SLEEP BODY POSITION CORRELATES WITH COGNITIVE PERFORMANCE IN MIDDLE AGE OBSTRUCTIVE SLEEP APNEA SUBJECTS.

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Introduction: The association between sleep disturbances, mainly obstructive sleep apnea (OSA), cognition and neurodegeneration may be bidirectional. Sleep disturbances may alternatively cause or result from neurodegenerative processes in the brain. The characterization of sleep with cognitive performance is essential in understanding the potential neurobiological mechanisms that underlie the connection between sleep disruption and neurodegenerative manifestations and progression.
Objective: We explore the inter-relationships between body position during sleep, that can affect cerebral glymphatic system transport and cognitive status.
Methods: All consecutive subjects greater than 18-years old attending our Sleep laboratory between June 1, 2021 to January 31, 2022 were included. We excluded patients with unreadable or uncomplete polysomnographic studies. All cases were evaluated according to AASM guidelines together with a rigid clinical protocol including demographic data, clinical history, anthropometric measures, previous diagnosis of OSA, snoring, sleep quality measures, and reporting of different sleep body position (supine, prone, right, and left side) together with a screening cognitive evaluation assessed by the Self-Administered Gerocognitive Exam (SAGE) to detect early signs of cognitive impairment. SAGE score was used as continuous and categorical variable [18–22, normal cognition; 15–17, mild cognitive impairment (MILD); below 14, dementia]. We used a generalized linear model to measure the degree of association between duration of sleep spent in a different body position and SAGE scoring, controlling for confounding variables [age, body mass index, apnea-hypopnea index (AHI), oxygen desaturation index (ODI) as measures of OSA severity].
Results: Of 157 consecutive cases, 152 subjects (91 men; mean age±SD: 66.5±13.0 years) were included. Seventeen (11.2%) subjects were normal, 47 (30.9%) have mild, 47 (30.9%) moderate, and 41 (27.0%) of them had severe OSA. We did not find any correlation between anthropometric and demographic variables, OSA severity and sleep quality with SAGE scoring (all p>0.05). SAGE scores were only correlated with minutes spent in right lateral (r=0.270, p=0.001) but not in prone (r=0.127; p=0.118) or left lateral sleep posture (r=0.015; p=0.856) and inversely correlated with time in supine sleep one (r=-0.233; p=0.004). After adjusting for confounding variables in the GLM model, SAGE scoring remained significantly correlated only with time in supine sleep posture (F= 4.131 p=0.018) while all other sleep positions were not more significant. Subjects with normal cognition usually spent significantly less time (hh:mm) in supine position when compared with dementia patients (-01:02±00:23; p=0.023) and with MILD patients (-01:11±00:36; p=0.050). Other sleep positions apparently did not show any significant effect on SAGE scoring punctuations (all p>0.05).
Conclusion: Our preliminary observations suggest that taking supine position for longer time during sleep is negatively correlated with cognitive performance in middle aged subjects. This effect was independent by OSA severity, sleep quality, demographic data, clinical history, and anthropometric measures. Our findings warrant further investigation, particularly in light of the recent evidence suggesting that sleep body position may have an active role in the brain's ability to optimize the clearance of metabolic leftovers and interstitial solutes.

SLEEP FRAGMENTATION, ASTROCYTE ACTIVATION, AND COGNITIVE IMPAIRMENT IN OLDER ADULTS

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Introduction: Alzheimer's Disease (AD) and other dementias are a growing public health concern. Emerging evidence suggests that sleep disruption may contribute to the risk of dementia. In model organisms, sleep disruption can lead to astrocyte activation and impaired cognition. However, the extent to which sleep fragmentation is associated with astrocyte activation in older humans is uncertain.
Objective: To test the hypothesis that sleep fragmentation is associated with astrocyte activation and downstream cognitive impairment
Materials and Methods: We used human single nucleus RNA-seq data to identify marker genes for human activated astrocytes. Then we quantified the expression of these genes from bulk RNA-seq of post-mortem dorsolateral prefrontal cortex blocksfrom 1080 community dwelling adults in the Rush Memory and Aging Project- a community-based cohort study of the chronic conditions of aging. Antemortem cognitive function was measured with a battery of 19 neuropsychological tests. In 408 individuals, antemortem sleep fragmentation was quantified from antemortem actigraphy recordings.
Results: Individuals with greater antemortem sleep fragmentation had higher composite expression gene characteristic of activated astrocytes (estimate=+0.141 standard units of expression per 1 standard unit of sleep fragmentation, SE=0.050, P= 0.0053), independent of demographic covariates and co-morbid neurodegenerative neuropathologies. Furthermore, greater expression of genes characteristic of activated astrocytes was associated with worse composite cognition proximate to death (estimate=-0.083 standard units of cognition per 1 standard unit expression, SE=0.035, P= 0.018), independent of dementia-associated neuropathologies.
Conclusions: Astrocyte activation may be a clinically important brain correlate of sleep fragmentation in older adults with and without Alzheimer's disease; further work is needed to determine if interventions targeting sleep fragmentation may prevent adverse impacts on astrocyte biology and cognition.
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SLEEP MODERATES THE ASSOCIATION BETWEEN STRESS AT WORK AND INCIDENT DEMENTIA: STUDY FROM THE SURVEY OF HEALTH, AGEING AND RETIREMENT IN EUROPE

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Introduction: Both psychosocial stress at work and sleep disturbances may predispose impaired cognitive function and dementia in later life. However, whether sleep plays a moderating role for the link between stress at work and subsequent dementia has yet to be investigated.
Materials and Methods: Data from the Survey of Health, Ageing and Retirement in Europe were used for the study. A cohort of 7799 dementia-free individuals (aged 71.1±0.2 years) were followed up for a median of 4.1 years for incident dementia. Job demand and control were estimated using questions derived from the Karasek's Job Content Questionnaire. Sleep disturbance was ascertained by a question in the EURO-Depression scale. Cox proportional hazard models adjusted for age, sex, education, cognitive test score, and other potential covariates were used to estimate hazard ratios (HR) and 95% confidence intervals (CI) of dementia in relation to different job strain levels.
Results: An interaction between job demand and sleep disturbance regarding the risk of dementia was detected. Data suggested a protective role of high-level job demand for dementia in individuals with sleep disturbance (HR [95%CI]: 0.69 [0.47, 1.00]) compared with low job demand. A four-category job strain model based on the combination of job demand and job control levels suggested that among individuals with sleep disturbance, passive job (low demand, low control) was associated with a higher risk of dementia (1.54 [1.01, 2.34]), compared to active job (high demand, high control).
Conclusions: The link between work related stress and risk of dementia is limited to individuals suffering sleep disturbance.
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SOCIODEMOGRAPHIC, PSYCHOLOGICAL, AND BEHAVIOURAL PREDICTORS OF SLEEP CHANGES IN OLDER ADULTS DURING THE COVID-19 PANDEMIC: A LONGITUDINAL STUDY

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Introduction: To mitigate the spread of COVID-19, strict lockdown measures were implemented in March of 2020. Although these measures have been shown to disrupt sleep in older adults beyond the effects of typical ageing, the long-term effects of the pandemic on sleep in this population are unclear. The objective of this study is to identify sociodemographic, psychological, and behavioural factors that predict sleep changes throughout the pandemic in older adults.
Materials and Methods: The longitudinal study included 645 older adults (73.10% female; *Mage*= 78.69; *SD*= 5.67) who completed self-report questionnaires at four timepoints: April 2020 (T1), July 2020 (T2), Fall 2020 (T3), and March 2021 (T4). Sociodemographic factors were age, gender, education, income, and living situation. Psychological factors that were assessed were loneliness (UCLA Loneliness Scale), psychological distress (Kessler Psychological Distress Scale), and perceived threat of the pandemic (questionnaire created by our team). Behavioural factors that were measured included physical activity (International Physical Activity Questionnaire) and sleep-related behaviours (retrospective sleep diaries), such as sleep duration, time in bed, and social rhythm within the prior two weeks of administration. The Insomnia Severity Index (ISI) was used to evaluate the severity of insomnia symptoms. Using the total ISI scores at each timepoint, group-based trajectory modelling was conducted to identify sleep trajectories. Subsequently, multinomial logistic regression was performed to find the aforementioned factors at T1 that predicted these trajectories.
Results: Three groups with distinct sleep trajectories were identified: high ISI (*n*= 76), intermediate ISI (*n*= 163), and low ISI (*n*= 406). The high ISI group reported having greater psychological distress (OR= 3.88, 95% CI: 2.42, 6.24), increased variability in time out of bed in the morning (OR= 1.59, 95% CI: 1.13, 2.23), more time in bed (OR= 2.73, 95% CI: 1.68, 4.45), and shorter sleep duration (OR= 0.09, 95% CI: 0.05, 0.17) at T1 than the low ISI group. The intermediate ISI group reported having more psychological distress (OR= 2.01, 95% CI: 1.47, 2.75), more time in bed (OR= 2.14, 95% CI: 1.47, 3.11), and shorter sleep duration (OR= 0.26, 95% CI: 0.17, 0.39) at T1 than the low ISI group. Those in the high ISI group were more likely to be male (OR= 0.25, 95% CI: 0.09, 0.68) and reported having greater psychological distress (OR= 1.93, 95% CI: 1.25, 2.98), increased variability in time out of bed (OR= 1.71, 95% CI: 1.19, 2.45), and shorter sleep duration (OR= 0.36, 95% CI: 0.21, 0.60) at T1 than the intermediate ISI group.
Conclusions: Being male as well as having elevated psychological distress and poorer sleep at the start of the pandemic were risk factors for sleep disturbances over time in older adults. Interventions aimed at reducing psychological distress and sleep disturbances should be implemented.
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SUBJECTIVE SLEEP QUALITY IS THE STRONGEST PREDICTOR OF MENTAL AND PHYSICAL HEALTH INDEPENDENT OF CHRONOTYPE, SLEEP DURATION, APOE-ε4 CARRIERSHIP, AGE, SEX, ALCOHOL CONSUMPTION, AND RETIREMENT STATUS IN HEALTHY OLDER ADULTS

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Introduction: Sleep and circadian rhythm disturbances are risk factors for mental and physical health problems. Carriership of the apolipoprotein E (APOE) gene variant, APOE-ε4, has been associated with objective sleep disturbances; mixed evidence suggests APOE-ε4 may also be implicated in worsened mental and physical health outcomes. This study aims to extend previous findings by examining how self-reported sleep quality, sleep duration, and chronotype independently associate with mental and physical health in healthy older adults, while controlling for APOE-ε4 carriership and other demographic characteristics.
Materials and methods: In total 166 participants (117 female) between 42 and 90 years old (M = 64.69, SD = 9.42) were recruited as part of the screening phase for a sleep-circadian and cognition experiment. Sleep quality was assessed using the Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI) global score, and PSQI subjective sleep quality item. Chronotype was assessed via the Morningness-Eveningness Questionnaire (MEQ) and the Munich Chronotype Questionnaire (MCTQ). Sleep duration was assessed using the PSQI and the General Medical Questionnaire (GMQ). Mental health and physical health were measured using the Short Form Health Survey (SF-36). Data was collected on APOE-ε polymorphism using genotyping; participants were coded as APOE-ε4 carriers or APOE-ε4 non-carriers.
Results: A series of linear regression models assessed the independent associations of self-reported sleep quality, sleep duration, and chronotype with mental health and physical health. Secondary models controlled for age, sex, APOE-ε4 carriership, alcohol consumption, and retirement status. Poor sleep quality was the strongest independent predictor of lower mental health across all measures and models; ISI (Beta = -.410, p<.001), PSQI global score (Beta = -.260, p = .006), and PSQI subjective sleep quality (Beta = -.254, p = .003). The regression models were then run separately for men and women. Lower sleep quality was found to be the strongest predictor of worse mental health, particularly in men (Beta = -.951, p<.001), compared with women (Beta = -.325, p = .001). Lower sleep quality was also associated with lower physical health, but only in women (Beta = -.285, p = .006). Limited meaningful associations were found for chronotype and sleep duration. APOE-ε4 carriership was not found to predict mental or physical health and did not adjust the results of the studied associations in any of the models.
Conclusions: This study found that sleep quality was the strongest independent predictor of mental health in older adults, especially in men. Similarly, lower sleep quality was independently associated with poorer physical health; however this was only found in women. Sleep quality should therefore be considered alongside the assessment and treatment of physical and mental health problems in older adults, independent of APOE-ε4 status and demographic characteristics.
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THE AGES OF SLEEP ONSET: SPATIO-TEMPORAL EEG PATTERNS IN PREADOLESCENTS, YOUNG AND OLDER ADULTS

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