

Nutrition in older adults living with diabetes

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Abstract

People in the UK are living longer, consequently an increasing number of adults are living with type 1 and type 2 diabetes to an older age. Diabetes is a complex condition to manage, requiring consideration of several different dietary recommendations. In addition, there are many nutritional issues and social barriers associated with older age, which may make following these recommendations more difficult.

Older adults represent a diverse age group with varying needs. In order to give the most appropriate advice, clinicians need to consider the functional status of the older adult. Some older adults will continue to manage their diabetes and nutrition in the same manner as their younger peers. Others may have increased needs due to disease or social circumstance, which may affect how they should be advised to manage their diabetes.

Both obesity and malnutrition are prevalent in older adults. They impact both nutritional status and diabetes management and are important to consider. Sarcopenia, the loss of muscle mass, increases frailty in older adults which may exacerbate hypoglycaemic episodes. Nutrition support and tailored dietary interventions by a registered dietitian to help manage these conditions are essential. This, in addition to consideration of the many social, financial and physical barriers to nutrition, is key management of diabetes in older adults.

This review aims to explore the complex challenges in nutrition for older adults with diabetes. Copyright © 2020 John Wiley & Sons.

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Key words

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Introduction

Older adults can be defined in the UK as those over the age of 65.¹ As people get older, body composition naturally changes and this negatively impacts cardiovascular health and nutritional status. Conditions such as diabetes can exacerbate the effects of these changes. Diabetes affects one in five of those aged over 65 and is a leading cause of death.^{2,3}

As diabetes management has improved over recent years, and the UK population ages, there are an increasing number of older adults with type 1 diabetes living into older age. Associated with the high prevalence of obesity and sedentary lifestyles, there is also an increased prevalence of type 2 diabetes among older age groups in the UK. Dietary intervention is a fundamental aspect of the management of diabetes but in an ageing population is more challenging due to increased risk of undernutrition and frailty. Age is not a barrier to diabetes education, but such education needs to be tailored appropriately to the social and medical circumstances of individual older adults.^{4,5}

This review aims to explore the challenges of diabetes and nutrition for older adults.

Current recommendations for nutrition in older adults with diabetes

The Diabetes UK nutrition working group emphasise the importance of ensuring all older adults with diabetes are offered appropriate education and dietary intervention. Older age should never be a barrier to accessing advice on nutrition. Nutritional care plans for diabetes should be under the care of a registered dietitian and adapted, if necessary, for those with cognitive impairment such as dementia.⁴ Similarly, NICE guidance for older adults with type 2 diabetes advises considering the individual's circumstances and relaxing potentially inappropriately tight glycaemic targets if necessary.⁶

The Diabetes UK position statement for older adults with type 1 diabetes emphasises the importance of individualised care plans and consideration of the functional status of the individual (independent living vs care home). Older adults with type 1 diabetes should have access to a dietitian

Box 1. Key recommendations from UK guidelines⁴⁻⁶

- All older adults with diabetes should have access to nutritional education
- Individualised dietary interventions developed by a registered dietitian because of the nutritional effects of ageing
- Individualising glycaemic targets where appropriate to prevent hypoglycaemic episodes in frail older adults

and advice on managing blood glucose levels (BGLs) and a healthy diet.⁵

Box 1 summarises key recommendations from UK guidelines.

Diabetes, carbohydrates and cardio-protective eating in older adults

Older age presents a number of challenges and barriers to nutrition that may impact diabetes management (see Table 1). Decreased amounts of lean muscle mass can contribute to a decreased metabolic rate meaning overall energy requirements of older adults will decrease as they age.⁷ Single older adults can become lonely, have a reduced appetite and find it difficult cooking and shopping for one which impacts negatively on nutritional intake and increases risk of frailty.^{8,9} Changes in dietary habits may mean older adults are no longer on the correct medication dosage to match their food intake or body weight. This could lead to a greater risk of hypoglycaemia. Older adults have a reduced awareness of hypoglycaemia and tend to encounter symptoms at a lower BGL than younger adults.¹⁰ While frailty and dementia are risk factors for hypoglycaemia, hypoglycaemic episodes (which may occur regularly undetected) increase frailty creating a recurring cycle.¹⁰

Comprehensive food based dietary guidelines for older adults are lacking. The Scientific Advisory Committee on Nutrition has an older adults working group and a review of the current evidence is underway.

Key principles for nutrition in adults with diabetes

Dietary intervention is an important component in diabetes care. Structured education programmes

Condition/burden	Barrier to nutrition	Suggestions
Retinopathy	Difficulty preparing food May find it hard to eat Unable to independently monitor diabetes	Encourage help from a family member of carer if appropriate
Reduced mobility	Difficulty shopping or preparing food Increased insulin resistance Peripheral neuropathy	Community scheme helping older adults with shopping Encourage appropriate exercise
Swallowing difficulties	Difficulty finding appropriate texture Lack of variety in diet Dysphagia Poor dentition Poor mouth care	Referral to speech and language therapist Referral to a dentist Texture modified diet
Financial (e.g. caring for a sick loved one, pension)	Concern about finances may cause concern about spending money on food	Referral to occupational therapist Seek help from local council
Depression and loneliness	Undereating or overeating Loss of interest in food Lack of meal structure Risk of malnutrition	Referral for counselling Engagement in social activities or socials for older adults such as breakfast clubs, seniors outings, community groups etc Encourage trying new flavours and foods Screening for depression
Cognition	Lack of independence with diabetes management and nutrition	Consider vitamin B ₁₂ deficiency Encourage help from a family member of carer if appropriate Encourage nutrition and hydration
Gut motility decline	Discomfort when eating Overuse of laxatives Lack of appetite	Nutritional modifications if appropriate (refer to dietitian) Referral to gastroenterologist to investigate if any red flag symptoms
Frequent hospital admissions	Weight loss Blood glucose disturbances Increased frailty	Nutrition support Medication modification
Age related loss of smell and taste	Apathy towards food Disinterest in eating and cooking	Encourage trying new flavours and foods Eating little and often rather than focusing on large meals Advice on how to enjoy favourite foods and manage diabetes

Table 1. Barriers to nutrition in older adults

for adults with both type 1 and type 2 diabetes are essential.⁴

- Adults with type 1 diabetes should be educated to identify the amount of carbohydrates in a meal and match their insulin accordingly if they use multiple insulin injections or an insulin pump.⁴

- Those adults with type 1 diabetes on fixed insulin regimens should be taught to aim for a similar level of carbohydrates at each meal.⁴

- Adults with type 2 diabetes should be educated about carbohydrates, glycaemic index and blood glucose control.⁴

- For both type 1 and type 2 diabetes a heart healthy diet should be encouraged.⁴
- For both type 1 and type 2 diabetes there should be an aim to maintain a healthy weight and regular exercise of 150 minutes a week.⁴

Carbohydrates

Carbohydrates are a major source of fuel for the body and most break down into the molecule glucose, which is absorbed into the blood stream.¹¹ It is important for those with diabetes to have a good understanding of carbohydrate containing foods so that they can adequately manage their BGLs. Those with type 1 diabetes will need to match the amount of insulin they administer to their carbohydrate intake, while those with type 2 diabetes should have a good understanding of the effects of carbohydrates on their BGLs.⁴ What makes carbohydrate food more complex is that they are not all absorbed into the blood stream in the same way. Carbohydrate foods are often oversimplified by being described as ‘sugars’ or ‘complex carbs’, which ignores how different food sources vary in terms of how they affect BGLs. This effect is referred to as the glycaemic index (GI).

Glycaemic effects of carbohydrates and importance of meals

Diabetes UK recommends those living with type 2 diabetes should have an understanding of the GI for blood glucose control.⁴ Foods digested and absorbed quickly raise BGLs rapidly and are high GI foods, while those that are digested and absorbed more slowly and have a more gradual effect on BGLs are low GI foods.¹² Due to the complexity of GI the following summary of how to reduce glycaemic effects of food is a useful practical guide for older adults.

How to reduce the glycaemic effect of foods

- Eat whole foods where possible as this helps reduce rapid absorption (for example whole fruit rather than juices or smoothies).
- Eat more wholegrain foods where possible.
- Aim to eat carbohydrate containing food with fat and protein (as

would be done in a meal) rather than on its own. This can help to lower the glycaemic effect of the carbohydrate food and raise BGLs more gradually.

- Watch portion size of carbohydrate food.

Cardio-protective diet

Adults with type 1 or type 2 diabetes are at an increased risk of cardiovascular disease (CVD).¹³ This needs to be addressed both medically and nutritionally to ensure optimal prevention of CVD. The Diabetes UK nutrition working group outlines the following important aspects of a cardio-protective diet (based on the Mediterranean and DASH diets) for adults with diabetes to follow:⁴

- Reduce salt intake (<6g/day).
- Eat two portions of oily fish a week.
- Eat a variety of fruit and vegetables.
- Eat more wholegrains, fish, nuts and legumes.
- Eat less red and processed meat, refined carbohydrates and sugar sweetened beverages.

Defining the population

It is important to consider that older adults with diabetes represent a diverse population with different care needs requiring individualised dietary treatment. Where possible, the older person should be involved in the dietary management of their diabetes. When setting goals, the social, medical and living situation of older adults needs to be considered. There are three main functional categories of older adults that should be considered in diabetes care.⁵

Population 1: Free-living and generally well

This group represents those living independently and managing their own medical conditions. They should receive in-depth information about their condition so that they can make informed decisions and appropriate treatment goals. This population group manage their diabetes independently.

The goals of this group may include:

- Matching their insulin to their carbohydrate intake (being proficient in carbohydrate counting) and having a good understanding of GI (type 1 diabetes).

- Being carbohydrate aware and having good knowledge of the GI (type 2 diabetes).
- Maintaining a healthy body weight.
- Eating a cardio-protective diet.
- Controlling BGLs in the same way as younger adults to prevent complications.
- Regular physical activity.

Population 2: Some assistance with daily living

This group of people have reduced independence and require some help at home with activities of daily living (cooking, shopping, cleaning etc). Comorbidities are more likely and need to be considered, along with reduced mobility and increased frailty. This group of older adults may have some help managing their diabetes from a spouse, family member or carer.

The goals for this group may include similar ones for the free-living individuals as mentioned above but with some additional considerations:

- Include carers or relatives in hospital appointments to help the individual manage their treatment and organise their medications and diet.
- Older adults with type 1 diabetes are likely to be on a fixed insulin regimen. Therefore, encouraging carbohydrate consistency throughout the day and in each meal is important for managing BGLs.
- Encourage mixed meals with a balance of carbohydrates, fats and protein to aid GI and reduce any unwanted peak in BGLs.
- Regular dietetic support for dietary modifications that are likely to be complex due to comorbidities which may make dietary choices more difficult; for example a low potassium diet due to renal failure.
- Monitor bloods for vitamin D and B12 deficiency.
- Maintaining BGLs at an appropriate level considering any comorbidities.
- Adjusting exercise advice to consider frailty and comorbidities of this group may benefit from input from a physiotherapist.

Population 3: Assistance with all daily activities/living in long-term residential care

This includes those that are frail and need help with most, if not all, daily needs such as washing, dressing,

cooking etc. Cognitive impairment may be present along with other comorbidities. In summary, this group of older adults are least able to self-manage their condition and their complex nutritional needs.

Their care plan for their diabetes should include:

- Management and prevention, with the involvement of carers, of hypo- and hyperglycaemic episodes with realistic and manageable goals set.
- Regular nutrition screening by care home or GP; consider weekly or monthly weight checks.
- Ensuring adequate nutrition and hydration as they may be at greater risk of malnutrition.
- If prescribed insulin it is likely to be a fixed insulin regimen. Encourage consistent provision of carbohydrates at each meal to help manage BGLs and prevent hypoglycaemia.
- Encourage mixed meals with a balance of carbohydrates, fats and protein to aid GI and reduce any unwanted peak in BGLs.
- Appropriate dietary intervention taking consideration of any comorbidities. For example, a texture modified diet due to dysphagia.
- Prevention of complications of comorbidities of diabetes with realistic goals and expectations – this group may have a reduced life expectancy due to current disease (for example cancer, end-stage renal failure).
- Vitamin D supplementation is likely to be essential due to lack of sunlight exposure.

Obesity

Obesity and insulin resistance

Obesity is a health crisis in the UK with 64.3% of adults living with either overweight or obesity and the age group with the highest prevalence being 66–74 year olds.¹⁴ This is further complicated by the loss of lean muscle tissue and associated reduction in basal metabolic rate that occurs in ageing, along with a natural reduction in physical activity.^{15,16} It is important to consider the impact of obesity in the older adult living with diabetes as this can make BGLs harder to control. Some drugs prescribed for type 2 diabetes focus on improving insulin sensitivity such as glitazones (pioglitazone) or biguanides (metformin). When

High energy foods	High energy foods (cardio-protective)
<ul style="list-style-type: none"> • Cheese (sprinkle on potatoes, soups, pastas)* • Full fat milk* • Cream (add to soups, sauces) • Butter (add to potatoes) • Milkshake (can use a sweetener alternative)* 	<ul style="list-style-type: none"> • Full fat houmous* • Nuts* • Seeds* • Olive oil • Avocado • Peanut butter*
* Good source of protein	

Table 2. High energy, low carbohydrate food suggestions (or foods to add to meals or snacks) for those patients in need of nutrition support

recommending drugs to improve insulin sensitivity in the management of an individual's diabetes it is important to also consider the role of exercise, in improving lean tissue mass, and the role of diet, in helping to maintain a healthy weight.

Sarcopenic obesity

Weight and body mass index (BMI), however, are not always the best indicator of health. Particularly in older adults, NICE recommends interpreting an obese/overweight BMI with caution and using clinical judgement.¹⁷ Although living with overweight or obesity may have an impact on diabetes risk and management, it does not increase risk of overall mortality in the elderly.⁷ At the age of 70, both fat and fat free mass tend to decline in parallel.⁷ Lean muscle mass is lost at a greater rate in those older adults who have diabetes.¹⁸ This loss of muscle mass is a leading cause of frailty in the elderly and has coined the term 'sarcopenic obesity'.¹⁹ The evidence for weight loss in older adults with diabetes being beneficial is equivocal.²⁰ Any consideration of weight loss in older adults should therefore be treated with care and under the supervision of a registered dietitian. Sarcopenia, defined as the loss of muscle mass and function associated with ageing, is most commonly associated with those older people who may be underweight or malnourished; however, it is important to note it can occur in those who are living with overweight or obesity as well.²¹

Malnutrition in older adults

Risks of malnutrition

Although obesity is prevalent in older adults it is also important to understand the impact of malnutrition.

Malnutrition has different forms and can be defined as excessive, deficient or imbalanced dietary habits.²² There are estimated to be three million adults in the UK who are malnourished, with 93% being within the community, 5% living in care homes and 2% in hospital.²³ Because of the high turnover of people with diabetes in hospitals and the vulnerability of those in care homes it is vital to have nutritional screening tools in place to identify those at risk of malnutrition such as MUST (the Malnutrition Universal Screening Tool).²³

Older adults are at risk of malnutrition due to the nutritional barriers that present with ageing (see Table 1). A reduction in total food intake results in a fall in energy and micro- and macronutrients. Malnutrition is associated with increased illness and risk of infection, frailty, slower wound healing and therefore prolonged hospital stays.²⁴

Nutrition support in older adults with diabetes

Sarcopenia tends to be accelerated in those older adults with diabetes.¹⁰ Evidence suggests consuming protein above the recommended daily amount in older adults helps to maintain lean body mass.²⁵ However, those older adults with diabetes and kidney damage may be advised to lower their protein intake to prevent further kidney damage.²⁶ High energy diets are useful for those adults with a reduced appetite finding it difficult to finish meals; see Table 2 for low carbohydrate ways to add extra energy to food and drinks. Eating little and often, rather than relying on large meals can be helpful to increase energy intakes. Understanding whether a barrier to nutrition is acute or chronic helps

to identify the goals for the person with diabetes. It may be appropriate that BGL targets can be less stringent. If it is a long-term barrier to nutrition, it may be important for high energy foods recommended to be more 'cardiovascular friendly'. Those thought to be at risk of malnutrition should be referred to a registered dietitian for an individualised nutrition care plan. This nutrition care plan needs to be discussed with their doctor so that necessary adjustment to diabetes medications can be considered.

If there is concern an individual is unable to meet their nutritional needs through food only, they may need to be prescribed oral nutritional supplements through their dietitian. Many older people with diabetes are on fixed diabetes medication regimens of tablets or insulin and so the carbohydrate content of these supplements should be considered. A registered dietitian should be consulted to develop an individualised care plan for the person with diabetes or their carer. Some people are unable to eat orally and may require tube feeding. This may be acute (where a nasogastric or naso-jejunal tube would be used) or long term (such as a percutaneous gastric tube). A registered dietitian should work in conjunction with the practitioner prescribing the diabetes medication to help find a way of appropriately managing BGLs.²⁷

Conclusion

Diabetes is a complex condition to manage. There are many barriers to nutrition in older adults that make the management of diabetes difficult. The functional status of older

adults is variable – thus advice needs to be tailored to ensure it is appropriate for the individual needs of each older person living with diabetes. A multidisciplinary approach should be taken to help the older adult manage their diabetes. Age should not be a barrier to nutrition education in diabetes.

Declaration of interests

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