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LETTER

Women develop type 2 diabetes at a higher body mass index than men

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Abbreviation
GPRD General Practice Research Database

To the Editor: Logue et al explored the association between age, sex and BMI at the time of diagnosis of type 2 diabetes using a large cohort of patients from Scottish diabetes register [1]. They reported a significant difference in the inverse relationships between age and BMI for men and women. They also observed marked differences in the average BMI levels for men and women at younger ages, which narrowed down with advancing age.

We examined this age–BMI relationship at the time of diagnosis of type 2 diabetes using a large cohort of 84,633 patients, who were diagnosed between January 1990 and April 2007. The data were obtained from the UK General Practice Research Database (GPRD). The patients were 46% female and 17% current smokers, with mean (SD) age of 63 (13) years, BMI 30.5 (6.2) kg/m^2 and HbA_{1c} 7.9 (2) % (62.8 mmol/mol). The systolic and diastolic blood pressure were 141 (19) mmHg and 81 (10) mmHg, respectively, at the time of diagnosis of diabetes. The risk factor data were obtained within a 6 month window of the diagnosis of diabetes. The GPRD Group obtained ethical approval from a multicentre research ethics committee for all purely observational research, using anonymised records from the GPRD. The extraction of data for this study was approved by the GPRD Independent Scientific Advisory Committee.

The distributions of age, BMI and HbA_{1c} were significantly different between men and women. Compared with men, women were older (65 vs. 61 years) with larger proportion of obesity (53% vs. 43%) and a higher level of systolic blood pressure (143 vs. 140 mmHg), but had lower HbA_{1c} level (7.82% vs. 7.87%). The age-adjusted average BMI for women and men was 31.5 (95% CI 31.4, 31.6) kg/m^2 and 29.7 (95% CI 29.6, 29.9) kg/m^2, respectively, with higher average for women by 1.8 (95% CI 1.7, 1.9)kg/m^2 ($p<0.01$).

The observations made by Logue et al on the narrowing of BMI differences between sexes with advancing age was not immediately clear from their data. Possible significant differences in average BMI over the distribution of age needed to be explored. To evaluate the patterns of BMI differences by sex over the whole distribution of age, we conducted regression analysis with deciles of age. As evident from Fig. 1, the average BMI level continued to be significantly higher for women until the eighth decile of age. The narrowing of BMI differences at the highest age group could be because of chance, as we had a small number of patients in the highest age groups. Although we did not have data on ethnicity, additional analyses with adjustment for blood pressure, smoking and drinking status revealed

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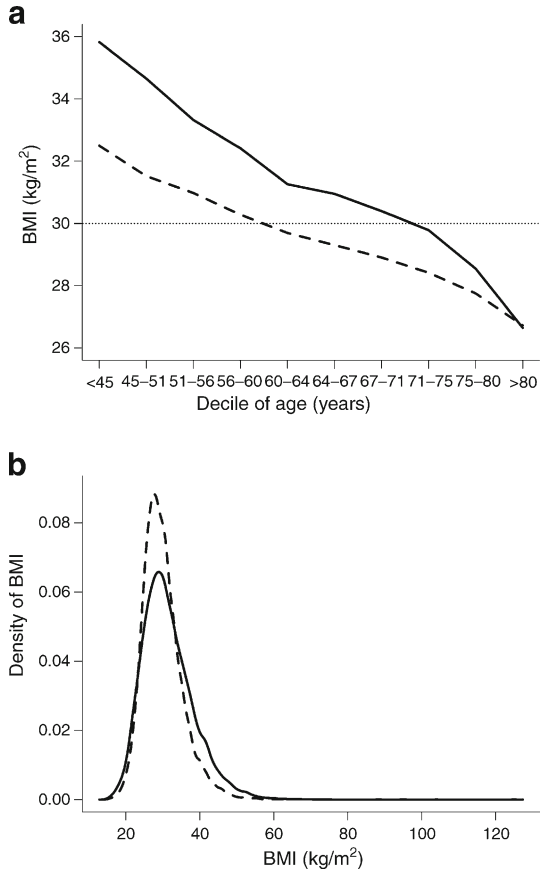

Fig. 1 **a** Mean BMI levels by sex over deciles of age at diagnosis of diabetes. **b** Density plot of BMI by sex. Continuous line, women; dashed line, men

similar differences in the average BMI levels. As reported by Logue et al. our data also reveal that men, who were diagnosed with diabetes at later age (> 60 years) than women, were less likely to be obese. Our analysis provides further evidence that the findings based on the Scottish cohort data are very likely to be presenting the true population-level scenario.

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Contribution statement SP conceived the idea of the study and was responsible for the design of the study. KKh and AM assisted with the design and conduct of the study together with SP. SP, GT and KKl were responsible for the analysis and interpretation of data. All authors participated in the development of the manuscript and approved the final version. SP is the guarantor.

Duality of interest All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that (1) SP, KKl, GT, AM and KKh have support from University of Leicester, University of Queensland and Imperial College for the submitted work; (2) SP has acted as a consultant and speaker for Novartis and Amylin Pharmaceuticals Inc. He has received grants in support of investigator and investigator initiated clinical studies from Merck, Novo Nordisk and Pfizer. KKh has acted as a consultant and speaker for Novartis, Novo Nordisk, sanofi-aventis, Lilly and Merck Sharp & Dohme. He has received grants in support of investigator and investigator initiated trials from Novartis, Novo Nordisk, sanofi-aventis, Lilly, Pfizer, Boehringer Ingelheim and Merck Sharp & Dohme; (3) the authors' spouses, partners, or children have no financial relationships that may be relevant to the submitted work; and (4) SP, KKl, GT, AM and KKh have no non-financial interests that may be relevant to the submitted work.

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