To the Editor: Obstructive sleep apnea syndrome (OSAS) is characterized by repetitive episodes of upper airway obstruction (partial or complete) during sleep, which leads to recurrent arterial hypoxemia and sleep fragmentation. Untreated OSAS in middle-aged patients cause impairments in attention, vigilance, some aspects of memory, and executive function.\(^1\) Transient ischemic attack (TIA) is characterized by a transient episode of neurological dysfunction caused by focal brain ischemia. By definition, TIA should not bring persistent deficits but it does increase the risk of long-term cognitive impairment.\(^2\) OSAS is an independent risk factor for TIA. However, transient or persistent cognitive impairment after TIA in OSAS patients remains unclear. Therefore, we conducted a prospective cohort study on cognitive function after TIA to provide insight into the characteristics and influence factors of cognitive function in OSAS patients within 2 years.

Totally, 163 moderate and severe OSAS patients who were admitted to the Stroke Unit of Shengli Oilfield Central Hospital between 2012 and 2017 were consecutively enrolled. Inclusion criteria: (i) patients aged ≥45 years with predominant OSAS exhibiting at least apnea-hypopnea index (AHI) ≥20/h; (ii) an event of neurological symptoms within 7 days. Exclusion criteria: (i) patients with some other sleep disorders, such as rapid eye movement sleep behavior disorder; (ii) mini-mental state examination score less than 24; (iii) patients had intracerebral space-occupying lesion or other neurological diseases that could impact their cognitive function or respiratory function; (iv) patients with major depression; (v) the presence of acute or chronic cardiopulmonary diseases that affected pulmonary function; and (vi) patients with magnetic resonance imaging (MRI) contraindication or developed incident stroke during follow-up. Besides, 134 patients with moderate and severe OSAS but without TIA were recruited as control group.

Baseline neuropsychological assessment, basic clinical features, vascular risk factors, hospital anxiety and depression scale (HADS), and MRI were evaluated within 7 days after admission, at 6-month, and 2-year follow-up. All patients were scored according to the ABCD2 scoring method. No significant difference was found between OSAS patients with and without TIA in age, sex, education level, sleep parameters, mean score of the HADS-D, and presence of vascular risk factors (\(P > 0.05\)). For OSAS patients with TIA, the function of cognitive domain including executive function (\(P < 0.001\)), attention (\(P < 0.001\)), and information processing speed (\(P < 0.001\)) decreased continuously at baseline, 6-month and 2-year follow-up, whereas the other cognitive function remained stable [Table 1]. There was a significant association of TIA event with decline in executive function [odds ratio [OR] = 0.046, 95% confidence interval [CI]: 0.025–0.084, \(P < 0.001\)], attention (OR = 4.112, 95% CI: 2.971–5.692, \(P < 0.001\)), and information processing speed (OR = 7.258, 95% CI: 4.768–11.048, \(P < 0.001\)) in OSAS patients. The multiple linear regression analysis revealed that age and ABCD2 scores were the adverse risk factors for executive dysfunction. Age, hypertension, Fazekas score, and ABCD2 scores were the adverse risk factors for attention dysfunction and reduced information processing speed.

In this study, moderate and severe OSAS patients showed functional impairment in multiple cognitive domains in the first 2 years after TIA. Among them, the working memory remained relatively intact. However, the cognitive domains
Table 1: Cognitive domain compound scores within 2 years after TIA.

| Items                      | Cognitive domain compound scores | Within 7 days after admission | At 6 months after TIA | At 2 years after TIA |
|----------------------------|---------------------------------|------------------------------|-----------------------|----------------------|
| Information                |                                 | TIA Group                     | Control Group         | TIA Group            | Control Group         |
|                            |                                 | P                             | z                     | P                    | z                     |
| Executive function         | 0.224 (0.067–0.381)             | -0.165 (0.070–0.299)          | 0.000                 | -0.323 (0.450–0.116) | 0.000                 |
| Attention                  | 0.240 (0.086–0.426)             | -0.172 (0.059–0.291)          | 0.000                 | -0.157 (0.128–0.183) | 0.215                 |
| Working memory             | 0.050 (0.110–0.191)             | -0.062 (0.010–0.124)          | 0.671                 | 0.027 (0.084–0.140)  | 0.671                 |

Data were shown as mean (95% confidence interval). Cognitive domain compound scores represent the mean of individual test z scores within a cognitive domain. TIA: Transient ischemic attack.

Vascular risk factors are associated with reduced performance on both the cognitive screening task.[5] Our results suggest that the presence of vascular risk factors (hypertension and low-density lipoprotein cholesterol) and age were associated with reduced performance of the executive function measures, attention, and information processing speed. Moreover, the ABCD2, which also loads heavily on vascular risk factors, was associated with cognitive decline.

In summary, the decline of cognitive function, including attention, executive function, and information processing speed, showed in OSAS patients was a dynamic process, especially in the first 2 years after TIA. Early onset and persisting cognitive impairment was more likely to occur in moderate and severe OSAS patients with TIA. Furthermore, long-term management of vascular risk factors may reduce the risk of cognitive impairment.

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Conflicts of interest

None.

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