

Early childhood obesity: a call for early surveillance and preventive measures

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The study of preschool children in Newfoundland and Labrador reported by Canning, Courage and Frizzell¹ in this issue (see page 240) indicates that about 8% of preschool children in Newfoundland and Labrador aged 3.5 to 5.5 years are obese, and a further 17% are overweight. This research emphasizes the importance of early surveillance based on direct assessment and makes a clear case for increased efforts at preventing and decreasing childhood obesity. Although the prevalence of overweight and obesity tends to be higher in the Atlantic provinces than in the rest of Canada, these results have implications for all provinces: in 1996 the reported prevalence of overweight in Canadian children aged 7 to 13 ranged from 23% to 36%, and in every province the rate has at least doubled since 1981.^{2,3}

Early surveillance of childhood obesity does not need to be expensive; indeed, Canning and colleagues' study was based solely on height and weight data collected by public health nurses through regional health and community service boards. The public health infrastructure for immunizations and preschool screening could easily be extended to include the direct measurement of children's height and weight. However, several issues concerning the measurement of body fat and the definition of overweight and obesity are unresolved. Canning and colleagues estimated children's body mass index, defined as the child's weight divided by the square of his or her height (kg/m^2). This index, when used with conventional definitions of overweight and obesity, can misclassify children who are particularly short or tall,⁴ or who are of Asian descent.⁵ Moreover, other indices based on weight and height, such as kg/m^3 , may provide a more accurate measure of relative adiposity in very young children.⁶ Although there are "gold standard" procedures for measuring adiposity, including hydrodensitometry (underwater weighing), magnetic resonance imaging and computed tomography, these are impractical for population surveillance, especially of young children.⁷ Nevertheless, we need research using these procedures to validate indicators derived from direct measures of height and weight.

The cutoff points to define overweight and obesity are also problematic. Canning and colleagues used the method proposed by Cole and coauthors,⁸ which projects the prevalence of obesity and overweight for boys and girls at age 18 (using the standard adult cutoffs of $25 \text{ kg}/\text{m}^2$ for over-

weight and $30 \text{ kg}/\text{m}^2$ for obesity) to earlier ages. This approach assumes that, on average, children maintain their relative position in a population throughout childhood. However, the accumulation of adipose tissue during childhood occurs primarily during the third trimester through to the end of the first year of life; during puberty; and in late adolescence.⁹ Each of these "filling periods" is followed by "stretching periods," when the percentage of fat in children's body mass falls.^{7,10} The increase in adipose cells during the first period occurs mainly through proliferation, and there is a further increase in the number of adipose cells during puberty. After adolescence, increases in body fat are mainly attributable to increases in the size of adipose cells.¹⁰ Consequently, it may be that the dramatic secular increases in obesity observed in Canada over the past 2 decades are associated more with changes in the prevalence of obesity for particular age groups, and these may vary among subpopulations. Although the method used by Cole and associates is perhaps the best one available, longitudinal research is required to develop age- and sex-related clinical measures of overweight and obesity, based on health risks and the developmental patterns of physically fit children.

Research on the risk factors associated with early childhood obesity is at an early stage. A study of Israeli army recruits found that youth whose birth weights were greater than 4000 grams were more than 3 times as likely to be obese at age 17.¹¹ Other research has implicated smoking during pregnancy and parental obesity as significant risk factors.¹²⁻¹⁴ This research suggests an interaction between a child's genetic disposition to obesity and his or her environment during their mother's pregnancy and the first year of life.

The population of preschool children that Canning and colleagues studied in Newfoundland and Labrador was about halfway through the first stretching period. Therefore, many of these children were probably overweight or obese on their first birthday, and a disproportionate number would likely have had exceedingly high birth weights. Some of them may also have increased their proportion of body fat after their first birthday, when most children are reducing their proportion of fat. These findings emphasize the need for even earlier surveillance, perhaps at birth and at 6 and 12 months of age. They also stress the need for longitudinal research that follows children from the prenatal period through to late adolescence.

Children who are obese or overweight when they enter school are at risk of being overweight and obese throughout their school years and into adulthood. They are more likely to experience health problems, including sleep apnea, asthma, fatty liver disease, type II diabetes and either early or delayed puberty.⁷ Children who are overweight or obese tend to have lower self-esteem, which in turn is associated with lower academic achievement.¹⁵ They are also more likely to be obese as adults and at risk of cardiovascular disease.^{16,17} If, at a conservative estimate, 20% to 25% of Canadian children are overweight or obese when they enter school, we need widespread multisectoral preventive efforts to ensure that they do not increase their risk of future problems during their school years. This will require health promotion policies in schools concerning diet and exercise, support from food industries to offer more nutritious food, support from the public and private sectors to facilitate healthy pregnancies, and local, provincial and national funding and legislation to improve the safety of neighbourhoods and increase access to playgrounds and recreational facilities. Leadership and advocacy from both health professionals and social scientists is required to bring about these changes.

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