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Impact of obstructive sleep apnoea and intermittent hypoxia on blood rheology: a translational study

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Shareable abstract (@ERSpublications)
Obstructive sleep apnoea and/or intermittent hypoxia *per se* are not significantly implicated in haemorheological disturbances https://bit.ly/3seciGd

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Abstract

Background Haemorheological alterations are reported in obstructive sleep apnoea (OSA) and reversed with continuous positive airway pressure (CPAP), observations potentially explained by intermittent hypoxia (IH)-induced oxidative stress. Our objective was to investigate whether IH causes haemorheological alterations *via* oxidative stress.

Methods Wistar rats were exposed to normoxia (n=7) or IH (n=8) for 14 days. 23 moderate-to-severe OSA patients were assessed at three time-points: baseline, after randomisation to either 2 weeks of nocturnal oxygen (n=13) or no treatment (n=10) and after 1 month of CPAP treatment (n=17). Furthermore, an OSA-free control group (n=13) was assessed at baseline and after time-matched follow-up. We measured haemorheological parameters (haematocrit, blood viscosity, plasma viscosity (rats only), erythrocyte aggregation and deformability (humans only)) and redox balance (superoxide dismutase (SOD), glutathione peroxidase, protein oxidation (advanced oxidation protein products (AOPPs)) and lipid peroxidation (malondialdehyde)). We also tested the haemorheological sensitivity of erythrocytes to reactive oxygen species (ROS) in our human participants using the oxidant *t*-butyl hydroperoxide (TBHP).

Results In rats, IH increased blood viscosity by increasing haematocrit without altering the haemorheological properties of erythrocytes. IH also reduced SOD activity and increased AOPPs. In humans, baseline haemorheological properties were similar between patients and control participants, and properties were unaltered following oxygen and CPAP, except erythrocyte deformability was reduced following oxygen therapy. Redox balance was comparable between patients and control participants. At baseline, TBHP induced a greater reduction of erythrocyte deformability in patients while CPAP reduced TBHP-induced increase in aggregation strength.

Conclusions IH and OSA *per se* do not cause haemorheological alterations despite the presence of oxidative stress or higher sensitivity to ROS, respectively.