

OBESITY AND DIABETES: IS THE WORST YET TO COME FOR CARDIOVASCULAR DISEASE?

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The escalating prevalence of overweight and obesity is a problem worldwide. Developing and developed countries alike are witnessing an increase in body weight in both adults and children. This weight gain is bringing a related increase in the risk for type 2 diabetes and many other serious conditions and diseases. If the prevalence of overweight and obesity were to remain constant over the next several years, the personal and economic costs of these conditions would be enormous. If the prevalence continues to increase, as many expect it will, the health and economic costs will be far greater than what many people have planned for.

GLOBAL BURDEN OF OBESITY AND DIABETES

Cardiovascular disease (CVD) is the leading cause of death worldwide. In 1999, 17 million people or 30 percent of all deaths were due to heart disease and stroke, a significant increase from the 14.7 million CVD deaths in 1990.¹ Overweight and obesity, diabetes, sedentary lifestyles, and smoking all increase the risk for CVD. However, the problems associated with overweight and obesity go well beyond the cardiovascular risks of hypertension, stroke, and coronary heart disease to include gallbladder disease, osteoarthritis, sleep apnea and respiratory problems, and some types of cancer.

Globally, about 1 billion people are considered overweight or obese. In the United States, approximately 122.5 million people or 64.5 percent of adults are overweight or obese, as defined by a body mass index (BMI) greater than or equal to 25 kg/m².² During the late 1990s, obesity continued to increase dramatically for Americans of all ages and currently is at an all time high. Nearly one-third of all adults are now classified as obese—a BMI of greater than or equal to 30 kg/m² according to the 1999–2000 National Health and Nutrition Examination Survey. Thirty-one percent of adults 20 years of age and older—nearly 59 million people—are obese, compared to 23 percent in 1994 and 13 percent in the early 1960s. More adult

women are obese (33 percent) than are men (28 percent), with the problem greatest among non-Hispanic Black women (50 percent) compared to Mexican-American women (40 percent) and non-Hispanic White women (30 percent). There was practically no difference in obesity levels among men based on race/ethnicity.²

The current weight status in children can only be called alarming. Among children and adolescents ages 6 to 19, 15 percent (almost 9 million) are overweight, or triple what the proportion was in 1980. As with adults, the increased prevalence is more apparent in minority children than White children. And, the problem is beginning earlier in a child's life. More than 10 percent of younger, pre-school-aged children between ages 2 and 5 are overweight, up from 7 percent in 1994.³

The increase in overweight among US children and adolescents is also linked to a dramatic increase in type 2 diabetes, particularly among minority populations.⁴ And, since overweight children are more likely to become overweight adults, they are at increased risk for major cardiovascular problems early in life.

It comes as no surprise that the burden of type 2 diabetes worldwide is expected to grow. The number of diabetics is expected to double from the current estimate of approximately 150 million people worldwide to 300 million in 2025.¹ Moreover, developing countries are expected to experience an increase of 170 percent in diabetes compared with a 42 percent increase in developed countries.⁵ It is believed that the prevalence of diabetes in developing countries will be greatest among those aged 45 to 65—the most productive years economically. In developed countries, those most affected will be 65 or older and primarily from economically disadvantaged and minority groups.

In the United States, 17 million people or 6.2 percent of the population have diabetes. On average, Hispanic Americans and African Americans are two times more likely to have diabetes than non-Hispanic Whites, while American Indians and Alaska Natives are 2.6 times more likely to have it.⁶

Diabetes is a complex and multi-factorial disease. Besides CVD, it is associated with end-stage renal disease, lower limb amputations, and blindness. CVD is the most common cause of death among people with diabetes. Fifty percent of those with diabetes in the United States die from coronary heart dis-

From the National Heart, Lung, and Blood Institute; National Institutes of Health; Bethesda, Maryland.

ease.⁵ Worldwide, 10 to 25 percent of those with diabetes have CVD, according to the World Health Organization.

The economic costs associated with overweight and obesity and diabetes are increasing along with the rising prevalence. They include both direct and indirect costs. Direct costs refer to treatment, and preventive and diagnostic services; indirect costs refer to wages lost due to disability or disease, or lost years of productivity. In 2000, the direct and indirect costs associated with overweight and obesity in the United States came to about \$117 billion.⁷ Much of this sum was due to costs from the associated co-morbidities of type 2 diabetes, hypertension, and coronary heart disease. In 1997, diabetes' total costs came to \$98 billion.⁸

FACTORS THAT INFLUENCE THE OCCURRENCE OF OBESITY AND DIABETES

Obesity and type 2 diabetes often result from lifestyle habits. These habits have undergone changes in recent decades, particularly dietary and physical activity patterns.

In many countries, there has been an increase in caloric intake along with a decrease in physical activity. These changes occur at the individual level but are greatly influenced by factors in the society. For instance, increased globalization of agricultural productivity and processing has created a world where food is often not only plentiful but also dense in calories. It is estimated that the average energy supply per capita worldwide will be 2900 kcal in 2010, up from 2300 kcal in 1963.⁹

Along with the increase in energy intake has come a decrease in energy expenditure due in large part to changes in mechanization and transportation. People today are less physically active not only in their leisure time but also at work. Today, about 60 percent of the world's population is not adequately active to prevent obesity, diabetes and CVD.¹ Cultural patterns, traditions, and the lack of civic organizations that promote physical activity greatly influence this trend.

The impact of environmental change on obesity rates vary depending on socioeconomic status. In most affluent countries, obesity is typically seen most at the lower end of the socioeconomic scale. By contrast, an analysis of mainly European countries found that obesity rose along with degree of education.⁹ In the United States, changes in obesity prevalence did not differ by socioeconomic group. Thus, it is not yet possible to predict which population groups are most at risk for obesity from simply considering their socioeconomic status.

IN THIS ISSUE

From the public health perspective, prevention of both overweight/obesity and type 2 diabetes is critical, and appro-

priate management of those who are already obese; is crucial in order to help control rates of CVD and type 2 diabetes.

The article by Crook in this issue of the journal provides a compelling look at the public health impact of diabetes and obesity in the United States. Crook's paper reveals the disproportionate prevalence of end stage renal disease due to diabetic nephropathy in obese African-American women when compared to African-American men in Mississippi. At the start of the study, more women than men had had diabetes for about 17 years, were hypertensive, and had advanced renal disease. In those with advanced diabetic nephropathy a mean arterial pressure of <100 mm Hg appeared to worsen survival.

The contribution of dietary patterns and lifestyle characteristics to the development of obesity and type 2 diabetes is considered in this issue's article by Brathwaite. He and his colleagues examined a population of Seventh Day Adventists in Barbados to determine the relationship between vegetarian status, BMI, type 2 diabetes, and hypertension. Long-term vegetarians were leaner and had less type 2 diabetes and hypertension than did the non-vegetarians.

Additional papers in this issue consider the influence of acculturation, cultural orientation, and various community outreach activities on the risk for type 2 diabetes and obesity. Tull's paper shows that acculturation and adoption of American values differentially influences the risk of obesity and diabetes. Adoption of such values was associated with an increase in BMI among African Americans born in the Virgin Islands and to fasting glucose levels among African-Caribbean immigrants. In the study by de Groot, traditional African-American cultural orientation was significantly associated with a decrease in dietary adherence measures in inner-city hospital outpatients with type 2 diabetes. Thus, knowledge of cultural orientation could help providers better understand a patient's potential risk for disease. It also may help them tailor diabetes education programs to particular patients. Anderson's and Fedder's papers also show the importance of tailored education programs. Their studies included a more personalized and intensive intervention of community health workers, telephone calls and letters to follow up with patients. These interventions boosted clinic return rates, reduced emergency room and hospital visits, and improved quality of life for African-American diabetic patients.

RESEARCH, TRANSLATION, AND EDUCATION EFFORTS

We know from the basic tenets of thermodynamics that a healthy diet that balances caloric intake with caloric expenditure will help individuals maintain a healthy weight. In addition, the results from the Diabetes Prevention Program pointed out clearly that the development of diabetes can be prevented through similar types of behavior change and lifestyle modifi-

cation that affect weight loss. The study of 3200 adults who were overweight and had impaired glucose tolerance showed that those following a low fat diet and exercising not only lost about 15 pounds but reduced their risk of developing diabetes by 58 percent.

A variety of research activities are currently under way to examine the many variables and intervention possibilities that may help prevent overweight/obesity and type 2 diabetes. These studies are considering different kinds of programs and approaches for various population groups. Programs at school, day care, church, primary care settings, and worksites are being studied, as are approaches that include the Internet, mentors, peers and families. Additional research is investigating such environmental factors as vending machines in schools and safe recreational areas, which could help prevent obesity.

In terms of the impact of different treatment strategies, a major clinical trial entitled "Look Ahead" is examining the effects of an intensive lifestyle intervention program on weight loss and subsequent cardiovascular events in 5,000 overweight or obese adults with type 2 diabetes. The intensive lifestyle intervention program is designed to achieve and maintain weight loss by decreasing caloric intake and increasing physical activity. It includes individual supervision and group sessions, and is aimed at achieving and maintaining at least a 7 percent decrease in weight and 175 minutes per week of physical activity.

In 1998, the National Heart, Lung, and Blood Institute (NHLBI) Obesity Education Initiative, in cooperation with the National Institute of Diabetes and Digestive and Kidney Diseases, took a major step in the translation of research into effective treatment. The expert panel released a thorough review of the scientific evidence to date on the appropriate assessment and treatment strategies related to overweight and obesity. The report entitled *The Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: Evidence Report* provides health care practitioners with the first evidence-based treatment guideline on overweight and obesity.¹⁰ It serves as the basis for a variety of educational materials, products and interactive tools created for health professionals and patients. These materials can be found on the NHLBI's Aim for a Healthy Weight web page at http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/index.htm. The NHLBI is also planning a national communications campaign to bring broad-scale attention to this public health menace.

Another effort to translate findings into practice is the National Diabetes Education Program (NDEP), which promotes the early diagnosis and improved treatment and outcomes for people with diabetes. Information from the NDEP is available at <http://www.ndep.nih.gov>.

A variety of organizations in numerous countries have begun efforts to stem the growing tide of overweight/obesity and diabetes. In 2001, the US Surgeon General released the *Call to Action to Prevent and Decrease Overweight and Obesity*.¹¹ The *Call to Action* states that overweight and obesity are among the most pressing health challenges faced today and may soon cause as much preventable death and disease as cigarette smoking. It encourages professional organizations, community groups, and policy makers to do the following: promote the recognition of overweight and obesity as a major public health concern; assist Americans in balancing healthful eating with regular physical activity; encourage environmental changes that help prevent overweight and obesity; identify effective and culturally appropriate interventions; and develop and enhance public-private partnerships to help implement this vision.

Many countries have recognized the detrimental health and economic impact from overweight/obesity and type 2 diabetes in their populations. Global success in dealing with overweight/obesity and type 2 diabetes depends on changes in individual behaviors, group influences, environmental change, and public policies. Only then will we begin to see positive trends in CVD and type 2 diabetes.

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