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CARDIAC Kids: Obesity Intervention Program in Elementary School Children

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CARDIAC Kids: Obesity Intervention Program in Elementary School Children

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Abstract

Background: The prevalence of childhood obesity in the United States has more than doubled in the past 20 years. Tennessee is the third most obese state in the country, and 43% of all Tennessee children are either obese or at risk for becoming obese. CARDIAC (Coronary Artery Risk Detection in Appalachian Children) Kids screened 4th and 5th grade school children in a mid-sized Tennessee city for body mass index (BMI) percentile as a method for determining the prevalence of childhood obesity in this area. After collecting this data, the children with parental permission participated in an after-school, obesity intervention program. The purpose of the study was to evaluate the effectiveness of the intervention program in decreasing obesity and increasing health knowledge and healthy behaviors in elementary school children.

Methods: CARDIAC Kids screened students for biophysical measures before and after the intervention program to measure physical change that occurred over the course of the intervention program. During the program, students met after-school biweekly for ten weeks and participated in physical fitness activities, healthy eating, and health education. Participants and their parents/guardians completed pre and post intervention questionnaires to measure health knowledge and behavioral change.

Results: CARDIAC Kids has collected data from three years of the intervention program. In the most recent year, there was a -2.45 change in BMI percentile from the beginning to the end of the program. The change between BMI percentiles was statistically significant ($r=.990$, $p=.000$).

Conclusion: The most recent results indicate that an after-school, obesity intervention program can produce positive results in decreasing BMI percentile in elementary school children.

Keywords: childhood obesity, school-based, intervention, nutrition, physical activity, health education

INTRODUCTION

Childhood obesity is an epidemic affecting children throughout the United States. According to data from the Centers for Disease Control and Prevention (CDC), the prevalence of childhood obesity has more than doubled in the past 20 years (Centers for Disease Control and Prevention, 2010). Overweight and obese students are at a higher risk for multiple health problems including high cholesterol, hypertension, Type 2 diabetes, insulin resistance, polycystic ovary syndrome, and emotional issues. If obesity persists to adulthood, it predisposes these youth to serious health problems such as coronary disease, stroke, gallbladder disease, various types of cancer, and osteoarthritis of the weight-bearing joints (Tennessee Department of Education, 2006).

While obesity is an issue all across the United States, it is an extreme problem in the southeastern region of the country, where nine states report obesity rates over 30% (Centers for Disease Control and Prevention, 2010). Tennessee is the third most obese state in the country, and forty-three percent of all Tennessee children are either at risk for being overweight or are overweight (Tennessee Department of Education, 2006). Starting in 2008, a voluntary screening program known as CARDIAC (Coronary Artery Risk Detection in Appalachian Children) Kids has studied childhood obesity prevalence in Tennessee through data collection on 4th and 5th grade students in Tennessee elementary schools. The program screened for body mass index (BMI) percentile, total cholesterol, high-density lipoprotein (HDL), blood pressure and glucose. After obtaining baseline measures, students with parental/guardian consent participated in an after-school intervention program known as Cardiac Cardinals. The objectives of this after-school program were to:

- Assist overweight and obese 4th and 5th graders in decreasing BMI percentile.

- Change the eating and exercise behaviors of these children.
- Involve families of overweight and/or obese youngsters in learning about better eating habits and activity levels.

With the increasing childhood obesity rates, there has been increased interest in childhood obesity intervention programs. A review prepared by the Cochrane Collaboration looked at twenty-two intervention studies that involved physical activity and/or dietary intake changes, and summarized their conclusions. The review found that most childhood obesity interventions combining both diet and exercise were not effective in preventing weight gain; however, they were sometimes effective in the promotion of healthy eating and increased physical activity. While there was no evidence to suggest that any one intervention program could guarantee obesity prevention or reduction in children, the review did report that any program that promotes healthy living and combines this with psycho-social support and environmental change may be helpful in accomplishing this goal (Summerbell, Waters, Edmunds, Brown, & Campbell, 2005).

Another study, Wellness, Academics & You (WAY), was a school-based intervention program completed by 4th and 5th graders. This program combined physical activity with nutritional information. Teachers included nutrition modules into their daily teaching followed by a 10-minute aerobic exercise routine. The study measured BMI and used a student survey to measure consumption of fruits and vegetables and physical activity. At the conclusion of the 6-month program, results showed a significant positive shift in BMI in the intervention group compared with the control group, and notable increases in fruit and vegetable consumption and physical activity levels were reported in the intervention group (Spiegel & Foulk, 2006).

A study by Caballero et al. (2003), implemented similar interventions with 3rd and 5th

graders with four goals in mind: change in dietary intake, increase in physical activity, a classroom curriculum focused on healthy eating and lifestyle, and a family-involvement program. Outcomes measured were BMI, triceps skinfold (TSF), physical activity, and knowledge, attitudes and beliefs. There were no differences between the control and intervention groups in any category except for knowledge, attitudes and beliefs. While results do vary, the general trend amongst intervention programs is that knowledge is easier to affect than actual bodily changes.

METHODS

Subjects

The research population consisted of every 4th and 5th grade student at one urban elementary school in Tennessee. CARDIAC Kids screened all 4th and 5th graders with parental consent. After baseline measures were recorded, those 4th and 5th graders who signed consent and gained consent from their parent/guardian participated in the after-school program known as Cardiac Cardinals.

Instruments

CARDIAC Kids collected data about health knowledge and health behaviors through a questionnaire developed by nutritionists involved in the project. The questionnaire drew influence from questions used by CATCH (Coordinated Approach To Child Health) Kids, a physical activity and nutrition program designed for elementary school children in an after-school setting (Kelder et al., 2005). The questionnaire was administered to both students and their parent/guardian before and after the Cardiac Cardinals intervention program.

CARDIAC Kids recorded physical activity measurements in Fitnessgram. The Fitnessgram program assesses aerobic capacity, muscular strength, muscular endurance, flexibility, and body composition. The program analyzes the students' strengths and weaknesses

and provides printouts for students and their parents/guardians to take home (Human Kinetics, 2011).

Procedure

CARDIAC Kids screened elementary school students with parental/guardian consent for BMI percentile measurements. Following this screening, parents/guardians received letters informing them of the results of the screening. If the student's BMI percentile was in the overweight or obese categories, the child's parents/guardians received a recommendation to follow up with a health care provider.

Following the CARDIAC Kids screening, children who had baseline measures and parental/guardian permission participated in the Cardiac Cardinals intervention program. The intervention was a ten-week, after-school program in which enrolled children participated in nutritional education and physical exercise for two hours twice a week. A certified physical education (PE) teacher managed this program. The intervention program consisted of three parts: nutritional intervention, physical activity intervention, and parental participation.

1. The Nutritional Intervention:

Each nutrition session lasted 45-minutes, and there were 20 total sessions. A nutritionist worked to increase the students' health knowledge through tasting, snacks, games, nutrition characters and plays. The sessions covered topics such as sugar sweetened beverages, food safety, whole grains, veggies, fruits, milk, breakfast, fats/oils, lean meats, and meat alternatives.

2. The Physical Activity Intervention:

All physical activity sessions lasted one hour. Physical activities included jumping jacks, jump rope, pushups, sit ups, jogging, obstacle courses, fitness circuits, strength training, and various sports games.

3. Parental participation

Parents/guardians were invited to participate in the after-school sessions. The goal was that a parent/guardian would participate in at least two sessions.

At the end of the ten-week intervention program, the staff of CARDIAC Kids recollected data on BMI percentile. In addition, the students and their parents/guardians completed questionnaires to measure change in health knowledge and healthy behaviors.

RESULTS

The BMI percentile data has been consolidated into Table 1.

Table 1

	Year 1	Year 2	Year 3
N	33	44	39
T1			
Mean BMI Percentile	68.77	69.92	74.24
Underweight	0	1	0
Normal	19	20	18
Overweight	7	9	7
Obese	7	14	14
T2			
Mean BMI Percentile	74.44	70.88	71.79
Underweight	0	1	0
Normal	13	20	21
Overweight	12	10	7
Obese	8	13	11
Change in Percentile	+5.67	+0.96	-2.45

DISCUSSION

The pre intervention mean BMI percentiles increased over the three years of the study, emphasizing the importance of implementing an effective obesity intervention program. While the first two years of the program were not successful in decreasing BMI percentile, the third year was successful. The change between BMI percentile at the beginning of the program and at

the end of the program was statistically significant ($r=.990$, $p=.000$) using a 0.05 significance level and a two-tailed test. This represents a positive shift in the effectiveness of the Cardiac Cardinals program in combating childhood obesity.

Limitations

An identified limitation to the study is that elementary school children are still growing over the course of the intervention program. It is difficult to incorporate the BMI percentile increase due to normal growth patterns in with the intervention results.

IMPLICATIONS FOR SCHOOL HEALTH

With childhood obesity being an ever-increasing issue, it is crucial for schools to become active in promoting healthy lifestyle choices. This study served to look at the effectiveness of an after-school intervention program in decreasing the number of overweight and obese children, and increasing student's health knowledge and healthy behaviors. The study's successful results in Year 3 indicate that this form of intervention program, utilizing basic principles of nutrition and physical activity, can be successful in decreasing the amount of overweight and obese elementary school children.

The University of Tennessee Institutional review board approved this study.

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