

Webinar: BDA - Diabetes Specialist Group

Renal diet for Patients with Diabetes

By Gabby Ramlan
Diabetes & Renal Specialist Dietitian

Our
values



Overview

- Diabetes Dietitian Vs Renal Dietitian
- Problems in individual with kidney disease
- Salt
- Protein
- Phosphate
- Potassium
- Acute Kidney Injury (AKI)

Around 40% people with diabetes eventually develop diabetic nephropathy or diabetes kidney disease.

Diabetes is a leading cause of kidney failure in UK – around 20% starting dialysis have diabetes.

Kidney Research UK

“Dietary requirements for patients with both diabetes and chronic kidney disease (CKD) is more complicated than with each individual condition as it involves multiple nutrients”

• • •

National Kidney Foundation (NKF) 2007

Diabetes vs Renal Specialist Dietitian

Diabetes

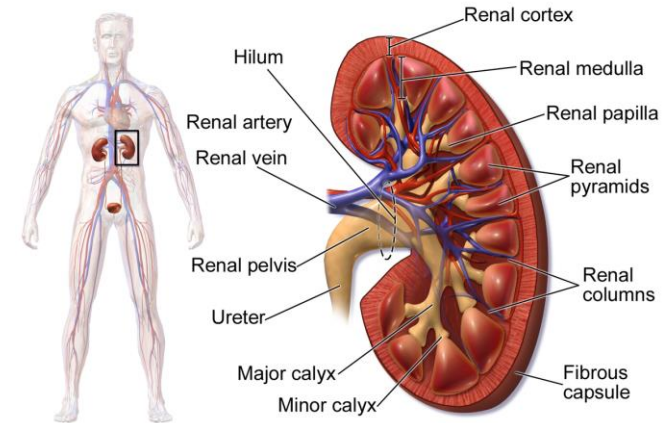
- Salt
- Lipid control
- Carbohydrates
- Glycaemic control
- OHAs
- Injectable meds
- Insulin

Renal

- Salt
- Lipid control
- Protein
- Potassium
- Fluid
- CKD-MBD
 - Phosphate Binders
 - Vit D / calcimimetic

Kidney's Functions

- **Regulation** of the composition and volume of *body fluids*
 - Na⁺, K⁺, Phosphate, Mg
 - Acid/base balance
 - BP & volume via renin angiotensin system
- **Excretion** of *waste products*
 - Urea (protein metabolism)
 - Creatinine (muscle metabolism)
 - Drugs & toxins



Kidney Anatomy

Kidney's Fx

- ***Endocrine fx***
 - Erythropoetin & Hb
- ***Metabolic***
 - Control calcium/phosphate/ PTH balance
 - Vit D metabolism
 - Excretion of phosphate

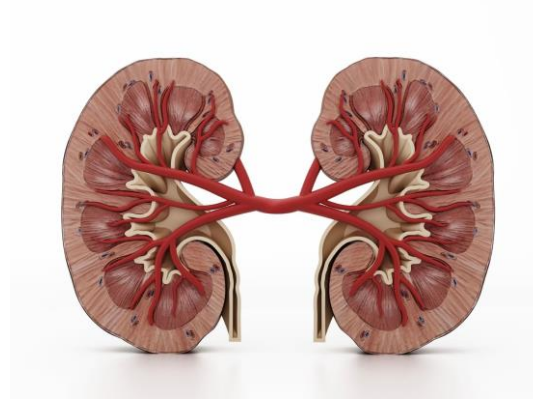


Table 1. Definition and stages of CKD¹

CKD stage ^a	GFR (ml/min/1.73 m ²)	Description
1	≥90	Normal or increased GFR, but with other evidence of kidney damage
2	60–89	Slight decrease in GFR, with other evidence of kidney damage
3A	45–59	Moderate decrease in GFR, with or without other evidence of kidney damage
3B	30–44	
4	15–29	Severe decrease in GFR, with or without other evidence of kidney damage
5	<15	Established renal failure
		^a Use the suffix (p) to denote the presence of proteinuria when staging CKD

Common problems with renal patients

- Anaemia – no dietary advice

Hypertension

1. Weight
2. Salt intake
3. Proteinuria (ACR>3mg/mmol)

Hyperkalaemia

1. Serum Potassium
2. Causes
3. Bicarbonate ($\text{HCO}_3^- > 24 \text{ mmol/l}$)

CKD – Mineral Bone Disorder (MBD)

1. Vitamin D
2. Corrected Calcium (C Ca)
3. Serum Phosphate
4. PTH

Fluid

1. Salt intake
2. Output = oliguria or anuria
3. Fluid allowance = 24hr Urine output + 500ml

Salt

- Salt reduction – first dietary advice esp. CKD 1-3
- Sodium Chloride
 - <6g per day or 80-100mmol/day
 - Mainly in processed food
- Potassium Chloride – salt substitute
 - Beneficial to pts with hypertension but not for individual with hyperkalaemia

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/660526/SACN_COT - Potassium-based sodium replacers.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/660526/SACN_COT_-_Potassium-based_sodium_replacers.pdf)

Our
values



Protein

Without dialysis

(0.8 – 1.0g/kg)

- Pre – dialysis
- Low clearance
- Conservative Treatment
- Diabetes: 0.8 – 0.9g/kg IBW/day (KDOQI 2019)
- Nephrotic syndrome 0.8 – 1.0g/kg/day (KDIGO 2012)

With dialysis

(1.0 – 1.4g/kg)

- Modality
 - Haemodialysis
>1.1g/kg/d
 - Peritoneal Dialysis
>1.2g/kg/d
- Frequency of dialysis

Protein for Individuals with Diabetes

(KDOQI 2019)

- CKD stage 3-5
 - 0.8 to 0.9g protein/kg IBW /day
- CKD on HDx or PD
 - 1.0 to 1.2g protein /kg IBW /day
- KDIGO recommends <1.3g/kg/day if at risk of progression
 - CAREFUL: high protein requirement e.g. foot ulcer or wound

How about Low Protein Diet?

- Mainly use in CKD 3-5
- Low protein diet
 - 0.55 to 0.6g prot/ kg IBW
- Very low protein diet
 - 0.28 to 0.43g prot/kg IBW with additional keto acid analogues to meet protein requirement of 0.55 to 0.6g/kg IBW/day
- BDA-RNG does not recommend protein intake $<0.8\text{g/kg/day}$ due to limited evidence (PENG 2019).



Phosphorus or Phosphate

- Hyperphosphataemia is serum phosphorus $>1.5\text{mmol/l}$ in CKD 3-5 (UK RA 2015 & NICE 2013)
- May occur in CKD stage 4-5 & associated with mineral bone disease (MBD).

What information do you need?

- Corrected calcium
- Vitamin D supplement
(ergocalciferol, cholecalciferol, alfacalcidol)
- Phosphate binder (CaCO_3 , Lanthanum, Sevelamer)
- Diet

Phosphate

Sources:

- Protein, phytate, food additives
- Organic Vs Inorganic
- Organic:
 - Animal (meat, fish, eggs, dairy products)
 - Plant sources – Phytate (mainly outer coating grains, seeds, nuts & pulses) & requires phytase to release phosphorus
- Inorganic: mainly food additives

Food Additives: Look For PHOS

(BDA – RNG 2018)

- Acidity regulator, antioxidant synergist, stabiliser, emulsifier, texturiser, water retention agent & many more
- Contributes 600-800mg phosphorus
- 90-100% bioavailability & readily absorbed

E338 Phosphoric Acid

E339 Sodium phosphates

E340 Potassium phosphates

E341 Calcium phosphates

E343 Magnesium phosphates

E450 Diphosphates

E451 Triphosphates

E452 Polyphosphates

Key where phosphorus containing food additives are:

- **Bakery products:** cakes, biscuits, pastries and flour tortillas
- **Meat and poultry products:** processed meats, processed poultry, burgers, sausages and meat paste
- **Seafood products:** frozen processed and unprocessed fish, frozen processed and unprocessed shellfish and fish paste
- **Dairy products:** evaporated milk, creams, sterilised and ultra-high temperature processing (UHT) milk, dried milk products, milk desserts and yoghurt
- **Processed cheese:** spreadable and sliced processed cheese
- **Potato products:** frozen, chilled and dried products (e.g. chips, waffles, roast potato and mashed potato)
- **Dried powdered food items:** sauces (especially cheese-based), dessert mixes, soups, instant pasta dishes, instant noodles and dried milk
- **Non-alcoholic drinks:** dark fizzy drinks, soft drinks, and chocolate and malt dairy-based drinks

Phosphorus in diet

Absorption:

- Phytate (plant) requires phytase to release phosphorus
 - Fermentation
 - Boiling or roasting
- 40 – 60% of organic from animal sources (KDIGO 2017)
- 90 – 100% of inorganic, mainly food additives (Kalanter-Zadeh 2013)

Phosphate Binders

- Removes 200 – 300mg phosphorus per day (Cupisti et al 2013)
- Calcium base
 - Calcium Carbonate
 - Calcium Acetate
- Non-calcium base
 - Aluminium Hydroxide
 - Magnesium
 - Lanthanum
 - Sevelamer

BDA-RNG Recommendation (2018): Dietary Mx of Hyperphosphataemia

- Encourage *fresh foods* instead of processed foods & prepared at home.
- Ensure *adequate protein* intake according to CKD stages.
 - Fresh meat, fish, eggs, moderate dairy intake, beans & pulses
- Encourage *wholegrain* products
- Reduce intake of food & drinks high in phosphorus with low nutritive value.
- Choose commercial foods & drinks *without phosphorus containing food additives*.

Potassium

- Cause of hyperkalaemia
- Potassium salt
- Potassium binder

Potassium: Causes of Hyperkalaemia

- Poor diabetes control
- Constipation
- Medications: ACE-inhibitors, Potassium sparing diuretics, ARBs
- Metabolic acidosis – low $\text{HCO}_3^- < 24 \text{mmol/l}$
- Rhabdomyolysis
- Rapid catabolism e.g. significant weight loss
- Extreme exercise
- Heart failure

Low Potassium Diet

- What about diet?
 - Aim <70mmol per day
 - Choose high fibre content
 - Promote healthy gut
- Cooking method
 - Boiling food is the best method
 - Taking 60-80% of potassium content (Picq et al. 2014)

New RNG Resources for Multicultural Low Potassium Diet *(Free for BDA members)*



Available in 4 versions:

1. African – Caribbean diet
2. Chinese & Far Eastern diet
3. Eastern European diet
4. South Asian diet

*NKF-Kidney X 2020 Award
Patient Innovation Challenge*

Current project:



A Consensus on Multicultural Low Potassium Diet: A Handbook for Health Professionals (DRAFT)



www.shutterstock.com • 1019380132

Our
values



Low Potassium Diet

- What is high potassium content?
 - depends on per gram of protein, fibre, allowance <70mmol/day

Categories	Potassium distribution (mmols)	% Potassium in daily intake
Potatoes, starchy root vegetables/tubers and some high potassium containing grains	11	15.7
Fruit & Vegetables (estimated 5 portions x 4mmols)	20	28.6
Protein portion (estimated 2 x 10mmol)	20	28.6
Milk & Dairy	12	17.1
Breakfast cereals	3	4.3
Bread	2 - 4	2.8 - 5.7
Rice, pasta and low potassium containing grains	Free foods	Not included

Salt Substitutes Potassium Salt (KCl)

- Widely used to reduce sodium content to reduce hypertension but also used as flavour enhancer, stabilizer & thickener.
- 15-25% reduction of NaCl & replaced with potassium salt.
- Average potassium intake in UK population is 68-77mmol/day (Bart et al. 2014).
 - Increase by 15-25% with salt substitute leads to 80 – 91mmol/day (SACN/COT, 2017)

Potassium Binder

- Currently available:
 - Patiromer
 - Lokelma
- Started being used mainly in acute setting
- Not cost effective
- Needs further research

Diabetes & Renal Diets

DIABETES

- ✓ Fresh options
- ✓ Low salt
- ✓ Lipid control
- ✓ Healthy: high fibre
 - Fruits & vegetables
 - Bran & Granary

RENAL

- ✓ Fresh options
- ✓ Low salt
- ✓ Lipid control
- ✓ Healthy: High fibre
 - ? potassium
 - ? Phosphate – phytate

Diabetes & Renal Diets

DIABETES

- Normal protein requirement
- Healthy: energy requirement depends on BMI. Low fat diet
- Carbohydrates: Quantity?
- Hypo treatments
- No fluid restriction

RENAL

- Higher protein if on dialysis
- Healthy but high energy requirements (CHO vs fats)
- Carbohydrates: Low potassium options
- Fluid restrictions if anuric

Dietary Management & Nutrition

JBDS & RA Guidance (2016)

- Energy: 30- 40 kcal/kg IBW
- CHO: 50 – 60%
- Protein: >1.1g/kg IBW
- Fat: <30%
- Low GI & Low K⁺ options
- Low phosphorus additives
- Salt <6g/day
- Limit oily fish intake



Low GI but not so low for ...

- *High potassium*

- Kiwis, banana
- Pulses
- Potato, plantain, corn

- *Swap to:*

- Apple, pear, berries
- Boiled pulses
- Limit portion: Lower K+ content & Lower CHO

- *High phosphate*

- Milk & yoghurt
- Macaroni & cheese ready meal
- Frozen roast potatoes

- *Swap to:*

- Limit dairy intake
- Cooked from fresh

Incidents of Acute Kidney Injury (AKI)

- In UK 100,000 deaths in hospital per year are associated with AKI (NCEPOD 2009).
- An estimated 5–20% of critically ill patients experience an episode of AKI during the course of their illness and AKI receiving RRT has been reported in 4.9% of all admissions to intensive-care units (ICU). The Intensive Care National Audit Research Centre (ICNARC) suggests that AKI accounts for nearly 10 percent of all ICU bed day 13.

AKI & Nutrition

- Metabolically stable?
 - Good glycaemic control, no short term wt loss, no inflammation, not hospitalised <2wks, not on antibiotics or immunosuppressant
- Protein
 - Depends on treatment, if on continuous renal replacement therapy (CRRT), may need up to 1.7g protein per kg per day
- Fluid
 - Depends on hydration and urine output
- Potassium
 - Depends on causes & if on dialysis/filtration or not
- Phosphate?

Dietary challenges in patients with diabetes and chronic kidney disease

For patients with diabetes and chronic kidney disease, several dietary restrictions are necessary to prevent episodes of hyperglycaemia and fluid overloading. Patients should be advised by specialist dietitians in renal medicine and diabetes when modifying their nutritional intake and lifestyle. Gabby Ramlan reviews the key dietary recommendations in national clinical guidelines.

■ diabetes ■ chronic kidney disease ■ diet ■ carbohydrate ■ protein ■ potassium ■ phosphate ■ hypoglycaemia

THANK YOU
gabby.ramlan@nhs.net

Our
values

