

INVITADO ESPECIAL***Acanthosis nigricans*: DETERMINING CHRONIC HEALTH RISK IN CHILDREN****By: Paul Villas, D.Ed.**

Department of Health and Kinesiology
The University of Texas-Pan American
Edinburg, Texas (USA)
pvillas@utpa.edu

Introduction

Surgeon General David Satcher's Call to Action in 2002 about the United States' obesity rates recognized that obesity was highest among minorities and the poor. He called for higher consumption of low-calorie, nutritious food items, including more vegetables and fruits (1). However, poor people's ability to adopt healthier diets may have less to do with health awareness, nutrition education, or readiness to change than with the fact that such diets cost more. In 2004, current U.S. Surgeon General Carmona said that obesity would soon surpass smoking as the nation's leading cause of preventable death. The Surgeon General supports a disease prevention model to combat chronic health problems. He predicted that if prevention is not embraced, states will always be chasing the dollar (2,3). While both Surgeon Generals were addressing obesity health issues in general, of particular concern should be the issue of childhood obesity, its health complications, its future health consequences and a strategy to reduce the problem.

There should be no question that health disparities are associated with inequalities in educational levels and income earnings. Equally as certain is the association between poverty and obesity (4). A question to consider is how to identify and address the obesity issue and provide solutions to address poverty. This paper promotes the screening of children for *Acanthosis nigricans* and obesity related health consequences as well as promoting early reading and numeracy to combat poverty.

The Disturbing Health Crisis

If the prediction that two out of every three children born after the year 2000 will develop type 2 diabetes is correct, an epidemic of grave proportions is looming (5). The dilemma's vastness is further compounded with the reported estimated costs doubling for treating type 2 diabetes (6). Because of the problem's magnitude, it is recognized that there are not enough clinicians or resources available to take care of the projected cases. Therefore, a public health approach is the recommended recourse.

The Diabetes Prevention Program (DPP) demonstrated that type 2 diabetes could be prevented or delayed and produced encouraging results through a change in lifestyle (7). Since prevention

is key, logic suggests employing a prevention strategy as soon as possible, meaning infancy/childhood. While the early childhood prevention strategy message needs to resonate, at issue also is how to get the message to those at greatest risk. Using highly prevalent clinical entity, metabolic syndrome, to educate is one strategy that can be employed. Metabolic syndrome is a term used to define a condition in a person who has three or more of five risk factors that include abdominal obesity, high triglycerides, low HDL, high blood pressure and high glucose levels (8). The metabolic syndrome has received clinical attention resulting from the attempts of targeting type 2 diabetes/cardiovascular risks factors as a means of risk reduction therapy. It can be emphasized to groups such as African Americans, American Indians, Asian Americans, Pacific Islanders and Hispanics/Latinos who have been identified as groups with the highest risk of developing type 2 diabetes (9). Additionally, the American Diabetes Association has associated risk in a person if at least three determined categories exist simultaneously. The categories are ethnicity/race, elevated blood pressure, *Acanthosis nigricans*, body mass index (BMI) >85th %tile, first degree relative with diabetes, elevated lipids, and polycystic ovary syndrome (10).

Targeting Children At-Risk

It has been established that physically fit children who also get proper nutrition excel academically (11). Since academic achievement is key to countering poverty, it is in everyone's best interest to ensure that children succeed in school. By putting academic success first, the issues of childhood obesity will be easier to address with the idea of averting future adult chronic health problems. Childhood obesity rates are increasing at rapid rates and across all racial/ethnic and socioeconomic classes. Since obesity is occurring faster in areas with the greatest poverty rates, addressing the obesity problem must also include increasing early childhood literacy and numeracy rates, physical activity opportunities and sensible food choices.

School districts that offer the National School Breakfast Program and the National School Lunch Program are poorer and have more overweight children (12,13). Although the USDA regulates the meal nutrient content of these programs, the regulation of "dietary fat" has taken center stage by offering foods with refined grains and added sugars under the "no fat" label." The most affordable foods are those that provide pure calories (sodas, fries, etc), whereas the tastiest ones are those that combine sugar and fat. Since key motivations for food choice are taste, cost, and convenience, the empty calorie foods that are energy-dense appeal to the poor because of taste and low cost. Energy-dense foods are those high in fat, sugar, or starch, and contribute to overeating and weight gain (14,15,16).

Other studies associate high consumption of energy-dense snacks, fast foods, and soft drinks with rising obesity rates both in this country and worldwide (17,18). Proposed nutrition interventions banning or placing restrictions on the sale of energy-dense foods in schools are important. However, while developing policies to discourage the consumption of added sugars and fats to promote healthier alternative food choices, it must be recognized just how cheap these energy-dense foods really are and how much more expensive a healthy diet will be. For example, the fact that high fructose corn syrup is less expensive than sucrose accounts for its growing use in the food supply. It is also true that the price of most vegetable oils is very low. It costs about a dollar to buy around 20,000 energy dense calories from oils and fats and about 20,000 calories of dietary energy from sugar (19). A daily energy ration of approximately 2,400 calories is very affordable when purchased in the form of refined grains, vegetable oil, shortening, sugar, bread, cookies, potato chips, or carbonated soft drinks. It should be no secret, then, that persons in poverty who wish to reduce diet costs consume record levels of refined grains, added sugars, and added fats. As an example, a 1.69 oz package of M&Ms candy provides 236 calories while an orange provides only 60 calories for the same money (20).

Literacy and numeracy are major issue related to poverty and affect health. Literacy is the ability to read, write, speak in a particular language and numeracy is the ability solve math problems at levels where a person can function in society (21). While attaining a high school or a college

education may not guarantee getting a high paying job, educational attainment is one of the most significant things an individual can do to resist poverty. Poverty rates of high school dropouts are three times higher than poverty rates among high school graduates and those with greater educational attainment have less poverty (22). Proper health status and the ability to learn, which include good nutrition and physical activity, has been established (23). Therefore, to attain the best citizenry possible, health, literacy and numeracy must be addressed together.

Acanthosis nigricans As A Screening Method

The increasing number of youth-onset type 2 diabetes cases has heightened new interest in children's health, particularly in cases where *Acanthosis nigricans* has been present at the time of diagnosis. *Acanthosis nigricans*, a hyperkeratinization of the skin, is a cutaneous marker associated with systemic disorders such as hyperinsulinemia and insulin-resistance and may serve as an indicator for heart disease, stroke and type 2 diabetes. Insulin-resistance and the compensatory hyperinsulinemia have been linked to obesity, hypertension, hyperlipidemia, stroke and cardiovascular disease. Ultimately, insulin-resistance results in pancreatic exhaustion which may lead to the development of type 2 diabetes and other chronic diseases. *Acanthosis nigricans* is a condition that can be easily evaluated by means of a visual examination as it frequently manifests itself on the nape and sides of the neck, but can also be found on the axillae, elbows, knuckles, knees, and in the groin area (24, 25). The literature reports that Hispanics, Native Americans and African Americans have a higher prevalence of these lesions and could be genetically predisposed and more sensitive to higher insulin levels (26, 27).

Because of the need to protect children from invasive health procedures, there is a need to determine intervention for those children at greatest risk with a prompt non-invasive technique. The recognized ADA algorithm for determining diabetes risk includes five non-invasive categories. Asking children about a first degree relative with diabetes may not prove reliable and attempting to determine ethnicity/race may put the screener in an uncomfortable position. Therefore, a non-discriminatory examination for determining diabetes risk should include *Acanthosis nigricans*, BMI and blood pressure measures as acceptable standards in a non-invasive method. *Acanthosis nigricans* has been determined to be a rapid reliable procedure and a clinical surrogate for hyperinsulinemia (28, 29, 30, 31).

While it is correct that much effort to avert chronic health conditions has gone into recommending a reduction in BMI, BMI as the first category to consider may result in identifying false-positives. A selected population study reported that 32% of overweight/at-risk-of overweight participants could not continue in the study because they did not have at least two other recognized at-risk markers (32). Another report mentioned that if *Acanthosis nigricans* is used as the first category of entry, only 5% of overweight/at-risk-of overweight are missed (33). Others have concluded that ***Acanthosis nigricans*** demonstrates a strong association with screening, inasmuch as screening was ordered for 93% of subjects identified as having ***Acanthosis nigricans*** who had been recommend for various health risks (34).

Conclusions

Public health advocates should join with researchers who are looking into the potential relationship between inexpensive food, agricultural and trade policies and the current obesity epidemic. In many cases, it is the policies that promote obesity in the very poor. While disparities in education and income produce barriers to adopting healthier diets and other lifestyle behaviors consistent with good health, they are not insurmountable. Given that childhood obesity has reached epidemic proportions in many countries, the focus of any policy should first converge on low-income children and families with the goal of increasing the educational and skill levels and thereby increasing the income capacity.

Because *Acanthosis nigricans* alerts us to hyperinsulinemia which suggests the development of the metabolic syndrome, identifying children with the marker is the first step in doing something about the impending future health problems. Besides lack of physical activity, the type and

quantity of food metabolized is the root cause of hyperinsulinemia. CDC has reported that the cornerstone for the treatment of the metabolic syndrome is dietary modifications and increased physical activity, functions can be accommodated during school hours.

Acanthosis nigricans can easily be evaluated by means of a visual examination in schools. In most cases, the *Acanthosis nigricans* manifestations may look like a dirty neck. Before cardiovascular disease and type 2 diabetes manifest themselves, the presence of *Acanthosis nigricans* alerts us to the need for change in dietary choices, over consumption and sedentary lifestyles. By the time *Acanthosis nigricans* is visible, insidious invisible health risk consequences are already occurring such as hyperinsulinemia, insulin resistance, high low-density- cholesterol, high triglycerides, high blood pressure, sleep apnea and type 2 diabetes. *Acanthosis nigricans* is most frequently seen in preadolescence and, in most cases, co-exists with obesity. These negative health conditions do much to impede academic success and thus exist as barriers to move away from poverty.

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