Commentary: Normative orbital measurement in Indian population

The manuscript titled "CT imaging-based normative orbital measurement in Indian population" by Gupta *et al*. attempts to provide normative measures for bone and soft tissues in 200 orbits drawn from an Indian population.[1] Normative measurements of the orbit were reported by Dhanwate and Gaikwad from dry ossified intact adult skulls in an Indian population.[2] Orbital height, breadth, and index measured by the current study are higher than those reported by Dhanwate and Gaikwad.[1,2] This difference may be attributed largely to methodological variance than actual differences related to gender (males predominated both study groups) and age.[1,2] Gupta *et al*. acknowledge this methodological difference.[1] While Dhanwate and Gaikwad used simple instruments like Vernier caliper, scale, and marker to measure the horizontal and vertical dimensions along predetermined points on the orbital rim in a human skull, Gupta *et al*. relied on the computed tomography (CT) to measure the maximum distance between superior and inferior walls on coronal section and the medial and lateral walls on axial section as vertical and horizontal diameters, respectively.[1,2] Anatomically, the largest horizontal and vertical dimensions in the orbit are posterior to the orbital rim and this explains why Gupta *et al*. have higher values for orbital height and breadth.[1] The orbital indices of 103 and 97 for the right and left orbits, respectively, reported by Gupta *et al*. would classify Indians (North Indians) as megaseme.[2] This is in contrast to two other studies from North India where orbital indices were classified as microseme.[3,4]

It is important for the readers to understand the validity of CT-based measurements of orbital bony volume, soft tissues – extraocular muscle and fat, and eyeball in comparison to the actual and this aspect is highlighted by Diaconu *et al*.[5] They have compared CT-based measurements with direct measurements using water displacement in 12 human cadaver orbits.[5] Interestingly, Diaconu *et al*. found that CT-based orbital volumes were different from volumes derived from the displacement of water, but the degree of error varied.[5] The eyeball volumes matched the most (95% difference between −0.54 and +0.50), while the bony volumes measured by CT were likely to be overestimated (95% difference between −1.82 and +2.62 mL).[5] CT-based extraocular muscle volumes had poor validity as they showed the large percentage error of −13.62 ±10.8%.[5] Thus, extraocular muscle volumes were likely to be underestimated by CT-based measurement.[5]

Finally, one must keep in mind that cone-beam CT-aided volumetric measurements have shown that orbital volume is likely to increase with age and that of the optic canal decreases with age.[6]

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