

Skeletal Muscle Loss is Associated with Increased Risk of Dementia-Related Outcomes: Longitudinal Observational Study Using ADNI Brain MRIs

PURPOSE

Age-related skeletal muscle loss (i.e., sarcopenia), which is largely undiagnosed and potentially modifiable, is often seen in older adults with Alzheimer's disease (AD) dementia. This study aimed to examine whether temporalis muscle loss (a measure of skeletal muscle loss) is associated with an increased risk of AD dementia in non-demented older adults.

METHODS AND MATERIALS

To quantify sarcopenia, we utilized baseline T1 brain MRIs from the Alzheimer's Disease Neuroimaging Initiative (ADNI) cohort. In non-demented participants aged ≥ 70 years, we manually segmented the bilateral temporalis muscles and calculated the sum cross-sectional area (CSA) of these muscles. Based on the CSA, participants were categorized into two distinct groups using the Maximally Selected Rank Statistics method: large CSA and small CSA. Outcomes included subsequent AD dementia incidence, and change in cognitive and functional scores, and brain volumes between the groups.

RESULTS

We included 621 non-demented participants (age mean \pm SD:77.3 \pm 4.9, female/male:0.7) and established a cut-off of 1076.4 mm² to define large and small CSA. At the study baseline, 131 participants had a large CSA and 488 participants had a small CSA. Median follow-up was 5.8 years. According to the Cox proportional hazard model fitting result (adjusted for age, sex, years of education, marital status, APOE- ϵ 4 status, and intracranial volume), a small temporalis CSA was associated with a higher incidence risk of AD dementia (hazard ratio, 95% confidence interval (CI): 1.59, 1.09 to 2.33, P:0.016). Furthermore, linear mixed-effect regression models showed that having a smaller temporalis CSA was associated with a greater decrease in memory composite score, functional activity questionnaire score, as well as structural brain volumes, including whole brain, hippocampus, entorhinal cortex, and fusiform gyri over the follow-up period (P values < 0.05).

CONCLUSIONS

Temporalis muscles size (a measure of skeletal muscle loss i.e., sarcopenia) is an early risk factor for cognitive decline in older adults.

CLINICAL RELEVANCE/APPLICATIONS

Utilizing brain MRI scans to quantify sarcopenia, specifically through the measurement of temporalis muscle biomarkers, may serve as a readily available predictive tool for assessing the likelihood of future dementia incidence in brain imaging studies.