Continuous positive airway pressure treatment may restore optic nerve function in patients affected by obstructive sleep apnea.

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OBJECTIVE

Obstructive sleep apnea (OSA) is a sleep disorder with widespread prevalence, currently receiving significant literature attention since it represents a risk factor for several health concerns.[1] OSA has been recently associated with optic nerve pathology; in particular, literature proposed the clinical and electrophysiological evidence of optic nerve damage in OSA patients.[2] The aim of this study is to evaluate in patients affected by OSA the effect of continuous positive airway pressure (CPAP) treatment on the functional integrity of the visual system evaluated by means of visual evoked potentials (VEP).

METHODS

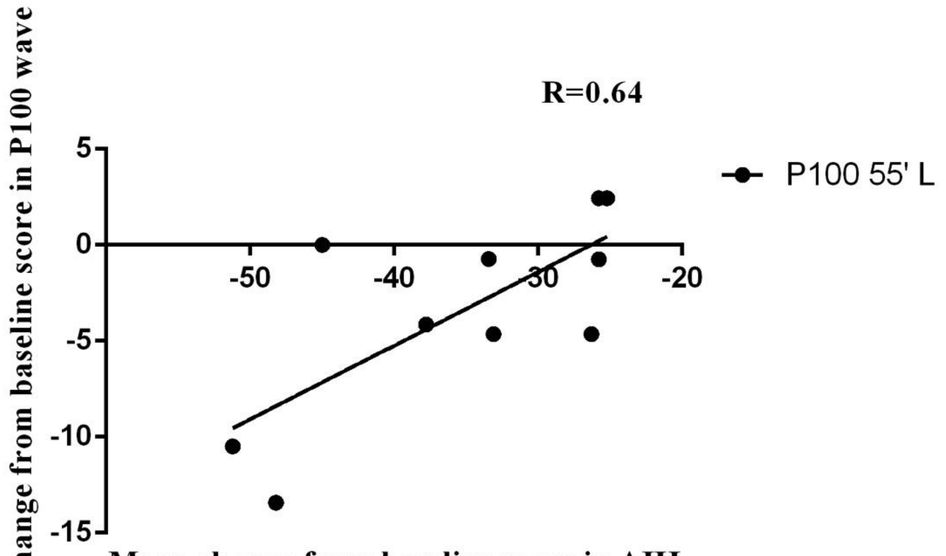
We performed the electrophysiological study of visual system in a population of severe OSA (apnea-hypopnea events/time in bed ≥ 30/h) patients at baseline and after 1-year of CPAP treatments. We divided OSA patients in two subgroups on the basis of the compliance at the CPAP therapy. Patients with adequate compliance (OSA/CPAP+) and patients with scarce compliance (OSA/CPAP-) were then compared. Compliance was measured by analyzing the software ventilator report; patients should use their device for at least 4 hours per night and for 5 days a week. To be included in the study, OSA patients should not have visual impairment and systemic disorders with known influence on visual system. VEP were elicited by a reversal pattern generated on a television monitor at low (55') and high (15') spatial frequencies stimulation. Daytime sleepiness was assessed using the Epworth Sleepiness Scale (ESS) in OSA patients at baseline and after CPAP treatment. Finally, we compare VEP of OSA/CPAP+ with VEP of a population of healthy controls.

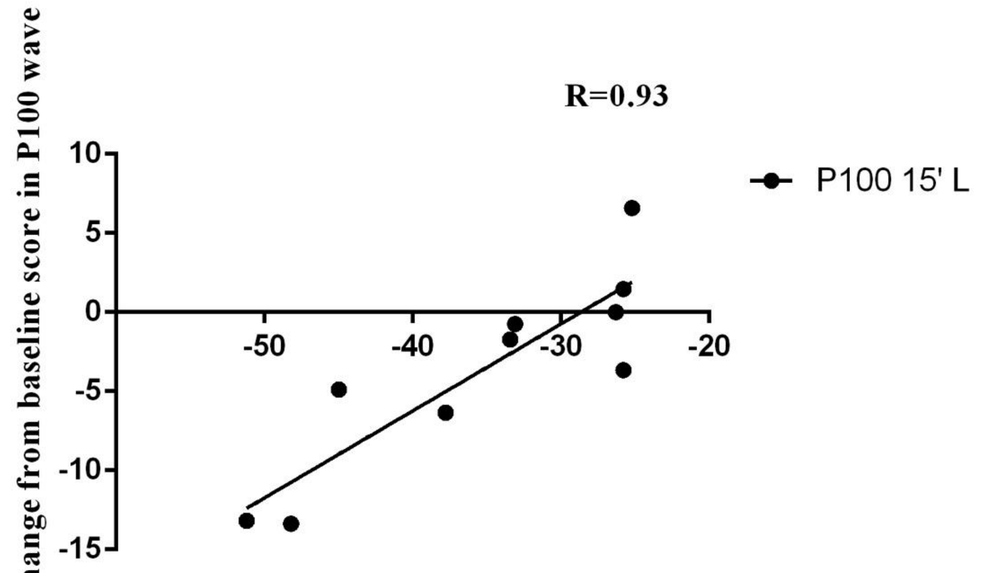
RESULTS

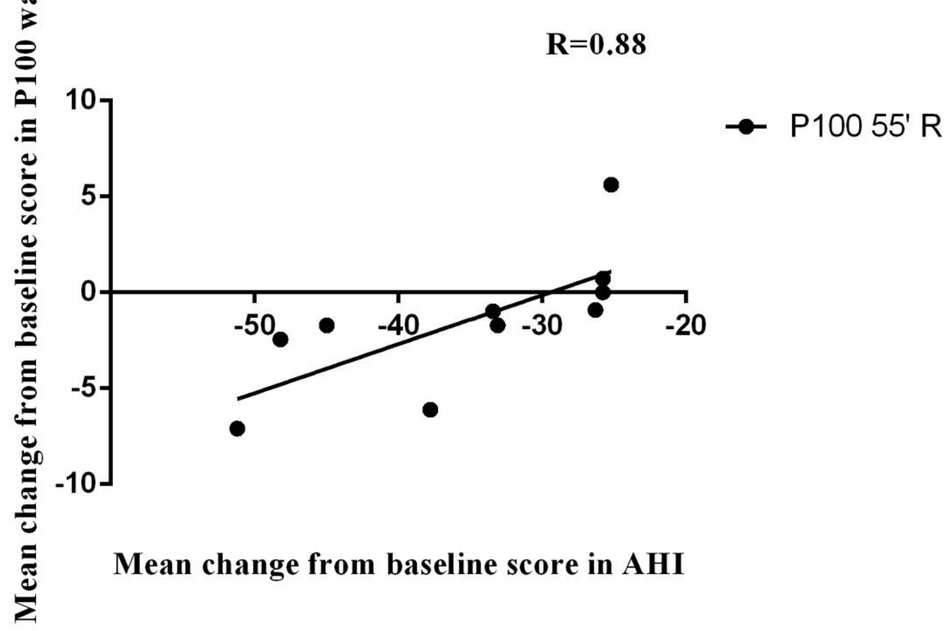
	OSA/CPAP+	OSA/CPAP-	P Value
Age	46.83±11.54	44.2±11.71	NS
Sex	8M 2F	6M 4F	NS
AHI	38.78±22.81	47.49±21.21	NS
ODI	30.59±9.95	46.76±23.22	NS
Mean SaO2	93.71±1.34	94.03±1.59	NS
T<90%	6.26±5.62	6.92±8.65	NS
Min SaO2	75.1±11.98	77.4±10.76	NS
ESS pre	12.5±3.88	11.3±7.49	NS
ESS post	8.4±3.77	9.7±5.25	NS
ΔESS	-4.7±4.22	-0.9±5.04	<0.05
BMI	27.8±2.39	29.39±3.91	NS
Hours of CPAP/night	5.64±1.15	1.6±0.73	<0.01
Days of CPAP/week	6±0.67	2.6±0.84	<0.01
Residual AHI	4.8±2.27	3.27±1.44	NS
ΔAHI	-38.37±19.78	-44.2±21.19	NS

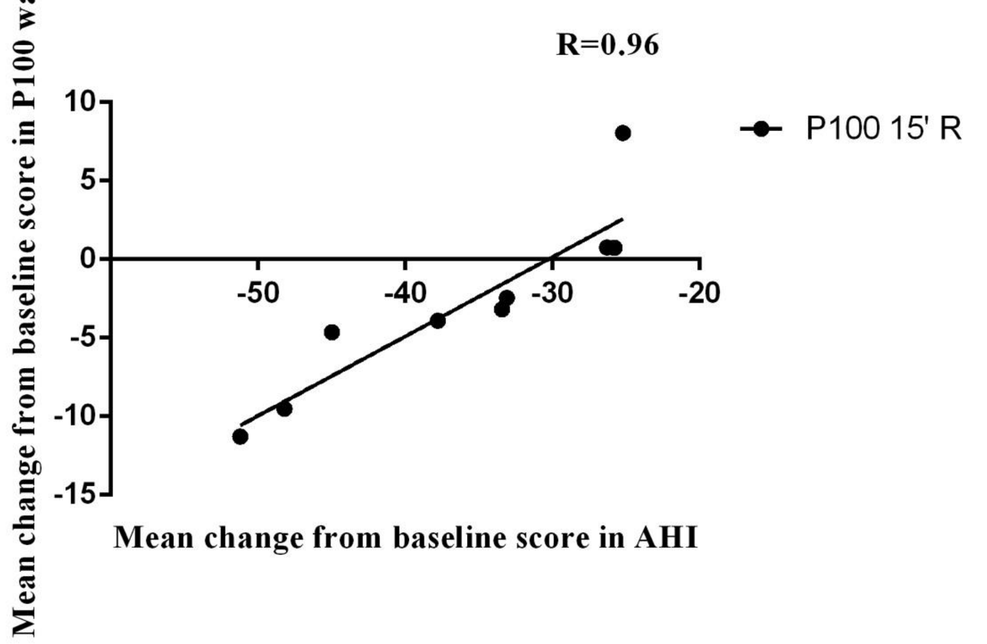
	P100		OSA/CPAP+	OSA/CPAP-	P Value
Latency	15	DX	-2.54±4.41	3.13±3.03	<0.01
		SX	-3.58±5.21	5.12±3.34	<0.01
	55	DX	-1.46±2.41	1.14±3.16	<0.01
		SX	-3.39±4.47	0.8±2.29	<0.01
Amplitude	15	DX	2.59±1.8	0.27±5.12	<0.05
		SX	1.22±4.69	-0.25±5.33	<0.05
	55	DX	3.49±2.26	2.4±5.11	<0.05
		SX	1.22±4.69	0.9±4.5	<0.05

	P100		OSA/CPAP+	Controls	P Value
Latency	15	DX	114.69±5.36	106.29±3.41	<0.01
		SX	115.72±5.08	108.08±4.53	<0.01
	55	DX	105.71±2.5	99.83±4.66	<0.01
		SX	104.94±3.08	100.48±4.69	<0.01
Amplitude	15	DX	12.95±7.37	13.7±3.9	NS
		SX	12.78±9.02	15.08±6.21	NS
	55	DX	15.04±7.72	15.55±4.81	NS
		SX	12.86±7.1	16.56±6.38	NS









CONCLUSIONS

Taking into account that OSA patients are affected by VEP alterations as documented by lower amplitude and longer latency of the P100 component, this study documented that CPAP treatment significantly ameliorate VEP in OSA patients who show good compliance at CPAP treatment with respect to OSA patients who did not adequately treat sleep apneas. Since VEP latency and amplitude pathological changes may be the expression of optic nerve dysfunction provoked by hypoxia, acidosis, hypercarbia and airway obstruction, frequently observed in patients with OSA, we hypothesize that correcting OSA condition by CPAP optic nerve function may be recovered in those patients. In particular, OSA/CPAP+ patients showed VEP P100 amplitude similar with that of controls, thus confirming the hypothesis that CPAP may restore optic nerve function.

In conclusion, CPAP treatment may restore the altered electrophysiological findings present in OSA patients if appropriately performed.