

Camp PowerUp: An Evaluation of an American Diabetes Association Program to Target Children at Risk for Developing Type-2 Diabetes

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Abstract

Purpose: Camp PowerUp, sponsored by the American Diabetes Association, is a week long day camp for youth, ages 10-14 years, at high risk for developing type 2 diabetes. Despite best efforts, San Antonio still faces a high rate of childhood obesity, especially in Hispanic/Latino populations. The purpose of this project is to implement and evaluate the efficacy of Camp PowerUp to decrease the risk of developing type 2 diabetes.

Methods: The program was evaluated using a mixed methods approach-qualitative and quantitative data through pre/post surveys given to the youth and their parents as well as quantitative data through TANITA Body composition scores of exact Body Mass Indexes (BMIs) of the campers pre-camp and three months after.

Findings: The program was effective in teaching the parents/youth healthy living and active lifestyle as shown in the significant changes in 6 out of 9 (66.7%) pre and post survey questions for the adults ($p < 0.05$) and 6 out of 14 (42.8%) questions in the campers surveys ($p < 0.05$). When reviewing the journals, activity, exercise, healthy eating, and being healthy were common themes found everyday as well as diabetes, sugar, soccer, and vegetables being sub themes.

Conclusion: A SWOT analysis will also be done by the ADA-San Antonio planning board to address the strength, weaknesses, opportunities and threats from camp to prepare for 2018 as well as promote the start of camps in other cities with high prevalence of Type-2 diabetes.

Keywords: Childhood obesity; Hispanic youth; Type-2 diabetes; Health promotion and education

Introduction

My favorite thing was learning to stay active. I learned how to eat healthy and how all the food I like are unhealthy and bad for my body" (Diego, age 12).

Since the 1970s, the rate of child obesity in the United States has more than tripled [1] and today about one in five school-aged children are obese [2]. In Texas, Hispanic children have the highest rates of overweight and obesity: 47% of Texas Hispanic children were obese based on 2007 national data, compared to 26% of black non-Hispanic children, and 23% of white non-Hispanic children [3]. Studies have shown that low physical activity [4], high beverage consumption [5], and diet [6,7] are three main factors of high youth obesity rates in Hispanic/Latino populations. This is the foundation of Camp PowerUp.

Camp PowerUp, sponsored by the American Diabetes Association, is a week long day camp for youth at high risk for developing type 2 diabetes. The one week program offers an educational and fun-filled environment that focuses on understanding diabetes, nutrition, physical activity, and obesity prevention. There are currently three camp sessions around the country, including a program in Chicago, Illinois, New Orleans, Louisiana and San Antonio, Texas. However, little research has been done on the camp's efficacy in tackling child obesity. Therefore, we partnered with the American Diabetes Association to conduct a program evaluation of Camp PowerUp and its ability to impact the children enrolled in reducing their risk of obtaining type-2 diabetes.

Methodology

Camp PowerUp was hosted at a YMCA in a predominately Hispanic community in San Antonio, TX from June 5-9, 2017. The program was sponsored by the local community partners including the local grocery chain, Walgreens, and local universities. Camp PowerUp is a week-long educational program with focus on diabetes education, nutrition, physical activity and obesity prevention alongside a fun-

filled environment. There were also two field trips to the local museum, and nearby university. Our study was approved by the institutional review board at the University of Health Center at San Antonio. All parents and guardians were required to sign a consent form for this study.

The evaluation expanded over two months. We used pre/post survey design that focused on factors that cause diabetes as well as importance of diet and exercise such as: *How much of your plate should be filled with fruits and vegetables?* We also analyzed 49 journal entries collected at the end of the day to uncover main themes. The pre and post surveys were given to all attendees of the camp as well as their guardians to assess the camp efficacy on promoting healthy lifestyles.

Each day of camp was nine hours with a thirty minute lunch at noon. The meals were pre-approved by a dietician and prepared by local sponsors. Each meal adhered to the MyPlate approach where half of the plate is fruits and vegetables, one-fourth protein and one-fourth grain. The youth were also encouraged to drink only water for the entire week while at camp. Snacks were also pre-approved by dieticians and consisted of portion-size healthy snacks such as fruits and butter less popcorn. Each day of camp had a unique focus on a specific topic which included how to read labels, the ideal sugar intake for a day, and the importance of exercise. At the end of camp, the youth were able to participate in recess as well as join in a yoga class. Thus the camp was able to expose the youth to healthy lifestyles in an interactive environment.

During participant observation, researchers joined in on the health and wellness sessions alongside the campers as well as the exercises completed during the camp. This allowed for a thorough assessment of the camp to create a SWOT analysis at the end of the program.

There was a total of sixty-one Hispanic/Latino youth physician referrals received; however, for this study, there were forty-nine that completed the camp from start to finish due to confictions with summer school. Ages ranged from 10-14 with 42% being female and 58% male. All youth campers were referred to the camp by their primary provider as well as present with signs of at least one risk factor, such as being overweight with BMI over the 95% percentile for their age/height, family history of Type-2 Diabetes, diagnosis of hypertension, diagnosis of hyperlipidemia, diagnosis of fatty liver, hemoglobin A1c in the range 5.7-6.4% or diagnosis of polycystic syndrome. The highest prevalent risk factor among the camp was an overweight BMI of 95% followed by a 94% of youth having a family history of Type-2 Diabetes. All participants were eligible for the camp through these criteria and there was only one camper who could not complete the program due to health complications.

There were also 49 adult parents/guardians surveyed pre and post camp. All of the parents/guardians were self-identified minorities, either black/african american (1), hispanic/latino (47), or native American (1). The demographics of the parents/guardians were 74% female and 26% male.

One main source of qualitative data was analyzed using standard textual analysis: journal entries used by the children to document what they “learned, liked, and tried” each day of the camp. Journal entries were reviewed at the end of each day and repeated words throughout all of the journals were accounted for as either a theme or subtheme. Themes were defined as main discussion points while subthemes described the theme (Figure 1). Techniques from previous research [8] helped to identify the themes.

Quantitative data came from pre surveys and post given to the campers as well as their guardians. A summary T-test for independent samples was run for each question. Frequency of correct answers allowed for us to assess retention of knowledge learned during the camp sessions. Other quantitative data included anthropometric measurements- height and weight- which were assessed on the first day of camps through the assistance of volunteer nursing staff. BMI was calculated by obtaining the body weight (kg)/[height (m)]² of each camper. Measurements of fat mass percentage were taken as well using a TANITA body analyzer system.

Results

“What I liked about the camp is that it made me very active for the entire week. I learned how to stay active all the time and I will carry this information with me for the rest of my life” (Jonathan, age 11)

Survey data-parents/guardians

Pre and post surveys were collected of the guardians during the camp. At the end of the day there were optional bilingual

Common Themes	Subthemes
Activity	Dancing
	Losing weight
	Friends
Exercise	Workout
	Basketball
	Yoga
	Karate
	Soccer
Healthy Eating	Vegetables
	MyPlate
	Calories
	Sugar
	Fruit
Being Healthy	Mindful Eating
	Food labels
	Diabetes

Figure 1: Themes found in campers journals
When analyzing the campers daily journals these were the common themes and subthemes discovered.

parent classes that paralleled what the youth had learned such as how to read nutrition labels. Parent session attendance remained steady at 25% each day for the week with 75.6% of guardians attending three or more classes. Since assessments were done during registration at the beginning of camp as well as camp graduation, forty-one out of forty-nine (83.6%) of parents/guardians were able to complete both pre and post surveys. Out of those, six out of nine (66.67%) questions saw significant changes between pre and post surveys which included. The following are results for each of the significant survey questions. *How confident are you in reading a nutrition label to find the amount of sugar in the food?* For this question, 40.8% said very confident in the pre-survey versus 57% in the post survey ($X^2=10.726$, $df=2$, $p=0.05$). *When reading a food label, the nutrition information about the food-like the calories, sodium, and fiber-is based on how many servings?* The correct answer was one, and the percentage of those who chose two went from 10.2% to 0% ($X^2=8.579$, $df=2$, $p=0.014$) while the percent of those who chose the correct answer became 100%. *How much of your plate should be filled with fruits and vegetables?* In the pre-survey 59% chose half of the plate versus 68% in the post survey ($X^2=6.039$, $df=2$, $p=0.049$). *How confident do you feel that you can order healthy meals at restaurants?* In the pre-survey 30.6% said very confident versus 58.5% in the post survey ($X^2=8.104$, $df=2$, $p=0.017$). *In a typical day, how physically active is your child (walking, biking, sports, etc.)* In the pre-survey 38.7% said 30-45 minutes versus 58.5% in the post survey ($X^2=5.766$, $df=2$, $p=0.05$). *In a typical week, how often do you plan for your family to be physically active?* 32.6% said they plan 3-4 times a week in the pre survey versus 70.7% in the post survey. Also, 40.9% said they did not plan exercise in the pre survey versus 14% in the post survey ($X^2=13.267$, $df=2$, $p=0.001$).

Survey data-campers

Pre and post surveys were collected of the campers during the camp. Each day of the week there were focus topics such as reading nutrition labels, healthy plate and BMI definition that the campers were taught by a pediatrician. Forty-five out of forty-nine (91.8%) of parents/guardians completed both pre and post surveys. Out of those, six out of fourteen (42.8%) questions saw significant changes between pre and post surveys. The following are results for each of these significant survey questions. *Which of these help you determine your healthy weight (BMI)?* 51% said all of the above (your age, height, gender) in the pre-survey versus 75% in the post-survey ($X^2=8.218$, $df=3$, $p=0.036$). *How much of your plate should be filled with fruits and vegetables?* 61% said half of the plate in the pre survey versus 82% in the post survey ($X^2=5.943$, $df=2$, $p=0.042$). *How many times within the last week have you eaten fruits and vegetables?* 51% said 3 or more times in the pre-survey versus 84% in the post-survey ($X^2=12.535$, $df=2$, $p=0.001$). *How often do you read food labels on products in your own home?* 42.8% said rarely or never in the pre-survey versus 17% in the post-survey ($X^2=11.531$, $df=2$,

$p=0.003$). *When reading a food label, the nutrition information about the food-like the calories, sodium, and fiber-is based on how many servings?* 73% said one in the pre survey versus 44% in the post survey ($X^2=8.671$, $df=3$, $p=0.013$). *How often do you participate in moderate physical activity?* 26.5% said more than 60 minutes per day in the pre survey versus 62.2% in the post survey ($X^2=12.322$, $df=2$, $p=0.002$).

Anthropometric data

In addition to survey data, biomarker data was collected pre and post camp as well as one month post camp. This includes body mass index (BMI), fat mass percentage, and weight the campers. The biomarker data were taken using a TANITA body composition analyzer system. On the first day of camp, the mean weight for females (age 9-16) was 175 lbs, BMI was 31 and fat mass percentage was 42.6%. The mean weight for the males (age 8-16) was 168 lbs, BMI was 29.03 and the mean fat mass percentage was 36.05%. On the last day of camp, the mean weight for females dropped to 156 lbs, BMI 30.5, and fat mass percentage was 41.85%. The mean weight for males was 186 lb, BMI of 32.4 and fat mass percentage of 41.3%.

Overall, the average body weight for all youth changed from 166.9 lb pre camp to 167.4 post camp. This is an average so does not reflect the individual weight lost in the campers which was seen. The average fat mass percentage for all youth dropped from 40% to 38% post camp. The average BMI value remained consistent at 30.5 which is expected since significant weight loss does not occur within one week. However, the total pounds lost with all youth campers were 22.2 lbs, fat mass was 147.8 lbs, and fat percentage lost was 2.9%.

Campers journal entries

On day one, there were 73% completed entries, day two had 81.6%, day 3 had 65.3%, day four had 57% and day five had 80%. This inconsistency was addressed in the SWOT analysis for the next evaluation. Activity was a key theme in youth explanations of the impact that the camp had in their lives. Healthy eating was another key theme seen throughout the journals which are shown below. When the youth discussed healthy eating, it was normally followed with ideas from the sub theme. In this instance, the sub theme would be MyPlate as the camper mentioned they learned what a healthy plate would consist of

“Today I learned that staying active is fun, I’ve never been to a camp and I’m glad that I get to experience the activity that camp power up provides. I tasted a variety of foods, it wasn’t the best but at least I tried. Also I learned more about different types of foods and what a healthy plate should contain” (Leila, age 10)

Discussion

The rate of childhood obesity for ages 2-4 years in Hispanic/Latino lower socioeconomic status estimates to be 14.9% for Texas [9]. For 2-5 year-olds, Hispanic children have a prevalence of obesity that is 15.6% higher than all other racial or ethnic groups [10]. Foster BA et al. [11] showed Hispanic children in

south Texas experience levels of obesity significantly higher than their white or black peers. Obesity in Hispanic adolescents was stable at 30.4% in 2009 and 31.3 in 2015. Thus, South Texas continues to experience high levels of obesity that exceed national averages with significant disparities in Hispanic youth [10].

Results of this study have led to revisions of the program for the next summer camp as well as an expansion of the camp to two more high risk locations for diabetes in children. At the one month follow up, parents/guardians expressed increased activity of their youth and a significant decrease in their unhealthy eating habits. One guardian in particular stated how their son, "stopped drinking sodas after learning in camp how much sugar is in one bottle." As proven in previous research [12,13] physical activity plays an important role in reducing the risk of developing Type-2 diabetes as well as improving health. Specific benefits for children with diabetes include lower blood glucose, less insulin requirements and can allow greater food intake. For each day, the campers were participating in more than sixty minutes of moderate physical activity through soccer, exercise drills, running, dancing, martial arts, etc. which is beyond the what is recommended by the American Academy of Sports Medicine [14]. It is possible that this health program could be effectively utilized in future models of diabetes prevention.

There were a few limitations of this study, the most impactful being post survey data collection. For three months after the camp, campers were asked to return so that new weight measurements could be taken to determine the short-term effects of the program. However, the retention rate was 50%; therefore, the data was not significant. Incentives for the parents and youth will be made for next summer's campers so that significant data can be collected for the three months after the program is completed.

There is room for more research to be done on the efficacy of this camp in reducing participant's risk of developing Type-2 diabetes such as long term studies on participants after the camp. As mentioned, data was collected for three months after the camp which should be expanded to at least two years to make a strong correlation. Also, further evaluation on parents who were involved in the optional parent sessions should also be collected to assess the positive effects of the classes for possible expansion of an adult program. An addition to next year's program will be step monitors as another anthropometric data measurement to 1) assess how effective the camp is in ensuring each camper has an appropriate amount of exercise and 2) promote the campers to obtain as much steps as they can. Incentives will be given to the camper who has the most steps at the end of each day.

Conclusions

Participants of the program strongly suggested that their involvement in the camp had a positive impact in their lifestyle behavior. The combination of team exercise and class sessions proved to be a positive method in promoting a healthy lifestyle

in children who are at a high risk for developing Type-2 diabetes. Since participants in this program were 99% Hispanic and had clear beneficial effects, there is hope that this camp can be extended to other parts of south Texas to continue the effort to decrease child obesity and prediabetes.

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