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“The Relationship Between Hair Cortisol Concentrations and Neurofilament Light Chain Levels in Women with Multiple Sclerosis”

Introduction: Multiple Sclerosis (MS) is a chronic neurodegenerative disease characterized by inflammation, neuroaxonal injury, and progressive neurological disability. Women are approximately three times more likely than men to develop MS, a disparity that has increased over the last decades. Chronic physiological stress and dysregulation of the hypothalamic-pituitary-adrenal axis may influence inflammatory and neurodegenerative processes in MS. Hair cortisol concentration provides a measure of cumulative cortisol exposure over an extended period, while neurofilament light chain (NfL) is a serum biomarker of neuronal damage in various neurologic diseases. Examining the association between hair cortisol concentrations and NfL levels in women with MS may help clarify the relationship between cumulative cortisol exposure and neuroaxonal injury.

Objective: This study examined the association between hair cortisol concentrations and NfL levels in women with MS, including adjustment for age and disease duration.

Methods: This retrospective cohort study used previously collected hair cortisol measurements and serum NfL values obtained through medical record review in women with MS. The hierarchical regression analysis included 26 women with complete data for cortisol, NfL, age, and disease duration. This analysis examined whether NfL levels were associated with cortisol levels and whether age and disease duration accounted for additional variance. Model 1 included NfL as the sole predictor of cortisol. Model 2 added age and disease duration, measured in months, to assess their additional contribution to variance.

Results: In Model 1, NfL values were not significantly associated with log-transformed hair cortisol ($\beta = -0.05$, $p = 0.81$) and explained less than 1% of its variance ($R^2 < 0.01$). Adding age and disease duration significantly improved the model, $\Delta R^2 = 0.40$, F change (2, 22) = 7.44, $p < 0.01$, with the full model explaining 40% of the variance in cortisol ($R^2 = 0.40$, adjusted $R^2 = 0.32$). Disease duration was significantly positively associated with cortisol, $\beta = .71$, $p < .01$, while age, $\beta = -.31$, $p = .10$, and NfL, $\beta = -.16$, $p = .36$, were not significantly associated with cortisol.

Conclusion: This study did not support the hypothesized association between hair cortisol concentrations and NfL levels in women with MS. Longer disease duration was associated with higher hair cortisol after adjustment for age and NfL. The findings identify disease duration as a factor worth further investigation in future studies of hair cortisol concentrations in women with MS.

Citations:

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