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Unveiling Gender Variations in Skull Bone Thickness in Epilepsy: A 3D CT Scan Study

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This study aimed to investigate gender-based differences in skull bone thickness (SBT) among epileptic patients using three-dimensional computed tomography (3D CT). The skull plays a critical role in protecting the brain, and its structural variations have long been examined in anthropology, forensic science, and clinical practice. While gender dimorphism in cranial morphology is well recognized, little is known about how epilepsy may influence these characteristics. A retrospective analysis was conducted using archived CT images from Universiti Sains Malaysia (USM), encompassing 17 epileptic males with 17 controls and 15 epileptic females with 15 controls, aged 18–60 years. SBT was measured at three standard landmarks of the frontal bone (glabella, bregma, and midpoint between them) using Mimics software. Results revealed no significant differences between epileptic and control males across all landmarks. However, in females, SBT at the glabella-bregma midpoint was significantly greater in the epilepsy group compared to controls ($p = 0.027$), whereas glabella and bregma values showed no significant differences. These findings suggest that epilepsy does not significantly influence SBT in males, but may contribute to localized thickening in females, potentially due to biological or treatment-related factors. The study provides novel evidence linking epilepsy with cranial structural variation, highlighting the importance of considering sex- specific differences in clinical and forensic contexts. Additionally, it demonstrates the utility of 3D CT imaging as a precise, non-invasive tool for craniofacial assessment. Establishing standard reference values may aid in diagnostic evaluation, treatment planning, and anthropological research.

Keywords: Skull bone thickness, Epilepsy, Gender-based differences

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