Retrospective study on sedation outcomes in overweight and obese children

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BACKGROUND

Oral conscious sedation (OCS) can be used safely and effectively in children to facilitate successful dental treatment when behavior may be poor with only basic behavior guidance techniques.[1] However certain medical and/or physical conditions may complicate the safety of sedation.

A prominent concern is children who are overweight or obese, as childhood obesity has become a rising medical concern. Children who are overweight or obese are more likely to have medical comorbidities and compromised or complex airways, thus posing a risk of increased complications during OCS.[2]

There have been minimal studies on whether scaling drug dosages during OCS in the dental setting affects success of sedation.[3-4] In pediatric dentistry, there is currently no universally accepted standard of care, recommendations, or safety guidelines for oral conscious sedation dosing in children who are overweight or obese.

PURPOSE

The purpose of the study is to 1) determine if reducing the dose of OCS drugs affected the overall success of sedation in overweight/obese children; and 2) measure the incidence of adverse events in overweight/obese children during OCS.

METHODS

IRB approval was obtained. Data was collected from electronic health records of patients seen for OCS at the USC Pediatric Dental Clinic from January 2012 to September 2022. Inclusion criteria consisted of children 3-18 years old who were overweight (BMI from the 85th to less than the 95th percentile) or obese (BMI at or above the 95th percentile). OCS was done with a triple drug regimen of either morphine, midazolam, hydroxyzine or morphine, diazepam, hydroxyzine. Morphine dose, adverse events, and sedation effectiveness were amongst the data recorded.

Patient Demographics (N = 136)	
Age, median (IQR)	6.2 (4.9-7.2) years
Female, *n (%)*	57 (41.9)
Male, *n (%)*	79 (58.1)
Obese, *n (%)*	76 (55.9)
Overweight, *n (%)*	60 (44.1)
Weight, median (IQR)	26.5 (21.6-34.7) kg
History of OCS, *n (%)*	53 (39.0)

Table 1. Patient demographics.

RESULTS

PARTICIPANT INFORMATION

Of the 1,079 charts screened, 136 sedations were included, of which 95 belonged to distinct patients (**Table 1**). Thirty-nine percent of sedations had a previous history of OCS (**Table 1**). Twenty-five patients had two previous sedations, and seven patients had more than two previous sedations. Fifty-six percent of patients were obese, and forty-four percent were overweight (**Table 1**).

SEDATION SUCCESS

A multivariable mixed-effects model that would account for morphine dose, treatment type, and history of multiple sedations, did not produce a reliable estimate of association due to low sample. Thus, simpler models were used.

Of the five simplified models fitted, only Model 4 showed statistical significance. Model 4 estimated that the odds of having a successful OCS were 50% higher per 0.1 mg/kg increase in morphine dose (n = 95; 95% CI 1.03-2.23; P = .036) (**Figure 1**).

Fisher tests were performed to compare OCS effectiveness amongst four ranges of morphine doses but proved to be statistically insignificant (Table 3).

OCS Information (N = 136)	
Morphine dose, *n (%)*	
≤ 0.30 mg/kg	23 (16.9)
0.31-0.49 mg/kg	20 (14.7)
0.50-0.65 mg/kg	38 (27.9)
≥ 0.66 mg/kg	55 (40.4)
Morphine dose, median (IQR)	14 (12-18) mg
Recorded morphine dose reduction (to dose at weight of BMI-for-age at the 50th percentile), *n (%)*	10 (7.4)
Treatment type: complex, *n (%)*	124 (91.2)
Treatment type: simple, n (%)	12 (8.8)
Adverse event, n (%)	7 (5.1)

Table 2. Patient sedation information.

	Obese patients (N = 50)	Overweight patients (N = 45)
Morphine Dose Ranges	OCS Effective	OCS Effective
≤ 0.30 mg/kg	7 (63.6%)	3 (60.0%)
0.31-0.49 mg/kg	4 (80.0%)	7 (87.5%)
0.50-0.65 mg/kg	13 (76.5%)	5 (71.4%)
≥ 0.66 mg/kg	15 (88.2%)	21 (84.0%)
P value	0.534	0.537

Table 3: Categorical morphine dose and sedation success in obese and overweight patients (earliest appointment).

ADVERSE EVENTS

Seven adverse events were recorded amongst all sedations, with four in patients who were obese versus three in patients who were overweight (**Table 2**). For the overweight patients, these events included emesis (one), paradoxical angry child reaction (one), and transient oxygen desaturation (one). For the obese patients, these events included emesis (one) and transient oxygen desaturation (three). However, an association between BMI (obese versus overweight) and having an adverse event was not detected with this sample (P > .999).

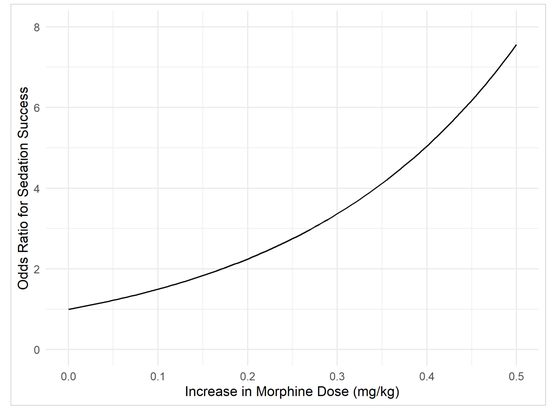

Figure 1. Model 4 – Relationship between increasing morphine dose and odds ratio for sedation success while controlling for treatment type and whether dose reduction was performed.

CONCLUSIONS

Although Model 4 demonstrated that increasing the dose of OCS drugs increased the chance of overall success of sedation in overweight/obese children, the multiple other tests run were unable to draw statistical significance; thus, overall association was unable to be determined. Similarly, although there was a numerically low cases of adverse events in overweight/obese children, no statistical significance could be drawn due to a low sample size.

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