Dietary approaches for patients with heart failure and diabetes

Abstract
Nutritional management has a key role to play in the management of diabetes and heart failure (HF). There is currently little evidence to make dietary recommendations specifically for people living with both diabetes and HF. Therefore, most nutritional management recommendations for HF and diabetes need to be based on those for people living with diabetes.

This review paper details what is known about the nutritional management recommendations for people living with both diabetes and HF. The only specific approach focusing on managing HF which is currently part of nutritional recommendations are those focused upon fluid and sodium intake to reduce blood volume. There is an emerging body of evidence to suggest individuals living with both diabetes and HF could benefit from dietary pattern approaches, e.g., the Mediterranean diet.

A range of dietary approaches have been shown to be effective; the key is for nutritional and dietary advice to be carefully tailored to the individual’s social situation and food preferences as well as being supportive of the overall medical management of their condition. Copyright © 2018 John Wiley & Sons.

Background
Heart failure (HF) represents a clearly-defined clinical endpoint derived from multiple cardiac and non-cardiac diseases which impair ventricular function. Heart failure is also a common and serious cardiovascular complication of diabetes.1,2 The comorbidities of HF and diabetes can occur concurrently more often than might be expected, being reported as five times more common in people living with diabetes.3 This is perhaps a reflection of the increased incidence of HF associated with cardiovascular disease in people living with diabetes. The role of nutrition is crucial for both health conditions, not only in prevention, but also in their management and prognosis.4,5

This paper aims to summarise the nutritional recommendations for these conditions.

Nutritional recommendations for heart failure management
Advances in the evidence underpinning the nutritional recommendations for individuals with HF have remained relatively limited (Table 1), and there is even less considering nutrition for individuals living with both HF and diabetes. To date, with respect to HF it has largely focused on fluid and sodium restrictions as part of symptom control alongside medical management. There is the potential that the influence of drugs (primarily diuretics which can be potassium sparing or losing) could, depending on other pathologies, lead to hyperkalaemia or hypokalaemia suggesting a need to alter dietary potassium intake. These approaches can be compatible with recommendations for people living with diabetes, but care needs to be taken not to unnecessarily restrict dietary choice.

Approaches based on dietary patterns have a potentially important role in disease management, with respect to both prevention and moderating its progression in people living with HF.6,7 These reports highlight that a number of well-investigated patterns associated with other health benefits linked to management of chronic disease – including the Mediterranean diet, the Dietary Approaches to Stop Hypertension (DASH) and low-carbohydrate diets. All of these approaches are likely to have clinical relevance to individuals living with both diabetes and HF. Indeed, this recognition of multiple approaches to improving health is also consistent with the most recent

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Nutritional recommendations for the management and prevention of diabetes

As part of the review process for Diabetes UK, their Nutrition Working Group published its latest review of dietary guidelines,8 which moved from a nutrients-based approach to one that is focused more on foods and dietary patterns (Table 1). This approach has a number of advantages in that it not only relates to the food people actually eat, but also helps to resolve some of the challenges associated with nutrient-focused nutritional messaging.

The first of these perhaps is the discussion regarding saturated fatty acids (SFAs). Although there is a significant body of evidence supporting the role of some SFAs in increasing cholesterol levels10 and a modest benefit from reducing SFA intake and cardiovascular mortality,11 there is some debate linked to the effects of different SFAs. Taking a food-based approach allows accounting for data suggesting a protective beneficial effect of fermented dairy products, despite their SFA content, both on risk of developing type 2 diabetes12 and cardiovascular disease.13 This suggests that either the different SFAs have different effects, or that the overall effect is linked to the interactions within the food itself, or how the food is consumed, with cheese being inversely associated with LDL cholesterol when substituted for butter.14 This shift from focusing on single nutrients has the advantage that it is congruent with the dietary pattern messages which are supported by the data in the form of the Mediterranean diet, the principles of which are described in this article, more vegetables and fruit and a shift in type of fat used, especially in processed foods such as pastry, biscuits etc and added fats, e.g. butter; replace with unsaturated fats, such as olive oil and canola oil.

The updated dietary guidelines from Diabetes UK,9 which were the fifth version of the UK guidelines,14 highlight the importance of not only the evidence from clinical trials and epidemiology, but also how these data should be carefully synthesised by clinicians, especially involving dietitians to develop individualised nutrition approaches. For example, for T2DM not complicated by other chronic comorbidities such as HF, they promote an individualised approach highlighting the evidence that a range of dietary approaches can be equally effective in a research setting. The person living with the condition should be supported to find the dietary approach which is best suited to their preferences.

### Table 1. Summary of current nutritional management recommendations for people living with heart failure and diabetes

<table>
<thead>
<tr>
<th>Condition</th>
<th>Heart failure</th>
<th>Type 2 diabetes</th>
<th>Both heart failure and diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current recommendations</td>
<td>Sodium (salt) restriction. Fluid restriction may be considered in those with severe heart failure to relieve symptoms28</td>
<td>In individuals who are overweight: weight loss. A variety of dietary recommendations are suggested including: – Mediterranean type diet – DASH – Low-carbohydrate diet. The key message is that dietary recommendations should be individually tailored</td>
<td>No agreed recommendations, but cardio-protective diet, e.g. Mediterranean diet, can be supported as part of individualised dietary advice</td>
</tr>
</tbody>
</table>
| Areas currently being investigated (trial nos.) | – DASH (NCT03170375)  
– Effects of unsaturated fat (NCT03310099)  
– Effect of weight loss (NCT02911337) | – | – |

### Practical food-based messages

| Less salt | • Minimise added salt in cooking and check labels on foods to look for lower sodium (salt option); (<0.1g sodium per 100g) |
| More plant-based foods | • Increase intake of vegetables and fruit (aim for at least 5 a day) and choose a variety and mainly vegetables |
| Choose whole grains when selecting bread and cereals | • When choosing breads, cereals, rice, pasta or potatoes, where possible look to choose whole grain and higher fibre versions. Also consider your portion size to help glucose levels and manage weight |
| Switch types of fat | • Moderate fat intake, look to reduce intake of saturated fat, especially in processed foods such as pastry, biscuits etc and added fats, e.g. butter; replace with unsaturated fats, such as olive oil and canola oil |
| Aim for a varied pattern of eating | • Try to eat a variety of foods, in a pattern similar to a Mediterranean diet, the principles of which are described in this article, more vegetables and fruit and a shift in type of fat used, along with inclusion of more legumes, nuts and seeds  
• Emerging evidence supports the inclusion of fermented dairy products, e.g. yoghurt, as part of a healthy diet |

DASH = Dietary Approaches to Stop Hypertension.
diabetes is complicated by further additional chronic disease, the need for clinical skill in interpreting nutritional and dietary advice for individuals to become more bespoke and tailored is even more important. This not only reflects a lack of research evidence for this group, but that individual clinical presentations are likely to require an individualised approach as some may be at high risk of malnutrition, while for others weight management might be the primary treatment goal. Therefore, it is key for advice to focus on supporting the needs of the individual; this need is vital when considering the potential interaction with medication. This can be seen in relation to diuretics which are typically used in the management of blood volume in an attempt to manage ventricular hypertrophy and can either be potassium sparing or losing. If they are the former, then where renal function is compromised hyperkalaemia is a potential risk; therefore dietary advice may need to moderate intake of this mineral and the consumption of a range of foods including instant coffee, chocolate, oranges, bananas etc. Although initial generic advice can be given to people living with diabetes, especially when they have a comorbidity such as HF, ideally a referral to a diettian with experience of both conditions should be sought.

**Nutritional recommendations for people living with both diabetes and heart failure**

Although not essential if taking an individualised approach to dietary advice in individuals living with diabetes who also have HF, it is regrettable there are limited studies that have specifically focused on diabetes and HF. This is especially the case, as diabetes is known to be an important comorbidity in the HF population; however, this perhaps mirrors the lack of data on nutrition in HF in general. As such, evidence needs to be extrapolated from studies that have, at the very least, contained some participants with diabetes. Greater adherence to a Mediterranean diet or DASH diet has been shown to be associated with a lower hazard rate of mortality in women with HF. In this study using participants from the Women’s Health Initiative, there was a significant difference in the prevalence of diabetes between those women who survived follow-up and those who died; diabetes was reported in 31.8% of those who died during the study, and in 24.9% of those women who survived. Regrettably, the authors provided no details on the medications used to control diabetes and as such it is not possible to determine accurately the level of glycaemic control in those individuals with diabetes and whether this was linked with the outcome status. Nonetheless, in this study greater intake of fruit and vegetables, nuts, legumes, whole grains and fish, and reduced intake of sweetened beverages and red and processed meat were a characteristic of both dietary patterns and associated with lower rates of mortality. However, this association appeared to be driven by vegetables, nuts and whole grains in the Mediterranean diet pattern, and vegetables, nuts and legumes, and whole grains in the DASH group, which provide the beneficial effects.

More recent studies have also shown that greater adherence to a Mediterranean diet is associated with a decreased rate of rehospitalisation following admission for acute HF. Similarly, a small, well-controlled clinical trial by Hummel et al. showed a sodium-restricted DASH diet increased ejection fraction and stroke volume by 8% and 11%, respectively. The significance of these findings includes that improvements were observed relatively rapidly (within 21 days). Furthermore, 43% of the participants had T2DM, although the authors again did not measure any changes in glycaemic status in participants.

The debate with respect to the utility of modifying macronutrient intake rather than adopting food-based approaches in the context of diabetes and HF has been given an increased profile based on the data of DIETFITS. This study suggested no increased benefit in improving glucose and insulin sensitivity irrespective of dietary approach, be that either a low-fat or low-carbohydrate diet. Evangelista et al. compared a 12-week hypoenergetic diet (5021–6276kJ/d [1200–1500kcal/d]) consisting of three arms (high protein, standard protein and American Heart Association diet) in individuals with T2DM. This trial is relatively novel as the inclusion criterion was non-insulin treated T2DM, which removes insulin treatment as a potential confounder. Over the 12-week study duration, those participants in the high-protein group lost significantly more weight than the other diet groups, and displayed a greater reduction in percent body fat, waist circumference and improved quality of life and 6-minute walk test, although there were no objective measurements made of cardiac function, i.e. ejection fraction. All groups displayed a small but significant reduction in HbA1c but all findings are substantially limited by the use of an extremely low sample size (n=5 in the high-protein arm). What this trial does show is that weight loss in patients with HF and diabetes can have a positive impact on functional status, and it adds more information to the ongoing debate regarding the ‘obesity paradox’ associated with HF, which has suggested that a higher body weight might be protective with respect to mortality.

Low-carbohydrate diets have also shown value in HF patients with and without diabetes. In 88 participants (53% of whom had diabetes) randomised to either a high carbohydrate diet (50% energy from carbohydrate) or a reduced carbohydrate diet (40% carbohydrate), a significant improvement in oxygen saturation was found following two months of the low-carbohydrate diet. Changes in all other parameters did not reach statistical significance between groups, including weight and blood pressure; however, it should be noted that there was a marked reduction in weight in the low-carbohydrate group, although failing to reach statistical significance. Similar results have also been reported previously, showing significant weight loss, improved oxygen saturation and functional class with a diet providing 40% energy from carbohydrate. There are no agreed criteria for the definition of a low-carbohydrate diet, and
these studies compared reduced rather than low-carbohydrate with high-carbohydrate intake. The subjects included both those with and without diabetes, making it challenging to draw a firm conclusion about the role of low-carbohydrate diets independent of weight loss in people with diabetes and HF.

Further research is needed and ongoing dietary trials which have yet to report include: NCT03170375 examining the role of the DASH diet; NCT03310099 assessing the impact of increasing unsaturated fat intake on parameters such as body composition, blood glucose and insulin concentrations; and NCT02911337 examining the role of weight loss therapy in patients with HFpEF (HF with a preserved ejection fraction).

Nutritional support for people with diabetes and heart failure

Much of the focus has been placed on preventing the progression of HF by encouraging an approach aimed at managing risk factors also associated with general cardiovascular risk in this population, and dietary approaches such as the Mediterranean diet. However, if or when HF progresses it can lead to cachexia (estimated to occur in 8–42% of cases) and is associated with a worse prognosis. Measures used to assess nutritional risk have been shown to be predictive of mortality; this does not necessarily mean it is a direct effect of malnutrition, but it could be an effect of the disease process increasing inflammatory markers, reducing markers such as albumen typically included in biochemical assessments of malnutrition, e.g. CONUT score. It is also considered that although the obesity paradox has been reported in HF and with diabetes, this may represent loss of lean tissue related to the pathology.

The key nutritional management target for those people with diabetes and HF who have unplanned weight loss and risk of malnutrition is meeting their nutrient requirements and increasing energy and, typically, protein intake. This may involve the use of nutritional supplements, and diabetes therapy should be adjusted to optimise glycaemic control. There is some suggestion regarding the use of specialised supplements, e.g. those with lower carbohydrate content or with altered fatty acid profiles (typically less saturated fat, and more unsaturated fatty acids including omega 3 fatty acids), but these are not routinely available in the UK and there is insufficient evidence to support a change in practice.

Summary

Although there is a lack of specific data defining optimal dietary guidelines for people with diabetes and HF, it is possible to extrapolate from studies of people with diabetes and what is known about HF. There are similarities in the approaches that work in both conditions.

Currently, there are a number of studies investigating the effect of diet on HF in further detail in order to attempt to develop an understanding of the best dietary management approach. Until these data are available, approaches used to manage glycaemia and cardiovascular risk should be recommended. If individuals are at risk of malnutrition, this should be the priority. Overall, dietary advice needs to be carefully individualised to meet the needs of the patient, informed and shaped by evidence.

Declaration of interests

TB: Member of Steering Group for Heart UK and member of British Association for Cardiovascular Prevention & Rehabilitation council.

ENG: Nothing to declare.

DM: Board member of British Dietetic Association, member of the council of health professionals for Diabetes UK. Honoraria for speaking and consultation with the International Sweeteners Association.

References

References are available online at www.practicaldiabetes.com.
Review

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References