

Commentary on Current Literature

Richard A. Johnson, MD

Trends in the Prevalence and Ratio of Diagnosed to Undiagnosed Diabetes According to Obesity Levels in the U.S.

Gregg EW, Cadwell BL, Cheng YJ, et al.

Diabetes Care. 2004;27:2806–2812.

Objective: To examine trends in the prevalence of diagnosed and undiagnosed diabetes and the proportion of total cases previously diagnosed, according to obesity status in the U.S. over the past 40 years.

Research Design and Methods: We assembled data from five consecutive cross-sectional national surveys: National Health Examination Survey I (1960–1962), National Health and Nutrition Examination Survey (NHANES) I (1971–1974), NHANES II (1976–1980), NHANES III (1988–1994), and NHANES 1999–2000. Diagnosed diabetes was ascertained, and height and weight were measured in adults aged 20–74 years in all surveys. In NHANES II, NHANES III, and NHANES 1999–2000, a fasting glucose level ≥ 126 mg/dl was used to identify cases among individuals not reporting diabetes. Design-based analyses and Bayesian models estimate the probability that prevalence of diabetes increased within four BMI groups (<25 , 25–29, 30–34, and ≥ 35 kg/m²).

Results: In the U.S. population aged 20–74 years between 1976–1980 and 1999–2000, significant increases in the prevalence of diagnosed diabetes (3.3–5.8%, probability $>99.9\%$) were accompanied by nonsignificant increases in undiagnosed diabetes (2.0–2.4%, 66.6%). This resulted in an increase in total diabetes (5.3–8.2%,

$>99.9\%$) and a modest nonsignificant increase in the proportion of cases that were diagnosed (62–70%, 62.4%). However, these trends varied considerably by BMI level. In individuals with BMI ≥ 35 kg/m², diagnosed diabetes increased markedly (from 4.9% in 1960, to 8.6% during 1976–1980, to 15.1% in 1999–2000; probability $>99.9\%$), whereas undiagnosed diabetes declined considerably (12.5% during 1976–1980 to 3.2% in 1999–2000, probability of increase 4.5%). Therefore, the proportion of total diabetes cases that were diagnosed increased from 41 to 83% (probability 99.9%) among individuals with BMI ≥ 35 kg/m². By comparison, changes in prevalence within BMI strata <35 kg/m² were modest and there was no increase in the percent of total cases that were diagnosed.

Conclusions: National surveys over the last several decades have found large increases in diagnosed diabetes, particularly in overweight and obese individuals, but this has been accompanied by large decreases in undiagnosed diabetes only among individuals with BMI ≥ 35 kg/m². This suggests that improvements in diabetes awareness and detection are most prominent among this subgroup.

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COMMENTARY

Undiagnosed Diabetes Still a Common Problem

This review by Gregg et al of data obtained from 5 consecutive US health surveys over 40 years provides some encouraging as well as discouraging results with respect to the ability to detect undiagnosed type 2 diabetes mellitus. The authors analyzed the ratio of diagnosed diabetes to total diabetes as a function of body mass index (BMI) over the past 4 decades. In patients with moderate obesity (BMI >35 kg/m²), there has been a dramatic improvement in detection of diabetes from 41% to >80%. But in all other subgroups of weight status (BMI <35 kg/m²), there has been no improvement over the past 40 years in our ability to detect diabetes, as there is still ~25% of current diabetes cases being undetected. It is good that as physicians we are more effective in looking for diabetes in our heavier patients, but we should not forget that this is a very prevalent condition that can affect all of our patients.

Commentary on Current Literature

Richard A. Johnson, MD

Obesity, Inactivity, and the Prevalence of Diabetes and Diabetes-Related Cardiovascular Comorbidities in the U.S., 2000–2002

Sullivan PW, Morrato EH, Ghushchyan V, et al.

Diabetes Care. 2005;28:1599–1603.

Objective: Obesity and physical inactivity are established risk factors for type 2 diabetes and cardiovascular comorbidities. Whether adiposity or fitness level is more important to health is controversial. The objective of this research is to determine the relative associations of physical activity and BMI with the prevalence of diabetes and diabetes-related cardiovascular comorbidities in the U.S.

Research Design and Methods: The Medical Expenditure Panel Survey (MEPS) is a nationally representative survey of the U.S. population. From 2000 to 2002, detailed information on sociodemographic characteristics and health conditions were collected for 68,500 adults. Normal weight was defined as BMI 18.5 to <25 kg/m², overweight 25 to ≤30 kg/m², obese (class I and II) 30 to <40 kg/m², and obese (class III) ≥40 kg/m². Physical activity was defined as moderate/vigorous activity ≥30 min ≥3 days per week.

Results: The likelihood of having diabetes and diabetes-related cardiovascular comorbidities increased with BMI regardless of physical activity and increased with physical inactivity regardless of BMI. Compared with normal-weight active adults, the multivariate-adjusted odds ratio (OR) for diabetes was 1.52 (95% CI 1.25–1.86) for normal-weight inactive adults and 1.65 (1.40–1.96) for overweight inactive adults; the OR for diabetes and comorbid hypertension was 1.71 (1.32–2.19) for normal-weight inactive adults and 1.84 (1.47–2.32) for over-weight inactive adults.

Conclusions: Both physical inactivity and obesity seem to be strongly and independently associated with diabetes and diabetes-related comorbidities. These results support continued research investigating the independent causal nature of these factors.

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COMMENTARY

Would you rather be heavy or inactive? Don't be both!

This analysis of a population review conducted between 2000 and 2002 provides the reader with the answer to the question of the independent risk associated with inactivity and obesity towards one's risk of diabetes and diabetic-related cardiovascular comorbidities. For the 68,500 patients in the study, those who were active (self-reported vigorous activity of 30 minutes 3 times per week) had a prevalence of diabetes of 2.2%, 4.6%, 8.7%, and 14.1% for body mass index (BMI) groups of <25 kg/m², 25 to 30 kg/m², 30 to 40 kg/m², and >40 kg/m², respectively. The corresponding prevalence for diabetes in self-reported inactive patients was 4.5%, 8.0%, 13.7%, and 22.1%, respectively. It would appear from this analysis that being inactive increases one's risk of diabetes and diabetes-related cardiovascular comorbidities 1.5 to 2 times across all BMI groups. The messages here for physicians to relate to their patients is: (1) it is not good to gain weight above a normal BMI, and (2) if you do gain weight, you need to get active and the activity doesn't have to be all that strenuous to provide significant health benefits.