Dimensional changes in structures of craniofacial and brain in precocious puberty: Developmental surrogate markers of the brain as a secondary sex characteristic in puberty

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INTRODUCTION
At puberty, sex-specific changes are observed in the reproductive organs, as well as in the craniofacial structures and specific parts of the brain. Changes are observed evidently in nasal bone, jaw, teeth, orbital and maxillary bones and soft tissues such as lips. It has been reported that puberty triggers sex-specific organizational and activation remodeling of the brain. Investigation of these changes will reveal to which structures investment is allocated for reproductive-related behaviors.

AIM
The aim of the study is to investigate the changes in linear measurements in craniofacial and brain structures in girls diagnosed with precocious puberty (PP) as an early variant of puberty, and to investigate the relationship between these structures and pubertal markers.

METHOD
A total of 46 diagnosed with precocious puberty (PP) and 37 healthy girls aged 6.5 to 8.4 years were included in the study. The following structures were measured in all participants using cranial magnetic resonance imaging: clivus-anterior nasal spin gap, interzygomatic, interuncal and transverse nasal spaces, nasal length, pituitary height, mediolateral and craniocaudal dimensions of the right and left hippocampus, and biparietal and temporal diameters. The dimensions of the structures measured in PP and healthy children were compared. Correlations between pubertal findings and these measurements were evaluated.

RESULTS
- Transverse nasal distance, nasal length, right hippocampus dimensions (craniocaudal and mediolateral) and biparietal diameters were found to be higher in girls with prepubertal precocious puberty (p<0.001, p=0.001, p=0.29 and p=0.001).
- A positive correlation was found between transverse nasal idistance and pituitary height (r=0.476) and right hippocampus dimensions (r<0.001) in healthy children, while it was not found in girls with PP.
- A positive correlation was found between uterine length and clivus-anterior nasal spin distance (r=0.377), transverse nasal distance (r=0.433) and interuncal lengths (r=0.380) in girls with PP.

CONCLUSIONS
This study showed that linear dimensions of nasal, pituitary and hippocampus were higher in girls with PP. It also demonstrated that while there was a positive correlation between linear measurements of nose and uterus length in healthy children, the positive correlation between most cranial structures disappeared in girls with PP, which indicates a highly heterogeneous brain and craniofacial anthropology that develops at puberty.

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