

BMI percentile change before and after COVID-19 pandemic

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Introduction

Obesity has been an ongoing epidemic with substantial health ramifications for growing children. Schools have a substantial impact on childhood obesity in terms of helping with food insecurity by offering school lunches and promoting physical activity. During the COVID pandemic, schools became primarily virtual. This led to increased time at home with easier access to food; in addition, many parks and gyms were closed, leaving children with limited opportunities for physical activity. This study aims to quantify the effect of COVID on patients between ages 3-18 in San Antonio, Texas in terms of BMI percentile change.

There have been a few articles suggesting the pandemic has had a negative effect on children's weight. Studies have not successfully quantified the severity of the BMI percentile change, and the few observational studies that exist have been done targeting weight rather than BMI. Our approach allowed us to establish a baseline BMI percentile change for each patient prior to the pandemic in order to properly make a comparison before and during the pandemic. We also included the extended CDC BMI charts to effectively analyze the patients who had obesity, which is the population at highest risk to become severely affected by COVID-19.

Methods

A retrospective cohort study was performed that included BMI assessment during three time periods. January 2019 through August 2019 was defined as the baseline weight for each patient (period 1-P1). September 2019 through March 2020 was used as the period to evaluate "usual" weight gain for each patient prior to the pandemic (period 2-P2). San Antonio released the first stay-at-home order on March 24, 2020; therefore, the quarantine (period 3-P3) included April 2020 through November 2020. BMI percentiles were averaged for each participant during the defined periods. Changes were evaluated with one-way ANOVA and two tailed T-test to determine COVID quarantine impact on "usual" weight change in our population. Extended CDC growth chart was used for BMI. Inclusion criteria were patients seen in person between ages 3-18 who had weight and height measurements taken during the determinate time periods. Exclusion criteria were patients with chronic conditions, failure to thrive or eating disorders.

BMI Percentiles in non-overweight and overweight subgroups						
	Variable	Observations	Minimum	Maximum	Mean	Standard deviation
Non-overweight						
	Before	46	4.700	82.000	48.144	24.038
	During	46	11.670	95.500	56.415	23.256
	After	46	13.880	111.000	59.072	26.321
Overweight						
	Before	59	85.440	167.000	105.585	18.174
	During	59	70.100	174.000	108.798	22.188
	After	59	63.860	193.000	115.088	26.628

Table 1: Compiled information comparing non overweight and overweight groups during the three time periods observed.

Results

104 children, mainly Hispanics, were included in our study with a mean age of 10 years (± 4.2); 60% of subjects were male. 57% were overweight for the first period and 64% of these subjects were male. The normal weight group had a BMI percentile mean of 48 (± 24) for P1, 56 (± 23) for P2, and 58 (± 26) for P3. The overweight group had a BMI percentile mean of 105 (± 18 SD) for P1, 108 (± 22 SD) for P2, and 115 (± 26 SD) for P3. The subgroup of children that had normal weight and subsequently became overweight during the pandemic was 9% of the population, with a BMI mean of 68 (± 17 SD) for P1, 76 (± 20 SD) for P2 and 95 (± 8 SD) for P3, respectively. In the overweight group and the subgroup normal to overweight there was statistical significance in weight gain, whereas no statistical significance in weight change was seen in the normal weight group.

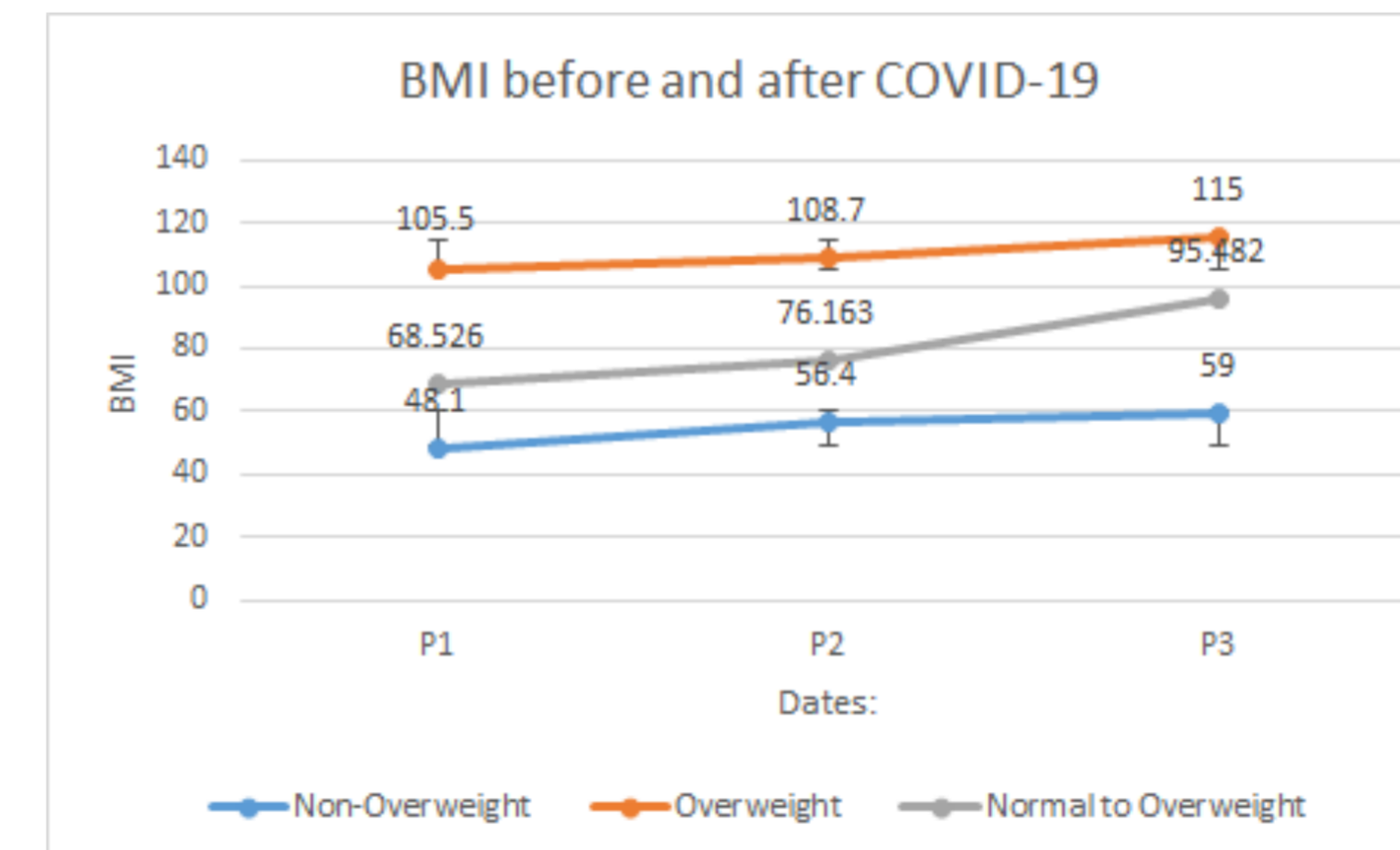


Fig 1: Representation of BMI percentiles compared by non overweight, overweight and pts who were of normal weight and became overweight during the study. Extended BMI chart was used.

Conclusions

In overweight patients, BMI percentile change during a pandemic tends to increase more than in normal circumstances when compared to normal weight patients, whom tend to maintain a similar BMI percentile during a pandemic. There is small group of patients, approximately 10% of the population, that despite having normal weight before a pandemic, can become overweight due to the dramatic changes in their lives. There are many factors that could contribute to the weight gain food insecurity, stress from the pandemic, decreased physical activity and inability to leave the house as frequently. The full effects of the pandemic still need further studies to analyze how it impacted children's well being mentally, physically and developmentally.

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