The COVID-19 Pandemic's Effect on Childhood Obesity and Its Implications on Obstructive Sleep Apnea

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INTRODUCTION

Childhood obesity has risen as an urgent public health problem in the United States; currently, 1 in 3 children in the United States are considered overweight or obese[1]. Given Rady Children's Hospital's patient demographics, our pediatric patients are particularly vulnerable as reports indicate that the pandemic has disproportionately impacted communities of color, compounding longstanding racial disparities[2].

One such health outcome of concern from the rise in obesity is Pediatric Obstructive Sleep Apnea (POSA). Between 25-45% of obese children have POSA, compared to the 1-3% of their normal-weight counterparts[4]. Most obese children do not have complete resolution of their POSA symptoms even after surgical intervention such as tonsillectomy or adenoidectomy—a recent meta-analysis found that 88% of obese children had evidence of persistent POSA symptoms following surgery[1]. Co-morbidities from POSA due to the resultant airway obstruction include, but are not limited to, increased daytime sleepiness, hyperactivity, poor school performance, inadequate somatic growth rate, and enuresis[5].

Obesity also has effects on treatment options in the dental setting. Normal respiratory physiology is usually impaired in obese patients[7]. Due to perioperative risks such as intraoperative desaturations, difficulty with mask ventilation, and multiple attempts often necessary for intubation[1], oral conscious sedation is not an option for obese patients in the dental setting Obese children are also more likely to receive medical intervention for upper airway obstruction and may require prolonged stays post anesthesia care units or require overnight hospitalization for procedures performed under general anesthesia[1].

PURPOSE

This study examines the body mass index (BMI) before and after the COVID-19 pandemic's quarantine period before March 13, 2020 and after August 18, 2020, in pediatric patients. Data was collected to determine the rate of increase of children who were classified as healthy weight to overweight, obese, or morbidly obese. This data will draw conclusions on the patients' collective risk for Pediatric Obstructive Sleep Apnea (POSA). Associated dental findings were also assessed such as: bruxism, malocclusion, mouth breathing, Brodsky score, parent-reported snoring, crowding, non-nutritive habits, and referral for sleep study. This data will draw conclusions on the patients' collective risk for POSA. It was predicted that a significant number of patients would experience an increase in overall BMI,, therefore, placing the patient at higher risk for POSA.

METHOD

A retrospective clinical chart review was conducted on 350 pediatric patients of record at San Ysidro Health's Children's Dental Center at Rady Children's Hospital and the Chula Vista Medical Plaza. Patients must have been previously seen for a comprehensive oral exam or recall exam before the pandemic's start date of March 13, 2020, as well as having a recall exam after the date of August 18, 2020.
Patients' BMI percentiles will be assigned as healthy weight (5th – 84th percentile), overweight (85th – 94th percentile), obese (95th – 99th percentile) and morbidly obese (greater than 99th percentile). Associated dental findings were also recorded. A chi square analysis was completed by an NYU statistician.

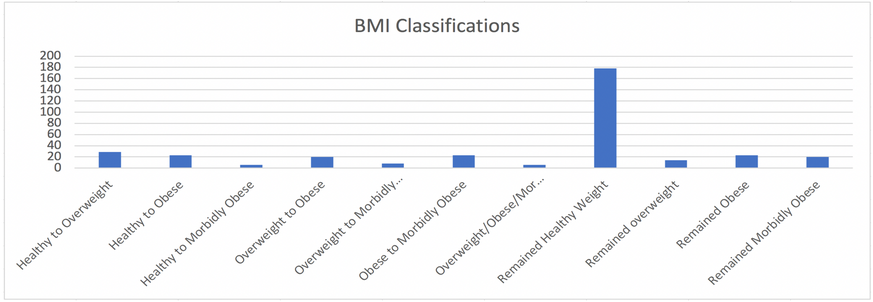

Figure 1: A graph showing the number of patients on the Y-axis and their increase/decrease in BMI status. The X-axis shows the 11 weight classifications used in this study: healthy weight to overweight, healthy weight to obese, healthy weight to morbidly obese, overweight to obese, overweight to morbidly obese, overweight/obese/morbidly obese to healthy weight, and then patients who remained healthy weight, patients who remained overweight, patients who remained obese, and patients who remained morbidly obese.

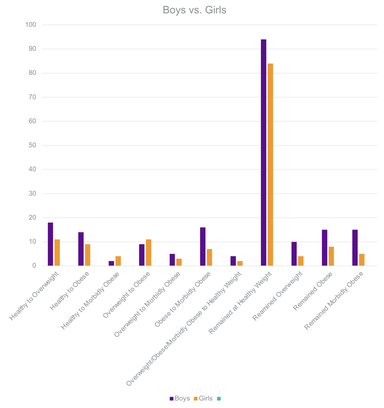

Figure 2: A graph showing the number of patients on the Y-axis and their increase/decrease in BMI status across the 11 weight classifications from above for boys and girls. We can see interestingly, that girls only outnumbered boys when transitioning from healthy to morbidly obese, and overweight to obese (p value=0.397).

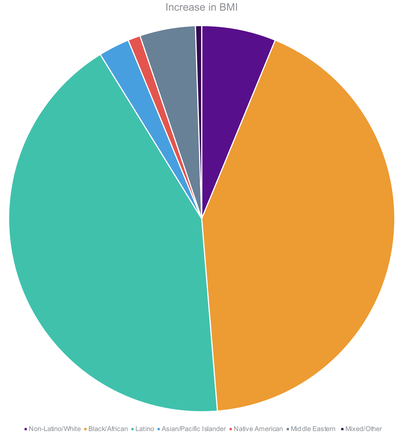

Figure 3: A graph showing the number of patients on the Y-axis and their increase/decrease in BMI status across the 11 described classifications comparing race/ethnicities. Since our clinic sees predominantly Hispanic Latino/Latina patients, we did not get very meaningful comparisons (p value=0.246).

RESULTS

Out of 350 patients, the BMI of 29 patients (8.3%) increased from healthy to overweight, 23 (6.6%) transitioned from healthy to obese, 6 increased from healthy to morbidly obese. 20 patients (5.7%) went from overweight to obese, 8 (2.3%) went from overweight to morbidly obese, and 23 (6.6%) went from obese to morbidly obese. 178 patients (50.9%) remained at a healthy weight, 14 (4%) remained overweight, 23 (6.6%) remained obese, and 20 patients (5.7%) remained morbidly obese. 6 patients (1.7%) went from overweight, obese, or morbidly obese to healthy weight. 109 patients (31.2%) saw an increase in their BMI classifications.

300 patients (85.7%) had class I occlusions, 27 (7.7%) had class II malocclusion, and 23 (6.6%) had class III malocclusion. 15 (4.3%) patients confirmed to have a tonsillectomy performed, 234 (66.9%) of patients had a Brodsky score of I, 87 (24.9%) of patients had a Brodsky score of II, 12 patients (3.4) had a Brodsky score of III, and 2 patients (0.6%) had a Brodsky score of IV.

31 (8.9%, p value=0.496) patients' parents reported bruxism. 25 patients' parents (7.1%, p value=0.01) reported mouth-breathing at night. 36 patients' parents (10.3%, p value=0.805) reported snoring during sleep. 6 patients (1.7%, p value=0.534) of patients were provided with a referral to Rady Children's Hospital for a sleep study.

CONCLUSIONS

Although 31.2% of patients who charts were analyzed for this study saw an increase in BMI classification, this value was not found to be significant (p value=0.149). If this study were ever to be replicated, we could increase the amount of analyzed charts to 500 or more charts to see if a higher sample size could attain more meaningful data. The only variable with significant value was mouth breathing with a p-value of 0.005. Increased weight not only places patients at higher risk for chronic health conditions and limits treatment modalities such as Oral Conscious Sedation but can also be a marker for overall stress the patient is experiencing due to the Pandemic[4]. This study is important since an elevated BMI does make a patient more at risk for POSA, which can have a dramatic effect on a patient's quality of life[4].

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