

Retrospective Review of Comorbid Conditions in a Multidisciplinary Pediatric Weight Management Clinic

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Abstract

A retrospective medical chart review was conducted of patients enrolled in the Fit for Healthy Weight Clinic (Fit Clinic). At initial evaluation, comorbidities were identified by the patient and pediatrician. The number of comorbidities increased with age among patients. In reviewing the differences among the number of identified comorbidities among grade school age and adolescent patients, increases of 30% were observed in gastrointestinal-associated, 23% in psychiatric, 18% in endocrine, 16% in cardiovascular, and 14% in respiratory comorbidities. Fit Clinic patients already manifest many known obesity-related comorbidities as evidenced in identified conditions and abnormal laboratory values. The elevated blood pressures, blood glucose, and cholesterol levels raise concern for the future development of coronary artery disease and type 2 diabetes mellitus. With an average of five obesity-related comorbidities, Fit Clinic patients already have more comorbidities than what is evidenced in large US population-based studies, demonstrating that solely addressing body mass index is not sufficient.

Keywords

morbid obesity, hypertension, multidisciplinary clinic

Introduction

The prevalence of childhood obesity in the United States remains high, with 17% of children reported as obese¹ and with associated higher risks of developing diabetes, cardiovascular disease, depression, gastrointestinal conditions, musculoskeletal problems, poor school performance, and disability.^{2–6} Socioeconomic, ethnic, and racial disparities exacerbate the emergence of comorbid conditions.⁷ Studies have identified psychosocial and familial factors as barriers to healthy weight management, highlighting the importance of addressing psychosocial well-being when managing pediatric obesity.⁸

Higher body mass index (BMI) levels are associated with elevated blood pressure (BP) and cardiovascular risk. The rate of progression from prehypertension (90th–95th percentile) to hypertension (>95th percentile) among children occurs at approximately 7% to 10% annually.^{9,10} If preventive measures through healthy eating and physical activity are implemented to modify BP early among high-risk obese children, this may limit the progression to hypertension and cardiovascular disease. However, few effective interventions have been reported to improve dietary and physical activity habits among high-risk obese children.¹¹

The University of California Los Angeles (UCLA) Fit for Healthy Weight Clinic (Fit Clinic) is a multidisciplinary tertiary weight management program that focuses on treating overweight and obese pediatric patients who have not met their healthy weight goals under the care of their primary care providers.¹² The multidisciplinary team, following the American Academy of Pediatrics (AAP) Expert Committee Recommendations, consists of a general pediatrician, registered dietitian, and clinical psychologist. The Fit Clinic team identifies and addresses the patients' barriers to healthy diet, physical activity, and emotional well-being, utilizing motivational interviewing strategies and

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different perspectives of health care. The purpose of this study was to identify the characteristics, comorbidities, and barriers to health for the morbidly obese pediatric patients seeking care at the Fit Clinic.

Methods

This study was approved by the UCLA Institutional Review Board.

The Fit Clinic

The Fit Clinic utilizes a multidisciplinary team approach consisting of a general pediatrician with a specialty in nutrition, a registered dietitian, and a clinical psychologist. There is also a pediatric surgeon on staff available to patients interested in exploring bariatric surgery. Patients referred to the clinic by their primary care providers are not making progress under their current primary care, and many have exhausted other strategies of weight control. During each Fit Clinic visit, all three health care providers individually rotate through to evaluate and counsel each patient. A patient's medical, dietary, psychological, social, developmental, family, and physical activity histories are elicited and reviewed, and a full physical examination is conducted. A registration form (<http://fitprogram.ucla.edu>) aids in the collection of this information.

Providers utilize treatment strategies that include nutritional and psychological education, motivational interviewing, counseling, and behavior intervention therapies targeted at improving daily routines, emotional health, diet, and physical activity. Motivational interviewing is the major strategy, utilizing a patient-centered approach that helps establish the foundation for subsequent goal setting.¹³ The patient and family identify lifestyle modifications and quantify their level of confidence in reaching them. The team will reflect and summarize, both verbally and in writing, the lifestyle modifications.

The individualized behavior change goals for healthy eating, physical activity, emotional well-being, and family support are then followed up at subsequent monthly visits. Healthy eating goals often focus on hunger management, portion control, decreasing sugar-based beverage intake, increasing fruit and vegetable intake, and modifying eating behaviors.¹² Healthy physical activity goals are structured to increase daily activity from often a baseline sedentary level. The healthy emotional well-being goals focus on anxiety, psychosocial stressors, and emotional eating. Following the multidisciplinary discussions, one to two healthy eating, physical activity, emotional well-being, and family goals are selected and

followed up at subsequent visits. Appropriate medical referrals are also made, including sleep studies to rule out obstructive sleep apnea, an often underdiagnosed comorbid condition.¹⁴

Study Design and Patient Demographics

A retrospective medical chart review was conducted of 115 patients enrolled in the Fit Clinic. Eligible participants were boys and girls, 3 to 22 years of age with BMI >85%, seen at the Fit Clinic between April 2008 and October 2011. Self-identified (by the parent or patient, depending on the age) comorbidities and barriers that prevented the patient from engaging in physical activity and healthful eating were documented, assessed, and discussed with the pediatrician. After the initial evaluation, patients had follow-up appointments with the Fit Clinic multidisciplinary team scheduled at approximately one-month intervals. Anthropometric and BP data were collected in clinical charts at each visit. Of note, no changes were made to already existing hypertensive pharmaceutical regimens among patients in this study sample.

Collection of Data and Classification of Clinical Outcomes

Height, weight, BP, and when available, laboratory data were abstracted from patient medical records. Baseline laboratory values were not available for all Fit Clinic patients because they were ordered based on clinical judgment and protocols and not for research purposes. Barriers to physical activity and healthy eating were abstracted from the baseline registration forms. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2). BMI of ≥ 85 th to 94th percentile for age and gender was classified as *overweight* and ≥ 95 th percentile was defined as *obese*.¹² BP values were categorized using national data from the Centers for Disease Control and the National Heart, Lung and Blood Institute Task Force on Blood Pressure Control in Children.¹⁰ Abnormal fasting lipid levels were based on values recommended by the AAP.¹⁵ Abnormal fasting blood glucose was based on the American Diabetes Association and the International Expert Committee recommendations.¹⁵⁻¹⁷

Statistical Analysis

Statistical analysis was completed using STATA software. Descriptive statistics were calculated for all variables. The paired *t*-test was used to assess for differences among clinical measures at baseline and after a number of clinic visits.

Results

Baseline Characteristics of Fit Clinic Patients

The sample included 115 Fit Clinic patients enrolled during the study interval. The mean number of clinic visits was three, with an average of one month between visits. The mean age at the first visit was 13 years old. The number of male (49.6%) and female (50.4%) patients was nearly equal. The average baseline BMI was 34 kg/m², with a mean percentile of 98%. Among all patients, 97% were categorized as obese based on BMI, and 30% were classified as prehypertensive or hypertensive based on their BPs.

Abnormal total cholesterol level >200 mg/dL was observed in 19 (24%). Also, 33% of patients had borderline to elevated low-density lipoprotein, 43% of patients had abnormal, or low, high-density lipoprotein levels, and 54% of patients had elevated triglycerides. Six patients (8%) had borderline elevated fasting glucose levels (100-125 mg/dL), and seven (12%) had elevated hemoglobin A1c. Aspartate aminotransferase and alanine aminotransferase were above normal in 8% and 17% of children, respectively.

Comorbidities and Barriers to Healthful Eating and Physical Activity

An average of 5.8 comorbid systems were identified at the first clinic visit. Among the more frequently listed comorbidities were those related to gastrointestinal (32%), respiratory (36%), psychiatric (41%), ears/nose/mouth/throat (50%), cardiovascular (52%), endocrine (70%), skin (79%), and constitutional (fever, night sweats, chills, fatigue, weight change; 97%) comorbidities.

The most commonly identified barriers to healthy eating were lack of self-discipline (63%), that dieting “is hard work” (55%), and dislike of healthy foods (30%). With respect to physical activity, the most commonly cited barriers were lack of self-discipline (41%), lack of someone with whom to engage in physical activity (38%), self-consciousness about appearance (33%), and lack of energy (28%). Less than 10% of patients selected lack of money, equipment, or time as barriers to healthy eating or physical activity.

Trends in BMI and BP

At initial evaluation, 100% of Fit Clinic patients had BMI values at or above the 85th percentile. Although there was no statistically significant decrease in BMI, there was an overall trend of a reduction or stabilization in BMI. The distribution of BMI for Fit Clinic patients is shown in Figure 1.

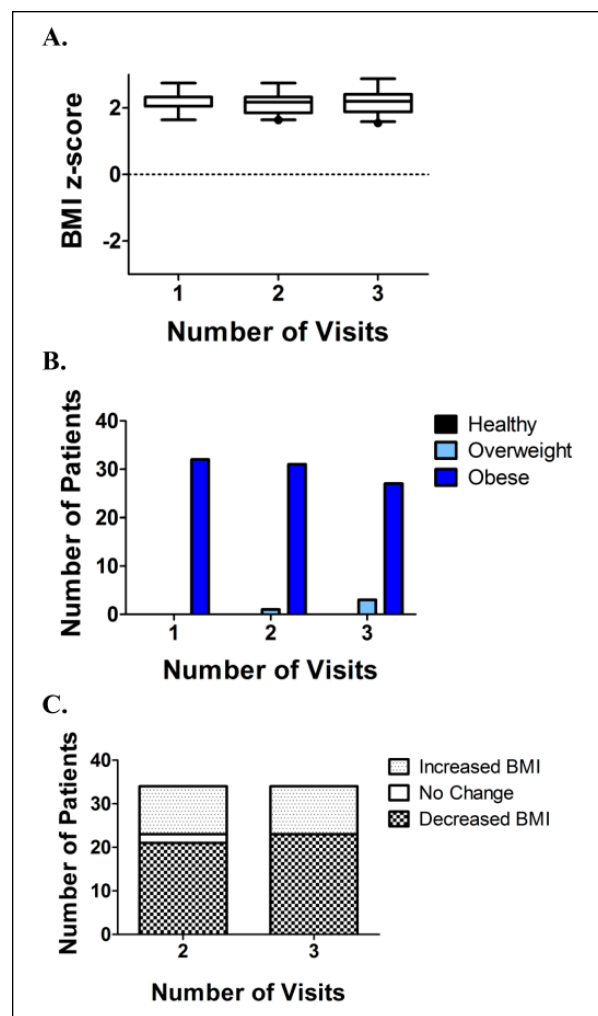


Figure 1. A. Body mass index (BMI) z-scores across three clinic visits ($n = 35$). The average time between visits was 1.59 months. There was no statistically significant change in BMI. B. Prevalence of BMI categories. The number of patients with BMI percentile values in each BMI category at initial screening and subsequent clinic visits. C. Change in BMI values across the number of visits. The number of patients with an increase, decrease, or no change in BMI values over clinic visits compared with the initial visit. Although there was no significant decrease in BMI, more patients saw a reduction or stabilization in BMI compared with an increase in BMI.^a

^aHealthy, BMI percentile 5th to 85th; overweight, 85th to 95th; obese, >95th.

Using the subset of patients who completed the average of three clinic visits, 26% of patients were outside the normotensive range. After three clinic visits, there was a significant improvement ($P < .05$) in BP across these patients. It was noted that 82% of patients in the elevated BP category moved into the normotensive range. Patients saw a reduction of their BP from the

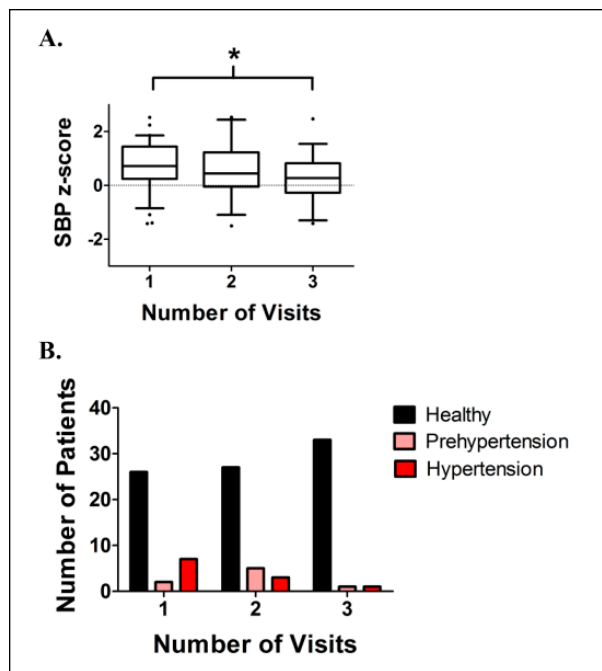


Figure 2. A. Systolic blood pressure (SBP) z-scores across clinic visits ($n = 35$). Patients saw a statistically significant reduction in SBP after three clinic visits ($P = .01$). B. Prevalence of elevated BP categories. Number of patients with SBP readings in each BP category at initial screening and subsequent clinic visits.^a
^aHealthy, SBP percentile <90th; prehypertension, 90th to 95th; hypertension, >95th.

hypertensive to the prehypertensive category or to the normotensive range. No patient jumped into a higher BP category. Figure 2 illustrates BP outcomes among patients after three clinic visits.

Discussion

The preliminary data from this retrospective chart review of the Fit Clinic provides a glimpse into a cohort of overweight and obese children and adolescents whose efforts in weight management with their primary medical providers were unsuccessful. Multidisciplinary services are recommended for overweight and obese children and adolescents who do not stabilize or reduce their BMI in the primary care setting after six to twelve months of prevention and structured weight management interventions.¹² The multidisciplinary treatment team, patient and family-centered approach, and behavioral lifestyle intervention and counseling are the components recommended by pediatric obesity researchers to curtail the growing pediatric obesity epidemic.^{11,12,18-20}

This report adds to the growing evidence that a multidisciplinary pediatric obesity clinic can have an impact

on overweight and obese patients. Other reports of clinical programs in the literature with comparable patient-centered approaches and multidisciplinary teams have reported similar overall small changes in BMI with reductions of 0.03 to 0.24 points.²¹⁻²⁴ Patients in the prehypertensive BP range have the most to benefit with respect to reversing the progression to hypertension and cardiovascular disease.²⁵⁻²⁸ This report suggests that significant changes in BP can occur with small, even statistically nonsignificant, changes in BMI. This may be attributed to personalized lifestyle modifications manifested in improved BPs preceding any change to BMI.

Although not every overweight or obese child is destined to become an overweight or obese adolescent or adult, it is recognized that pediatric obesity can precede adult obesity and can have adverse health consequences in adulthood related to premature mortality and cardiometabolic morbidity.²⁹ Abnormalities that begin in childhood precede many of the well-studied obesity-associated comorbidities in adulthood.^{30,31} Many Fit Clinic patients already manifest known obesity-related comorbidities as evidenced in self-reports and abnormal baseline laboratory values. Fit Clinic patients who average five obesity-related comorbidities already have more than what is reported in large US population-based studies.^{5,30} With an understanding of the association of obesity with other health conditions in childhood, pediatricians can better manage these patients by addressing additional factors beyond high BMI. Although not a random sample of the population, this cohort of morbidly obese pediatric patients nevertheless demonstrates that solely addressing BMI is not sufficient.

A multidisciplinary approach that incorporates a psychologist and dietitian may prove to be the most beneficial option for obese pediatric patients to reach their healthy lifestyle goals. In a systematic review of the effectiveness of lifestyle interventions in childhood obesity, behavioral modifications in addition to diet changes were found to be essential elements in effective obesity management programs.³² Patients attending the multidisciplinary Fit Clinic, which focuses on the commonly identified barriers to healthy diets and physical activity, exhibited successful trends in their BMI and BP. Whereas lack of time and financial resources are often cited in the literature as impediments to healthy lifestyles,^{7,33} psychological barriers are more commonly reported among Fit Clinic patients, including perceived lack of self-discipline and the challenges of lifestyle change. Whether pediatric patients lack awareness of socioeconomic factors in their lives compared with the adult population warrants further exploration.

Obesity has been recognized as a chronic disease that requires ongoing follow-up care.²⁹ Thus, it is important to

evaluate the long-term success of pediatric weight management programs in mitigating the trajectory of pediatric obesity. Short-term successes have been studied, with noted improvements in weight and cardiometabolic outcomes.³² The question arises as to whether positive effects can be sustained and followed into adulthood.³⁴ How pediatric obesity translates into and predicts adult morbidity and mortality is widely reviewed,^{29,31} but few studies exist that determine the long-term effectiveness of pediatric weight management and lifestyle intervention programs. This is probably because of difficulties in maintaining a cohort of pediatric patients through adulthood.

The early successes of the Fit Clinic suggest the effectiveness of a tertiary care multidisciplinary approach at addressing barriers to healthy lifestyles. In tailoring its multifaceted approach to the unique needs of its patient population, the Fit Clinic has been successful in curtailing the progression of its patients toward unhealthy clinical outcomes. The Fit Clinic offers a promising intervention to decrease obesity rates and ameliorate disparities in pediatric obesity.

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Author Contributions

CT conceptualized and designed the study, carried out the initial analyses, drafted the initial manuscript, reviewed and revised the manuscript, and approved the final manuscript as submitted. MW conceptualized and designed the evaluation, coordinated and supervised data collection, critically reviewed the manuscript, and approved the final manuscript as submitted. NI coordinated and supervised data collection, critically reviewed the manuscript, and approved the final manuscript as submitted. DD developed the data collection forms, critically reviewed the manuscript, and approved the final manuscript as submitted. WS conceptualized and designed the study, designed the data collection instruments, supervised data collection, critically reviewed the manuscript, and approved the final manuscript as submitted. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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