

Oral Contraceptive Use Is Associated with Smaller Hypothalamic Volumes in Healthy Women

Wednesday 3:30-3:40 PM | SSM19-04 | Room: S501ABC

PURPOSE

There is limited evidence on the structural and functional effects of hormonal contraceptives on the brain. In particular, these effects on the hypothalamus are not known. In this study, we aim to identify alteration of hypothalamic volume associated with oral contraceptive pill (OCP) use in healthy women.

METHOD AND MATERIALS

We acquired high-resolution MR images of the brain at 3T for a prospective cohort of 50 healthy women. Psychometric tests (Cogstate and PROMIS) were administered at the time of imaging. 21 participants took OCPs at the time of imaging while 29 did not. After training and validation, 5 raters independently performed manual segmentation of the hypothalamus using ITK-SNAP. Total intracranial volume (tICV) was determined using FreeSurfer. The intraclass correlation was calculated for a subset of 20 randomly selected cases to assess inter-rater reliability. A general linear model was fit to test for the association of OCP use with hypothalamic volume, with tICV and birth control used as covariates. Additional exploratory analyses assessed associations with menstrual cycle phase and with cognitive and health measures.

RESULTS

The inter-rater ICC was 0.86. Total hypothalamic volume in participants taking OCPs was smaller than those not taking OCPs ($b=-63.4 \pm 22.2$, $p=0.006$). There was a significant association of hypothalamic volume with greater anger ($p=0.02$) as well as a strong correlation with depression ($p=0.09$). However, no significant correlation was found between hypothalamic volume and cognitive testing results.

CONCLUSION

Our hypothalamic segmentation method is highly reliable. OCP use is associated with smaller total hypothalamic volume, which may be related to interference with known trophic effects of sex hormones and provide a structural mechanism for OCP-mediated inhibition of folliculogenesis as well as potential functional effects.

CLINICAL RELEVANCE/APPLICATION

Characterizing effects of OCPs on the hypothalamus provides a bridge to understanding functional alterations associated with OCP use that may impact selection of contraceptive method.