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"Do Cortisol Levels Affect Performance on SDMT in People With MS"

Background: Multiple Sclerosis (MS) is a chronic autoimmune disease that affects the central nervous system. Subsequent demyelination and neural degeneration, caused by immune dysfunction, leads to cognitive impairments among other symptoms seen in people with MS. Cortisol is a steroid hormone that is released during the body's stress response. Cortisol levels tend to be higher in those with chronic stress. Since MS is a chronic disease, people with MS tend to have elevated levels of cortisol. Cortisol may worsen the severity of MS symptoms and lead to more cognitive dysfunction. The Symbol Digit Modalities Test (SDMT) is given to people with MS to assess their psychomotor functioning and cognitive processing speed. The SDMT is a good indicator of cognitive function in MS. This study aims to determine whether higher cortisol levels in people with MS leads to a worse performance on the SDMT.

Methods: 58 patients with a MS diagnosis were enrolled in the study. The SDMT was administered to each of the patients. 34 patients were determined to be in the impaired group (SDMT t-score <41) and 24 were determined to be in the unimpaired group (SDMT t-score > 41) based on their test performance. The two groups were compared via ANOVA analysis using SPSS version 26. Hair samples were collected from the patients and cortisol levels were recorded, giving an estimate of the average stress levels over the previous 3-month period. The relationship between cortisol level and SDMT t-scores were measured using bivariate correlation .

Results: Results of the analysis showed that there was there was a significant negative correlation within the impaired group ($r=-0.36$ $p=0.04$), but there was no significant correlation between cortisol and performance on the SDMT in the unimpaired group ($r=-0.39$ $p=0.06$). ANOVA analysis determined that the two groups differed by age ($f= 4.98$ $p=0.03$) and level of education ($f=12.61$ $p=0.01$), but not by disease duration or cortisol levels.

Conclusions: The results show there is a negative correlation between cortisol levels and performance on the SDMT meaning as cortisol levels increase, performance on the SDMT decreases. The correlation between hair cortisol and SDMT performance in the non-impaired group was not statistically significant, but the r -0.39 is actually larger than the effect size in the impaired group. The non-significant result is likely the result of not having a large enough sample size in the unimpaired group. There appears to be a similar relationship between cortisol levels and SDMT performance regardless of whether the participants are performing in the average range or below such that cognitive performance decreases as cortisol levels rise.