Background/Objective:
Energy balance is preserved through the exchange between body weight and adipose tissue across the multi-faceted complex network that is composed of the sensorial, metabolic, and neuro-endocrine circuits. The olfactory control of energy homeostasis is maintained through central structures that include the hypothalamic-pituitary axis, together with the interplay between the olfactory bulbus (OB) and adipose tissue. Although the interaction of the body mass index (BMI) with olfactory functions has been studied extensively, there is no clear information regarding its relationship with OB volume (OBV). This study focuses on the relationship between OBV and BMI.

Method:
The selected children (n=195) were categorized according to their BMI percentiles with the groups being broken down into normal weight (n=89), overweight (n=31), children with obesity (n=32) and children with severe obesity (n=43). The total brain volume (TBV)-corrected OBV were calculated using magnetic resonance imaging (MRI).

Results:
The mean of the OBV was higher in the children with a high body mass index (BMI) than in healthy group. The OBV increased in the overweight and children with obesity groups (43.76±9.50-49.29±8.61 mm$^3$) but decreased in children with severe obesity (38.23±11.52 mm$^3$). In overweight and children with the obesity groups, a weak but positive correlation between the BMI and OBV was detected ($r_{31}=0.275$-$r_{32}=0.377$), while in the children with severely obesity, a moderate negative correlation was detected ($r_{43}=-0.445$).

This study indicates that there is a positive, albeit weak, correlation between olfactory bulb volume and BMI in the children with overweight and obesity, however, the correlation, albeit moderate, appeared inversely in the children with severely obesity. This finding may suggest that the olfactory bulb volume could change depending on BMI, although it does not demonstrate any cause-and-effect relationship.