JNP

Managing Adolescents With Type 2 Diabetes Mellitus

Michelle P. Zappas, DNP, FNP, and Theresa Anne Granger, PhD, FNP

ABSTRACT

Over the past 3 decades, type 2 diabetes mellitus in adolescents, those between the ages of 12 and 18 years, has gone from unusual to increasingly common. The prevalence of type 2 diabetes in youth increased by 35% from 2001 to 2009 and has continued to rise. This rise in prevalence is attributed to the increase in pediatric and adolescent obesity. The aim of this article is to provide the nurse practitioner with the tools necessary to treat this unique population using a holistic approach. We address information regarding lifestyle and medical management, growth and development, and the social determinants of health.

Keywords: adolescent, obesity, social determinants of health, type 2 diabetes mellitus, youth

INTRODUCTION

Over the past 3 decades, type 2 diabetes mellitus in adolescents has gone from rare to commonplace.[1] Type 2 diabetes is now responsible for between 20% and 50% of newly diagnosed cases of type 2 diabetes.[2] Among youth 10-19 years of age, prevalence has increased by 35%.[2] This rise is attributed to the increase in adolescent obesity. Diabetes is now the third most common chronic illness among youth, affecting 2.22 per 1,000 of those < 20 years old.[3] Type 2 diabetes disproportionally involves racial and ethnic minorities; the prevalence per 1,000 is estimated to be 1.20 for Native American youth, 1.06 for African American youth, and 0.79 for Hispanic youth, compared with 0.17 for Caucasian youth.[2] The highest incidence can be found among the Pima Indians at 22.3 per 1,000; that is, 2.23% of those between 10 and 14 years of age have been diagnosed with type 2 diabetes.[1]

Type 2 diabetes is a financially burdensome public health epidemic, particularly among youth. In 2012, approximately US$245 billion was in some way attributed to this chronic illness.[4] The reduced life expectancy of those with type 2 diabetes, particularly at a young age, corresponds to the high cost of lost wages and productivity due to premature demise.[3] The progression to chronic micro- and macrovascular complications is related to the amount of time with diabetes.[3] Therefore, diabetic onset early in life signifies a high risk of developing these complications.[3]

PATHOPHYSIOLOGY

As in adults, the pathophysiology of type 2 diabetes is thought to be the result of a complex interaction between genetic and environmental factors. Type 2 diabetes is associated with a decline in pancreatic beta-cell function occurring in the setting of insulin resistance and hyperglycemia. During puberty there is an increase in insulin resistance, likely the result of an increased secretion of growth hormone and sex steroids, which peaks in mid-puberty and declines after puberty.[1,5] Elevated blood glucose intensifies insulin resistance and beta-cell insulin secretion.[1] Furthermore, excess adipose tissue secretes the metabolites leptin, adiponectin, and tumor necrosis factor-alpha, resulting in additional excretion of insulin and subsequent sensitivity changes.[1] Obese youth tend to have increased insulin levels and reduced responses to glucose metabolism compared with their non-obese counterparts.[1] Certain ethnic groups, such as African Americans, Latinos, Asian or Pacific Islanders, and Native Americans, are further

genetically susceptible to insulin resistance.[1] For example, African Americans between 7 and 11 years of age of have been found to have increased levels of insulin when compared with Caucasian age equivalents.[1]

SOCIAL DETERMINANTS OF HEALTH AND LIFESTYLE MODIFICATION

The social and relational web that adolescents grow up in is complex.[6] This dynamic web is often referred to as the social determinants of health. In part, the social determinants of health are conditions in the environments in which people are born, live, work, play, and age that affect a wide range of health outcomes and risks.[7] Health and eating habits developed during the adolescent period will extend into adulthood. The goal for the nurse practitioner (NP) is to assist adolescents with type 2 diabetes and their families in accessing resources and developing healthy habits that will carry them through their transition to adulthood with the ultimate goal of creating a consistently healthy lifestyle.[8]

Health outcomes for adolescents are influenced in part by a lack of access to basic needs.[9] The costs of food and fee-based physical activity opportunities may be prohibitive for some. In addition, the costs of managing type 2 diabetes are significant and may result in an increased financial burden for the adolescent and for the family.[10]

Eating a healthy, well-balanced diet, maintaining an appropriate weight, and incorporating physical activity into the whole family's habits is integral to adolescents achieving adequate glycemic control.[11] Engaging parents has been associated with positive effects on diabetes management.[12] Therefore, lifestyle modification should be aimed at the entire family. A low-fat, calorie-restricted diet of no less than 1,200 kcal/day is optimal.[13] The adolescent diet should focus on 3 meals daily, healthy snacks, with generous amounts of fresh fruits and vegetables. Portion sizes should be limited.[13] Complete avoidance of soft drinks and other empty calorie–containing beverages should be encouraged.[13] Referral to a nutritionist experienced in working with the unique dietary needs of adolescents with type 2 diabetes is recommended.[1]

Physical activity aids in insulin sensitivity by increasing uptake by the muscle.[5] The entire family should be encouraged to participate in moderate to vigorous physical activity for at least 60 minutes per day. Screen time (television and social media) should be limited to $<$ 2 hours/day to help encourage more activity.[5] Although formal, organized exercise may not be within the family's fiscal or logistical resources, it is important for the NP to take into consideration the family environment and make culturally aware, family-centered recommendations.[13]

Although a diet of fresh fruits and vegetables, along with exercise, is important to prevent weight gain and control, adolescents with type 2 diabetes living in low-income households may not have access to the types of goods and services as those adolescents living in higher income households, particularly with regard to available food choices. Adolescents living in poverty are among the most vulnerable.[14] The resulting food insecurity is a major issue for a number of reasons. Food insecurity contributes to poor health outcomes, including lower nutrient intake and obesity,[9,15] both of which have the potential to adversely affect type 2 diabetes by causing poor glycemic control.[10]

Resources located within the surrounding neighborhood and in the schools may provide access for the adolescent with type 2 diabetes to the needed recreational outlets and other services.[6] Neighborhoods with green spaces, parks, and outdoor play/recreation areas provide adolescents with areas to exercise and provide outlets to relieve stress and anxiety.[15] Living in residentially segregated neighborhoods and neighborhoods with low socioeconomic status may have an influence on healthy food choices, physical activity, and body mass index.[10,16] In addition, lack of access to recreational facilities and exercise programs in some neighborhoods may be a barrier to regular exercise.[8] NPs should not assume that adolescents are not motivated to change health behaviors. When asked, many adolescents expressed an appreciation of assistance in accessing nutrition and fitness services.[8]

At each visit, the NP can address social determinants of health and related factors by considering the following: (1) asking about family concerns or needs; (2) screening for specific social issues at visits; (3) asking about the number of addresses in the past year; and (4) asking about access to parks and green spaces for exercise. Food insecurity can be addressed by asking the