

# Potassium & Hyperkalemia in CKD

Why potassium rises in kidney disease, how to recognize danger levels, and which Filipino foods are safe — with emergency guidance and medication warnings. Covers **all CKD stages, hemodialysis, and peritoneal dialysis.**

W.G.M. Rivero MD  
FPCP · DPSN  
Nephrologist

williamriveromd.com

**3.5–5.0**

mEq/L Normal Range

**>5.5**

mEq/L Danger Zone

**↑ Risk**

Cardiac Arrhythmia

**↓ Intake**

Primary Treatment

*Hyperkalemia (high blood potassium) is one of the most dangerous complications of CKD — and one of the most preventable with the right diet and monitoring.*

## 1 Why High Potassium Is Dangerous in CKD

Healthy kidneys filter excess potassium from the blood every day. When kidneys are damaged, potassium builds up — a condition called **hyperkalemia**. Even a small rise above normal can disturb the electrical signals that keep your heart beating regularly. At levels above 6.0 mEq/L, the risk of sudden cardiac arrest rises sharply.

### Cardiac Effects of Hyperkalemia

- Slows electrical conduction in heart muscle
- Causes peaked T-waves on ECG (early sign)
- Widens QRS complex → irregular heartbeat
- Can progress to ventricular fibrillation
- Sudden cardiac arrest — may have NO warning

### Symptoms Patients May Notice

- Muscle weakness or heaviness in legs and arms
- Palpitations or irregular heartbeat
- Numbness or tingling in hands/feet
- Nausea or stomach discomfort
- Shortness of breath
- **Often NO symptoms at all — most dangerous**

## 2 Potassium Targets by CKD Stage

CKD Stage	Target Serum K <sup>+</sup>	Dietary K <sup>+</sup> Limit	Key Note
Stage 1–2 (eGFR >60)	<b>3.5–5.0 mEq/L</b>	No restriction needed	Monitor annually; no limit unless K <sup>+</sup> is elevated
Stage 3 (eGFR 30–59)	<b>3.5–5.0 mEq/L</b>	2,000–3,000 mg/day	Moderate vigilance; avoid high-K foods if trending up
Stage 4–5 (eGFR <30)	<b>3.5–5.0 mEq/L</b>	1,500–2,000 mg/day	Strict restriction; leach all vegetables; frequent monitoring
Hemodialysis (HD)	<b>3.5–5.5 mEq/L</b>	2,000–2,500 mg/day	K <sup>+</sup> rises between sessions; most dangerous the day before dialysis
Peritoneal Dialysis (PD)	<b>3.5–5.5 mEq/L</b>	2,500–3,000 mg/day	Continuous dialysis allows slightly more; monitor monthly

### Critical Warning — Hyperkalemia Can Be Silent

Hyperkalemia can cause sudden cardiac arrest — it may have **no warning symptoms at all**. Many patients feel completely normal right up to the moment of a dangerous arrhythmia. Never skip lab monitoring. If your nephrologist orders a potassium check, it is not optional.

HYPERKALEMIA: MECHANISM & CARDIAC RISK IN CKD

# POTASSIUM & HYPERKALEMIA IN CHRONIC KIDNEY DISEASE (CKD)

## Understanding, Prevention, and Control

Potassium is an essential mineral your body needs to function. But when kidneys can't remove extra potassium, levels can rise too high (hyperkalemia) and cause serious complications—especially in CKD.

Healthy kidneys remove extra potassium.

In CKD, potassium can build up in your body.

High potassium can affect your heart.

Managing potassium protects your health and saves lives.

**WHY IT MATTERS**

- High potassium can cause dangerous heart rhythms.
- It can be life-threatening if not treated.
- Often there are no symptoms.
- Common in CKD, especially in advanced stages.

### 1 WHAT IS POTASSIUM?

Potassium helps your body:

Maintain a normal heartbeat

Support muscle function

Transmit nerve signals

Balance fluids in your body

The right amount is important.

Too much potassium (hyperkalemia) can be dangerous.

### 2 WHAT CAUSES HIGH POTASSIUM (HYPERKALEMIA)?

Common causes in CKD:

Reduced kidney function

Certain medications (ACE inhibitors, ARBs, potassium-sparing diuretics, NSAIDs, etc.)

High potassium foods and salt substitutes

Constipation

Acidosis (too much acid in the blood)

Uncontrolled diabetes

Hormonal problems (low aldosterone)

Intense exercise or tissue injury

Skipping dialysis or inadequate dialysis

**!** Sometimes, no clear cause is found. Regular monitoring helps catch high potassium early.

### 3 SIGNS & SYMPTOMS

Hyperkalemia may not cause symptoms. When it does, you may notice:

- Muscle weakness or heaviness
- Tiredness or fatigue
- Numbness or tingling
- Nausea
- Irregular heartbeat (palpitations)
- Shortness of breath
- Chest pain (severe cases)

**HIGH POTASSIUM IS OFTEN SILENT.**

Routine blood tests are the only way to know for sure.

### 4 HIGH-POTASSIUM FOODS: KNOW YOUR CHOICES

ENJOY (Lower Potassium Choices)	ENJOY IN MODERATION (Medium Potassium)	LIMIT OR AVOID (High Potassium)
 Apples, berries, grapes, pineapple, watermelon	 Banana, orange, mango, kiwi, melon	 Avocado, tomato, coconut, dried fruits
 Cabbage, cucumber, lettuce, onion, bell peppers	 Potato, sweet potato, corn, peas	 Spinach, broccoli, beet greens, mushrooms
 White rice, pasta, bread	 Beans, lentils, chickpeas, tofu	 Nuts, seeds, chocolate, potato chips, banana chips

**!** Portion size matters. Work with your dietitian for a plan that fits you.

### 5 HOW IS HIGH POTASSIUM TREATED?

- Medical treatment**  
Medicines or IV treatments can quickly lower potassium in an emergency.
- Medication review**  
Your doctor may adjust or stop medicines that raise potassium.
- Dialysis**  
Dialysis removes extra potassium from your blood.
- Dietary changes**  
Following a kidney-friendly eating plan helps keep potassium in a safe range.

**!** Severe hyperkalemia is a medical emergency. Get help right away if advised by your healthcare team.

### 6 TIPS TO KEEP YOUR POTASSIUM IN CONTROL

Get regular blood tests and follow your care plan.

Follow your kidney-friendly eating plan.

Take medicines as prescribed. Never stop or change doses on your own.

Don't skip dialysis. It keeps you and your levels balanced.

Ask questions. Your healthcare team is here to help you.

**✓** Small daily choices today can prevent big problems tomorrow. Protect your heart. Protect your health.

#### WHEN TO GET HELP

Seek immediate medical care if you have:

- Chest pain
- Severe weakness
- Trouble breathing
- Very slow or irregular heartbeat
- Fainting or feeling like you'll faint

#### REMEMBER

- ✓ High potassium can be silent but serious.
- ✓ You have the power to keep it in control.
- ✓ Partner with your healthcare team and stay proactive.

#### WORKING TOGETHER

You, your kidneys, and your healthcare team—a strong partnership for a healthier life.

**Stay informed. Stay in control. Stay healthy.**

This information is for educational purposes only and does not replace professional medical advice. Always follow the advice of your healthcare team.

**William Rivero, MD**  
Nephrologist

Fig. 1 — In healthy kidneys, excess potassium from food is filtered and excreted in urine. When kidney function declines, this filtration fails and potassium accumulates in the bloodstream. As serum potassium rises above 5.5 mEq/L, the electrical balance across heart muscle cells is disrupted — leading to ECG changes (peaked T-waves, widened QRS), arrhythmias, and at levels above 6.5–7.0 mEq/L, potentially fatal ventricular fibrillation. Dietary restriction, potassium binders, and dialysis are the three pillars of treatment.

Food (Filipino name)	Standard Serving	K+ (mg)	Recommendation for CKD
<b>HIGH POTASSIUM — &gt;300 MG PER SERVING · LIMIT SEVERELY IN CKD 4–5 AND DIALYSIS</b>			
Kamote tops / talbos ng kamote	1 cup cooked	950 mg	Avoid entirely in CKD 4–5 and dialysis — extremely high K+
Buko water / coconut water	1 cup (240 mL)	600 mg	Avoid — marketed as “healthy” but very high potassium; dangerous in CKD
Kalabasa / squash (cooked)	1 cup cooked	500 mg	Avoid in CKD 4–5; small amounts (¼ cup) if leached in CKD 3
Avocado / abokado (½ fruit)	½ medium	487 mg	Avoid in CKD 4–5 and dialysis; very high K+ per serving
Banana / lakatan (ripe)	1 medium	422 mg	Avoid in CKD 4–5 and dialysis — one of the highest-K+ fruits available locally
Saging na saba (ripe, boiled)	1 piece	450 mg	Avoid in CKD 4–5; 1 small unripe piece may be OK in CKD 3 with monitoring
Monggo / mung beans (boiled)	½ cup cooked	400 mg	Leach before cooking; limit to ¼ cup in CKD 4–5; discuss with dietitian
Kamote / sweet potato (boiled)	1 medium (150 g)	400 mg	Leach (peel, dice, soak 2 h, boil in fresh water) — reduces K+ 30–50%; avoid baked
Kangkong / water spinach (cooked)	1 cup cooked	350 mg	Leach and boil; discard cooking water; limit portion to ½ cup in CKD 4–5
Calamansi juice (fresh, 1 cup)	1 cup (240 mL)	300 mg	Limit to small amounts (¼ cup) as condiment only; avoid drinking by the glass
Tomato (fresh, medium)	1 medium	290 mg	Limit — 1 slice OK as garnish; avoid tomato sauce, ketchup, and tomato soup
<b>MODERATE POTASSIUM — 150–300 MG PER SERVING · USE CAREFULLY IN CKD 4–5</b>			
Ampalaya / bitter melon (cooked)	1 cup cooked	270 mg	Leach before cooking; limit to ½ cup per meal in CKD 4–5
Bangus / milkfish (steamed)	100 g	280 mg	Good protein source; prefer steamed/boiled over fried; discard cooking water
Gabi / taro (boiled)	1 cup cooked	250 mg	Peel and leach; boil in fresh water; limit to ½ cup in CKD 4–5
Okra (cooked)	1 cup cooked	220 mg	Generally safe in CKD 1–3; limit to ½ cup in CKD 4–5; low phosphorus bonus
Sayote / chayote (cooked)	1 cup cooked	200 mg	Moderate K+; safe at 1 cup in CKD 1–3; reduce to ½ cup in CKD 4–5
Pechay / bok choy (cooked)	1 cup cooked	200 mg	Moderate — boil and discard water; limit to ½ cup in CKD 4–5
Egg (large, boiled)	1 large	70 mg	Good low-K protein source; 1–2 eggs/day generally safe in most CKD stages
<b>LOW POTASSIUM — &lt;150 MG PER SERVING · GENERALLY SAFE FOR CKD</b>			
White rice (kanin, cooked)	1 cup cooked	55 mg	Safest staple — very low K+ and phosphorus; ideal base for a kidney diet
Cassava / kamoteng kahoy (boiled)	1 cup boiled	75 mg	Low K+ when boiled and drained; good kamote substitute for CKD patients
Upo / bottle gourd (cooked)	1 cup cooked	100 mg	Excellent low-K vegetable; safe for all CKD stages; good in sinigang and soups
Alugbati / Malabar spinach (cooked)	1 cup cooked	140 mg	Lower K+ than kangkong; good leafy green alternative for CKD; boil and drain
Sago (cooked, plain)	1 cup	0 mg	Zero potassium; good calorie source for CKD; avoid sweetened versions with milk
Cooking oil (canola, corn)	1 tbsp	0 mg	No potassium; prefer canola or olive oil; limit total fat per physician's advice

K+ values are approximate per serving. Cooking method greatly affects final potassium content — boiling and discarding cooking water reduces K+ by 30–50%. Sources: FNRI Philippine Food Composition Tables 2023 · USDA FoodData Central · NKF KDOQI Nutrition 2020.

## The Leaching Technique — How to Reduce Potassium in Vegetables

<p><b>1</b></p> <p><b>Peel &amp; Cut Small</b></p> <p>Peel vegetables and cut into small thin pieces. More surface area = more potassium released into water.</p>	<p><b>2</b></p> <p><b>Soak 2+ Hours</b></p> <p>Soak in a large amount of water (10:1 ratio). Change the water at least once during soaking.</p>	<p><b>3</b></p> <p><b>Drain &amp; Rinse</b></p> <p>Drain completely and rinse well with fresh water. Discard all soak water — it is now loaded with potassium.</p>	<p><b>4</b></p> <p><b>Boil in Fresh Water</b></p> <p>Boil in a new large pot of water. Discard the cooking water too — do not use as broth or soup base.</p>	<p><b>5</b></p> <p><b>30–50% Reduction</b></p> <p>Leaching reduces potassium by 30–50% depending on the food. Best for root crops and leafy vegetables.</p>
---	---	--	--	---

### Important: Leaching Limits

Leaching works best for root crops (kamote, gabi, cassava) and leafy vegetables (kangkong, pechay, ampalaya). It does **NOT** work well for fruits — avoid high-potassium fruits entirely if your potassium level is elevated. Leaching also reduces some vitamins — compensate by eating a varied diet of approved low-K foods.

## Food Swap Guide — High-K Foods → Lower-K Alternatives

Instead of (High K+)	K+ (mg)	Choose This (Lower K+)	K+ (mg)	Notes
Saging na saba (1 piece)	450	Cassava / kamoteng kahoy (boiled, 1 cup)	75	Good carb swap; boil and drain thoroughly
Avocado (½ fruit)	487	Papaya (small serving, ½ cup)	~180	Papaya is still moderate-K; limit to ½ cup in CKD 4–5
Kamote tops / talbos (1 cup)	950	Upo / bottle gourd (1 cup cooked)	100	Excellent low-K leafy substitute; safe for all CKD stages
Buko water (1 cup)	600	Plain water or tap water	0	Buko water is NOT safe for CKD — avoid completely
Monggo soup (½ cup cooked)	400	Sayote + tofu (½ cup each, leached)	~200	Lower K+ protein-vegetable combo; leach sayote before use
Banana / lakatan (1 medium)	422	Canned fruit in own juice (drained, ½ cup)	~100	Draining canned fruit removes additional K+; avoid syrup packs

## 🍽️ Sample Low-Potassium Filipino Day — For CKD Stage 4–5 / Hemodialysis

Meal	Food	K+ (est.)	CKD Notes
Breakfast	1 cup white rice + 1 boiled egg + sautéed upo (½ cup, boiled and drained) + water	~200 mg	Very low K+; excellent kidney-safe breakfast
Snack	Sago (½ cup, plain, unsweetened) + plain water	~5 mg	Zero K+ snack; good calorie source without potassium burden
Lunch	1 cup white rice + grilled bangus (100 g) + leached sayote (½ cup boiled) + pechay (½ cup, boiled, water discarded)	~500 mg	Moderate — acceptable at lunch; leach all vegetables
Afternoon	Canned fruit (drained, ½ cup) in own juice — not syrup	~100 mg	Draining canned fruit removes K+; avoid heavy syrup packs
Dinner	1 cup white rice + steamed tilapia or galunggong (100 g) + stir-fried alugbati (½ cup, boiled first, water discarded)	~400 mg	Low-K dinner; always discard all cooking water
<b>TOTAL</b>	<b>Full day — kidney-safe low-potassium Filipino menu</b>	<b>~1,205 mg</b>	<b>Well within 1,500–2,000 mg limit for CKD 4–5</b>

### Individualized Restriction — Do Not Self-Restrict Unnecessarily

Potassium restriction is **individualized** — your nephrologist sets your limit based on your current serum K+ level and CKD stage. Do not restrict severely if your potassium is normal (3.5–5.0 mEq/L). Too-low potassium (hypokalemia) is also dangerous. Always follow your doctor's specific dietary instructions.

### Symptoms of Hyperkalemia — Know the Warning Signs

#### Muscle Weakness / Fatigue

Heavy, weak feeling in arms and legs — especially thighs. May feel like you cannot stand or climb stairs. Often the earliest symptom patients notice.

#### Palpitations / Irregular Heartbeat

Fluttering, pounding, or skipping sensations in the chest. Irregular heartbeat (arrhythmia) — may feel like the heart is "jumping." Seek care immediately.

#### Numbness / Tingling

Pins-and-needles sensation in hands, feet, and around the mouth. High potassium disrupts nerve signal transmission throughout the body.

#### Nausea

Stomach discomfort, nausea, or vomiting — non-specific but often accompanies elevated potassium, especially in acute rises.

#### Difficulty Breathing

Shortness of breath at rest or with minimal activity — can indicate severe hyperkalemia affecting respiratory muscles. Seek emergency care immediately.

#### NO SYMPTOMS — Most Dangerous

Many patients with K+ above 6.0 mEq/L feel completely normal. Sudden cardiac arrest can occur without any warning. This is why lab monitoring is non-negotiable.

#### Go to the Emergency Room Immediately If:

- Chest pain or pressure
- Irregular heartbeat or palpitations that do not stop
- Severe or sudden muscle weakness — cannot move legs/arms normally
- Difficulty breathing at rest
- Serum K+ >6.0 mEq/L on home or clinic monitoring
- You missed a dialysis session and feel any of the above symptoms

### Medications & Potassium — What Raises and What Lowers K+

Drugs That RAISE Potassium — Monitor Carefully		Treatments That LOWER Potassium — Only as Prescribed	
Drug (Generic Name)	Filipino Brand / Note	Treatment	Notes
<b>ACE inhibitors</b> enalapril, lisinopril, captopril	Vasotec, Zestril, Capoten — essential for CKD but block K+ excretion; monitor K+ monthly	<b>Sodium polystyrene sulfonate</b> (Kayexalate)	Oldest binder; exchanges sodium for K+ in gut; available locally; take with water; not for long-term use
<b>ARBs</b> losartan, valsartan, telmisartan	Cozaar, Diovan — similar to ACE inhibitors; never combine ACEi + ARB in CKD	<b>Patiromer</b> (Veltassa)	Newer K+ binder; exchange resin; well-tolerated; limited availability in Philippines
<b>Potassium-sparing diuretics</b> spironolactone, eplerenone	Aldactone — blocks aldosterone; use with extreme caution in CKD 4–5	<b>Sodium zirconium cyclosilicate</b> (Lokelma)	Newer zirconium-based binder; fast-acting; once daily; limited availability locally
<b>NSAIDs</b> mefenamic acid, ibuprofen, naproxen	Ponstan, Advil — reduce kidney K+ excretion AND worsen kidney function; avoid in CKD	<b>Loop diuretics</b> furosemide, torsemide	Lasix — increases K+ excretion via urine; used in CKD with residual kidney function
<b>Trimethoprim</b> (in co-trimoxazole / Bactrim)	Blocks K+ excretion like a diuretic; monitor K+ during use	<b>Sodium bicarbonate</b>	Corrects acidosis which causes K+ to shift out of cells; used in CKD with metabolic acidosis
<b>Potassium supplements</b> KCl oral tablets/solutions	Kalium Durules — never self-supplement in CKD; only take if prescribed	<b>Dialysis (HD or PD)</b>	Most effective K+ removal — HD removes 40–80 mEq per session; never miss sessions

#### Key Medication Rule for CKD Patients

Never stop a prescribed ACE inhibitor or ARB on your own — they protect your kidneys even though they raise potassium slightly. Instead, manage potassium through diet and discuss with your nephrologist whether a potassium binder is needed. Never take NSAIDs (mefenamic acid, ibuprofen) without your doctor's approval — they worsen kidney function AND raise potassium simultaneously.

## Quick Reference — Potassium Level Action Guide

Serum K+ Level	Status	What to Do
3.5–5.0 mEq/L	Normal	Continue current diet. Recheck as scheduled (every 1–3 months in CKD).
5.1–5.5 mEq/L	Mild High	Tighten dietary restriction. Review all medications. Recheck in 1–2 weeks. Call your nephrologist.
5.6–6.0 mEq/L	Moderate	Contact nephrologist same day. Strict dietary restriction. May need potassium binder. ECG monitoring.
>6.0 mEq/L	Danger	<b>Go to the EMERGENCY ROOM immediately. Risk of sudden cardiac arrest. Call for help — do not drive alone.</b>
>6.5 mEq/L	Life-threatening	<b>Medical emergency. IV calcium gluconate, IV insulin + glucose, emergency dialysis may be needed.</b>

## Key Takeaways — The Most Important Rules

## The "Banana Rule" for CKD Patients

Bananas, buko water, and kamote tops are the three most common potassium mistakes Filipino CKD patients make — all are perceived as "healthy" but are among the highest-K+ foods available. **Avoid all three if your potassium is elevated.** Also avoid sports drinks (Gatorade, Pocari Sweat) and salt substitutes — both contain potassium.

## Never Miss Dialysis

For dialysis patients, skipping even one session allows potassium to accumulate to dangerous levels — especially over the Monday–Wednesday gap (3 days off). Restrict potassium most strictly during the longest inter-dialytic gap. The day before dialysis is the highest-risk period.

## Hidden Potassium Sources

- Salt substitutes (NoSalt, Nu-Salt) — contain potassium chloride; dangerous in CKD
- Sports drinks (Gatorade, Pocari Sweat) — contain added K+
- Fruit juices and smoothies — concentrated K+ from multiple fruits
- Herbal supplements and "natural" health drinks — may contain high K+

## Safest Filipino Staples for CKD

- **White rice** — lowest K+ of all staples; ideal base food for any CKD stage
- **Upo / bottle gourd** — excellent low-K vegetable; good for soups
- **Cassava (boiled and drained)** — good carbohydrate alternative to kamote
- **Sago (plain, unsweetened)** — zero K+; good calorie source
- **Alugbati** — safer leafy green alternative to kangkong
- **Eggs (1–2 daily)** — low-K protein; generally safe in most CKD stages
- **White fish (steamed or boiled)** — moderate K+; always discard cooking water

## Monitoring Schedule

- **CKD Stage 1–3:** Serum K+ every 3–6 months
- **CKD Stage 4–5:** Serum K+ every 1–3 months
- **Hemodialysis:** Pre-dialysis K+ every session (3x per week)
- **Peritoneal Dialysis:** Serum K+ every 1–2 months
- If K+ was recently elevated: recheck in 1–2 weeks
- After changing diet or medications: recheck in 2–4 weeks

## Call Your Nephrologist If:

- K+ result is above 5.5 mEq/L on any lab result
- New muscle weakness or palpitations develop
- You started a new medication (especially ACEi/ARB or NSAID)
- You are unsure if a food or supplement is safe to eat
- You have had severe vomiting, diarrhea, or inability to eat

**Dr. W.G.M. Rivero MD · FPCP · DPSN · PRC 0105184**

Nephrology & Internal Medicine · williamriveromd.com

This guide is for patient education only. Potassium targets and dietary limits are individualized — always follow your nephrologist's specific instructions. References: KDIGO CKD 2024 · NKF KDOQI Nutrition 2020 · Kovesdy CP et al. JASN 2022 · FNRI Philippine Food Composition Tables 2023 · MIMS Philippines 2025.

For educational use only. This guide does not replace individualized care from your nephrologist or dietitian.

Potassium targets, medication decisions, and dietary limits must be set by your physician based on your lab results.

References: KDIGO CKD 2024 · NKF KDOQI Nutrition 2020 · FNRI 2023.

williamriveromd.com

Page 6 of 6 · williamriveromd.com/guides/potassium-hyperkalemia-ckd