CPD with this article

Diabetes and Dialysis

Nutritional considerations

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Introduction

Poor blood glucose control can lead to diabetic nephropathy.[1] It is important to notice the early signs, so that progression can be delayed with medical and lifestyle management, including control of blood pressure (BP), diabetes, lipids and weight, before the need for dialysis occurs. The initial sign of diabetic nephropathy is microalbuminuria (30-300 mg albumin in urine per day). As damage progresses, macroalbuminuria occurs (>300 mg per day).[2]

Patients who have progressed to chronic kidney disease stage 5, will require renal replacement therapy (RRT), peritoneal dialysis (PD), haemodialysis (HD) or transplant.[3] Diabetics on dialysis are less likely to be transplanted even though diabetes itself is not a contraindication for transplant. The reason for this disparity is age and co-morbidities.

End stage chronic kidney disease is 12 times higher in men and eight times higher in women with diabetes compared to those without diabetes.[4] In 2011, 25 per cent of patients starting RRT had diabetes (diabetic nephropathy) as their primary renal diagnosis.[5]

Prevalence of malnutrition in the dialysis population

Audits from three UK renal units[6, 7, 8] show that malnutrition rates in HD patients ranged from 10 to 26 per cent. Due to the higher risk of co-morbidities with diabetes, it is quite likely that those with diabetes will be at high risk of malnutrition. People with diabetes are more likely to have leg infections or ulcers, pancreatic insufficiency leading to a reduction in digestive enzymes and also gastroparesis. They are also more likely to have calcification which can be exacerbated in renal failure patients due to an imbalance of calcium and phosphate. Resulting ischaemia and possible amputations can cause ill health and a reduction in food intake (see **Table One**).

Table One: Nutritional Requirements for Dialysis

	Outpatient dialysis patient	Inpatient dialysis patient	Comments
Energy	30-35 kcal/kg IBW[9]	20-30 g/kg IBW[10]	Need to include kcal from glucose via PD and determine if extra energy is required due to comorbidities
Protein	Minimum of 1.1 g/kg IBW[11]	1.1-1.5 g/kg IBW[10, 11]	Continuously filtered patients require 1.5 g/kg IBW
Potassium	2000-2500 mg/d (50-65 mmol/d)		Poor intake may allow some relaxation to the diet as long as serum levels are well controlled
Phosphorus	1000-1400 mg/d (32-45 mmol/d)[9]		As phosphate containing foods tend to be good sources of protein, phosphate restriction may need to be relaxed during times when the need for energy and protein rich foods is required. An increase to phosphate binders can be considered if levels rise (>1.7 mmol/l)
Fluid	500 ml + output[9]		If food intake is very poor or the patient is nil by mouth, there may be scope for a slight increase of fluid allowance as the patient is likely to get less fluid from solid foods. Standard fluid allowances are based on pourable liquids at room temperature (it doesn't include fluid naturally present in food)

Nutritional composition of feeds and supplements for dialysis dependant patients

The protein to calorie ratio required by patients can vary depending on treatment modality and other factors. Those on PD will absorb glucose from dialysis[12] and hence require less calories orally, but still need the higher levels of protein compared to a HD patient who doesn't absorb any extra calories from dialysis. A patient in intensive care on RRT, ventilated and on propofol may require less energy due to metabolic rate and energy provision from propofol, but still have high protein requirements. For this reason, having access to high protein feeds or oral nutrition supplements (ONS) is of benefit (more than 4 g protein/100 kcals). The fluid and electrolyte content of feeds should also be considered. This is dependent on urine volume, frequency of dialysis and current electrolyte levels (see **Table Two**).[11]

Identifying the renal dialysis patient at risk of malnutrition

Sometimes the types of screening tools that are commonly available in hospitals may not always be specific enough to identify a malnourished renal patient on a busy general ward. Renal patients may have oedema, this is more common in the HD patient when they are losing flesh. Oedema will affect BMI, therefore screening tools which factor BMI and weight change can be difficult to interpret accurately.[13] If mid arm circumference is measured in those with oedema, serial measurements should be taken, and on a busy ward, this may not always occur.

Generally, patients on dialysis, who are admitted to hospital, would benefit from dietetic intervention and the provision of additional snacks or supplements from the outset, as it is very difficult to meet full protein requirements from a standard hospital diet.[14] For example, an 80 kg renal patient with a healthy BMI would require a minimum of 88 g protein which is unlikely to be achieved from the standard hospital menu, when the number of drinks they are allowed (e.g. tea with milk, hot chocolate) is limited due to fluid restriction.

Combining the diabetes diet with renal diet principles in the well nourished dialysis patient

For well nourished patients with diabetes that lead on to develop the need for dialysis, one of the struggles is combining the 'diabetes diet' with the 'renal diet'. Some of the advice provided by renal dietitians' can seem contradictory to the advice provided by the diabetes team, who they have likely to have known for years.

Table Three summarises the principles of the diabetes diet and how it compares to the renal diet. **Table Four** compares foods high in potassium and phosphate with suitable alternatives.

Table Two: Feeds and Oral Nutrition Support to Consider for Your Renal Dialysis Patient

Type of feed/ supplement	Indications
Standard 1 kcal/ml enteral feed	Daily filtered patient who does not require fluid or electrolyte restriction
1.5 kcal/ml enteral feed	PD patients needing a moderate fluid restriction
≥1.8 kcal/ml enteral feed	HD patients likely to also require feed to be low electrolytes. Those at high risk of refeeding syndrome may need to be started on a feed with moderate amounts of electrolytes initially to offset any drop
Renal specific ONS	Fluid and electrolyte restricted patients
Standard ONS	Patients who don't need electrolyte or fluid restriction, or those eating very poorly such that an electrolyte/fluid restriction is not yet required. Fluid and serum electrolyte levels need to be monitored

Table Three: Principles of the Diabetes Diet Compared with Principles of the Renal Diet

Diabetes principles	Considerations for the renal dialysis patient
Regular meals with complex carbohydrates	In addition to regular meals with complex carbohydrates, it is important to encourage a protein source with all 3 main meals
Fruit and vegetables encouraged	If blood potassium is raised (>5.5 mmol/l for PD patients and >6.0 mmol/l for HD patients), there is a need to keep fruit and vegetable intake to 4-5 portions per day
Inclusion of oily fish	The same can be advised for renal patients but need to avoid any edible bones that may be present in tinned fish due to its high phosphate content
High fibre foods encouraged	Phosphate naturally present in these foods is bound to phytate and hence its limited absorption makes it suitable to include in a renal diet
Pulses and legumes encouraged	Pulses and legumes can be a rich source of potassium, so meat intake (which also contains potassium) may need to be adjusted. Vegetarians would be allowed legumes/pulses without the need for other adjustments as they will not have meat as a potassium source
Encourage activity	Equally encouraged in the renal dialysis patient due to benefits to the cardiovascular system as well as overall wellbeing and quality of life. Cycling on HD and exercise classes held in hospitals for dialysis patients are becoming more common. For those able to partake in activity, the standard recommendation of 150 minutes exercise per week should be aimed for

Summary

In the dialysis patient with diabetes, it is important to ensure that high protein requirements are met.

For those with a poor appetite, it is important to find dietary options that are energy and protein dense, which may include the use of ONS or enteral feeds. It may be that some dietary restrictions are relaxed as long as it is not likely to cause immediate harm, e.g. high serum potassium levels or oedema.

For the well nourished diabetic dialysis patient, it is important to try to achieve a healthy, low sugar, high protein diet bearing in mind the electrolyte restrictions.

Table Four: Foods High in Potassium and Phosphate Compared with Suitable Alternatives

High potassium	Low potassium	High phosphate	Low phosphate
Juice	Squash, fizzy drinks including diet varieties	Processed/reformed meats	Fresh chicken, beef, lamb, pork
Crisps	Non potato crisps (need to check salt substitutes are not present)	Processed cheese	Cottage/cream cheese, brie, camembert, edam
Salt substitutes containing potassium chloride (e.g. Lo salt, Saxa So-Low)	Herbs and spices used in cooking	Fish with edible bones	Fish with edible bones removed
Bananas and dried fruit	Apples, grapes, satsumas, berries		
Potato/yam/plantain/ breadfruit (no more than 1 portion per day)	Rice, bread, pasta, couscous, semolina, chapatti, noodles, dumplings		

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