

The Association between the Acute Cortisol Stress Response and Cognition in Men and Women with Mild Cognitive Impairment

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Objective

The risk of developing Alzheimer's disease (AD) is 1.5 times greater in women than in men. Given the well-known associations between stress and risk for AD, and particularly the negative effects of glucocorticoids on memory, we contend that sex differences in the negative effects of stress on cognition may explain women's increased vulnerability to this disease. We examined the association between the cortisol levels following an acute stressor and cognitive test scores in older men and women with mild cognitive impairment (MCI) due to AD.

Participants and Methods:

Part of the ongoing Stress-AD clinical trial, the sample comprised 32 individuals (17 women, 15 men; 84% White) aged 62 – 89 years ($M = 74.3$; $SD = 7.5$) with MCI. All participants underwent an acute stressor (5 minutes of public speaking and 5 minutes of arithmetic) induced with the Trier Social Stress Test (TSST). They then completed tests of memory (NAB Word List and the Morris Revision, 4th edition story memory) and executive function (Digit Span Backwards, phonemic fluency, and part B of the Trail Making Test). Subjects provided saliva samples at prespecified intervals prior to and following the TSST. We calculated areas under the cortisol curve (AUC) using the trapezoidal method, and used Pearson's correlation to examine associations between the cortisol AUC following the TSST and each cognitive test score in the sample after stratifying by biological sex.

Results:

Cortisol AUC following the TSST predicted scores on two tests of immediate memory in women (NAB Trials 1-3 $r = -.436$, $p = .04$; Morris Revision Story A & B immediate recall $r = -.598$, $p = .006$), but not in men. In contrast, delayed recall on the same tests was not predicted by cortisol AUC following the TSST. Similarly, saliva cortisol level following the TSST did not predict executive test scores in men or women.

Conclusions:

This is the first study to our knowledge to examine the association between cortisol stress response and cognition in individuals with MCI. Our finding of a consistent association between the cortisol level following a stressor and immediate memory in women, but not in men, may bear relevance to women's increased risk for AD. Cortisol was not associated with delayed recall, possibly because the effects of disease may have conferred a more significant effect on this domain. Future studies in individuals without cognitive impairment are needed to elucidate the association between the endocrine stress response and AD risk.