

Attentional, memory and executive specificities in patients with Obstructive Sleep Apnea syndrome (OSAS): A neuropsychological approach

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Introduction

Patients with Obstructive Sleep Apnea Syndrome (OSAS) show **specific cognitive impairments**, such as impaired alertness/attention, executive and memory functioning. However, there is little to **no consensus** in research about these possible alterations (Daurat et al., 2016). We propose a **neuropsychological battery test** assessing vigilance, sustained attention, processing speed, inhibition, updating, shifting and working memory to evaluate these impairments in OSAS. We also studied the subjective aspect of OSAS, by proposing questionnaires on the quality of sleep, sleepiness, fatigue and the severity of insomnia.

Methodology

Material

The battery included 11 neuropsychological tests assessing attentional, executive and memory functions (cf. Table 1). Control subjects also underwent neuropsychological testing. OSAS patients completed the "sleep" questionnaires (cf. Table 2). The day before administration, OSAS patients underwent polysomnography (PSG) in the CHU Brugmann sleep laboratory.

Neuropsychological Battery Test	
Vigilance	Behavioral Sleep Resistance Task (BSRT)
Sustained Attention	Psychomotor Vigilance Task (PVT)
Processing speed	Trail Making Test A (TMT A)
	Symbol Digit Modalities Test (SDMT)
Inhibition	Hayling Test
	Go/No-Go from Test of Attentional Performance (TAP)
Updating	Working Memory Level 3 from Test of Attentional Performance (TAP)
Shifting	Trail Making Test B (TMT B)
	Five Point Test (FPT)
	Flexibility from Test of Attentional Performance (TAP)
Working memory	Reading Span Task (RST)

Table 1. Neuropsychological battery test administered to subjects

Questionnaires

Pittsburgh Sleep Quality Index (PSQI)
Epworth Sleepiness Scale (ESS)
Fatigue Severity Scale (FSS)
Brugmann Fatigue Scale (BFS)
Insomnia Severity Index (ISI)
Functional Outcomes of Sleep Questionnaire (FOSQ-10)

Table 2. Questionnaires administered to OSAS patients

Population

We administered the neuropsychological test battery to 43 participants, 21 OSAS and 22 control subjects, reporting no sleep problems (cf. Table 3). The two groups are matched in terms of age, gender and socio-cultural level.

	Control group	OSAS patients
Sample	N=22 11♀ / 11♂	N=21 10♀ / 11♂
Age	41.68 (σ=15.44)	45.16 (σ=14.51)
IMC	24.36 (σ=4.27)	30.28 (σ=6.30)
Apnea-hypopnea index	26.85 (σ=32.44)	NO PSG

Table 3. Clinical and demographical information of the groups

Results

1) Principal results

Inter-group comparisons (OSAS vs Control subjects)

The results showed a significant difference for all neuropsychological tests, except TMT A, between the performance of OSAS patients and control subjects ($p < .05$).

Compared to control subjects, OSAS patients had significantly lower performances in alertness, sustained attention, processing speed, motor and cognitive inhibition, flexibility, updating and working memory.

Correlation between severity of cognitive disorders and severity of OSAS

There was no correlation ($p > .05$) between the severity of cognitive disorders, expressed by the performance of OSAS patients on neuropsychological tests, and the degree of severity of OSAS, expressed in apnea-hypopnea index (AHI).

2) Supplementary results

We also evaluated the relationship between the subjective complaints of OSAS patients, expressed by their results on the "sleep" questionnaires, and the degree of severity of OSAS, expressed in the apnea-hypopnea index (AHI).

We found no significant correlation for any test ($p > .05$).

Discussion and conclusions

Our study adds to a growing body of evidence that **cognitive deficits** are present in OSAS. However, the **lack of correlation** between disorder severity and poor test performance, and between disorder severity and questionnaire scores, demonstrates that OSAS is a disorder with **multiple causes and consequences**, which is still poorly understood (Daurat et al., 2016). The relationship between Apnea Hypopnea Index (AHI) and the severity of cognitive disorders would not be linear and various mechanisms such as **pre-morbid intelligence or cognitive reserve** could be significant variables that **interact with the severity of OSAS** in the manifestation of cognitive deficit (Alchanatis et al., 2005).