Atrophy patterns of hippocampal subfields in T2DM patients with cognitive impairment

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Abstract

Background: To identify the volume changes of hippocampus subfields in T2DM patients with cognitive impairment and to determine whether these atrophy patterns in hippocampal subfields are associated with different cognitive domain functional impairment.

Method: A total of 117 individuals were recruited, including T2DM patients with cognitive impairment (T2DM-CI) (n=34), T2DM patients without cognitive impairment (T2DM-nonCI) (n=36) and normal controls (NC) (n=47). Hippocampal and subfield volumes were assessed using structural magnetic resonance (MR) scans. Structural MR images were processed by the FreeSurfer 6.0 image analysis. Then, further correlation analyses were used to estimate the relationship between the cognitive domain and hippocampal subfield volume.

Result: The total hippocampal volume was smaller in the T2DM patient groups, especially in the T2DM-CI group, than in the NC group. Regarding the hippocampal subfields, among the three groups, the volumes of the left subiculum, presubiculum, and fimbria and the right CA1 and molecular layer HP were significantly decreased in the T2DM-CI group (all P values <0.05/12). Partial correlation analyses showed that the volumes of the left subiculum, left fimbria and left presubiculum were most strongly related to executive function. The right hippocampal CA1 volume was significantly correlated with memory (P values <0.05). The levels of blood glucose had no relationship with cognitive function.

Conclusion: Our results indicated that atrophy was heterogeneous across the hippocampal subregions of T2DM patients with cognitive impairment. Among these subregions, the smaller volumes of the left subiculum, left fimbria and left presubiculum were significantly associated with lower executive function, the atrophy of the right CA1 seemed to be related to memory impairment.