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STOP-Bang: Screening for Obstructive Sleep Apnoea in a Cognitive Disorders Clinic

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Abstract

Study background: Obstructive sleep apnoea may be one of the few reversible causes of cognitive impairment. Hence its reliable identification in patients referred to dedicated cognitive disorders clinics is important.

Method: STOP-Bang, a validated questionnaire for obstructive sleep apnoea, was administered to consecutive new patients attending a dedicated cognitive disorders clinic based in a regional neuroscience centre.

Results: Almost half of those completing the STOP-Bang were screen positive, although on clinical grounds the diagnosis of obstructive sleep apnoea was seldom considered likely; many were diagnosed with other explanations for their cognitive impairment.

Conclusion: STOP-Bang is likely a very sensitive screening instrument which may generate large numbers of false positives in a cognitive disorders clinic, which might have significant service implications for onward referral to sleep disorders clinics.

Introduction

Obstructive sleep apnoea (OSA) syndrome may, amongst its various symptoms, produce an adverse effect on cognitive performance [1]. Frank cognitive impairment in OSA may be a consequence of factors such as sleep disturbance, excessive daytime somnolence, and intermittent cerebral hypoxia [2]. Since these deficits may be reversible with appropriate treatment, OSA is an important diagnostic consideration in the assessment of patients presenting with cognitive complaints. Although the exact prevalence of OSA in those with cognitive complaints is unknown, one study undertaken in a specialist cognitive disorders clinic suggested that 8.4% of young adults with suspected dementia had OSA [3].

Definitive diagnosis of OSA requires nocturnal polysomnography or pulse oximetry [4,5]. These investigations may not be universally available. Hence, screening tests for OSA may be of value [6,7], with onward referral of screen positive patients to dedicated sleep disorders clinics for more detailed investigation. One such screening questionnaire for OSA is STOP-Bang [8]. This comprises 8-items, each requiring a Yes/No answer, relating to snoring, tiredness, observation of sleep apnoeas, high blood pressure, body mass index, age, neck circumference and gender [8]. STOP-Bang scores thus range from 0-8, and high scores have been shown to indicate a high probability of OSA [9]. The STOP-Bang screening instrument has been validated as a highly sensitive screening questionnaire for OSA [10], and has been widely adopted and translated into several languages.

Because OSA may contribute to symptoms of cognitive impairment [1-3], we undertook an exploratory investigation of possible undiagnosed OSA prevalence in a population of patients with cognitive complaints. The specific aims of the current study were to investigate the use of the STOP-Bang screening questionnaire in new patients referred to a dedicated cognitive disorders clinic, and to examine correlations between STOP-Bang scores and those of selected cognitive screening instruments (CSIs).

Materials and Method

The study took place in a dedicated Cognitive Function Clinic based in a regional neurosciences centre. Consecutive new patients assessed over a 3-month period (October-December 2014) were administered the STOP-Bang questionnaire.

This was in addition to the standard clinic protocol of semi-structured patient history enquiring about cognitive symptoms and functional performance, with collateral history where possible; administration of CSIs; and neuroradiological examination (brain computed tomography in all patients; interval magnetic resonance brain imaging in some cases) [11].

The CSIs used to assess cognitive performance were the Mini-Mental State Examination (MMSE) [12] and the Mini-Addenbrooke's Cognitive Examination (M-ACE) [13], both of which are in regular use in this clinic [14,15].

Standard diagnostic criteria for dementia (DSM-IV) [16] and mild cognitive impairment (MCI; Petersen) [17] were used. Criterion diagnosis was by judgment of an experienced clinician based on diagnostic criteria blinded to STOP-Bang scores. STOP-Bang score ≥ 3/8 was taken as the criterion for "suspected high risk of OSA" [9].

Results

Over the 3-month study period, 92 new referrals were seen. Of these, there were 25 exclusions from STOP-Bang screening for the following reasons: a pre-existing diagnosis of OSA (6); a pre-existing diagnosis of dementia or amnesia with established etiology (10); no cognitive complaint (1); patient not an English speaker or requiring a translator (3); patient declined or unable to complete STOP-Bang (5).

The demographic data of the remaining 67 patients showed a male preponderance (F:M=26:41, 39% female), with a patient age range of 25-88 years (median age 60 years, typical of non-overlapping cohorts from this clinic [11]). Final clinical diagnoses were dementia (10), MCI (13), and cognitively unimpaired and/or subjective memory complaint (44). This prevalence of cognitive impairment (dementia and MCI; 0.34) was also typical of non-overlapping cohorts from this clinic [11].

Examining correlation coefficients, STOP-Bang scores did not correlate with patient age, MMSE scores or M-ACE scores (Table 1).

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Patient age	0.06
MMSE (range 0-30, higher score better)	-0.17
M-ACE (range 0-30, higher score better)	-0.13

Table 1: Correlation coefficients between STOP-Bang scores, patient age, and cognitive screening instrument scores.

STOP-Bang score ≥ 3/8, the criterion for "suspected high risk of OSA", was observed in 33/67 patients. However, in only one of these cases did the clinician think it very likely on clinical grounds that OSA contributed to the presenting cognitive problems, and possibly so in another five cases. Of the 33 with STOP-Bang score ≥ 3/8, 13 had clear alternative explanations for cognitive complaint, such as clinical (with or without or radiological) evidence for an underlying neurodegenerative disorder and/or depression (Table 2).

Diagnosis	n
Dementia	6
	(Alzheimer's disease 1; mixed Alzheimer's disease and cerebrovascular disease 3; Parkinson's disease dementia 1; frontotemporal dementia 1)
MCI	5
	(MCI 1; PD-MCI 1; DLB-MCI 1; FTD-MCI 2)
No cognitive impairment	2
	(Depression 1; Transient global amnesia 1)

Table 2: Diagnoses accounting for cognitive complaint associated with high STOP-Bang scores (≥ 3/8).

The proportion of cognitively impaired (dementia plus MCI) and cognitively unimpaired patients with STOP-Bang score ≥ 3/8 were 12/23 (52.2%) and 21/44 (47.7%) respectively. The null hypothesis that the proportion of cognitively impaired and cognitively unimpaired patients with STOP-Bang score ≥ 3/8 did not differ significantly was not rejected (χ^2=0.27, df=1, p>0.5).

Discussion

In this study, STOP-Bang proved acceptable to patients attending a cognitive disorders clinic and easy to administer and score, without appreciable effect on the running of the clinic. STOP-Bang scores did not correlate with patient age nor with scores on CSIs in common use in this clinic [14,15].

This was not a screening or diagnostic test accuracy study, since there was no referent (e.g., polysomnography) or application of OSA diagnostic criteria [4,5]. Rather, this was an exploratory study to gauge whether the STOP-Bang questionnaire might be applicable in this setting. We are not aware of any previous examination of STOP-Bang in a dedicated cognitive disorders clinic.

The finding was of large numbers of STOP-Bang screen positive patients, but few of these were thought to have OSA on clinical grounds. This may be in keeping with the previous report of 8.4% of young adults with suspected dementia having OSA [3], although the experience of this cognitive disorders clinic has been of only occasional OSA cases [11] despite the high frequency of poor sleep quality [18]. Since STOP-Bang is known to be a very sensitive screening test for OSA but with rather low specificity [9,10], it may generate significant numbers of false positive results in a cognitive clinic setting (e.g., any tired male over 50 years will score 3/8 on STOP-Bang). Reliance on STOP-Bang scores as a screening test in isolation might therefore result in large numbers of patients being referred onwards to dedicated sleep disorders clinics for further assessment, with potentially significant implications for service provision in the latter. Revision of the STOP-Bang cutoff score or scoring method [10], to improve specificity without significantly compromising sensitivity may be required for optimal use in cognitive clinic populations, as well as the exercise of clinical judgment in deciding on the indications for onward referral.

In conclusion, STOP-Bang was simple to administer and score in this setting, and proved acceptable to patients undergoing cognitive assessment. It was very sensitive, meaning that it is likely to detect prevalent cases of OSA but in addition it will probably also identify large numbers of false positives.

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