Impact of CPAP therapy on health-related quality of life in elderly patients with apnoea–hypopnea syndrome: a systematic review of randomised clinical trials

To Editor:

Obstructive sleep apnoea (OSA) is a chronic pathology characterised by the presence of repetitive upper airway obstruction during the sleep, the prevalence of which increases with the age [1], and for which continuous positive airway pressure (CPAP) is the treatment of choice [2–4]. However, there have been few studies on diagnosis and management of OSA in elderly people. A qualitative systematic review of randomised clinical trials (RCTs) was conducted to evaluate the impact of CPAP therapy on health-related quality of life (HRQL) in OSA patients (aged >65 years), diagnosed by polysomnography or polygraphy and treated with CPAP for at least 3 months (>4 h·day^{-1}). Studies whose primary outcome did not assess HRQL were excluded. Interventions were categorised according to whether or not they included CPAP treatment. The primary outcome was HRQL based on validated generic or specific questionnaires.

Following quality guidelines for conducting systematic literature reviews [5], research was carried out in November and December 2015; trials were identified in the records of Trip, Scopus, the Cochrane Controlled Trials Register and Medline. Studies published since November 2000 were identified using Medical Subject Headings: "CPAP", "SAHS", "quality of life", "therapeutic effect" and "elderly". The search formula was: "CPAP [AND] OSA [AND] quality life; CPAP [AND] quality life; OSA [AND] quality life". Subsequently, two authors classified the studies independently, taking into account the summary, key words and title of the study. At a second level, two researchers independently determined the eligibility and quality of the studies, and the performed intervention. Disagreements were analysed and resolved by discussion.

We found up to 896 potentially relevant articles; in the first evaluation, 868 of them were rejected, as they did not comply with some of the requirements. In the second evaluation, from these 28 studies, one was ruled out because it was not finished and nine because they were not RCTs with control groups. In the third evaluation, from 18 studies, 16 were ruled out because the average age was <65 years. Finally, only two RCTs were included in the review; the main results are shown in table 1.

It must be emphasised that researchers come to the same conclusion despite using different questionnaires. Martínez-García *et al.* [6] used the Quebec Sleep Questionnaire (QSQ) [8], which is appropriate for OSA patients. In the PREDICT study [7], two general questionnaires and one specific for OSA were used. The general ones were Short-Form 36 (SF-36) [9], validated for OSA patients, and European Quality of Life-5 Dimensions (EQ-5D) [10, 11] questionnaire, which does not have enough sensitivity to measure the health of the patient individually, while the specific questionnaire was the Sleep Apnea Quality of Life Index (SAQLI) [12], the only one that takes into account the possible impact of the use of CPAP. Martínez-García *et al.* [6] show that the CPAP group improved in every domain of the QSQ test ($p<0.001$; size of the effect 0.4–0.98) and also for the symptoms related to sleep ($p<0.001$; size of the effect 0.31–0.91). In the PREDICT study, the HRQL was tested through these questionnaires: EQ-5D, SF-36 and SAQLI. These questionnaires were administered immediately after the polysomnography study, and 3 and 12 months later, in both the control and CPAP groups. The CPAP patients had better outcomes in HRQL measured by the SF-36 and SAQLI, compared to baseline data. In relation to the control group, in the CPAP group, daytime sleepiness was improved at

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TABLE 1 Results of trials included

	Martínez-García *et al.* [6]	McMillan *et al.* [7]
Target population	⩾70 years of age with OSA	⩾65 years of age with OSA
Setting	Spain (12 clinical centres)	UK (14 clinical centres)
Design	Randomised multicentre clinical trial with a blinded design	Randomised multicentre clinical trial with a blinded design
Participants in CPAP/control groups	115/109	140/138
Selection criteria		
Inclusion	Age ⩾70 years, AHI ⩾30 events per h, current use of CPAP, central sleep apnoea, incapacitating hypersomnia	Age ⩾65 years, OSA, AHI ⩾7 events per h, ESS ⩾9, ODI >4%
Exclusion	Severe heart failure, a cardiovascular event in the month prior to the inclusion in the study, ESS ⩾18, severe impairment of cognitive.	CPAP therapy (previous study), S_{pO_2} (vigil) <90%, FEV_1/FVC <60%, being a professional driver, reporting sleepiness while driving, shift work
Intervention CPAP/control group	Treatment with CPAP and health education/health education	Treatment with CPAP and health education/health education
Mean follow-up months	3	12
Primary end-point	QSQ	ESS, cost-effectiveness
Secondary end-points	Neurocognitive battery test, HADS Blood pressure measurements	SAQLI, OSLER, EQ-5D, SF-36, cardiovascular risk factor
Age years mean±SD	75±3.9	71.1±4.6
Men/women	153 (68%)/71 (32%)	229 (83.38%)/49 (16.62%)
BMI kg·m^{-2} CPAP/control mean±SD	33.0±7.3/32.8±5.1	33.9±5.7/33.6±6.4

	QSQ		SAQLI total	
	Hypersomnolence	Diurnal symptoms	3 months	12 months
Treatment effect (95% CI)	−0.612 (−0.894–−0.331)	−0.778 (−1.049–−0.506)	0.3 (0.1–0.5)	0.4 (0.2–0.6)
p-value	<0.001	<0.001	0.005	0.001

	Nocturnal symptoms	Emotions	Social interaction
Treatment effect (95% CI)	−0.958 (−1.249–−0.668)	−0.597 (−0.864–−0.331)	−0.546 (−0.833–−0.259)
p-value	<0.001	<0.001	<0.001

ESS mean±SD	Baseline	3 months	Baseline	3 months	12 months
CPAP group	9.56±4.0	5.94±3.41	11.6±3.4	7.7±0.4	5.7±1.2
Control group	9.33±3.62	9.22±3.99	11.6±3.4	9.8±0.4	9.1±1.2
p-value	>0.05	<0.001	>0.05	0.002	0.002

OSA: obstructive sleep apnoea; CPAP: continuous positive airway pressure; AHI: apnoea–hypopnoea index; ESS: Epworth Sleepiness Scale; ODI: oxygen desaturation index; S_{pO_2}: oxygen saturation measured by pulse oximetry; FEV1: forced expiratory volume in 1 s; FVC: forced vital capacity; QSQ: Quebec Sleep Questionnaire; HADS: Hospital Anxiety and Depression Scale; SAQLI: Sleep Apnea Quality of Life Index; OSLER: Oxford Sleep Resistance test; EQ-5D: European Quality of Life-5 Dimensions; SF-36: 36-item Short-Form Health Survey; BMI: body mass index.

3 months (p=0.002) and at 12 months (p<0.001). The average increment of quality-adjusted life years obtained in the EQ-D5 for CPAP group, in relation to control group, was 0.01 (95% CI 0.63–0.71, p=0.787).

The two RCTs show that CPAP therapy increases HRQL; this improvement is significant in the patient's energy or vitality, and in the diurnal symptoms. The positive impact of CPAP on HRQL in elderly patients is an important finding that sheds light on the lack of scientific evidence on the effect of this therapy [13]. However, the lack of an analysis correlating the impact of CPAP on HRQL and the age of subjects makes it difficult to define the age at which the CPAP can make a significant improvement in quality of life. Moreover, the authors did not study the influence of sex on this therapy, since the role of CPAP in women may be different [14].

The study by Martínez-García *et al.* [6] showed the highest percentage of adherence to CPAP therapy (69.6%, as opposed to 35.0% in the PREDICT study). However, the Martínez-García *et al.* [6] study lasted 3 months, *versus* 12 months for the PREDICT study, and this could explain this divergence. In the selected studies, the diagnosis of OSA was not performed in all patients by polysomnography, so the quality of sleep and HRQL could not be related.

In conclusion, the results of the two clinical trials included in the review underline that CPAP could have a positive impact in patients older than 65 years, particularly on nocturnal and diurnal symptoms, and on HRQL. However, the small number of trials prevents us from reaching conclusions. More studies on the treatment effect of CPAP on HRQL in patients older than 65 years with OSA are needed.

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