Abstract

Context: Olfactory bulb (OB) and eyeball size change depending on age and puberty. There is well-established trade-off between sensory structures of brain such as eye and olfactory bulb depend on environmental circumstances in evolutionary history of animals.

Objective: The aim of this study is to developmentally investigate the potential reciprocal changes between OB and eyeball volumes (EV) in girls with precocious puberty (PP).

Design: A total of 148 girls aged between 5-8 years (63 PP, 85 healthy) were included in the study. Exclusion criteria: Cases of anosmia/hyposmia, neurodegenerative disorder, refractive errors and trauma. The pituitary height (PH), EV and OB volume were measured on segmentation of magnetic resonance image slice using manual counting. The corrected measurements by body surface were used in all statistical analyses.

Results:
In girls with PP, the means of OB volume and pituitary height (PH) were larger (71.11±20.64ml) and higher (4.62±1.18mm), respectively, while mean of EVs was smaller (11.24±2.62cm³) (p=0.000). Cut-off values were 62.27ml, 10.7cm² and 4.71mm for OB volume, EV and PH, respectively. While the negative correlations were found between OB-EV and EV-PH (r= -0.224, p=0.001 and r= -0.116, p=0.001, respectively), OB volume was positively correlated with PH (r= 0.578, p=0.001).

Conclusion:
The present study demonstrates that girls with PP have significantly larger OB volume, but smaller EV, and there is negative correlation between two structures. These results indicate that there is trade-off between anatomical dimensions of OB and eyeball in favor of OB in PP girls.

Keywords: trade-off, olfactory bulb, eyeball volume, pituitary height, precocious puberty