ENERGIZE! A Community-Based Lifestyle Intervention Targeting At-Risk, Overweight Children

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Twenty-eight percent of US adolescents are overweight or obese, and type 2 diabetes now accounts for >30% of all diabetes cases among adolescents. Although the Diabetes Prevention Program demonstrated that a healthy lifestyle could reduce the rate of progression to type 2 diabetes in adults, access to intensive yet affordable lifestyle intervention programs remains limited. To begin to address the epidemic of obesity in North Carolina children, WakeMed Health and Hospitals has developed ENERGIZE!, a healthy lifestyle intervention program targeting overweight children at greatest risk for type 2 diabetes.

The ENERGIZE! program was developed through a community collaboration of local physicians, fitness organizations, and WakeMed. The goals of the program are to (1) identify overweight children aged 6-18 years with prediabetes or metabolic syndrome, (2) provide access to an intensive community-based lifestyle program that targets the child and their family, and (3) prevent type 2 diabetes and other obesity-associated comorbidities through the adoption of a healthier lifestyle. Children are identified by their primary care professionals as high risk if they are overweight (defined as a body mass index [BMI] percentile of ≥85) and meet 2 of the following criteria: minority ethnicity and family history of type 2 diabetes, acanthosis, or hypertension. They are then referred to WakeMed for measurement of fasting glucose and lipid levels. If risk factors are present and results of laboratory tests lead to a diagnosis of metabolic syndrome, prediabetes, or type 2 diabetes, children are invited to participate in the program.

The ENERGIZE! program is an intensive community-based program held 3 days weekly over 12 weeks that is designed to educate families about healthy eating, physical activity, and behavior change. The program incorporates an interactive, age-appropriate curriculum to review healthy nutrition, physical activity, behavior change, positive body image, self-esteem, and role modeling. Each week, children engage in 3 hours of structured physical activity that incorporates progressive skill building with cooperative games. Families participate in a fun fitness activity each week to stress the importance of families being active together and to teach group game skills. After completion of the intervention phase of the program, participants proceed to a maintenance phase and are reevaluated every 6 months for 2 years. BMI, blood pressure, height, weight, fasting lipid levels, and fasting blood glucose level are assessed at baseline, 6 months, 12 months, 18 months, and 24 months. Fitness evaluations, including a flexibility test, an endurance test, and a muscular strength test, as well as health behavior questionnaires, are performed during follow-up.

Since 2005, 3,755 children have been screened for the program, and 1,386 (37%) have been shown to have prediabetes or metabolic syndrome. To date, in Wake County, 862 children have been enrolled, and 535 have completed the 12-week intervention. The ethnic distribution of participants is 35% African American, 34% white, and 26% Hispanic. There is a slight predominance of female participants. Significant reductions in mean BMI percentile (97.7 vs 98.5; P < .05), total cholesterol level (163.8 mg/dL vs 173.5 mg/dL; P < .05), low-density lipoprotein level (102.1 mg/dL vs 106.9 mg/dL; P < .05), triglyceride level (120.6 mg/dL vs 143.0 mg/dL; P < .05), systolic blood pressure (112.7 mm Hg vs 116.9 mm Hg; P < .05), and diastolic blood pressure (63.1 mm Hg vs 70.2 mm Hg; P < .05) were observed at 6 months, compared with baseline levels. Significant reductions in fasting glucose level (98.6 mg/dL vs 103.8 mg/dL; P < .0001) were observed at 6 months for participants with an impaired fasting glucose level at baseline, and a trend toward increased high-density lipoprotein (HDL) level (31.7 mg/dL vs 30.5 mg/dL; P = .23) was observed for participants with an HDL level of <35 mg/dL at baseline. Significant reductions in metabolic syndrome were observed at 6 months, compared with baseline levels (McNemar statistic, 15.70; degrees of freedom, 1; P < .05). Improvements in BMI, glucose level, lipid levels, and blood pressure were sustained at 12 months for participants who continued to participate in the program. ENERGIZE! program graduates demonstrated a 30% improvement in flexibility, an 84% improvement in muscular strength, and a 48% improvement in endurance. Children and families reported increased daily physical activity, decreased consumption of sweetened beverages, and decreased consumption of high-fat snacks.

Our results suggest that, by promoting healthy lifestyle changes, the ENERGIZE! program reduces prediabetes and metabolic syndrome in at-risk, overweight children and may prevent progression to type 2 diabetes. The program has been successfully replicated in 12 North Carolina counties through various health systems, including hospitals, outpatient clinics, and health departments. ENERGIZE! is currently implemented in Wake, Buncombe, Nash, Henderson, and Stanly counties. Further research is needed to assess the long-term effectiveness of the ENERGIZE! program. It will be important to demonstrate whether lifestyle intervention programs such as ENERGIZE! are effective in the long term, so that needed third-party-payer reimbursement can be secured and thereby improve access to such programs. NCM}

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