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Abstract Title: Habitual napping in ageing; sex-specific associations with fractal motor activity regulation and hypothalamic integrity

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Introduction:

Studies about napping in the ageing population suggest a complex association with cognitive functions and neurodegenerative diseases. However, inconsistent results are reported. Recently, we demonstrated that habitual older nappers have an impaired circadian regulation of melatonin secretion and sleep efficiency, notably for the paradoxical sleep.

Alterations of scale-invariant patterns in fractal motor activity regulation (FMAR) have been observed in ageing and Alzheimer's disease. Lesion studies in animal demonstrated that these alterations result from the integrity loss of hypothalamic nuclei orchestrating the circadian sleep-wake regulation.

Here, to provide evidence for an hypothalamic dysfunction as a common origin, we tested the association between napping habits and FMAR alterations, and then investigated its potential link with a loss of in-vivo hypothalamic integrity in healthy older participants.

Method:

30 healthy older nappers and 30 age- and gender matched no-nappers (mean age (±SD): 69.0±5.3 years, 37% female) were included. Locomotor activity was recorded using actimetry during (13±2) days and fractal correlation, α, was calculated using detrended fluctuation analysis. Microstructural integrity of grey matter tissue in different hypothalamic regions were quantified through 3T qMRI-derived iron contents (R2* maps).

Results:

Our Bayesian mixed-effects models indicate that fractal correlation, α, is linked to napping habits with sex acting as modulating factor (Nap: ß=0.023, 95% C.I.=[0.001, 0.047], Sex: ß=0.048, 95% C.I.=[0.028, 0.068], Nap*Sex: ß=-0.034, 95% C.I.=[-0.064,-0.007]). In addition, female nappers show increased R2* values within the posterior hypothalamic region (Nap : ß=0.48,95% C.I.=[0.06, 0.92], Posterior*Sex: ß=0.30,95% C.I.=0.01,0.61], Nap*Posterior*Sex: ß=-0.57,95% C.I.=-1.04,-0.11]).

Conclusion:

Our results show for the first time that, in women, habitual napping is associated to altered FMAR and to elevated iron levels in the posterior hypothalamus, where is located the lateral hypothalamic area, containing orexinergic neurons which are crucial for stabilizing wakefulness.

We anticipate that these new findings will enhance our understanding of the origins and consequences of habitual napping in both normal ageing and neuropathological conditions.

Conflict of Interest: No -

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