calcium citrate  (kal-sis-um si-trate)
Calcium Citrate, Citrical, Citrical Liquitab

Classifications
Therapeutic: mineral and electrolyte replacements/supplements

Pregnancy Category C

Indications
Treatment and prevention of hypocalcemia. Adjunct in the prevention of postmenopausal osteoporosis.

Action
Essential for nervous, muscular, and skeletal systems. Maintains cell membrane and capillary permeability. Acts as a transmitter in the transmission of nerve impulses and contraction of cardiac, skeletal, and smooth muscle. Essential for bone formation and blood coagulation. Treatment of hyperphosphatemia in end-stage renal disease.

Therapeutic Effects:
Replacement of calcium in deficiency states. Control of hyperphosphatemia in end-stage renal disease without promoting aluminum absorption.

Pharmacokinetics
Absorption:
Absorption from the GI tract requires vitamin D.

Distribution:
Readily enters extracellular fluid. Crosses the placenta and enters breast milk.

Metabolism and Excretion:
Excreted mostly in the feces; 20% eliminated by the kidneys.

Half-life:
Unknown.

TIME/ACTION PROFILE (effects on serum calcium)

ROUTE ONSET PEAK DURATION
PO unknown unknown unknown
IV immediate immediate 0.5–2 hr

Contraindications/Precautions
Contraindicated in:
Hypercalcemia; Renal calculi; Ventricular fibrillation.

Use Cautiously in:
Patients receiving digitalis glycosides; Severe respiratory insufficiency; Renal disease; Cardiac disease.

Adverse Reactions/Side Effects
CNS: headache, tingling.
CV: arrhythmias, bradycardia.
GI: constipation, nausea, vomiting.
GU: calculi, hypercalciuria.

Interactions
Drug-Drug: Hypercalcemia increases the risk of digoxin toxicity. Chronic use with antacids in renal insufficiency may lead to renal-alkali syndrome. Hypercalcemia may decrease the absorption of orally administered tetracyclines, fluoroquinolones, phenytoin, and iron salts. Excessive amounts may decrease the effects of calcium channel blockers. Decreases absorption of ezetimibe and simvastatin (do not take within 2 hr of calcium supplements). May decrease the effectiveness of alendronate. Concurrent use with diuretics (thiazide) may result in hypercalcemia. May decrease the ability of sodium polystyrene sulfonate to decrease serum potassium.

Drug-Food: Cereals, spinach, or rhubarb can decrease the absorption of calcium supplements. Calcium acetate should not be given concurrently with other calcium supplements.

Route/Dosage
1 gram of calcium citrate contains 211 mg elemental calcium (10.6 mEq calcium). Doses are expressed in terms of elemental calcium.

PO (Adults):
Prevention of hypocalcemia, treatment of depletion, osteoporosis—1–2 g/day in 3–4 divided doses.

PO (Children):
Supplementation—45–65 mg/kg/day in 4 divided doses.

PO (Infants):
Neonatal hypocalcemia—50–150 mg/kg in 4–6 divided doses (not to exceed 1 g/day).

NURSING IMPLICATIONS
Assessment
● Calcium Supplement/Replacement: Observe patient closely for symptoms of hypocalcemia (parasthesia, muscle twitching, hyperreflexia, colic, cardiac arrhythmias, Gorlin’s or Spinalis’ sign). Notify physician or other health care professional if these occur. Protect symptomatic patients by elevating and padding siderails and keeping bed in low position.
● Monitor patient on digitalis glycosides for signs of toxicity.

Nursing Considerations: Monitor serum calcium or normal values, chloride, sodium, potassium, magnesium, albumin, and parathyroid hormone (PTH) levels.

Note: Indications indicate most frequent. Interactions indicate discontinued.
concentrations before and periodically during therapy for treatment of hypocalcemia.

- May cause decreased serum phosphate concentrations with excessive and prolonged use. When used to treat hyperphosphatemia in renal failure patients, monitor phosphate levels.

- Toxicity and Overdose: Notify patient for nausea, vomiting, anorexia, thirst, severe constipation, paralytic ileus, and bradycardia. Contact physician or other health care professional immediately if these signs of hypercalcemia occur.

Potential Nursing Diagnoses
- Imbalanced nutrition: less than body requirements (Indications)
- Risk for injury, related to osteoporosis or electrolyte imbalance (Indications)

Implementation
- **PO:** Administer with plenty of fluids with or following meals.

Patient/Family Teaching
- Do not administer concurrently with foods containing large amounts of oxalic acid (spinach, rhubarb), phytic acid (brans, cereals), or phosphorus (milk, dairy products). Administration with milk products may lead to milk-alkali syndrome (nausea, vomiting, confusion, headaches). Do not take within 1–2 hr of other medications if possible.

- Instruct patient on a regular schedule to take missed doses as soon as possible, then go back to regular schedule.
- Advise patient to avoid excessive use of tobacco or beverages containing alcohol or caffeine.

- **Calcium Supplement:** Encourage patient to maintain a diet adequate in vitamin D.

- **Osteoporosis:** Advise patients that exercise has been found to arrest and reverse bone loss. Patient should discuss any exercise limitations with health care professional before beginning program.

Evaluation/Desired Outcomes
- Increase in serum calcium levels.
- Decrease in the signs and symptoms of hypocalcemia.

Why was this drug prescribed for your patient?