Community-Based Diabetes Prevention Program for Overweight Latino Youth: An essential first step.

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ABSTRACT:

Background: Obesity and type 2 diabetes have emerged as critical public health issues in the Latino population. Although both conditions manifest early in life, very few diabetes prevention programs have been conducted in Latino youth. Therefore, the purpose of this report is to describe the foundations and clinical characteristics of a culturally grounded, community-based diabetes prevention program for overweight Latino youth.

Methods: 109 youth were referred to a community-based medical clinic in Phoenix, Arizona. Height, weight and body mass index (BMI) were determined by a physical exam and metabolic risk factors were obtained from fasting blood samples. HDL-Cholesterol, Triglycerides, Glucose, and Insulin were compared to published reference values.

Results: Youth were significantly overweight (BMI=30.4±4.9 kg/m^2) and exhibited the following fasting metabolic characteristics: mean HDL-Cholesterol = 37.9 ± 8.5 mg/dl, Triglycerides = 140.0 ± 82.2 mg/dl, Glucose = 91.0 ± 8.3 mg/dl, and Insulin = 24.2 ± 17.6 μU/ml. When individual levels were compared to reference standards, 68.4% of youth had low HDL, 33.8% had elevated Triglycerides, 11.4% had fasting hyperglycemia, and 64.1% were hyperinsulinemic.

Conclusions: Our initial findings suggest that a community-based diabetes prevention program for overweight Latino youth is a feasible strategy for reaching this high-risk population. Long-term follow-up is necessary to determine the effectiveness of such a program on the metabolic health of these youth.

INTRODUCTION:

The prevalence of overweight among youth defined as a body mass index (BMI) ≥ 95th percentile for age and gender has dramatically increased in recent years such that ~17% of today's youth are considered overweight (1). Moreover, youth from ethnic minority groups including Latinos are disproportionately more affected thus placing them at higher risk for developing obesity-related disorders at an early age (2). It has recently been shown that nearly 30% of overweight Latino youth have impaired glucose tolerance or pre-diabetes and 30% have a clustering of cardiovascular disease and diabetes risk factors known as the metabolic syndrome (3, 4). Clearly Latino youth represent a group who warrant special attention by the healthcare community particularly as they are the fastest growing segment of the pediatric population in the United States (5).

Unfortunately, Latino youth are less likely to receive routine health screenings and medical care compared to other children which may further perpetuate future health disparities (6). While regional access may be one reason Latino youth report lower rates of healthcare services, evidence suggests that limited insurance coverage as well as language and cultural barriers are also contributory (7). In the absence of routine health services, Latino youth and their families may not be receiving adequate consultation and education related to obesity and type 2 diabetes prevention; a particularly troubling notion in this population as the prevalence these preventable diseases is high (8). Community-based medical clinics often fill a gap in the healthcare system to provide services to underserved minority populations who would otherwise not receive necessary care (9). These clinics circumvent several of the barriers often reported by Latinos such as transportation, cultural and language competency, and cost when services are offered on a sliding scale. Despite the potential for these clinics to meet an overwhelming need, to date very few reports of community-based

medical clinics offering diabetes prevention programs to overweight Latino youth have been described in the literature. Therefore, we will present early findings of a cohort of overweight Latino youth who were referred to a community-based diabetes prevention program in Phoenix, Arizona. In addition to baseline characteristics, we will describe the process by which the program was developed and the strategic partnerships created with referring school-based health centers and hospital laboratories for biochemical measurements.

METHODS:

Description of the Clinic.

The St. Vincent de Paul Virginia G. Piper Medical & Dental Clinic is a community-based clinic that offers no-cost primary and specialty healthcare services to uninsured adults and children. On average, the clinic population lives 200% below the Federal Poverty Limit. Services are provided to the primarily Spanish-speaking clientele by volunteer physicians, nurse practitioners and naturopathic physicians who are supported by clinic staff as well as cadre of volunteer nurses, interpreters, laboratory technicians, pharmacists, dietitians, physical therapists, psychiatric counseling, and clerical personnel.

While the clinic offers health services for a wide variety of conditions, type 2 diabetes has historically been one of the most prevalent diagnoses managed. As a result, a Family Diabetes Program was developed to offer a more comprehensive approach to diabetes care. Initially, the program focused on education and self-management of newly diagnosed patients and their family members. The program was coordinated by bilingual / bicultural registered dietitians, certified in diabetes education (C.C. and Y.K) who worked closely with *promotores* or community health promoters. In addition to the dietitians and promotores,

volunteers were recruited to assist with group education classes, individual sessions, case management and home visits. Following establishment of the diabetes education component, the Family Diabetes Program began focusing on adult patients at risk for diabetes (Every Little Step Counts). The program was recently expanded to include a multi-disciplinary diabetes prevention component specifically targeting overweight Latino youth. This program was called the Every Little Step Counts - Children's Health In Lifestyle Decisions, or ELSC-CHILD.

Referrals were solicited through the clinic itself as well as partnerships with neighboring school districts which run primary care school-based health centers for their students. These school-based clinics do not have the capacity or resources to deliver a specialized program for this population but have adequate expertise in identifying overweight children at highest risk based upon clinical indicators beyond obesity such as hypertension, family history, or presence of acanthosis nigricans. Thus, these school-based health centers served as a natural link to refer the children in the community in need of follow-up care. The partnership was strengthened by the preexisting relationship between the school-based health centers and the clinic which has provided back-up pediatric and specialty healthcare for several years.

In order to identify the most appropriate children for follow-up care, a referral form was developed in collaboration with the school-based healthcare providers. An example of the referral form is provided in Figure 1. While overweight status (BMI $\geq 95^{th}$ for age and gender) was a requirement for referral, each child had to possess at least 2 additional risk factors to be considered for the program. To ascertain the most comprehensive metabolic profile of referred children, fasting laboratory values were requested prior to enrollment into

the program. Collection of these measures was coordinated by collaborating with a local community hospital.

The present analysis is a retrospective chart review describing the baseline clinical characteristics of the first 109 children referred to the ELSC-CHILD Diabetes Prevention Program at the St. Vincent de Paul Clinic. Upon entry to the program, each child underwent a comprehensive medical history and physical exam by a physician which included height, weight, and BMI calculation. Following the medical visit, children and their parents were invited to attend a series of 4 culturally sensitive nutrition and wellness education classes delivered by bilingual / bicultural registered dieticians (C.C. and Y.K.) The classes focused on various components of health including healthy eating, physical activity, parent/child roles and responsibilities, stress management, self-efficacy, and goal setting. In addition to these group education classes, the coordinating physician (CK) led group sessions to assess readiness for change of the children as well as determined the engagement of the family unit in the context of social support. These sessions often addressed common challenges and barriers observed such as coping with diabetes or family distress.

While the lifestyle program was offered to all referred children, some youth were prescribed medication (Metformin) in conjunction with lifestyle education to support weight management efforts. The decision to use pharmacological intervention was based upon in-depth conversations with the children (age > 10 years) and families which included the potential benefits, risks, and side effects. Typically, Metformin was considered for those youth who reported significant difficulty in controlling appetite urges or who have experienced rapid recent increases in their obesity trajectories. Standard protocols were developed to more closely monitor these youth and included: periodic laboratory test of liver function, regular check-ups, and medication adherence strategies. In addition to the weight

management and diabetes prevention potential of Metformin the low cost of this medication makes it an appealing therapeutic strategy in this population.

STATISTICS:

Descriptive and metabolic characteristics are presented by gender as well as for the combined sample as Means ± SD. Individual metabolic risk factors (fasting HDL-cholesterol, triglycerides, and glucose) were defined as abnormal according to a recently published consensus definition of the metabolic syndrome in children by the International Diabetes Federation (10). Children were also classified as hyperinsulinemic if they had a fasting insulin > 15μU/mL (11). In addition, the subgroup of children who were treated with Metformin was compared to those children enrolled in the lifestyle education classes. Group comparisons were evaluated by independent sample t-tests and Chi-squared analysis. All data were analyzed by SPSS 15.0.

RESULTS:

Baseline characteristics of the children referred to the ELSC-CHILD Diabetes Prevention Program are presented in Table 1. Children were similar in age, height, weight, and BMI but boys had significantly higher fasting glucose levels compared to girls (93.5 ± 7.5 vs.88.8 ± 8.4; P = 0.01). No other metabolic differences were noted. When genders were pooled to examine the prevalence of selected features of the metabolic syndrome, 68.4% had low HDL, 23.9% had high triglyceride levels, 11.4% had impaired fasting glucose, and 64.1% had elevated fasting insulin levels. No gender differences were noted in the prevalence of any abnormal metabolic variable.

When compared to the rest of the sample, children treated with Metformin (N = 18) were significantly heavier (83.4 ± 17.1 vs. 67.8 ± 20.1 kg, P = 0.003), had a higher BMI (34.9 ± 2.7 vs. 29.5 ± 4.7 kg/m^2, P < 0.001), higher fasting insulin (35.2 ± 27.2 vs. 21.7 ± 13.7 μU/ml, P = 0.01), and higher triglyceride levels (176.5 ± 131.0 vs. 129.2 ± 61.7 mg/dl, P = 0.003) compared to youth receiving lifestyle education alone. No significant differences were found in age, height, HDL-cholesterol, or glucose (data not shown).

DISCUSSION:

Obesity represents the most challenging public health dilemma facing today's society. In additional to the staggering numbers of overweight / obese adults, a substantial number of children are either at-risk of becoming overweight or are overweight (1). Unfortunately, increased adiposity emerges at a very young age as do disparities in obesity rates among minority children (12). Although excess adiposity may be explained by a simple biologic process related to energy imbalance (13), the prevention and treatment of obesity has proven to be more challenging (14, 15). There remains a relative paucity of intervention programs described specifically targeting Latino youth who experience disparities in both obesity rates as well as risk for type 2 diabetes (16) (12).

With the growing number of overweight Latino youth in the United States, community-based medical clinics present a novel venue to initiate obesity intervention programs for this population. In this manuscript we presented the thought process, essential partnerships, and feasibility of developing a culturally-sensitive diabetes prevention program for overweight Latino youth. We found that in addition to being overweight, a substantial proportion of these youth presented with abnormal clinical features associated with obesity including dyslipidemia, impaired glucose regulation, and hyperinsulinemia. Collectively, our

findings support previous academic institution-based work in this population suggesting that overweight Latino youth are at high risk for developing chronic obesity-related disorders early in life (3). The fact that our population represented a true community-based sample further highlights the magnitude of future disease risk in this population.

Of all the abnormal risk factors found in our sample, perhaps the high percentage of youth with hyperinsulinemia may be the most troubling. In adults, elevated insulin levels independently predict several chronic diseases including hypertension (17), cardiovascular disease (18), and type 2 diabetes (19). Moreover, elevated fasting insulin levels are thought to be the earliest manifestation of metabolic disease in children (20). Collectively, these findings suggest that in the absence of significant lifestyle changes, these youth will most likely develop obesity-related chronic disease in the future.

Although the majority of the children were identified as overweight by their school nurses, if not for the ELSC-CHILD program these youth would have otherwise received no structured education or follow-up care. Currently, school systems are not set up to adequately provide the comprehensive level of care necessary to individually counsel overweight children and families regarding metabolic health (21). Although several obesity prevention and treatment programs for youth have been described in the literature (14, 15), these programs may be offered through large academic medical centers or through private medical groups in effect placing resources out of reach for most families. Much like the challenges in receiving routine health screenings, access for Latino youth may be limited to those families who live in close proximity to facilities or to those who can afford the costs of private programs. Not only was our program offered in a community setting, but because of the financial structure of the St. Vincent de Paul Clinic (which runs largely on donations and volunteer services) we were able to offer the program without charge to the families.

Despite the strengths of our program there are some limitations that stand worthy of comment. First, while we have developed a close relationship with referring school-based health practitioners, initial contact by clinic staff was not feasible for every patient prior to enrollment. As such, some of the referrals never made it to our clinic and thus may have been lost to follow-up. Second, since the blood draws for metabolic assessments were ordered by the school-based health centers, children may have come to the clinic with incomplete laboratory assessments. Last, because our clinic relies heavily on volunteer physicians, scheduling patients was limited to days in which we had adequate medical coverage. In conclusion, we have described the feasibility and initial clinical characteristics of a community-based diabetes prevention program for overweight Latino youth. Community-based approaches for disease prevention have the potential to reach large numbers of individuals. The substantial proportion of overweight youth presenting with risk factors for cardiovascular disease and type 2 diabetes support the notion that wide-scale intervention strategies are warranted. Whether this setting will prove to be a viable mechanism for improving the health and well-being of this population requires further investigation.

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Figure 1. Child Referral Form to ELSC-CHILD Program from School-Based Healthcare Provider

Child's Name: _____ **D.O.B.** ___/___/___, **Age:** _____ **M F** **Phone:** (_____)_____-_____ **Parent or Guardian's Name:** _____ _____ **Siblings/Ages:** _____ _____ _____	**Date Referral Written:** ___/___/___ **Referred by:** _____ **Title:** _____ **School:** _____ **Phone:** _____ **Fax:** _____ **Referral received on:** ___/___/___

Overweight (BMI ≥ 95th %ile of age and sex, weight for height > 95th %ile or Off the Chart)

Plus any two for the following risk factors:

( ) Has a family history of type 2 diabetes in first and second degree relatives;
( ) Belongs to a certain race/ethnic group, e.g., Hispanic Americans, Native Americans, Asian-Americans
( ) Have signs of insulin resistance or conditions associated with insulin resistance: (acanthosis nigricans, hypertension, dyslipidemia, polycystic ovary syndrome, thyroid disease, etc.)
( ) Other or Comment:

_____

Date: ___/___/___ Ht.: _____ Wt.: _____ BMI: _____
Other pertinent information:_____

Table 1. Descriptive and metabolic characteristics of youth			
Characteristic	Boys	Girls	Total
Age (years)	11.6 ± 2.7	12.0 ± 3.2	11.8 ± 3.0
Height (cm)	150.2 ± 16.6	150.7 ± 14.6	150.4 ± 15.5
Weight (kg)	69.5 ± 21.2	71.5 ± 19.7	70.5 ± 20.4
BMI (kg/m2)	30.1 ± 4.6	30.8 ± 5.2	30.4 ± 4.9
HDL-cholesterol (mg/dl)	38.7 ± 8.3	37.2 ± 8.8	37.9 ± 8.5
Triglycerides (mg/dl)	139.0 ± 69.9	139.0 ± 93.1	139.0 ± 82.2
Glucose (mg/dl)	93.5 ± 7.5*	88.8 ± 8.4	91.0 ± 8.3
Insulin (μU/ml)	24.4 ± 19.5	24.1 ± 16.0	24.2 ± 17.6
Data are Means ± SD. BMI, Body Mass Index * $P < 0.05$			