Years of Education and Total Intracranial Volume: A Longitudinal Study

Background: Education is one of the factors that contribute to a higher brain reserve. Based on the brain reserve hypothesis, the greater the brain reserve, the less likely it is to develop a neurocognitive disorder, such as dementia.

Methods: Data for this study were obtained from the Open Access Series of Imaging Studies (OASIS) longitudinal magnetic resonance imaging (MRI) data in nondemented and demented adults. There was a total of 150 right-handed participants and 373 imaging sessions, with an average duration of 719 days between visits. The primary outcome was estimated total intracranial volume (eTIV). Multivariable longitudinal regression was used to determine the relationship between years of education and eTIV, while adjusting for age, gender, and socioeconomic status.

Results: We found a significant association between years of education and eTIV. For every additional year of education, there was an increase in eTIV by an average of 14.1 cm^3 (Mean difference [MD]: 14.09, 95%CI: 4.44–23.74). However, after adjusting for age, gender, and socioeconomic status, there was no association between years of education and eTIV (MD: 6.23, 95%CI: -5.60 – -18.06). The association between years of education and eTIV was found to be modified by gender (MD: -25.30, 95%CI: -44.85 – -5.75).

Conclusion: This longitudinal study showed a crude relationship between years of education and eTIV which reinforces the brain reserve hypothesis. This study further emphasizes the need for more intense dementia prevention measures for less educated individuals.

Keywords: Education, dementia, intracranial volume, neurodegenerative disorder