

WHITE MATTER HYPERINTENSITY BURDEN AND DEPRESSION ARE ASSOCIATED WITH SEVERITY AND IMPACT OF URGENCY URINARY INCONTINENCE IN FUNCTIONAL, COMMUNITY-DWELLING OLDER WOMEN

Hypothesis / aims of study

There is an observed association between white matter hyperintensities (WMH) and increased prevalence of urgency urinary incontinence (UI) in older subjects, suggesting a potential role of structural CNS changes in impaired bladder control. Depression has also been shown to have a relationship with WMH burden and urinary incontinence. We sought to investigate the relationship between WMH and severity and impact of UI symptoms. As a secondary analysis, we were interested in the role of depression in this association. We hypothesized that subjects with a higher burden of white matter hyperintensities will have more severe and bothersome urgency urinary incontinence.

Study design, materials and methods

We studied 65 functional, community-dwelling women aged 60 to 91 years with moderate to severe urgency UI (≥ 5 urgency incontinence episodes per week). Subjects with secondary causes of incontinence and impaired cognitive function (MMSE $<$ 25) were excluded. Structural brain images were obtained by MRI, while an in-house white matter processing protocol (based on several available image analysis programs) was used to calculate global white matter burdens. These values were normalized to each subject's respective brain volume to facilitate cross-subject comparisons. Severity and impact of urgency UI were measured by the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF, score range 0 to 21). This scale consists of three domains: frequency of urinary incontinence, amount of leakage, and overall impact of urinary incontinence. Depression was assessed by the 10-item Center for Epidemiologic Studies Depression Scale (CES-D 10, score range 0 to 30). We used linear regression to assess the relationship between the logarithm of WMH and ICIQ-UI SF. A secondary, post-hoc analysis was completed utilizing multiple regression to assess the relationship between logarithm of WMH, depression and each of the three domains of the ICIQ-UI SF.

Results

The mean age of our subjects was 71.5 and the mean ICIQ-UI SF score was 9 (range 3 to 21). The mean CES-D 10 was 5 (range 0 to 19). The mean normalized WMH ratio was 0.0021482 (range 0.0000625 to 0.0163723). There was a marginally significant positive relationship between WMH and ICIQ-UI SF ($p=0.072$). For each tenfold increase in WMH volume, the ICIQ-UI SF score increased by 2 points.

Post-hoc multiple regression with CES-D 10 and logarithm of WMH showed that depression was significantly related to ICIQ-UI SF score ($p=0.023$) but WMH was no longer a significant predictor ($p=0.117$). Further analysis was completed to assess the association between depression, WMH and the domains of the ICIQ-UI SF. WMH was associated with both frequency of urinary incontinence and amount of leakage ($p=0.064$ and $p=0.048$ respectively), while depression did not show a significant association with either of these domains ($p=0.121$ and $p=0.292$ respectively). The self-reported overall impact of urinary incontinence, however, was not associated with WMH ($p=0.479$) but showed a significant association with depression ($p=0.003$).

Interpretation of results

In a well-defined sample of functional, community-dwelling older women, we found evidence of a relationship between structural changes in white matter and self-reported severity and impact of urgency UI. When depression was added to this model, an additive effect was seen wherein depression associated significantly with the subject's perceived impact of incontinence and white matter hyperintensities associated with the frequency and severity of leakage. Compared to epidemiological studies, our population has less WMH burden, yet despite this lower range of burden, we were still able to find significant effects. This may further implicate a specific role of WMH in the development of urgency UI. The significant association between depression and subject's reported impact of urinary incontinence highlights the need to consider both in the treatment of the patient with urgency urinary incontinence.

Concluding message

This study shows that both white matter hyperintensity burden and depression are associated with self-reported severity and impact of urgency UI in an additive way.

Disclosures

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