Correlation between Childhood Obesity and Caries Rate

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ABSTRACT

Purpose: The aim of this quality improvement (QI) project was to examine if there is a difference in caries rates between children in various weight categories.

Methods: Data was extracted from charts of patients who were seen at the Holyoke Health Center Pediatric Dental Clinic between January-October 2022. The patients in this QI project were 12 years of age or younger. Children were divided into four subgroups depending on their weight percentile: Underweight (less than the 5th percentile), Normal weight (5th percentile to less than the 85th percentile), Overweight (85th percentile to less than the 95th percentile), and Obese (95th percentile or higher).[7] Each patient's DMFT score was calculated based on their most recent dental examination during the study period. Information regarding the patients' race, insurance type (private, Medicaid, uninsured), and sex were collected to ensure a representative sample.

Results: The results of the QI project did not show a statistically significant difference between caries rates between the four weight categories, nor did it find statistically significant differences when comparing, race, insurance type, or sex.

Conclusion: This QI project revealed that weight is not a statistically significant factor in determining caries rate in the health center's population. As such, obesity can be viewed as a condition with a multifactorial etiology, rather than only eating a diet high in cariogenic foods. This suggests that clinicians should focus on more than just reducing cariogenic diets in order to prevent children from getting caries.

INTRODUCTION

Both obesity and caries are difficult challenges to manage as healthcare providers. In particular, the prevalence of obesity has increased drastically in the United States. The CDC asserts that during the years 2017-2020, nearly 1 in 5 children and adolescents aged 2-19 are obese. It is well documented that beverages and foods that are high in sugar and carbohydrate content are more cariogenic in nature and can lead to the development of early childhood caries (ECC) and severe early childhood caries (S-ECC).

The 2022 revision of the AAPD's "Policy on Dietary Recommendations for Infants, Children, and Adolescents" states, "Multiple systematic reviews have reported inconsistent and inconclusive evidence on the relationship between caries and body mass index (BMI)" and further explains that "the need remains for research [...] to further advance healthy dietary practices for infants, children, and adolescents."[5]

Given that three systematic reviews drew three different conclusions relating childhood obesity and caries rate[2, 3, 4], it is necessary to conduct additional research to determine if there is a relationship between the two. Conducting a chart review at Holyoke Health Center will be useful for healthcare providers to improve patient education on the effects of diet on their dental health, as well as better identifying lifestyle changes that can prevent the development of decay.

The purpose of this quality improvement project is to determine if children who are obese experience caries at a higher rate than children who are healthy weight. The hypothesis is that children who are obese will experience caries at a higher rate than children who are a health weight.

METHODS

This quality improvement project is a retrospective chart review conducted at Holyoke Health Center Department of Pediatric Dentistry in Holyoke, Massachusetts.

The project reviews charts from January 2022-October 2022 of patients aged 12 years and younger, who did not have any other comorbidities, and presented for routine preventative appointments. There were no exclusions from the study based on race, sex, gender, or political affiliation.

Patients that met the project criteria were separated into 4 categories, as defined by the current CDC guidelines:[7]
1. Underweight: less than the 5th percentile
2. Normal weight: 5th percentile to less than the 85th percentile
3. Overweight: 85th percentile to less than the 95th percentile
4. Obese: 95th percentile or higher

Each patient's weight and DMFT score was classified based on their most recent dental examination during the study period, and securely stored and analyzed using REDCap software.

TABLE 1: Population Demographics

	Overall Population N= 56	Underweight (<5th percentile) N= 4	Healthy Weight (5th percentile to less than 85th percentile) N= 29	Overweight (85th percentile to less than the 95th percentile) N=10	Obese (95th percentile or higher) N= 13	P-value
Race						
A. White	2	0	2	0	0	
B. Black	1	0	0	1	0	
C. Native American/ Native Alaskan	1	0	0	0	1	
D. Native Hawaiian or Other Pacific Islander	0	0	0	0	0	p=0.14
E. Hispanic	29	1	18	5	5	
F. Two or More Races	12	3	3	3	3	
G. Unknown	11	0	6	1	4	
Age (Mean)	6.38	5.75	6.90	5.30	6.23	p=0.55
Sex						
A. Male	25	3	14	2	6	p=0.29
B. Female	31	1	15	8	7	
Insurance Type						
A. Medicaid	53	4	28	9	12	p=0.45
B. Private	2	0	1	0	1	
C. Uninsured	1	0	0	1	0	

TABLE 2: DMFT by BMI

	Overall population	Underweight (<5th percentile)	Healthy Weight (5th percentile to less than 85th percentile)	Overweight (85th percentile to less than the 95th percentile)	Obese (95th percentile or higher)	p-value
Average DMFT	4.14	1.50	3.93	6.70	3.46	p=0.11

RESULTS

A total of 56 patients at Holyoke Health Center were studied during this quality improvement project. Of the 56 patients, 29 of them were considered normal weight, ranging from the 5th percentile to less than the 85th percentile. Only 4 of the patients were underweight, meaning their weight was less than the 5th percentile. Exactly 10 patients were found to be overweight, who fell somewhere between the 85th to less than 95th percentile. Lastly, the quality improvement project found 13 obese patients, who were categorized at the 95th percentile or higher. These results were not statistically significant; the analysis found a p-value of 0.14, demonstrating that there was no specific trend in the distribution of population by weight.

The data was then analyzed to determine the average DMFT score in each particular weight category. On average, the underweight category had 1.5 DMFT. The patients in the normal weight had 3.93 DMFT. The patients in the overweight category showed an average of 6.7 DMFT. Lastly, the obese population had on average 3.46 DMFT. This data is not statistically significant, with p=0.11. (Table 2)

CONCLUSIONS

This quality improvement project is a source of valuable information from which dental providers can refer. It does not appear that, based on this quality improvement project, that there is a correlation between DMFT score and weight, although more research must be done to draw a more definitive conclusion. Based on this information, it is important for dental professionals to provide preventive care such as prophylaxis, oral hygiene instructions, and fluoride treatment to all children based on caries risk and other factors, rather than by weight classification. Although weight classification is important for practitioners to note while treating a patient comprehensively, based on this quality improvement project, obesity does not appear to be a predictor of caries rate in the patients treated at Holyoke Health Center.

Obesity is a multifactorial disease that combines genetics, dietary habits, activity level, and many more environmental influences. Because of this amalgamation of factors, providers should not assume that children are obese solely due to consumption of a highly cariogenic diet. Clinicians must focus their efforts on providing a variety of preventive measures, rather than just reduction of a cariogenic diet, in order to lower caries rates in their patient pool.

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