The Fattening Burden of Type 2 Diabetes on Mexicans

Projections from early growth to adulthood

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In Mexico, diabetes is the first cause of adult nonobstetric hospital admissions and hospital mortality and the third cause of mortality nationwide (1). Its overall prevalence increased from 8.8% in 1993 to 11.4% in 1999 (2). This was particularly marked, rising from 6.6 to 14.4% among the southern states of Mexico, which have the highest prevalence of undernutrition and the largest population of Mexican Indians (2). More drastic increases in type 2 diabetes are expected to occur over the next decades for the following reasons.

First, obesity, which is a high risk factor for type 2 diabetes, is also increasing rapidly in Mexico. In fact, between 1993 and 2000 the prevalence of overweight and obesity increased from 55 to 62% among adults (3,4) and between 1989 and 1998 the prevalence increased from 77.8 to 79.9% among 35- to 64-year-old men and women in the low-income Mexico City urban population (5). In addition, in a recent nationwide nutrition survey a 27% prevalence of overweight and obesity was found among children (6). Furthermore, this surge in childhood obesity has been associated with reduced physical activity and consumption of foods and drinks that are high in energy density (6). It was found that at the national level, only 3% of children reported intense physical activity (6), while in the Mexico-U.S. border state of Baja California, >90% of children and teenagers reported consumption of a soft drink daily and >75% had a daily high fat–containing snack (7). These patterns of lifestyle are undoubtedly high risk factors that favor the development of obesity and diabetes.

Second, pregestational obesity and gestational diabetes, which are associated with high birth weight and are both risk factors for later obesity, type 2 diabetes, hypertension, and the metabolic syndrome (8), are also increasing in Mexico (3,4,9) (Table 1). The fact that 1 in every 5 newborns in Mexico are heavier than 4 kg and that 1 in every 10 newborns are lighter than 2.5 kg (1) suggests that neither pregestational obesity nor gestational diabetes are adequately controlled in this country, leaving these babies at higher risk of becoming obese and developing its comorbidities later in life. The increasing prevalence of obesity in Mexico, where 58% of women of reproductive age are either overweight or obese (6), is therefore a cause of great concern for public health.

The third reason as to why the prevalence of diabetes will surge in Mexico is based upon emerging evidence from longitudinal studies conducted in several countries stating that malnutrition early in life, when followed by catch-up growth during childhood, is a high risk factor for the development of obesity, diabetes, and cardiovascular diseases in adulthood (10–12). Indeed, the available evidence suggests that catch-up growth per se is a state of hyperinsulinemia and that it is characterized by a disproportionate recovery of fat rather than lean (muscle) tissue (13). This phenomenon of "catch-up fat" (13) underscores the long-term pathophysiological consequences of catch-up growth, particularly among children from the low socioeconomic population groups undergoing transition from rural to urban areas, where they have more access to energy-dense fatty foods.

These above-mentioned conditions that predispose Mexicans to type 2 diabetes are compounded by an inadequate preventive health care system. At the prenatal care at primary health care clinics in Tijuana, tests of glucose tolerance are rarely conducted. Only 3% of the women at the Instituto Mexicano del Seguro Social (IMSS) and none of the women seen at the uninsured clinics, Instituto de Servicios de Salud (ISESALUD), had a 50-g glucose load test. In addition, only 45% of the women at IMSS and 23% of the women at ISESALUD had two fasting blood glucose tests.

Greater awareness of the diabetes epidemic in Mexico will eventually raise the critical question of how the cost of its treatment will be met in this country. The public health care system in Mexico provides services for insured and uninsured population, and those who are uninsured might received care from the "oportunidades" (OP) and the "seguro popular" (SP) programs. The OP program covers 15–10% of the population, i.e., the extremely poor, and provide some primary care services including drugs for diabetes and hypertension. The SP was expected to cover 500,000 families by the end of 2003, but by 2010 it will be expected to cover 45 million Mexicans (14). Therefore, by the end of 2003, 43 million people would have to pay for drugs and for most of their health care services. Furthermore, monitoring supplies and syringes are not provided by the public health care system. The cost of drugs at private pharmacies in the Mexico-U.S. border city of Tijuana in 2003 was $60 U.S. a month for the treatment and control of diabetes, $60 U.S. for the treatment of high cholesterol, and $60 U.S. for the treatment of hypertension. In 2002 at

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Abbreviations: OP, oportunidades; SP, seguro popular.

Table 1—*Trends of diabetes, hypertension, overweight, and hyperlipidemia in Mexico*

Disorder	Source	Age-group (years)	Cutoff	Prevalence (%)
Diabetes				
Fasting blood glucose	1992–1993*	20–69	≥7 mmol/l	8.5
Any blood glucose			≥11 mmol/l	
Fasting blood glucose	2000†	20–69	≥7 mmol/l	10.7
Any blood glucose			≥11 mmol/l	
Glucose impairment				
Fasting blood glucose			≥6.1–7 mmol/l	12.7
Any blood glucose			≥7–11 mmol/l	
Δ Cholesterol				
	1987–1988‡	20–98	≥5.17–6.20 mmol/l	22.8
	1987–1988‡	20–98	≥6.20 mmol/l	10.6
	1992–1993*	20–69	≥5.2–6.3 mmol/l	27
	1992–1993*	20–69	≥6.3 mmol/l	7
HDL cholesterol	1992–1993*	20–69	0.9 mmol/l	48
LDL cholesterol	1992–1993*	20–69	≥4.2 mmol/l	10
Overweight				
	1992–1993*	20–69	25–30 kg/m^2	35
	2000†	20–69	25–30 kg/m^2	38
Obesity				
	1992–1993*	20–69	≥30 kg/m^2	20
	2000†	20–69	≥30 kg/m^2	24.4
Overweight and obesity				
	1992–1993*	20–69	≥25 kg/m^2	55
	2000†	20–69	≥25 kg/m^2	62.4
Hypertension				
Systolic blood pressure	1992–1993*	20–69	≥140 mm/Hg	31.0
Diastolic blood pressure			≥90 mm/Hg	
Systolic blood pressure	2000†	20–69	≥140 mm/Hg	30.5
Diastolic blood pressure			≥90 mm/Hg	

*Ref. 4, National Survey of Chronic Diseases; †ref. 3, National Health Survey; ‡ref. 9, National Serum Epidemiologic Survey.

least 65% of the family income in Mexico was approximately $250 U.S. a month (15). That income will hardly meet the need for the treatment of diabetes and hypertension for one member of the family. In fact, at the National Health Survey, it was shown that >50% of adult population have at least one chronic disease and that >50% of them have no drug treatment (3). The above data suggest that neither the public health care system nor the uninsured population can afford to control the "diabesity" epidemic. This situation might be similar in other developing countries where there is no universal health care, including drug provision.

In conclusion, the lack of control of prenatal and postnatal risk factors, as well as the high prevalence of obesity/diabetes risk behaviors predicts a marked increase in the incidence of the diabesity epidemic in Mexico. An urgent strategy at the national level is needed to effectively prevent diabetes and obesity at different levels. This would need to include a more adequate prenatal care for obese and gestational diabetes, adequate monitoring of growth and nutrition during postnatal period, and intervention programs to promote physical activity and healthy eating at the preschool and grade-school levels.

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