Indo-Iranian Journal of Scientific Research (IIJSR)
Volume 1, Issue 1, Pages 157-164, October-December 2017

ONEMINCAL Tablets: Helps to Support Optimal Bone Health

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Article Received: 05 October 2017 *Article Accepted: 29 October 2017* *Article Published: 12 November 2017*

ABSTRACT

Calcium is the most common mineral in the human body. About 99% of the calcium in the body is found in bones and teeth, while the other 1% is found in the blood and soft tissue. Calcium levels in the blood and fluid surrounding the cells (extracellular fluid) must be maintained within a very narrow concentration range for normal physiological functioning. The physiological functions of calcium are so vital to survival that the body will dematerialize bone to maintain normal blood calcium levels when calcium intake is inadequate. Thus, adequate dietary calcium is a critical factor in maintaining a healthy skeleton. This review summarizes the current available scientific literature regarding the effect of onemincal calcium tablets in supporting optimal bone Health.

Keywords: Onemincal calcium tablets and Optimal bone Health.

1. INTRODUCTION

Calcium is a major structural element in bones and teeth. The mineral component of bone consists mainly of hydroxyapatite crystals, which contain large amounts of calcium and phosphorus (about 40% calcium and 60% phosphorus). Bone is a dynamic tissue that is remodeled throughout life. Bone cells called osteoclasts begin the process of remodeling by dissolving or resorbing bone. Bone-forming cells called osteoblasts then synthesize new bone to replace the bone that was resorbed. During normal growth, bone formation exceeds bone resorption. Osteoporosis may result when bone resorption exceeds formation.

1.1 Cell signaling

Calcium plays a role in mediating the constriction and relaxation of blood vessels (vasoconstriction and vasodilation), nerve impulse transmission, muscle contraction, and the secretion of hormones, such as insulin. Excitable cells, such as skeletal muscle and nerve cells, contain voltage-dependent calcium channels in their cell membranes that allow for rapid changes in calcium concentrations. For example, when a muscle fiber receives a nerve impulse that stimulates it to contract, calcium channels in the cell membrane open to allow a few calcium ions into the muscle cell. These calcium ions bind to activator proteins within the cell that release a flood of calcium ions from storage vesicles inside the cell. The binding of calcium to the protein, troponin-c, initiates a series of steps that lead to muscle contraction. The binding of calcium to the protein, calmodulin, activates enzymes that breakdown muscle glycogen to provide energy for muscle contraction.

1.2 Cofactor for enzymes and proteins

Calcium is necessary to stabilize or allow for optimal activity of a number of proteins and enzymes. The binding of calcium ions is required for the activation of the seven "vitamin K-dependent" clotting factors in the coagulation cascade. The term, "coagulation cascade," refers to a series of events, each dependent on the other that stops bleeding through clot formation.

1.3 Regulation of calcium levels

Calcium concentrations in the blood and fluid that surrounds cells are tightly controlled in order to preserve normal physiological functioning (diagram). When blood calcium decreases (e.g., in the case of inadequate calcium intake), calcium-sensing proteins in the parathyroid glands send signals resulting in the secretion of parathyroid hormone (PTH). PTH stimulates the conversion of vitamin D to its active form, calcitriol, in the kidneys. Calcitriol increases the absorption of calcium from the small intestine. Together with PTH, calcitriol stimulates the release of calcium from bone by activating osteoclasts (bone resorbing cells), and decreases the urinary excretion of calcium by increasing its reabsorption in the kidneys. When blood calcium rises to normal levels, the parathyroid glands stop secreting PTH and the kidneys begin to excrete any excess calcium in the urine. Although this complex system allows for rapid and tight control of blood calcium levels, it does so at the expense of the skeleton.

2. DEFICIENCY

A low blood calcium level usually implies abnormal parathyroid function, and is rarely due to low dietary calcium intake since the skeleton provides a large reserve of calcium for maintaining normal blood levels. Other causes of abnormally low blood calcium levels include chronic kidney failure, vitamin D deficiency, and low blood magnesium levels that occur mainly in cases of severe alcoholism. Magnesium deficiency results in a decrease in the responsiveness of osteoclasts to PTH. A chronically low calcium intake in growing individuals may prevent the attainment of optimal peak bone mass. Once peak bone mass is achieved, inadequate calcium intake may contribute to accelerated bone loss and ultimately the development of osteoporosis.

Composition

Supplement Facts

Serving size : 1 Tablet Servings per pack : 120

Each film coated tablet contains (approx.)		%ICMR RDA*
Calcium	214 mg	35.7%
as Calcium Citrate Malate	1000 mg	
Fructooligosaccharides	200 mg	**
Vitamin D2	5 mcg	50%
Magnesium	12.85 mg	3.8%
Copper	1 mg	50%
Zinc	10 mg	100%
Manganese	2.5 mg	50%

*Indian Council of Medical Research Recommended Daily Allowances **Not Established

Pharmacological Action of each ingredients

Calcium citrate malate is described as a metastable complex of calcium, citrate and malate or as a mixture of calcium salts comprising the calcium salt of citric acid and malic acid. It may consist of a mixture of calcium citrate and calcium malate, a complex of calcium containing citrate and malate ligands, a mixture of calcium salt with citric acid and malic acid and combinations thereof. Metastable means that the material is not at equilibrium and it is a mixture of various crystalline and non-crystalline forms and solid solutions of the calcium ions, citrate anions and malate ions as well as salts of these materials. The exact structure of the material is not known. The X-ray diffraction pattern indicates only that the complex salt is different from pure calcium citrate or pure calcium malate and that it may be crystalline or micro crystalline, but may also contain calcium, citrate and malate ions. Calcium citrate malate can exist in several states of hydration. The metastable materials have more than one crystalline state, reflected by the presence of multiple hydration states. In addition, there are likely to be significantly different arrangements of the citrate and malate within the material. The physical and chemical data of these salts are consistent with the theory that there are non-crystalline regions within the powdered material which can hydrate to the point of behaving like a solution. It is important for the solubility characteristics of the calcium citrate malate that the apparent metastable structure be achieved. Calcium citrate malate is a water-soluble calcium supplement. It is the calcium salt of citric acid and malic acid with variable composition. It is purported to be highly bioavailable. Calcium citrate malate's bioavailability stems from its water-solubility and its method of dissolution. When dissolved, it releases calcium ions and a calcium citrate complex. Calcium ions are absorbed directly into intestinal cells, and the citrate complex enters the body through paracellular absorption. It is related to, but different from, calcium malate. Calcium citrate/malate have been shown to support healthier bones in adolescents and adults. It is the most abundant mineral in the body with 99% of it deposited in the bones and teeth. The remaining 1% of calcium is used for numerous functions including muscle contraction, blood clotting, vitamin D metabolism and nerve transmission. Calcium citrate/malate is approximately 4-5% more absorbable than calcium carbonate and is well absorbed regardless of stomach acid. Calcium is an essential mineral with a wide range of biological roles. Calcium functions when combined with phosphorus, magnesium, sodium, and several vitamins A, C, D and possibly E. Not only does it build and maintain bones and teeth (along with phosphorus) but it's also essential for healthy blood, helps regulate heartbeat, eases insomnia, assists in blood clotting, plays a part in muscle growth, muscle contraction, and nerve transmission, aids in iron utilization, activates several enzymes and regulates passage of nutrients in and out of cells. In a review of 52 intervention trials investigating calcium's effects on osteoporosis, all but two were said to have shown beneficial effects, including better bone balance, greater bone gain during growth, reduced bone loss in the elderly and reduced risk of fracture. Observational studies have also, for the most part, associated higher calcium intake with enhanced bone health. Most of the intervention trials utilized calcium supplements; some used dairy products as the source of calcium. Most of these studies reported that high calcium intake augmented the osteoprotective effects of estrogen. Studies have suggested that calcium citrate is better absorbed than calcium carbonate and that the citrate form might thus be more effective in helping to prevent or ameliorate osteoporosis. An analysis of 15 randomized trials concluded that calcium citrate was absorbed 22% to 27% better than calcium carbonate, whether taken on an empty stomach or with food. More

research will be needed, however, to demonstrate conclusively that calcium citrate is more beneficial than calcium carbonate in osteoporosis.

2.1 Fructo-oligosaccharides (FOS)

FOS may have anticarcinogenic, antimicrobial, hypolipidemic and hypoglycemic actions in some. They may also help improve mineral absorption and balance, and may have anti-osteoporotic and anti-osteopenic activities.

3. MECHANISM OF ACTION

The possible anticarcinogenic activity of FOS might be accounted for, in part, by the possible anticarcinogenic action of butyrate. Butyrate, along with other short-chain fatty acids, is produced by bacterial fermentation of FOS in the colon. Some studies suggest that butyrate may induce growth arrest and cell differentiation, and may also upregulate apoptosis, three activities that could be significant for antitumor activity. FOS may also aid in increasing the concentrations of calcium and magnesium in the colon. High concentrations of these cations in the colon may help control the rate of cell turnover. High concentrations of calcium in the colon may also lead to the formation of insoluble bile or salts of fatty acids. This might reduce the potential damaging effects of bile or fatty acids on colonocytes.FOS may promote the growth of favorable bacterial populations, such as bifidobacteria, in the colon. Bifidobacteria may inhibit the growth of pathogenic bacteria, such as Clostridium perfringens and diarrheogenic strains of Escherichia coli.FOS may lower serum triglyceride levels in some. The mechanism of this possible effect is unclear. Decreased hepatocyte triglyceride synthesis is a hypothetical possibility. FOS may also lower total cholesterol and LDL-cholesterol levels in some. Again, the mechanism of this possible effect is unclear. Propionate, a product of FOS fermentation in the colon, may inhibit HMG-CoA reductase, the rate-limiting step in cholesterol synthesis. The possible effects of FOS on blood glucose may be explained in a few ways. FOS may delay gastric emptying and/or shorten small-intestinal tract transit time. Propionate may inhibit gluconeogenesis by its metabolic conversion to methylmalonyl-CoA and succinyl-CoA. These metabolites could inhibit pyruvate carboxylase. Propionate may also reduce plasma levels of free fatty acids. High levels of free fatty acids lower glucose utilization and induce insulin resistance. Propionate may enhance glycolysis via depletion of citrate in hepatocytes. Citrate is an allosteric inhibitor of phosphofructokinase.FOS may bind/sequester such minerals as calcium and magnesium in the small intestine. The short-chain fatty acids formed from the bacterial fermentation of FOS may facilitate the colonic absorption of calcium and, possibly, also magnesium ions. This could be beneficial in preventing osteoporosis and osteopenia.

4. VITAMIN D2

Vitamin D is a fat soluble vitamin that is found in food and can also be made in your body after exposure to ultraviolet (UV) rays from the sun. Sunshine is a significant source of vitamin D because UV rays from sunlight trigger vitamin D synthesis in the skin. Vitamin D exists in several forms, each with a different level of activity. Calciferol is the most active form of vitamin D. Other forms are relatively inactive in the body. The liver and kidney help convert vitamin D to its active hormone form. Once vitamin D is produced in the skin or consumed in

food, it requires chemical conversion in the liver and kidney to form 1,25 dihydroxyvitamin D, the physiologically active form of vitamin D. Active vitamin D functions as a hormone because it sends a message to the intestines to increase the absorption of calcium and phosphorus. The major biologic function of vitamin D is to maintain normal blood levels of calcium and phosphorus. By promoting calcium absorption, vitamin D helps to form and maintain strong bones. Vitamin D also works in concert with a number of other vitamins, minerals, and hormones to promote bone mineralization. Without vitamin D, bones can become thin, brittle, or misshapen. Vitamin D sufficiency prevents rickets in children and osteomalacia in adults, two forms of skeletal diseases that weaken bones. Research also suggests that vitamin D may help maintain a healthy immune system and help regulate cell growth and differentiation, the process that determines what a cell is to become.

5. MAGNESIUM

Magnesium in ONEMINCAL helps in Contractions & relaxation of muscle.

5.1 COPPER

Copper helps to prevent bone defects & promotes healthy connective tissues(hair, skin, nails, Tendons, Ligaments & blood vessels).

5.2 ZINC

Zinc protects DNA from damage; participates in cellular division, protein synthesis, gene expression, DNA and RNA synthesis; helps to digest proteins; involved in numerous activities of the immune system and hundreds of enzymes; controls the release of Vitamin A from the liver; crucial to ovulation, fertilization, sperm maturation; regulator of sensory perceptions; assists in conversion of thyroid hormones T4 to T3; possesses anti-inflammatory properties; keeps prostate gland healthy and prevents benign hyperplasia.

5.3.MANGANESE

Manganese acts as a co-factor in the formation of bone cartilage and bone collagen as well as in bone mineralization. It helps in increasing mineral density of spinal bone

Supplement Facts

Presentation: Tablets

Usage:

- Helps to support optimal bone density.
- Helps to support bone matrix deposition & mineralization.
- Delivers highest level of efficacy with most bioavailable form.

Contra-indications: Product is contra-indicated in persons with Known hypersensitivity to any component of the product hypersensitivity to any component of the product.

Recommended usage : Adults: .1-2 Tablets twice a day with water or Milk or liquid of choice twice daily

"Do not exceed the recommended daily dose"

Administration: Taken by oral route at anytime with food.

Precautions: Do not exceed the recommended daily dose.

Warnings: If you are taking any prescribed medication or has any medical conditions always consults doctor or healthcare practitioner before taking this supplement.

Side Effects: Very Mild side effects like nausea, headache and vomiting in some individuals may be observed.

Storage: Store in a cool, dry and dark place.

6. CONCLUSION

Calcium citrate malate have been shown to support healthier bones in adolescents and adults. It is the most abundant mineral in the body with 99% of it deposited in the bones and teeth. The remaining 1% of calcium is used for numerous functions including muscle contraction, blood clotting, vitamin D metabolism and nerve transmission. Calcium citrate malate is approximately 4-5% more absorbable than calcium carbonate and is well absorbed regardless of stomach acid. Calcium is an essential mineral with a wide range of biological roles. Not only does it build and maintain bones and teeth but it's also essential for healthy blood, helps regulate heartbeat, eases insomnia, assists in blood clotting, plays a part in muscle growth, muscle contraction, and nerve transmission, aids in iron utilization, activates several enzymes and regulates passage of nutrients in and out of cells.

7. FUNDING

This work was supported in part by grants from Lactonova Nutritional Research Foundation Hyderabad and funds from Pugos Products Pvt. Ltd., Bangalore.

8. CONFLICTS OF INTEREST STATEMENT

The authors declare that there is no conflict of interest.

REFERENCES

[1] Kroger H, Kotaniemi A, Kroger L, Alhava E. Development of bone mass and bone density of the spine and femoral neck – a prospective study of 65 children and adolescents. Bone Miner 1993;23:171-182.

[2] Nilas L, Christiansen C, Rodbro P. Calcium supplementation and postmenopausal bone loss. Br Med J (Clin Res Ed) 1984;289:1103- 1106.

[3] Ettinger B, Genant HK, Cann CE. Postmenopausal bone loss is prevented by treatment with low-dosage estrogen with calcium. Ann Intern Med 1987;106:40-45.

[4] Riis B, Thomsen K, Christiansen C. Does calcium supplementation prevent postmenopausal bone loss? N Engl J Med 1987;316:173- 177.

[5] Kanis JA. Textbook of Osteoporosis. Cambridge, MA: Blackwell Science, Ltd. 1996.

[6] Heaney R. Nutritional factors in osteoporosis. Ann Rev Nutr 1993;13:287-316.

[7] Van Beresteijn EC, van't Hof MA, de Waard H, et al. Relation of axial bone mass to habitual calcium intake and to cortical bone loss in healthy early postmenopausal women. Bone 1990;11:7-13.

[8] NIH Consensus Conference. Optimal calcium intake. NIH Consensus Development Panel on Optimal Calcium Intake. JAMA 1994;272:1942-1944.

[9] Heaney R, Recker R. Distribution of calcium absorption in middle-aged women. Am J Clin Nutr 1986;43:299-305.

[10] Devine A, Criddle RA, Dick IM, et al. A longitudinal study of the effect of sodium and calcium intakes on regional bone density in postmenopausal women. Am J Clin Nutr 1995;62:740-745.

[11] Spencer H, Kramer L, Osis D. Do protein and phosphorus cause calcium loss? J Nutr 1988;118:657-660.

[12] Heaney R. Nutrition and risk for osteoporosis. In: Marcus R, Feldman D, Kelsey J, eds. Osteoporosis. San Diego, CA: Academic Press Inc.; 1996:498-499.

[13] Dawson-Hughes B, Dallal GE, Krall A, et al. A controlled trial of the effect of calcium supplementation on bone density in postmenopausal women. N Engl J Med 1990;323:878-883.

[14] Hansen MA, Overgaard K, Riis BJ. Potential risk factors for development of postmenopausal osteoporosis – examined over a 12 year period. Osteoporosis Int 1991;1:95-102.

[15] Cumming RG. Calcium intake and bone mass: a quantitative review of the evidence. Calc Tissue Int 1990;47:194-201.

[16] Welten DC, Kemper HC, Post GB, Van Staveren WA. A meta-analysis of the effect of calcium on bone mass in young and middle aged females and males. J Nutr 1995;125:2802-2813.

[17] Eaton SB, Nelson DA. Calcium in evolutionary perspective. Am J Clin Nutr 1991; 54:281S-287S.

[18] Carroll MD, Abraham S, Dresser CM. Dietary Intake Source Data US, 1976-80. Vital Health Stat 1983;11:1-483.

[19] Smith P, Bloom RA, Berkowitz J. Diachronic trends in human cortical thickness of Near Eastern populations. J Hum Evol 1984;13:603- 611.

[20] Mazess RB, Jones R. Weight and density of Sadlermuit Eskimo long bones. Hum Biol 1972;44:537-548.

[21] Nordin B, Need A, Morris H, et al. Evidence for a renal calcium leak in postmenopausal women. J Clin Endocrinol Metab 1991;72:401-407.

[22] Heaney RP, Recker RR. Determinants of endogenous fecal calcium in healthy women. J Bone Miner Res 1994; 9:1621-1627..