Body Mass Index and Risk of Parkinson's Disease in a Cohort of Two Million People Over Two Decades

Qizilbash N[1,2], Gregson J[2], Johnson ME[1], Pearce N[2], Douglas I[2], Wing K[2], Pocock SJ[2]

[1]OXON Epidemiology, London & Madrid; [2]Faculty of Epidemiology and Population Health, London School of Hygiene & Tropical Medicine

We declare no relevant conflicts of interest

BACKGROUND

The association of body mass index (BMI) and Parkinson's disease (PD) is unclear. One epidemiological study found an increasing risk of PD with BMI, while others found no such association[1-2]

OBJECTIVES

This study aimed to investigate the association between BMI and risk of PD

METHODS

Study design: Dynamic cohort study using routine UK primary care data from the Clinical Practice Research Datalink (CPRD)
Study population: People aged 40 years or older with a BMI recording between 1992 and 2007. Follow-up was from first eligible BMI reading until the first record of PD with censoring at earliest of: practice's last data collection date, patient death/transfer out of practice. People with a prior record of PD and/or dementia were excluded
Analysis: Incidence rates and rate ratios were calculated using Poisson regression

RESULTS

- The study population included 1,952,587 people in UK general practices
- Median BMI was 26.4 kg/m^2 (IQR 23.5-30.0); median age at time of BMI measurement was 55 years (IQR 45-66); median follow-up time was 9.3 years
- PD occurred in 11,616 people, a rate of 0.55 per 1,000 person-years
- There was an inverse association of BMI with risk of PD (Figures 1 & 2 & Table 1)

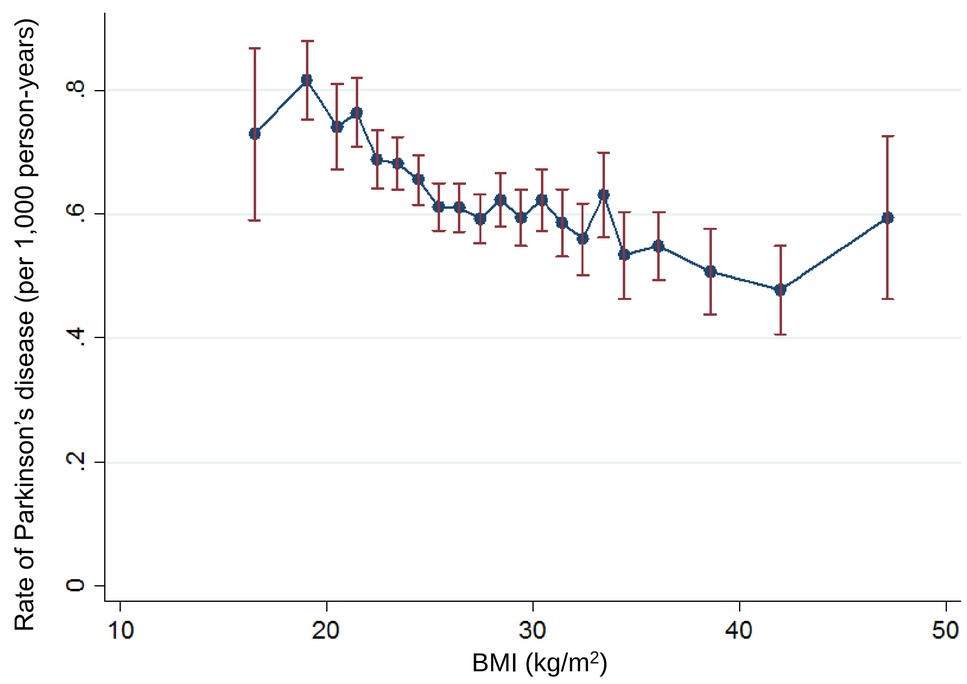

Figure 1: Age- and sex-standardised rates of PD per 1,000 person years by BMI (with 95% CIs)

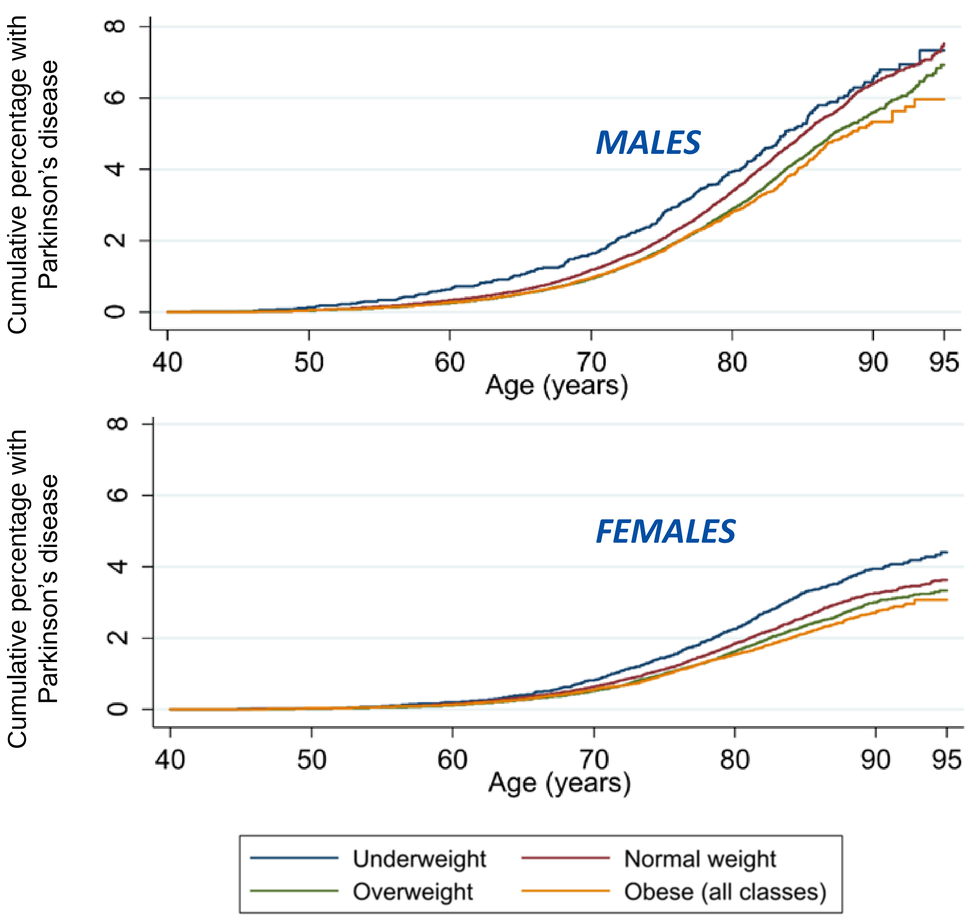

Figure 2: Cumulative risk of PD with increasing age by BMI category in males (top panel) and females (bottom panel)

- Compared to people with healthy weight, those underweight had a 15% excess risk of PD(Table 1)
- PD risk decreased for every increasing BMI category: from overweight with 12% lower risk to the very obese with 27% lower risk (Table 1)
- Further adjustment for potential confounders made the association marginally stronger, with underweight and very obese people having a 20% higher and 33% lower risk respectively (Table 1)
- These patterns persisted throughout two decades of follow-up, after allowance for the J-shape of BMI with mortality, and after exclusion of people who developed PD within the first 10 years of follow-up to exclude reverse causation.

BMI category	Rate (95% CI)	Rate ratio (95% CI)
Age- and sex-adjusted		
Underweight (<20 kg/m^2)	0.80 (0.77-0.83)	1.15 (1.07-1.24)
Healthy weight (20-24.9 kg/m^2)	0.69 (0.68-0.71)	1.00 (reference)
Overweight (25-29.9 kg/m^2)	0.61 (0.60-0.62)	0.88 (0.84-0.91)
Class I obese (<30-34.9 kg/m^2)	0.59 (0.58-0.61)	0.86 (0.81-0.90)
Class II Obese (35-39.9 kg/m^2)	0.53 (0.51-0.56)	0.77 (0.70-0.85)
Class III obese (≥40 kg/m^2)	0.50 (0.47-0.54)	0.73 (0.61-0.87)
Further-adjusted*		
Underweight (<20 kg/m^2)	0.85 (0.79-0.91)	1.20 (1.11-1.30)
Healthy weight (20-24.9 kg/m^2)	0.71 (0.68-0.73)	1.00 (reference)
Overweight (25-29.9 kg/m^2)	0.61 (0.59-0.63)	0.86 (0.82-0.90)
Class I obese (<30-34.9 kg/m^2)	0.59 (0.56-0.61)	0.83 (0.78-0.88)
Class II Obese (35-39.9 kg/m^2)	0.52 (0.47-0.57)	0.73 (0.66-0.81)
Class III obese (≥40 kg/m^2)	0.47 (0.39-0.56)	0.67 (0.56-0.80)

*Adjusted for age, sex, smoking status (never, ex, current), alcohol status (never, ex, current), diabetes, prior myocardial infarction, prior stroke, statin use, anti-hypertensive use, and number of general practice consultations in the year prior to BMI measurement

Table 1: Rates of PD per 1,000 person-years and rate ratios compared with healthy weight by category of BMI

CONCLUSIONS

- This is the largest study relating Parkinson's disease to BMI.
- Principal findings are:
  1. Underweight carries an increased risk of PD
  2. The risk of PD is lower in overweight and obese people
- These findings are broadly similar to those for the other major neurodegenerative disorder (dementia)[3] and suggest that a common mechanism may operate
- Further research into the reasons for these findings is warranted

REFERENCES

1: *Wang Y-L et al. PLoS ONE 2015; 10(6): e0131778****. 2:*** *Chen J et al. Int J Endocrinol 2014; 203930 3: Qizilbash N et al. Lancet Diabetes Endocrinol. 2015 ; 3(6):431-6*