

Body mass index, diet, physical inactivity, and the incidence of dementia in 1 million UK women

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Study objective and summary result

This study examined whether midlife obesity is associated with an increased risk of dementia and found evidence of this association only after allowing for the known weight loss that often occurs with preclinical dementia. It also examined whether poor diet and physical inactivity in midlife were associated with dementia, and found short-term associations only, which were likely to be consequences of and not causes of dementia.

What is known and what this paper adds

Women lose weight and become inactive as much as a decade before they are diagnosed with dementia, suggesting that reported short-term associations with being thin and inactive may be the consequence of preclinical disease. This investigation clarifies that such “reverse causation” is happening in the short-term but that, in the long-term, midlife obesity (but not poor diet or inactivity) may cause dementia.

Participants and setting

The investigators analyzed data from 1,136,846 women (mean baseline age, 56 ± 5 years) recruited into the Million Women Study in England and Scotland in 1996–2001. Analyses are restricted to women with no dementia at baseline.

Design, size, and duration

Each woman reported her height, weight, and physical activity at recruitment and diet 3 years later. Obesity was defined as a BMI ≥ 30 kg/m². The women were followed until 2017 by electronic linkage to UK National Health Service records; only 1% were lost to follow-up.

Primary outcome measure

The primary outcome was first mention of dementia in a hospital admission. Cox regression yielded separate rate ratios for dementia with <5, 5–9, 10–14, and ≥ 15 years follow-up after baseline.

Table Dementia risk ≥ 15 years after baseline in relation to midlife obesity, low caloric intake, and physical inactivity (dementia cases, n = 18,695)

	Dementia detection rate ratio (95% CI) ≥ 15 years after baseline
BMI ≥ 30 kg/m ² vs BMI 20–24.9 kg/m ²	1.21 (1.16–1.26)
Lowest caloric intake quintile vs higher caloric intake quintiles	1.03 (0.94–1.13)
Inactive vs active	1.05 (1.02–1.08)

Main results and the role of chance

Over mean follow-up of 18 ± 3 years, 30,957 women had a hospital admission with dementia, 18,695 diagnosed ≥ 15 years after baseline. Baseline obesity was associated with an increased risk of dementia occurring ≥ 15 years after baseline (rate ratio, 1.21; 95% CI, 1.16–1.26). Low caloric intake, and inactivity at baseline were associated with increased risks of dementia <15 years after baseline but these associations declined over time and approached null ≥ 15 years after baseline.

Bias, confounding, and other reasons for caution

This study shows the importance of long follow-up to mitigate reverse causation bias. Most women with dementia were admitted to hospital, but some would have been missed.

Generalizability to other populations

This investigation’s reliance on data from UK women may limit the generalizability of the results. The findings after 15+ years follow-up are generally consistent with results in other populations with long-term follow-up.

Study funding/potential competing interests

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A draft of the short-form article was written by M. Dalefield, a writer with Editage, a division of Cactus Communications. The corresponding author(s) of the full-length article and the journal editors edited and approved the final version.

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