Persistent Viral Pathogens and Cognitive Impairment across the Lifecourse in the Third National Health and Nutrition Examination Survey

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Abstract

Herpesviruses have been associated with cognitive impairment in older populations and those with co-morbid mental health conditions; however, little is known about the association between herpesviruses and cognition in the general U.S. population across the lifecourse. We examined whether herpes simplex virus-1 (HSV-1) and/or cytomegalovirus (CMV) seropositivity were associated with cognitive impairment among children aged 6-16, middle-aged adults aged 20-59 and older adults 60 year of age and older using data from the National Health and Nutrition Examination Survey (NHANES) III. Children were assessed with the Wechsler Intelligence Scale for Children-Revised/Wide Range Achievement Test-Revised (WISC-R/WRAT-R) and tested for CMV and/or HSV-1 seropositivity (n=4,349 and 1,140, respectively). Adults aged 20-59 were assessed with the Simple Reaction Time Test (SRTT), Symbol-Digit Substitution Test (SDST), and Serial Digit Learning Test (SDLT) and tested for CMV and/or HSV-1 seropositivity (n=4,949 and 3,816, respectively). Adults aged 60+ were assessed with the short-portable Mini-Mental State Examination and tested for CMV and/or HSV-1 seropositivity (n=5,124 and 2,394, respectively). Linear regression was used to examine the association between pathogens and WISC-R/WRAT-R scores among children and logistic regression was used to examine the association between SRTT, SDST, and SDLT impairment among middle-aged adults and between immediate memory, delayed memory and serial subtraction impairment among elderly adults. HSV-1 seropositivity was associated with lower scores on the WISC-R/WRAT-R reading ($P=0.0063$) and block design tests ($P=0.0009$) among children. Among 20-59 year olds, HSV-1 and CMV seropositivity were associated with greater odds of impaired reaction for the SDST among adults aged 20-59 (OR: 1.54, 95% CI: 1.13, 2.11, and 1.41, 95% CI: 1.09, 1.82, respectively) and CMV seropositivity was associated with impaired total score on the SDLT (OR: 1.43, 95% CI: 1.14, 1.80). HSV-1 seropositive adults aged 60 and older had 3.26 (95% CI 1.68, 6.32) times greater odds of immediate memory impairment compared to those seronegative. Further examination of biological pathways by which herpesviruses influence cognitive functioning across the lifecourse is warranted.