Obesity and diabetes

Obesity is a health problem of epidemic proportions and is estimated to affect over 300 million adults worldwide. Twenty per cent of the adult population is currently classed as obese compared to 6–8 per cent in 1980 (Erens and Primatesa, 1999). Alarmingly, 10 per cent of six-year-olds and 17 per cent of 15-year-olds are also affected. Obesity can be defined simply as an excess storage of body fat. The Body Mass Index (BMI) is currently accepted as an appropriate index to clinically define levels of weight and obesity (World Health Organization, 1997) (Box 1).

**Obesity and diabetes** Being obese increases the risk of developing a variety of illnesses including cardiovascular disease, musculoskeletal disorders, sleep apnoea, cancer and gall bladder disease. Both obesity and inactivity are independent risk factors strongly associated with type 2 diabetes.

The average BMI at diagnosis of type 2 diabetes is 29kg/m² and the risk rises steeply with a BMI >28kg/m². An individual with a BMI >40kg/m² has an 80-fold greater risk of type 2 diabetes than someone with a BMI ≤22kg/m² (UK Prospective Diabetes Study, 1988). As childhood obesity levels continue to rise, type 2 diabetes is becoming more common in children and young adults.

Not all people who develop type 2 diabetes are obese although this is true in a large number of cases. In general, the link between type 2 diabetes and obesity can best be attributed to the harmful effects of excess fat (adipose tissue) especially when it is distributed around the abdomen. The presence of abdominal adipose tissue is so strongly associated with the development of type 2 diabetes that waist circumference is often considered more appropriate for identifying those at risk, as BMI does not take account of fat distribution (Lean et al, 1995) (Box 2).

Waist circumference is a marker for the presence of fatty tissue around the internal organs that secretes products such as free fatty acids, leptin, and tumour necrosis factor-α, which are thought to cause a reduction in insulin sensitivity. This resistance to the action of insulin results in hyperglycaemia and glucose intolerance and will eventually result in type 2 diabetes if the insulin-producing beta cells fail to cope with the increased demand. In addition, an abnormal or dyslipidaemic lipid profile develops in 50 per cent of these patients which contributes to the fatty atherogenic plaques associated with heart disease. Insulin resistance also affects vasodilatation mechanisms, and may result in hypertension. This cluster of obesity, insulin resistance, dyslipidaemia and atheroma, commonly known as syndrome X, explains why heart disease is the most common cause of death in patients with type 2 diabetes.

**Benefits of weight loss** Managing an obese diabetic patient can be challenging, as it is considered harder for these patients to lose weight than the non-diabetic population. Benefits of weight loss to patients include significant improvements in quality of life. Even modest weight loss of 5–10 per cent can be associated with significant clinical benefits (Goldstein, 1992).

A weight loss of greater than five per cent can significantly improve HbA1c (glycated haemoglobin) levels, as well as decrease fasting cholesterol and triglyceride levels. Weight loss of 10kg reduces the risk of hypertension by 26 per cent and helps to achieve the recommended blood pressure target of 140/80mmHg, or 130/80mmHg if the patient has kidney damage. Patients who lose even a small amount of weight will experience benefits (Huang et al, 1998; Lean et al, 1990).

**Management strategies** Obesity results from a complex interplay of genetic, environmental, behavioural and psychosocial factors and requires an integrated management approach from doctors, nurses, dietitians, psychologists and physiotherapists. These resources may not always be available, especially in primary care where 95 per cent of patient contacts with the NHS occur. Treatment strategies include dietary counselling, increased physical activity, behavioural therapy, pharmacotherapy, and in extreme cases, surgery.

**Assessment** Matching patients to appropriate treatment requires careful assessment and includes:
- Measuring height, weight and waist circumference;
- Identifying other illnesses that are related to obesity such as hyperglycaemia, hypertension, hyperlipidaemia, ischaemic heart disease, and musculoskeletal disorders;
- Identifying endocrine disorders associated with obesity such as hypothyroidism, Cushing’s syndrome and polycystic ovarian syndrome;
- Very rarely, genetic causes may be identified.

**BOX 1. CATEGORIES OF BODY MASS INDEX (WEIGHT IN kg/m²)**

<table>
<thead>
<tr>
<th>Normal weight</th>
<th>Overweight</th>
<th>Pre-obese</th>
<th>Obese class 1</th>
<th>Obese class 2</th>
<th>Morbidly obese class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.5–24.9</td>
<td>&gt;25</td>
<td>25.0–29.9</td>
<td>30.0–34.9</td>
<td>35.0–39.9</td>
<td>&gt;40</td>
</tr>
</tbody>
</table>

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Recording a history of eating behaviour helps diagnose binge eating disorder, which is present in 10 per cent of type 2 diabetic patients, and a record of the patient’s weight will establish if they have been obese for a long time and will be more difficult to treat. An assessment of a patient’s ability to make enduring lifestyle changes is best made by practitioners skilled in behavioural change.

**Diet** Healthy eating guidelines for patients with type 2 diabetes currently recommend a total energy intake of 55 per cent carbohydrate, 30 per cent fat and 15 per cent protein (Nutritional Subcommittee of the British Diabetic Association, 1992) but the guidelines are being updated by Diabetes UK and will have greater flexibility with nutrient proportions and a relaxation of the 25g daily sugar restriction. Recently, prominence has also been given to the glycaemic index (GI), a method of ranking foods that contain carbohydrates and their effect on glucose levels. Low GI foods are absorbed more slowly and help maintain constant blood glucose levels.

If the patient is obese, it is essential to promote weight loss as well as healthy eating. This can only be achieved by making energy intake less than the energy required. An individual’s daily energy requirement is expressed in calories (kcal) and is calculated using preset equations, which take account of age, gender, height, weight and activity level. Reducing this daily allowance by 500kcal will produce weight loss at the rate of 0.5kg per week. This approach is generally easier for patients than following a fixed daily energy allowance, typically 1200kcal for women and 1500kcal for men.

Reducing fat intake is considered the most efficient way of losing weight, because fat has twice as many calories as carbohydrate gram per gram. It can be difficult to suggest specific changes in diet that are easy for patients to follow. Grace (2001) gives excellent advice on how to achieve this.

Any dietary strategy will founder if patients are not given help to change eating behaviour in the long term. Strategies borrowed from cognitive behaviour therapy include self-monitoring and stress management.

**Activity** Physical exercise by itself results in only modest weight loss of 0.5–1kg each month. Evidence suggests that it is probably more helpful in maintaining weight loss, as it raises resting metabolic rate causing more energy to be expended and also improves self-esteem, making patients better able to control their eating. Nonetheless, for the patient with type 2 diabetes any physical activity has beneficial effects on insulin action, lipid profiles, blood pressure and cardiac fitness, although the benefits are more evident in younger patients in the early stages of disease.

Unfortunately, patients with type 2 diabetes identify barriers to exercise such as fear of hypoglycaemia. Nurses must help patients to gradually accumulate 30 minutes of moderate physical activity equivalent to brisk walking on at least five days a week (Pate, 1995).

Patients with particular safety concerns could attend exercise referral schemes where available.

**Pharmacology** Early intervention with medication to improve glycaemic control minimizes the life-threatening side-effects of type 2 diabetes. Unfortunately, most medications, with the exception of biguanides (metformin) and possibly alpha-glucosidase inhibitors (acarbose) will contribute to weight gain. The average patient taking insulin will gain 10.4kg after six years and those taking sulphonylureas fare little better (UKPDS, 1998). Even the newer thiazolidinedione insulin sensitizers cause weight gain, although the fat is subcutaneous and may be less harmful.

One solution may be to use anti-obesity medication which causes weight loss in the first instance and lowers hyperglycaemia as a secondary effect.

Orlistat prevents the absorption of about 30 per cent of dietary fat and can be used by type 2 diabetic patients with a BMI >28kg/m² as a weight loss aid. Alternatively, sibutramine is available for patients with a BMI >27kg/m². Sibutramine works by causing feelings of fullness and promoting energy expenditure. Patients may need help to manage common side-effects, typically oily stools when using orlistat and a slightly higher blood pressure with sibutramine.

**Surgery** There is remarkable evidence from Sweden that patients with type 2 diabetes who have obesity surgery can see drastic improvements in insulin sensitivity and occasionally see their diabetes disappear altogether (Sjostrom et al, 1999).

**Conclusion** Traditional nursing management of type 2 diabetes has focused almost exclusively on glycaemic control. As our awareness of the relationship between obesity and this disease develops, the need for nurses to gain a greater understanding of nutritional management seems more pressing than ever.