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Age and Gender-Related Variations of Adult Human Ocular Volumes in Sri Lankan Population: An Evaluation Using Magnetic Resonance Imaging

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Magnetic Resonance Imaging (MRI) can be treated as one of the best modalities for volume determination of soft tissue structures. As age and sex show a conspicuous influence upon the ocular volume, this study was aimed to evaluate the age and gender dependent variations in ocular volumes of Sri Lankan adults using MRI. This study was conducted with 200 adult brain MR images, reported as normal within the age of 18–90 years at the National Hospital, Sri Lanka. Ocular volumes were measured separately as 2D and 3D measurements by using an equation and software, respectively. Statistically significant differences in both ocular volumes were found with gender ($p<0.05$) in both 2D and 3D volume analysis methods. On the contrary, while 3D measurements show a significant linear relationship with age in both eyeball volumes, 2D measurement showed a significant linear relationship with age only in the left ocular volume ($p<0.05$). Weak negative correlations were found with age in right ocular volume in both 2D($r=-0.121$) and 3D($r=-0.168$) measurements and in left ocular volume in both 2D($r=-0.151$) and 3D($r=-0.179$) measurements. Furthermore, a statistically significant difference was found between the two volume measurement methods ($p<0.05$) suggesting a partiality between them. Therefore, standardization between the two methods is required. This study concludes that both age and gender have a significant impact on ocular volumes. Since there are no recommended reference values for ocular volumes of the Sri Lankan adult population, this study may serve as normal reference values for the adult population in Sri Lanka. It also supports ophthalmologists and radiologists to quantitatively evaluate ocular pathologies.

Keywords: *ocular volume, MRI, 2D and 3D volume analysis*