Available online at www.sciencedirect.com
ScienceDirect
Diabetes Research and Clinical Practice 75 (2007) 159–168
DIABETES RESEARCH AND CLINICAL PRACTICE
www.elsevier.com/locate/diabres

Feasibility of a hospital-based, family-centered intervention to reduce weight gain in overweight children and adolescents ☆

Daina Dreimane [a,*], David Safani [a], Marsha MacKenzie [a,b], Mary Halvorson [a], Sharon Braun [a], Barry Conrad [a], Francine Kaufman [a,c]

[a] *Division of Endocrinology, Diabetes, and Metabolism, Department of Pediatrics, Childrens Hospital Los Angeles, Los Angeles, CA 90027, USA*
[b] *University of Texas Southwestern, Dallas, TX 75390, USA*
[c] *The Saban Research Institute of Childrens Hospital Los Angeles, Keck School of Medicine, University of Southern California, Los Angeles, CA 90027, USA*

Received 19 December 2005; accepted 31 May 2006
Available online 11 July 2006

Abstract

Objective: To evaluate the effects of a hospital-based, family-centered lifestyle program (Kids N Fitness©) on weight and health in overweight 7–17-year-old children.
Design: The Kids N Fitness© program consisting of up to twelve 90-min sessions was conducted in an outpatient setting. The program comprised interactive nutrition and exercise sessions with behavior modification. Subjects completed a logbook and child's health questionnaire. Measures and surveys were taken before, during, and after the program.
Participants: Two hundred and sixty-four overweight children (137 female, 73% Hispanic), mean age 11.5 ± 2.1 years, with body mass index (BMI) = 85th percentile, no physical limitations, and attendance of ≥50% of sessions. A subgroup of 115 children was observed for up to 6 months prior to program.
Intervention results: Weight and BMI velocity, and BMI, and BMI *z*-score were lower during the program than during the pre-program observation period. Compared, subjects in the 12-week program had significantly reduced gains in weight and greater losses in body mass index, than in 8 weeks. Improvements in emotional well-being and behavior correlated positively with weight loss ($p = 0.005$).
Conclusions: Positive health outcomes suggest that family-centered programs, stressing healthy eating strategies, participation in team-oriented physical activities, and behavior modification, are effective in improving weight dynamics and psychological functioning.

Keywords: Weight loss; BMI reduction; Obesity; Children; Adolescents; Family; Intervention

1. Introduction

Significant increases in obesity and type 2 diabetes are occurring across all age groups and ethnicities nationwide. Approximately one out of five children is now considered overweight or obese [1]. Both genetic and environmental factors contribute to obesity. While

☆ This work was presented in part at the American Diabetes Association Scientific Sessions, Orlando, FL, June 2004.

* Corresponding author at: Division of Endocrinology, Diabetes, and Metabolism, Department of Pediatrics, Childrens Hospital Los Angeles, 4650 Sunset Blvd., MS #61, Los Angeles, CA 90027, USA. Tel.: +1 323 644 8605; fax: +1 323 953 1349.
E-mail address: ddreimane@chla.usc.edu (D. Dreimane).

0168-8227/$ – see front matter
doi:10.1016/j.diabres.2006.05.017

approximately 80% of the offspring of overweight parents will become overweight, only 14% of offspring of two lean parents will become obese [2,3]. Predisposing environmental factors include excessive calorie consumption and decreased or inadequate physical exertion. Overweight children are more likely to become obese adults than are normal weight children [4]. Additionally, overweight children may experience psychological stress, poor body image, low self-esteem, feelings of shame and embarrassment, and other health problems [5].

The goals of treating overweight children are to decrease body weight, optimize body composition, improve well-being and lifestyle, and prevent potential complications such as diabetes and heart disease. Outcomes of various existing pediatric weight loss programs are difficult to compare due to differences in nutrition and behavior education, amount of prescribed exercise activity, and level of parental involvement. In outpatient settings, nutrition management, without a simultaneous exercise and behavior modification program, frequently fails as demonstrated by Pinelli et al. in a multi-center adult obesity treatment study [6]. Appropriately, the most dramatic short-term weight improvements are achieved in inpatient settings and camps where access to food is limited and exercise is mandatory [7]. However, while this type of treatment results in acute weight loss children must eventually face the trying challenge of maintaining their weight loss upon returning home. For long-term success in weight loss and weight loss maintenance, programs that include participation of a parent or caregiver as an integral component are generally more successful. Flodmark et al. demonstrated significant improvements in BMI in a number of severely obese 10–11-year-old children participating in a weight management intervention involving dietary counseling, exercise guidelines, and family therapy [8]. Epstein reported that participants in a child and parent weight management program demonstrated significantly greater decreases in percent overweight 5 and 10 years post-intervention (-11.2% and -7.5%, respectively) than a child-only group, or a group with variable family participation [9].

In an attempt to treat children at risk for overweight (BMI >85th percentile for age) and overweight (BMI >95th percentile for age), our center established a family-centered weight management program, KNF, in 1998, involving nutritional education, family therapy, and exercise activities. The theoretical framework behind this program was that lifestyle enhancement and family involvement would improve children's health.

We hypothesized that our weight management program would improve the lifestyle of the child and the family in order to achieve better weight controls. The study was designed to determine if changes in subjects' eating behaviors and physical activity, through participation in KNF, resulted in a significant decrease in weight velocity while in the program. Further, the study was designed to determine if there were significant changes in other variables, such as healthy food intake, exercise activity, and sense of well-being. A number of subjects were evaluated for presence of metabolic syndrome and results are published elsewhere [10].

2. Subjects and methods

2.1. Subjects

Subjects were referred to the program by our hospital staff, community physicians, school health personnel, or by self-referral. There was no charge to participate. Each child was required to be accompanied by a parent, grandparent, or legal guardian. All participants and parents signed informed consents prior to study enrollment. Eligibility criteria for program entrance included the following: (1) 7–17 years of age, (2) weight for height $\geq$85th percentile on the Center for Disease Control (CDC) growth charts, and (3) no physical limitations preventing regular exercise. Individuals were excluded from participation if they were non-ambulatory, undergoing rigorous medical therapy, or due to other medical conditions noted by their physician.

Approximately 20 subjects enrolled in each session and there were on average four sessions each year. Over 6 years, 417 overweight or at risk for overweight children enrolled into KNF.

2.2. Program design

In 1998, KNF began as an 8-week, eight-session intervention. After a preliminary analysis, it was determined that an 8-week intervention did not provide an ample amount of time for instruction to achieve expected outcomes. Beginning in the fall of 2002, the program was extended to 12 weeks. Due to space, staff, and resource limitations, 115 subjects had to wait up to 6 months prior to program commencement before beginning the program. Their data, obtained during registration for the program, were used for the calculation of weight and BMI velocities during the pre-program period.

At enrollment, all subjects chose a personalized exercise and/or nutrition goal to work on throughout the program and were encouraged toward the achievement of their goal(s) by program staff. During the program, participants were also asked to complete the KNF logbook© three times and an exercise activity sheet twice at set intervals in an effort to reinforce positive lifestyle changes.

Pre- and post-program measures included weight, height, BMI, resting blood pressure, 2-h oral glucose tolerance test (OGTT), fasting serum insulin, and total cholesterol, triglycerides, HDL, LDL, and a child health questionnaire (CHQ) [11].