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Featured Article

Sleep disturbances and dementia risk: A multicenter study

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Abstract

Introduction: Few longitudinal studies assessed whether sleep disturbances are associated with dementia risk.

Methods: Sleep disturbances were assessed in three population-based studies (H70 study and Kungsholmen Project [Sweden]; Cardiovascular Risk Factors, Aging and Dementia study [Finland]). Late-life baseline analyses (3–10 years follow-up) used all three studies (N = 1446). Baseline ages ≈ 70 years (Cardiovascular Risk Factors, Aging and Dementia, H70), and ≈84 years (Kungsholmen Project). Midlife baseline (age ≈ 50 years) analyses used Cardiovascular Risk Factors, Aging and Dementia (21 and 32 years follow-up) (N = 1407).

Results: Midlife insomnia (fully adjusted hazard ratio = 1.24, 95% confidence interval = 1.02–1.50) and late-life terminal insomnia (fully adjusted odds ratio = 1.94, 95% confidence interval = 1.08–3.49) were associated with a higher dementia risk. Late-life long sleep duration (>9 hours) was also associated with an increased dementia risk (adjusted odds ratio = 3.98, 95% confidence interval = 1.87–8.48).

Discussion: Midlife insomnia and late-life terminal insomnia or long sleep duration were associated with a higher late-life dementia risk.

Keywords: Sleep disturbances; Insomnia; Sleep duration; Dementia

1. Introduction

Older adults commonly experience sleep disturbances [1]. While much of the literature focuses on sleep changes following dementia onset, less is known about the long-term associations between sleep disturbances and dementia risk [2,3].

Recent longitudinal studies reported that sleep disturbances including insomnia, sleep inadequacy, poor sleep quality, change in sleep quantity/quality, or daytime sleepiness are associated with an increased risk for dementia and Alzheimer's disease (AD) [4–11]. Sleep duration may have a V-shape association with dementia; both short sleep duration (<6 hours) and long duration (>8 or 9 hours) in

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late-life heighten the risk [11–14]. The evidence suggests that both midlife and late-life sleep disturbances are important risk factors, emphasizing the importance of using a life course approach.

Studies thus far are limited by sex-specific samples [4,8,11], short follow-ups, small sample sizes, not including important confounders, and lack of dementia diagnostic information or reliability on register data, which may underestimate the prevalence of dementia [4–9,11,13]. These limitations render it difficult to determine which sleep disturbance characteristics (duration and/or quality) are important at the different exposure time points (midlife or late-life) for increasing dementia risk.

The aim of this study was to assess the associations between sleep disturbances and the risk for dementia using three prospective cohort studies. The specific goals were to examine the following sleep characteristics and their association with dementia: (1) insomnia in midlife and late-life; (2) subjective ratings of reduced sleep duration or depth in late life; and (3) sleep duration (number of hours) in late life.

2. Methods

2.1. Study populations

This study used data from three population-based studies, including two Swedish studies: The H70 study and the Kungsholmen Project (KP), and one Finnish study: the Cardiovascular Risk Factors, Aging and Dementia (CAIDE) study.

The respective local ethics committees approved each study, and all participants provided written informed consent. All studies comply with the Declaration of Helsinki.

2.2. CAIDE study

The CAIDE study was conducted in Finland. Participants were first examined at midlife in the North Karelia Project and the FINMONICA study, with baseline assessments in one of the following years: 1972, 1977, 1982, or 1987 [15]. In 1998, a random sample of 2000 survivors living in the cities of Kuopio and Joensuu, aged 65–79 years, were invited for a first re-examination. A total of 1449 individuals participated, and 1409 completed the cognitive assessments. The mean follow-up time was 21 years (standard deviation [SD] = 4.9). Participants returned for a second re-examination between 2005 and 2008, on average after 10 years after the first re-examination, and 1426 individuals were alive and living in the same region. When invited, 909 of them accepted to participate, and 852 completed the cognitive assessment.

In total, 1511 individuals participated in at least one re-examination, and 750 participated in both. The mean ages at each time point were as follows: At baseline, 50.2 years (SD = 5.9, age range: 40–64 years); at the first re-examination, 71.6 years (SD = 4.0, age range: 66–80 years); and at the second re-examination, 78.6 years (SD = 3.7, age range: 72–90 years). After excluding participants with missing data on sleep or other independent variables, 1407 were included in the analyses with baseline in midlife, and 703 participants were included in the analyses with baseline in late life.

2.3. H70 study

The H70 study started in the early 1970s to study health and health-related conditions in an older population in Gothenburg, Sweden. Samples were drawn systematically, based on birth dates from the Swedish Population Register, covering names and addresses of all people living in Sweden. In this study, we used data from the cohort born in 1930, examined at ages 70, 75, and 79 years. At baseline, 875 individuals were invited. After excluding individuals who died, could not be traced, could not speak Swedish, or had emigrated, an effective sample of 827 individuals remained. Among those, 579 agreed to participate in a psychiatric examination (response rate 70.0%). We excluded 16 individuals that either had dementia at baseline or missing information on independent variables. Of the 563 individuals examined at baseline, 405 were re-examined at age 75 years (in 2005–2006) and 332 at age 79 years (in 2009–2010). In total, 437 participants were included in the longitudinal analyses. The overall H70 study has previously been described in detail [16].

2.4. Kungsholmen project

The Kungsholmen Project (KP) was conducted among adults aged 75+ years residing in Kungsholmen district, Stockholm, Sweden. Individuals born before 1913 and living in Kungsholmen were invited to participate in the initial examination, which took place from 1987 to 1989. At baseline, 2368 individuals were invited, and 1810 participated. Three follow-up examinations were conducted approximately every 3 years until year 1998 giving up to 9 years of follow-up [17]. Of the initial sample (1810 participants), 668 individuals underwent a clinical examination involving assessments of psychiatric symptoms and sleep disturbances. Of these 668 individuals, 220 were excluded due to receiving a dementia diagnosis, resulting in a dementia-free cohort of 448 people. We also did not include 24 individuals who refused study participation after baseline testing. Another 118 individuals had missing information in other covariates, leaving 306 individuals for the analysis.

2.5. Measurements of sleep

A question about midlife insomnia was administered in the CAIDE study at baseline (mean age 50 years). Questions on initial insomnia (difficulties falling asleep) (H70) and terminal insomnia (waking up too early, e.g., at least 1–2 hours earlier than intended) (H70, CAIDE) were administered in late life (mean age 70 years in both studies). Questions on reduced sleep quality/quantity (H70, KP) were obtained in late life at study baseline (mean age 70 and 84 years). For