Increase in the Incidence of Diabetes and Its Implications

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Diabetes mellitus is among the most prevalent and morbid chronic diseases, affecting the health of millions of persons worldwide. According to the Global Burden of Disease (GBD) report for 2015, the prevalence of diabetes rose from approximately 333 million persons in 2005 to approximately 435 million persons in 2015, an increase of 30.6%. During the same interval, the annual number of deaths from diabetes rose from 1.2 million to 1.5 million. This increase is attributed in the GBD report to population growth and aging, with small decreases in age-specific and cause-specific mortality over the same period.

Although the GBD analyses provide a useful overall picture of disease burden, they are subject to uncertainty, given the widely varied data sources and the necessity that certain assumptions be made in order to achieve final estimates. Furthermore, more detailed examination of the specific features of a given disease than is possible through GBD assessments is often desirable. Thus, more focused studies can provide a useful complement to important global data. In this issue of the Journal, two original research articles examine the epidemiology of diabetes from different vantage points and in different countries. In one article, Mayer-Davis et al. examine the incidence of type 1 and type 2 diabetes among youths in the United States. In another article, Rawshani et al. consider downstream effects, concentrating on mortality and the incidence of cardiovascular disease among persons with type 1 or type 2 diabetes in Sweden.

The study by Mayer-Davis et al. provides the most current data available on the incidence of diabetes among youths. The authors analyzed data from the SEARCH for Diabetes in Youth study, which was conducted at centers in five U.S. states. Cases were identified at clinical centers in each region and were validated on the basis of a physician’s diagnosis of diabetes. Enrollment was restricted to persons who were younger than 20 years of age. Type 1 diabetes was distinguished from type 2 diabetes by means of analysis of blood samples for three diabetes autoantibodies. To calculate the incidence rates, denominators were based on U.S. Census data or total health-plan enrollment data.

Between 2002 and 2012, the adjusted annual incidence of type 1 diabetes increased by 1.8% per year, and the incidence of type 2 diabetes increased by 4.8% per year. Among participants with type 1 diabetes, the rate of increase was significantly greater among Hispanics than among non-Hispanic whites. Among participants with type 2 diabetes, the rate of increase was greater in all other racial and ethnic subgroups than among non-Hispanic whites, with the greatest rate of increase occurring among Native Americans.

Although it is not surprising that the incidence of type 2 diabetes among youths is increasing, the differing rates among racial and ethnic groups is somewhat unexpected. The authors note that some subgroups of youths in the United States have had a significant increase in the prevalence of obesity, which may be a contributing factor. Of even more concern is the fact that the incidence of type 1 diabetes appears to be increasing, with apparent disparities among ethnic groups that are not likely to be explained by the obesity epidemic.

What will happen to the increasing number of persons with early-onset diabetes as they age?
The study by Rawshani et al., although conducted in a less diverse population and in a different part of the world, provides a look at this question. The authors examined data from patients with type 1 or type 2 diabetes who were enrolled in the Swedish National Diabetes Register between 1998 and 2014. Controls were identified for each patient with diabetes and were matched for age, sex, and county. The mortality data and cardiovascular disease outcomes were obtained from the Swedish Inpatient Registry and the Swedish Cause of Death Registry.

The investigators examined changes in mortality and the incidence of cardiovascular disease over time. Mortality and the incidence of cardiovascular disease both decreased significantly over the study period. All-cause mortality decreased by 31.4 deaths per 10,000 person-years among persons with type 1 diabetes and by 69.6 deaths per 10,000 person-years among those with type 2 diabetes. The incidence of death from cardiovascular disease decreased by 26.0 deaths per 10,000 person-years among persons with type 1 diabetes and by 110.0 deaths per 10,000 person-years among those with type 2 diabetes. However, the rates of fatal outcomes decreased significantly less among patients with type 2 diabetes than among matched controls.

As Rawshani et al. note, their study had limitations. The type of diabetes was determined by epidemiologic criteria, not by the measurement of C-peptide levels or the detection of islet autoantibodies. Furthermore, the authors did not account for secular trends, which might have affected the perceived event rates. However, these limitations are unlikely to have caused inaccurate conclusions, according to data from previous validation studies.

The basic findings of these two studies, taken together, confirm the larger trends reported in the GBD analyses. The incidence of diabetes is increasing among young persons, as the study conducted by Mayer-Davis et al. shows. As a consequence of this trend and of the aging and growth of the population, even though mortality and the rate of cardiovascular disease are decreasing among persons with diabetes, the overall adverse effect of diabetes on public health is actually increasing. The number of years that are lived with disability has increased by 32.5% and now ranks 6th among leading causes of the burden of disease. The number of years of life that are lost has increased by 25.4% and now ranks 15th among causes of the burden of disease. According to data from the study by Mayer-Davis et al., these effects are likely to have a disproportionate effect on members of racial and ethnic minority groups.

What do the marked increase in the incidence of diabetes and more people at risk imply about therapy? Over the past several decades, there have been important studies focusing on the treatment of type 1 and type 2 diabetes. For example, the Diabetes Control and Complications Trial (DCCT) showed that intensive glycemic control improved outcomes in persons with type 1 diabetes mellitus, as did the United Kingdom Prospective Diabetes Study (UKPDS) in persons with type 2 diabetes. Despite a growing understanding about the pathogenesis of each condition, knowledge about how best to lower the number of new cases and how best to treat problems in persons with diabetes, once they arise, has been elusive.

It is clear that we are far from controlling the negative effects of diabetes on health worldwide. As the prevalence increases, we clearly need new approaches to reduce the burden of this disease on public health.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.


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