

Obesity

Does increasing obesity leave most of the rise in type 2 diabetes unexplained?



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Just how much of the increase in type 2 diabetes prevalence can be explained by the growing obesity problem in the UK? The answer to this important question will be informative for public health approaches to tackling type 2 diabetes.

There is a tendency for obesity defined by BMI to be viewed as the predominant factor in the type 2 diabetes pandemic, although the inadequacies of BMI – which takes no account of fat distribution – as a measure of obesity are well recognised (Diabetes Prevention Program Research Group, 2006). In this interesting study by Hardoon and colleagues (2010; summarised alongside) the relationship between BMI and type 2 diabetes in a sample of men from the British Regional Heart Study (>99% follow-up, 1984–2007) is investigated. Over this relatively short period of time, the mean population-averaged, age-adjusted BMI increase was a substantial 1.42 kg/m², yet, statistically, this explained only 26% of the increase in the prevalence of type 2 diabetes in the cohort.

The authors acknowledge a variety of potential interpretations of the results and several significant limitations of their methodology. The incidence of type 2 diabetes was probably somewhat underestimated, as

the diabetes diagnosis depended on self-report or general practice records. Yet, during the study period there has been an increase in the prevalence of type 2 diabetes attributable specifically to increased detection in primary care. Furthermore, the apparently modest contribution of BMI to diabetes risk might reflect that BMI – as compared with waist circumference – is a poor measure of central adiposity. It will be important to clarify further the relative contributions of other factors and the increased type 2 diabetes detection rate.

Hardoon et al's findings suggest that BMI alone cannot account for most of the increase in type 2 diabetes prevalence seen in the past 20 years. Notwithstanding confounding factors, the results prompt the question of

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whether environmental factors (e.g. declining physical activity, changing dietary patterns, lifestyle choices), independent of BMI, influence the risk of type 2 diabetes. If physical activity, dietary factors and waist circumference are greater predictors of future diabetes than BMI, this would add support to the view that improvement of these factors – at both the individual and public health levels – should be goals. It may also encourage the use of waist circumference in primary care as a more informative measure of central adiposity than BMI, and a better predictor of diabetes risk.

Diabetes Prevention Program Research Group (2006) Relationship of body size and shape to the development of diabetes in the diabetes prevention program. *Obesity (Silver Spring)* **14**: 2107–17

DIABETES CARE

Rising BMI only partially explains rise in T2D

Readability	✓✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓✓✓✓

1 The authors sought to determine the extent to which increasing BMI among British men may explain the observed rise in the incidence of T2D in a survivor cohort.

2 British men ($n=6460$) were followed-up for T2D incidence between 1984 (aged 45–65 years) and 2007 (aged 67–89 years).

3 BMI was ascertained in the cohort at outset and at regular intervals during follow-up. A >99% follow-up was achieved.

4 The age-adjusted hazard of T2D more than doubled between 1984–1992 and 1999–2007 (hazard ratio [HR], 2.33; 95% confidence interval [CI], 1.75–3.10).

5 Between 1984 and 1999, the mean BMI of the cohort rose by 1.42 kg/m² (95% CI, 1.10–1.74).

6 The population-averaged age-adjusted increase in mean BMI during the study period was found to explain 26% (95% CI, 17–38) of the increase in T2D.

7 While a quarter of the rise in T2D could be attributed to increased BMI in this cohort, a substantial portion remains unexplained.

8 Other determinants of T2D – such as physical activity, which has a strong protective effect on T2D risk and operates, at least partly, independently of BMI – merit further research, the authors said.

9 It was concluded that control and reversal of the rise in adiposity levels is an important priority but BMI alone cannot fully explain the diabetes epidemic.

Hardoon SL, Morris RW, Thomas MC et al (2010) Is the recent rise in type 2 diabetes incidence from 1984 to 2007 explained by the trend in increasing BMI?: evidence from a prospective study of British men. *Diabetes Care* **33**: 1494–6

DIABETES CARE

Increased leisure physical activities reduces T2D risk

Readability	✓✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓✓✓

1 A *post hoc* analysis of the Finnish Diabetes Prevention Study – a randomised controlled trial aimed at the prevention of T2D by lifestyle change among people with impaired glucose tolerance – was undertaken to assess the effects of leisure-time physical activity (LTPA) on the metabolic syndrome and T2D prevention.

2 Overweight people ($n=486$) with impaired glucose tolerance were followed-up for an average of 4.1 years. LTPA was assessed by questionnaire at baseline and annual follow-up. Features of the metabolic syndrome were assessed by anthropometric and biochemical measures annually.

3 Following adjustment for change in BMI and dietary intake (total and saturated fat, fibre, energy), an increase in moderate-to-vigorous LTPA was associated with a greater likelihood of resolution (29.7% vs 19.1%; $P<0.004$ in the upper vs the lower third of change). Likelihood of developing the metabolic syndrome was also lessened following an increase in moderate-to-vigorous LTPA (23.5% vs 44.7%; $P<0.041$).

4 Increase in moderate-to-vigorous LTPA was strongly associated with improvement in glycemia (elevated fasting glucose [EFG] development, $P=0.033$; EFG resolution, $P=0.053$).

5 The authors concluded that increased moderate-to-vigorous LTPA was positively associated with (i) a decreased likelihood of developing the metabolic syndrome and (ii) an increased likelihood of the resolution of markers of the metabolic syndrome among people at high T2D risk.

Ilanne-Parikka P, Laaksonen DE, Eriksson JG et al (2010) Leisure-time physical activity and the metabolic syndrome in the Finnish diabetes prevention study. *Diabetes Care* **33**: 1610–7

DIABETES CARE

No metabolic benefit from omentectomy

Readability	✓✓✓✓✓
Applicability to practice	✓
WOW! factor	✓✓✓

1 People ($n=22$) were randomised to receive Roux-en-Y gastric bypass alone or with omentectomy.

2 BMI, blood pressure, glucose, total and LDL-cholesterol and triglycerides significantly improved in both groups at 1, 3, 6 and 12 month follow-up, yet there was no significant differences between the groups in terms of metabolic syndrome components.

3 Omentectomy with gastric bypass did not have a significant impact on the components of the metabolic syndrome.

Herrera MF, Pantoja JP, Velázquez-Fernández D et al (2010) Potential additional effect of omentectomy on metabolic syndrome, acute-phase reactants, and inflammatory mediators in grade III obese patients undergoing laparoscopic Roux-en-Y gastric bypass: a randomized trial. *Diabetes Care* **33**: 1413–8

BMJ

Dietary advice improves glycaemia with optimal regimen

Readability	✓✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓✓

1 People ($n=93$) with T2D and an HbA_{1c} level $>7\%$ (>53 mmol/mol) despite optimised drug therapy were given intensive individualised dietary advice for 6 months.

2 HbA_{1c} improvement was statistically significant in the intervention group (-0.4% ; $P=0.007$), as was body weight (-1.3 kg; $P=0.032$).

3 Diet change added to optimised drug therapy improved glycaemic control.

Coppell KJ, Kataoka M, Williams SM et al (2010) Nutritional intervention in patients with type 2 diabetes who are hyperglycaemic despite optimized drug treatment – Lifestyle Over and Above Drugs in Diabetes (LOADD) study: randomized controlled trial. *BMJ* **341**: c3337

“*... increased moderate-to-vigorous leisure-time physical activity was positively associated with (i) a decreased likelihood of developing the metabolic syndrome and (ii) an increased likelihood of the resolution of markers of the metabolic syndrome ...*”