


Diabetes, the glycaemic index and older people

Older people differ from younger people but most of what is known about diabetes is derived from studies that have not involved older people. This is highlighted in the developing story about glucose metabolism and older people. There is a very high prevalence of type 2 diabetes in those over the age of 60 years. More than 20% of people over 60 years have type 2 diabetes and another 20% will have impaired glucose tolerance. Indeed isolated post-challenge hyperglycaemia defined as a 2 h level glucose >11.1 mmol/l by OGTT despite a fasting glucose of 7.0 mmol/l is also common in this group [1]. Isolated post-challenge glucose levels increase with age by about 0.3–0.5 mmol/l per decade. This is not benign; in all ages all-cause mortality increases as the post-challenge glucose rises.

In addition HbA1c levels are positively associated with age in non-diabetic people even when people with impaired glucose tolerance are excluded [2]. Previously the normal range for HbA1c was derived from non-diabetic healthy volunteers aged 13–39 years. Now data from large population-based cohorts established by NHANES 2001–04 and Framingham Offspring Study has compared HbA1c levels from people over 70 years with people below 40 years. This shows that HbA1c levels are significantly increased in older people. They also demonstrated that the 2 h post-glucose load increased with age in non-diabetic people.

Why should this be and does it matter? In older people, as part of normal ageing, intracellular body water is reduced, body fat increases and muscle mass is reduced and this can lead to the development of insulin resistance [3]. At the same time hepatic glucose output is normal in older people but pancreatic islet cell function declines and insulin levels are lower. Insulin secretion declines at a rate of around 0.7% per year with age in those without diabetes and this decline doubles in those with impaired glucose tolerance [4]. Those older people who develop type 2 diabetes are more likely to have near normal fasting glucose levels but significant post-prandial hyperglycaemia [5, 6].
Studies looking at diabetes prevention have proven that lifestyle interventions can successfully reduce type 2 diabetes by 58%. What is not appreciated is that in people over 60 years lifestyle changes were even more successful and reduced the relative risk of diabetes by 71%. Lifestyle changes involve increasing exercise and dietary modification [7].

Recommended dietary modifications currently focus on quantity of carbohydrate. Different carbohydrate foods have different effects on blood glucose. A useful way of quantifying this is by using the glycaemic index (GI) which ranks carbohydrates by their overall effect on blood glucose levels [8]. The GI is defined as the incremental area under the glucose response curve after a standard amount of carbohydrate from a test food relative to that of a control food (either white bread or glucose) is consumed [9, 10]. It is higher for refined starchy food and lower in non-starchy vegetables, fruit and legumes. Low GI foods such as oats and beans stimulate lower insulin release as they slowly release glucose to the blood stream and this may increase insulin sensitivity, whereas regular consumption of high GI foods results in higher 24 h average blood glucose and insulin levels in non-diabetic and diabetic individuals [11]. Two hours after the consumption of a high-GI meal integrated blood glucose concentrations can be at least twice as high as that after a low GI meal.

Brand-Miller et al. reported in a retrospective meta-analysis of randomised controlled trials that low GI foods have a small but clinically significant benefit on glycaemic control [12]. This view has been supported by a recent Cochrane review which concluded that ‘a low GI diet can improve glycaemic control in diabetes without compromising hypoglycaemic events’ [13]. Although only 11 studies met the reviewer’s criteria, the results were generalisable to both people with type 1 and type 2 diabetes. Low GI diets significantly reduced HbA1c, the weighted mean difference was −0.5% with 95% CI (−0.9 to −0.1) P = 0.02. The population studied included 402 participants including children and adults, the mean age ranging from 10 (SD; 2) years to 63 (SD; 4) years. One of the major advantages of the low GI diet was an improvement in glycaemic control and a reduction in hypoglycaemia.

In this issue of Age and Ageing Venn et al. raise an intriguing concept of age-related differences in the GI index [14]. In their study, they found a different response to reference foods between an older group (mean age 70.3 years) compared with a younger group (mean age 24.2 years). Older people had higher post-prandial glycaemia in response to test foods and the GI classification of these foods differed between the younger and older groups. This finding needs further exploration as the rate of carbohydrate absorption after a meal impacts directly on post-prandial glycaemia.

Diabetes is not a benign disease. Good dietary advice is key to prevention and treatment of this common condition. We need now to understand the implications of these findings for the management and treatment of our patients.

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References