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Executive function in sleep apnea: controlling for attentional capacity in assessing executive attention.

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STUDY OBJECTIVES: As the effects of general slowness and decreased attentional capacity on higher executive attention have not been fully taken into account in the sleep apnea literature, we statistically controlled for basic attentional performance in evaluating executive attention per se in sleep apnea patients. DESIGN: A case-controlled design was used with comparison of basic and executive attentional tasks. PARTICIPANTS: Thirty-six polysomnographically diagnosed patients (mean apnea-hypopnea index = 60.5 +/- SD 31.6) participated, together with 32 healthy controls. MEASUREMENTS AND RESULTS: Neuropsychological tests included Trail Making part A and B, Symbol Digit Modalities (SDMT), Digit Span forward and backward, Stroop Color-Word, Five-Point design fluency, and an Attentional Flexibility task. Patients' vigilance data indicated time-on-task decrements after 10 minutes. Moreover, their performance was significantly reduced on the SDMT (effect size d = 0.93), the Digit Span forward task (d = 0.44), the number of errors on the basic 2-choice reaction time subtest of the Attentional Flexibility task (d = 0.74) and the mean RT on the actual Attentional Flexibility subtest (d = 0.54). It has been argued that the latter poor performance was probably primarily related to the task's phonologic loop component of working memory rather than to an attentional switching deficit per se. No other performance differences were found between patients and healthy controls. CONCLUSIONS: In addition to vigilance decrements, attentional capacity deficits clearly emerge, ie, slowed information processing and decreased short-term memory span. However, no specific clinical indications for executive attentional deficits--such as disinhibition, distractibility, perseveration, attentional switching dysfunction, decreased design fluency, or an impaired central executive of working memory--are found in patients with severe sleep apnea. Their cognitive performance seems very similar to the cognitive decline found after sleep loss and qualitatively different from patients with chronic obstructive pulmonary disease, suggesting sleepiness as the primary factor in a parsimonious explanation for the attention deficits in sleep apnea, without the need to assume prefrontal brain damage.

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