

Potassium in pre-dialysis patients

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GUIDELINES

No recommendations possible based on Level I or II evidence

SUGGESTIONS FOR CLINICAL CARE

(Suggestions are based on Level III and IV evidence)

- **Serum potassium should be regularly monitored, and a reduced potassium diet commenced when serum potassium is greater than 5.5 mmol/L. (Opinion)**

The risk of cardiac arrhythmias is higher when the potassium is above 6.5 mmol/L or when the potassium is below 3.0 mmol/L. Patients who are especially at risk of cardiac arrhythmias are those with ischaemic heart disease, previous arrhythmias, or low serum calcium.

Potassium excretion is maintained in renal disease unless distal tubular urine flows or aldosterone secretion is affected.

When hyperkalaemia develops in the chronic kidney disease (CKD) patient, one of the following should be looked for, and when possible, corrected:

1. high potassium intake (including salt substitutes in sodium-reduced diets);
2. oliguria;
3. hypoaldosteronism;
4. metabolic acidosis; and
5. medications that either contain potassium or inhibit the clearance of potassium, such as angiotensin-converting enzyme (ACE) inhibitors, corticosteroids, and potassium-sparing diuretics.

Conversely, hypokalaemia may develop in the CKD patient when:

1. a low potassium diet is implemented, including poor/low food nutrition intake;
2. overuse or inappropriate use of potassium-lowering agents is occurring, e.g. ion-exchange resins; and
3. overuse or inappropriate use of diuretics is present.

A reduced potassium diet should limit the 24-hour intake to approximately 80 mmol.

Background

Potassium is an important electrolyte, dietary component and product of cellular metabolism. The nephron plays an important role in potassium homeostasis (Meneton et al 2004). The daily requirement of potassium in the normal healthy adult is in the range of 40–70 mmol/day. Diets with higher potassium content can be potentially harmful for patients with CKD, resulting in hyperkalaemia (Lancaster 2004). Hyperkalaemia occurs frequently in renal patients and is cardioplegic and arrhythmogenic – often without warning (Rado and Haris 1999). Medical therapies being used more frequently in the management of renal (and other) diseases are associated with renal potassium retention, e.g. spironolactone, ACE inhibitors and angiotensin-2 receptor blockers. Because hyperkalaemia is often asymptomatic and the plasma level is a balance of diet, internal body metabolism and degree of renal failure, no easy guide can be made, and regular blood testing is required.

This guideline aims to examine recommended dietary intake of potassium, goal plasma potassium levels and differences in morbidity and mortality that have been reported.

Search strategy

Databases searched: MeSH terms and text words for kidney disease were combined with MeSH terms and text words for dietary potassium then combined with the Cochrane highly sensitive search strategy for randomised controlled trials and search filters for identifying prognosis and aetiology studies. The search was carried out in Medline (1996 – November Week 2, 2003). The Cochrane Renal Group Trials Register was also searched for trials not indexed in Medline.

Date of searches: 27 November 2003.

What is the evidence?

No randomised controlled trials (RCTs) are available which address this issue.

Summary of the evidence

There are no RCTs on this topic.

What do the other guidelines say?

Kidney Disease Outcomes Quality Initiative:
No recommendation.

British Renal Association:
No recommendation.

Canadian Society of Nephrology:

No recommendation.

European Dialysis & Transplant Nurses Association/ European Renal Care Association:

The dietician/nutrition advisor will advise the pre-dialysis patient on a potassium intake of 50–65 mmol/day.

Implementation and audit

1. Early dietician advice and patient education about foodstuffs containing high potassium doses, and food preparation is essential. Education of the patient in potassium sources in the diet by all members of the renal team is important.
2. Regular reinforcement of this knowledge and information with the patient is recommended. Frequency of such repeated education depends upon the patient and renal service resources.
3. Care must be taken so as to not lead to a general state of malnutrition when potassium restriction is implemented.
4. Recommend a target potassium daily intake range for the individual patient. This needs to be guided by plasma potassium levels, and may vary according to cultural foods or cardiac health.
5. A balance between the risk of potassium-elevating medications (especially ACE inhibitors, ARBs and spironolactone) and their benefit needs to be considered.

Suggestions for future research

No recommendations.

References

Lancaster KJ. Dietary treatment of blood pressure in kidney disease. *Adv Chronic Kidney Dis* 2004; 11: 217–21.

Meneton P, Loffing J, Warnock DG. Sodium and potassium handling by the aldosterone-sensitive distal nephron: the pivotal role of the distal and connecting tubule. *Am J Physiol. Renal Physiol* 2004; 287: F593–601.

Rado J, Haris A. [Hyperkalemias]. *Orv Hetil* 1999; 140: 2611–18.

Out of date

Appendix

Table 1 Potassium content of some common food groups

Food Group	LOW (<150 mg, <4 mmol/serving)	MEDIUM (150-250 mg, 4-6 mmol/serving)	HIGH (>250 mg, >6 mmol/serving)
FRUIT	<p><u>Fresh:</u> Apple Pear Feijoa Persimmon Passionfruit Tangelo Nashi Cherries Paw Paw/Papaya Strawberries Raspberries Blueberries Blackberries Olives</p> <p><u>Canned:</u> Apple Pear Pineapple Mandarin Plums Mango Guava Cranberries Lychee Paw paw/papaya Peaches</p>	Lemon Mango – fresh Orange Plums - fresh Tamarillo Watermelon	Apricots - fresh, canned, dried Nectarines Peaches Grapefruit Grapes Pineapple Kiwifruit Bananas Coconut – flesh of Honeydew melon Rockmelon Avocado Rhubarb Dates Figs Prunes Raisins Sultanas
VEGETABLES	Cabbage Cauliflower Green beans Bean sprouts Celery Cucumber Lettuce Peas Marrow Courgette Spinach Garlic Spring onion Radish Turnip Eggplant Mixed vegetables Watercress	Potato – boiled Pumpkin – boiled Asparagus Broad beans Beetroot Sweetcorn Leeks Parsnip Brussel sprouts Lentils Chickpeas Potato salad Bean salad Onion	Potato - baked, french fries/ chips, instant roasted, microwaved Pumpkin – roasted Kumara Broccoli Mushroom Tomato Silverbeet Dried beans Kidney beans Breadfruit Green bananas Cassava/yam Taro Taro leaves Baked beans

The CARI Guidelines – Caring for Australians with Renal Impairment

Food Group	LOW (<150 mg, <4 mmol/serving)	MEDIUM (150-250 mg, 4-6 mmol/serving)	HIGH (>250 mg, >6 mmol/serving)
	Puha Swede Choko		
CEREALS/ BAKED GOODS	Porridge Rice bubbles Cornflakes Weetbix Honey Puffs White rice Noodles Pasta Bread Chapatis Scones Biscuits – plain Cakes – plain Meringues Sago/rice pudding	Bran bix Chocolate biscuits Brown rice Fruit cake Muesli bar	Bran cereal Oat bran Muesli Bran muffins
BEVERAGES	Cordial Ribena Cranberry juice Powdered drinks Spirits (alcoholic) Sherry Instant coffee Soft drink Diet soft drink Tea Liqueur Beer	Apple juice Coffee- freshly brewed Horlicks Bournvita Drinking chocolate Milo Wine Ovaltine Island cocoa Just juice	Coconut - cream/ milk/ juice Pineapple juice Vegetable juice Grapefruit juice Orange juice Tomato juice Soy milk
OTHERS	Margarine Butter Jam Honey Marmite Vegemite Salad dressing Chutney Pickle Confectionery Cream	Spaghetti - canned Cornchips Tofu Golden syrup Peanut butter Chocolate Salt substitutes Nuts	Potato crisps/chips Tomato soup Tomato puree Tomato sauce Tomato ketchup