenced the results including age, sex, marital status, income, educational level, region of birth, diabetes duration, and previous history of cardiovascular complications.

Cardiovascular risks and survival were strongly related to age at disease onset, with people diagnosed before the age of 10 having five-times

greater risk of heart attack and coronary heart disease than those diagnosed at age 26-30 years. The younger group also had much higher risk of heart failure and stroke than peers without diabetes and those diagnosed at an older age (figure 3).

Excess risks were particularly pronounced in women, with those diagnosed before age 10 facing a 60-fold higher risk of heart disease (0.48 cases per 100,000 person years for participants with diabetes vs 0.02 cases in every 100,000 person-years for controls) and 90-times increased risk of heart attack than matched controls (0.25 vs 0.01). In comparison, men with young-onset diabetes have a 17 times greater risk of developing heart disease and 15 times higher risk of having a heart attack in early adulthood compared to those in the general population (0.53 vs 0.05 and 0.36 vs 0.03).

These estimates for early-onset disease are substantially higher than recent estimates by the American Heart Association and American Diabetes Association, which do not consider age of onset as a risk stratifier, and report that women with type 1 diabetes are at seven times increased risk and men at three times the risk of developing heart disease.

Life expectancy was also markedly shorter for women with type 1 diabetes. Women who develop the condition before 10 years of age die on average around 18 years earlier than their diabetes-free counterparts (average [life expectancy](#) 70.9 years vs 88.6 years), whilst men with early onset type 1 diabetes die around 14 years earlier (69.1 years vs 83.3 years). Individuals diagnosed at 26-30 years old lose, on average, about 10 years of life.

The authors speculate that loss of beta cells which contribute to glycaemic load, and is more severe and rapid among those with younger age onset, could be a contributing factor to the increased risk of cardiovascular-related death. Whilst they adjust for duration, longer exposure to higher glucose levels in individuals who develop diabetes when children might also contribute to greater heart disease risks. However, the authors acknowledge that their findings show observational associations rather than cause and effect.

Professor Sattar adds: "People with early onset diabetes should more often be considered for cardioprotective drugs such as statins and blood pressure lowering medication when they reach 30-40 years of age. Currently, only around 10-20% of individuals with type 1 diabetes are taking statins by the age of 40. Also, improving glycaemic control and smoking cessation programmes could meaningfully prolong the lives of these individuals. The good news, however, is that recent technological advances are helping younger patients manage their glucose levels better."

The authors note some limitations including that they did not have information about patients' glycaemic control before enrolment in the register. What's more, they only included patients who had the condition for 20 years or less to provide contemporary comparisons of cardiovascular risk that reflect current diabetes management. Key strengths include the large cohort, individual controls, adjustment for diabetes duration, the range of age subgroups, and variety of cardiovascular outcomes. Life expectancy analyses used the entire cohort, regardless of duration of diabetes.

Writing in a linked Comment, Marina Basina and David M Maahs, Stanford University (USA) say: "These data will increase attention towards cardioprotection at younger ages and specifically for those with an earlier age of type 1 diabetes onset. Practitioners need a stronger evidence base, including confirmatory reports from other registries and clinical trials, to clarify proper therapy and translate research findings to care guidelines and clinical practice to improve mortality and cardiovascular disease outcomes for individuals with type 1 diabetes."

More information: Araz Rawshani et al. Excess mortality and cardiovascular disease in young adults with type 1 diabetes in relation to age at onset: a nationwide, register-based cohort study, *The Lancet* (2018). [DOI: 10.1016/S0140-6736\(18\)31506-X](https://doi.org/10.1016/S0140-6736(18)31506-X)

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