Diabetes moving from affliction of affluent countries to a global problem

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Lisa Staimez, left, and Mary Beth Weber, middle, are studying diabetes in India. Credit: Emory University

The number of people with diabetes has quadrupled from 1980 to 2014, and 415 million adults in the world now have diabetes, according to Rollins researchers. Globally, it was estimated that diabetes accounted for 12 percent of health expenditures in 2010, or at least $376 billion—a figure expected to hit $490 billion in 2030.

When K.M. Venkat Narayan first began studying type 2 diabetes in the early 1990s, it was considered a disease of adults in affluent countries. Today diabetes has spread to every country in the world, to both urban and rural areas. It afflicts the poor as much as if not more than the rich and strikes children and teens as well as adults. A possible new phenotype of type 2 diabetes has emerged that is affecting younger, thinner people.

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"In the years since I began working in this field, diabetes has grown to become one of the biggest public health threats we face," says Narayan, Ruth and O.C. Hubert Professor of Global Health. "The spread of some of the ills of a modern lifestyle—sedentary behaviors, a diet of processed and unhealthy foods, and an increase in obesity—has made diabetes a worldwide crisis. And at least in its most common form, it is substantially preventable."

Burden in low-income countries

Despite the great strides in treating diabetes in high-income countries, much about the disease in low- to middle-income countries remains a mystery. Can interventions that have been proven effective in places like the U.S. be successfully translated in poorer countries? Why are thinner and younger people in some countries developing diabetes, and how does this form of the disease differ from the more common type that occurs in overweight people?

The gap in knowledge has a straightforward explanation. About 75

percent of the burden of diabetes is borne in low- and middle-income countries, but more than 95 percent of the research is being conducted in high-income countries. Narayan and his team have been working to build up the research base in low- and middle-income countries, particularly in India and Pakistan.

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Mary Beth Weber, assistant professor of global health, partnered with the Madras Diabetes Research Foundation in Chennai, India, on a study that showed the interventions that have proven successful in the U.S. and elsewhere in preventing prediabetes from advancing to diabetes can work as well in India in some segments of the population. After three years, the study group that got the recommended intervention—lifestyle education plus the glucose-lowering drug metformin if needed—was 30 percent less likely to develop diabetes than the control group.

Weber is now planning an implementation study to see if this type of diabetes prevention program can be implemented at worksites in India. She and her team are modifying the educational curriculum and training peer educators to provide the interventions where they might have the

most impact.

Some participants, however, did not respond as well to Weber's intervention, and this group seems to represent a different phenotype of the disease. These people were thinner—some with BMIs as low as 18.5—and younger than the typical person with type 2 diabetes, and their disease characteristics were different from those in obesity-related type 2 diabetes.

Classically, in type 2 diabetes, the pancreas beta cells initially have no problem producing insulin. The trouble is that the body's cells become resistant and thus there is a problem regulating glucose, which builds up in the blood. Over years, the beta cells become exhausted as they have to work hard to produce more insulin to regulate higher glucose levels, and then they begin to fail. This type of diabetes, generally associated with obesity, responds well to weight loss interventions and metformin.

However, when Weber and Lisa Staimez, assistant professor of global health, looked at blood samples of Asian Indians with prediabetes, they found that there had already been dramatic change in their beta cell function. "This suggests that poor beta cell function might happen much earlier in this group as compared with those with typical type 2 diabetes," says Staimez. "But we don't know why."

Some hypothesize that this early beta cell dysfunction may stem from historic undernutrition. Their bodies may be programmed by food scarcity to store fat differently and perhaps secrete less insulin. Indeed, thin Asian people actually have more body fat than a similarly sized person in the U.S., but in Asian individuals fat is stored around organs. This type of fat storage has been linked to higher risk for cardiometabolic diseases like diabetes.

This thin group does not respond well to traditional interventions, such as

weight loss. "In the other groups, you are trying to improve insulin's action, whereas here you might have to improve insulin secretion, which we don't know how to do yet," says Narayan. "There is a huge gap in the research in this form of diabetes."

Staimez is starting one study on this group. She wants to know the impact on the child of a mother who is underweight or malnourished. She will look at infants of both normal weight and underweight mothers and compare their beta cell function at six months of age. "Understanding the way type 2 diabetes develops in this group could lead to some really innovative pharmacologic and lifestyle interventions," says Staimez. "By understanding early life factors, this study may provide new insight on how to globally improve the worsening reality of diabetes."

Provided by Emory University

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