



Effective Health Care

Effectiveness of Potassium and/or Thiamine Supplementation in Rheumatoid Arthritis, Gout, and Heart Disease Nomination Summary Document

Results of Topic Selection Process & Next Steps

- The topic area, *Effectiveness of Potassium and/or Thiamine Supplementation in Rheumatoid Arthritis, Gout, and Heart Disease*, is not feasible for a full systematic review due to the limited data available for a review at this time.

Topic Description

Nominator(s): Individual

Nomination Summary: A large number of people are afflicted with rheumatoid arthritis (RA) which is the primary interest of the nominator who believes potassium and/or thiamine supplements have the potential to ameliorate or cure RA. In addition, the nominator suggests potassium and thiamine supplements as prevention or treatment for gout, heart, disease, and high blood pressure. The nominator asserts that research demonstrating the effectiveness of potassium and thiamine supplements is needed to treat these common conditions.

Staff-Generated PICO (per key question)

1a. Rheumatoid arthritis, prevention

Population(s): Adult patients or adults at risk of developing RA

Intervention(s): Potassium and/or thiamine supplement(s)

Comparator(s): Placebo, usual care

Outcome(s): Diagnosis of RA or disease progression, morbidity, mortality.

1b. Rheumatoid arthritis, treatment

Population(s): Adult patients with RA

Intervention(s): Potassium and/or thiamine supplement(s)

Comparator(s): Placebo, usual care

Outcome(s): Morbidity, mortality, health-related quality of life, RA-specific outcomes such as joint pain and inflammatory disease activity measured by indexes such as the Disease Activity Score 28 (DAS28) and Health Assessment Questionnaire-Disability Index (HAQ-DI) score

2a. Gout, prevention

Population(s): Adult patients or adults at risk of developing gout

Intervention(s): Potassium and/or thiamine supplement(s)

Comparator(s): Placebo, usual care

Outcome(s): Diagnosis of gout or disease progression, morbidity, mortality

2b. Gout, treatment

Population(s): Adult patients with gout

Intervention(s): Potassium and/or thiamine supplement(s)

Comparator(s): Placebo, usual care

Outcome(s): Morbidity, mortality, health-related quality of life (HR-QoL), gout-specific outcomes such as joint pain, swelling, and function;

3a. Heart disease, prevention

Population(s): Adult patients with heart disease/ heart failure

Intervention(s): Potassium and/or thiamine supplement(s)

Comparator(s): Placebo, usual care

Outcome(s): Diagnosis of heart disease or disease progression, morbidity, and mortality

3b. Heart disease, treatment

Population(s): Adult patients with heart disease/heart failure

Intervention(s): Potassium and/or thiamine supplement(s)

Comparator(s): Placebo, usual care

Outcome(s): Cardiac function, cardiovascular morbidity, and mortality

3c. Hypertension, prevention

Population(s): Adult patients with hypertension

Intervention(s): Potassium and/or thiamine supplement(s)

Comparator(s): Placebo, usual care

Outcome(s): Diagnosis of hypertension or disease progression, morbidity, and mortality

3d. Hypertension, treatment

Population(s): Adult patients with hypertension

Intervention(s): Potassium and/or thiamine supplement(s)

Comparator(s): Placebo, usual care

Outcome(s): Morbidity, mortality, health-related quality of life (HRQoL), severity of hypertension, development of symptoms and/or complications of hypertension

**Key Questions
from Nominator:**

1. What is the effectiveness of potassium and/or thiamine supplements on the development of RA or on RA symptoms and disease progression?
2. What is the effectiveness of potassium and/or thiamine supplements on the development of gout or on gout-related symptoms and disease progression?
3. What is the effectiveness of potassium and/or thiamine supplements on the development of heart disease/ heart failure or on related symptoms and disease progression?

Considerations

Rheumatoid Arthritis

- Rheumatoid arthritis (RA) affects over a million Americans with a reported prevalence of 0.6% in the US. It is an autoimmune disease characterized by inflammation, swelling, redness, and pain of the joints which progresses to erosion of the bone, pain, loss of function and disability. The small joints of the hands and feet are most often affected but the condition can progress to include more systemic disease and symptoms. The diagnosis is based on clinical history and examination and supported by laboratory testing. Treatment includes corticosteroids, oral anti-rheumatic drugs such as methotrexate and biologics such as anti-tumor necrosis factor drugs. Goals of treatment are to control pain and inflammation and induce remission.
- Patients who suffer from RA have been noted to have significantly lower levels of potassium than healthy subjects and it has been suggested that potassium supplementation may improve the disease.

Gout

- Gout is another form of inflammatory arthritis resulting from an overproduction or under-excretion of uric acid with its resulting deposition in tissues and fluids. An estimated 6 million adults age 20 and older have gout during their lifetime.
- Some researchers have proposed potassium bicarbonate as a potential treatment for gout because potassium bicarbonate supplements increase the pH in urine, which allows uric acid to remain soluble and be excreted from the body.

Heart Disease

- Heart disease encompasses many types of heart conditions, including blood vessel diseases, such as coronary artery disease (CAD); heart rhythm problems; congenital heart defects; and heart conditions that affect multiple aspects of the heart including muscle, valves or rhythm, such as congestive heart failure (CHF). Heart diseases are the leading cause of death in the US; coronary heart disease alone caused 380,000 deaths in 2010.
- Most of the literature linking potassium and/or thiamine to heart disease appears to focus specifically on CHF. CHF manifests as the inability of the heart to pump enough blood to meet the body's requirements. CHF can be right-sided, left-sided or biventricular (both right and left). In right-sided heart failure, the heart cannot pump enough blood to the lungs where oxygen absorption occurs and carbon dioxide is released from the body. Left-sided heart failure manifests as the inability of the heart to pump enough oxygen-rich blood to the rest of the body. Most CHF cases, however, involve both sides of the heart. About 5.1 million people in the US have heart failure.
- Some studies have shown that common diuretics used to treat heart failure can lead to increased urinary thiamine excretion and long-term thiamine deficiency which may, in turn, further compromise cardiac function. Other studies have shown that other treatments for heart failure can also lead to potassium deficiency, which may be associated with worse outcomes for patients.
- Some research suggests that thiamine administration can relieve symptoms of heart failure.

Hypertension

- The nominator also mentions hypertension as a condition that is also potentially treatable by potassium and/or thiamine. The literature documents a clear link between the depletion of potassium,

thiamine, and other nutrients as a result of the use of anti-hypertensive medications, including the same diuretic medications used to treat heart failure as common culprits. Potassium and vitamin supplementation as well as changing medications to those that are more potassium-sparing are common approaches to managing these deficiencies.

Overall, a search of the literature identified limited research on thiamine and/or potassium supplementation for the treatment of RA, heart disease, and hypertension. No studies were identified that examined the use of thiamine and/or potassium supplementation for the prevention of these diseases. No studies were identified relevant to gout. Therefore, the topic is not feasible for a full systematic review due to the limited data available for a review at this time.

Rheumatoid Arthritis

- No relevant studies were found on the use of thiamine and/or potassium supplementation for the prevention of RA. A search of the literature identified only one RCT that found that potassium (dissolved in grapefruit juice) supplementation in hypokalemic patients with ongoing RA led to a significant reduction in RA-attributable pain. No study investigating the effect of thiamine in RA was found.

Gout

- No relevant studies were found on the use of thiamine and/or potassium supplementation for the prevention or treatment of gout.

Heart Disease and Hypertension

- No studies investigating thiamine and/or potassium supplementation and prevention of heart disease were identified. In terms of treatment, identified guidelines recommended potassium monitoring and/or supplementation where applicable in patients on medications for the management of hypertension and heart failure. We identified a systematic review of thiamine supplementation for individuals for heart failure. It found that thiamine may play a role in improving cardiac function, urinary output and other signs and symptoms of heart failure. We otherwise found limited evidence about the thiamine for heart failure.
- No studies investigating thiamine and/or potassium supplementation and hypertension as a clinical outcome were found. In terms of treatment of hypertension, we identified one systematic review of potassium and cardiovascular risk factors and disease. This review concluded that potassium supplementation was associated with a slight reduction in blood pressure in hypertensive patients. No effect of potassium supplementation on blood pressure was observed in normotensive patients. No studies examining the influence of thiamine supplementation on hypertension were found.