

# Hypoxic Burden Index and its influence on lesion volume in Ischemic Stroke.

M. de Scisciolo<sup>1</sup>, V. Brunetti<sup>1,2</sup>, R. Calandrelli<sup>1,2</sup>, G. Della Marca<sup>1,2</sup>

1.Università Cattolica del Sacro Cuore, Roma

2.Policlinico Universitario A. Gemelli, Roma

## INTRODUCTION

- The link between obstructive sleep apnoea (OSA) and ischemic stroke is a subject of discussion.
- It is well established that OSA is an independent risk factor for ischemic stroke, mortality, and major cardiovascular events. However, whether OSA influences the volume of stroke lesion is still unclear.
- In clinical practice, the Apnoea-Hypopnoea Index (AHI) and Oxygen Desaturation Index (ODI) are commonly used to diagnose and assess the severity of OSA. Recently, new quantitative parameters have been developed, such as the **Hypoxic Burden Index (HBI)**, which is defined as the total area under the oxygen desaturation curve from a pre-event baseline. HBI has been proposed as a predictor of stroke risk.

## AIM

- To assess whether respiratory parameters recorded through 24-hour polysomnography (PSG) correlate with the volume of stroke lesions.

## METHODS

**Study Design:** prospective observational study

### Inclusion Criteria:

- Both sexes
- Age  $\geq 18$  years
- Stroke due to M1 occlusion of MCA undergoing successful recanalization
- Baseline modified Rankin Scale (mRS) score of 0-1
- Hospitalization in Stroke Unit

### Exclusion Criteria:

- Unstable clinical conditions requiring mechanical ventilation
- Other neurological conditions

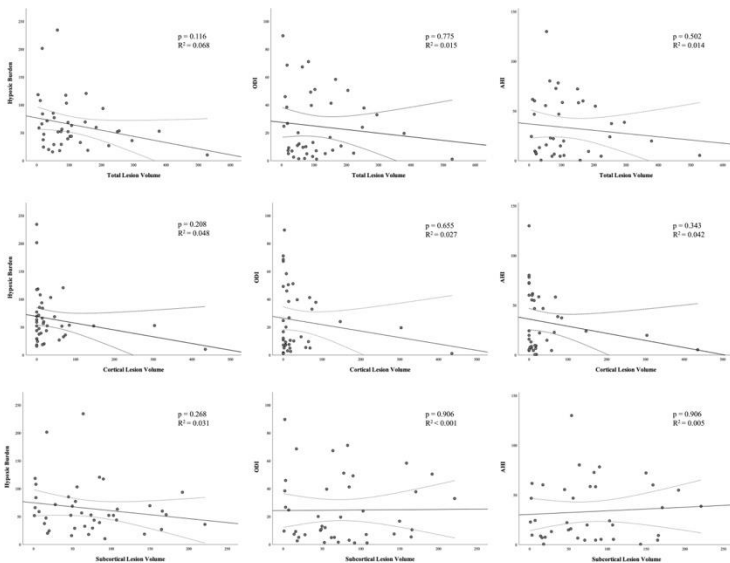
43 patients underwent MRI at 72 hours of symptoms onset and overnight polysomnography within 7 days

Lesion volumes were categorized into total, cortical, and subcortical volumes. Volumetric measurements were obtained with a semiautomatic segmentation open-source program called ITK-SNAP

Polysomnographic metrics extracted from recordings included: AHI, ODI, percentage of sleep with oxygen saturation  $<90\%$  (T90%), mean and lowest SpO<sub>2</sub>, sleep efficiency, and total sleep time. The HBI was calculated using <https://hypoxicburden.thesisgroup.com>

## RESULTS

- A total of 43 patients were enrolled (26 female, 60%).
- The median age was 75 years (IQR: 12.5). The median National Institutes of Health Stroke Scale score at presentation was 15 (IQR=9). The median total lesion volume was 82.6 mL (IQR=10.1), cortical lesion volume was 8.6 mL (IQR=31.6), basal ganglia lesion volume was 66.1 mL (IQR=7.6).
- The median AHI was 23 (IQR=49.7), and the median ODI was 13 (IQR=32.7). OSA, defined as AHI  $>5/h$ , was present in 33 (77%) patients, while moderate-to-severe OSA (AHI  $>15$ ) was present in 23 (53%).



**Multivariable regression analysis** did not show significant associations between the polysomnographic parameters and total, cortical, or subcortical infarct volumes.

## CONCLUSIONS

- In patients with stroke due to occlusion of the MCA, OSA severity and nocturnal hypoxemia (evaluated by means of HBI), does not predict the ischemic lesion volume.
- One plausible explanation is that stroke may exacerbate sleep-disordered breathing, making it difficult to disentangle pre-existing OSA from stroke-induced respiratory instability.
- Our findings highlight the need for large, longitudinal studies to elucidate the role of OSA in stroke pathophysiology and recovery.

## REFERENCES

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**CONTACT INFORMATION**  
martinadesciolo1@gmail.com

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