



## **Natural diet and supplements for calcium.**

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### **ABSTRACT**

Calcium is vital for strong bones and teeth but also very important for overall health. Calcium is essential to maintain optimal bone health throughout life. But the absorption of calcium is limited due to the presence of phytates, oxalates etc. hence there is a need to depend on calcium supplements but supplementation has its own advantages and disadvantages. The inability to absorb certain proper absorption from the gut, the synthetic compounds which are not metabolized by the liver, so there is a limited benefit and include health hazard due to assimilation of artificial compounds in body so there is a need to focus more on the natural diet sources for meeting the needs and promoting *Ayurvedic* calcium supplements as they are from herbal and natural sources which can be included in routine diet and *ayurvedic* supplements. As

the health experts suggests the first preference to meet the requirement should be natural diet. There are multiple dietary options as calcium rich diets which are loaded with health benefits.

**Keywords:** Supplementation, *Ayurvedic*, Calcium sources.

### **INTRODUCTION**

Calcium is an essential nutrient required for critical biological functions such as nerve conduction, muscle contraction, cell adhesiveness, mitosis, blood coagulation and structural support of the skeleton. An adequate intake of calcium has demonstrated to reduce the risk for chronic diseases such as osteoporosis, hypertension and possibly colon cancer, as well as a number of other disorders. The major concern is how to meet calcium needs. Calcium can be obtained from food naturally rich in calcium such as

dairy foods, dark green, leafy vegetables contain high amount of calcium, seafood, cereals. Health professional's organizations as well as medical experts agree that food is the priority in meeting calcium requirement of body.[1,,2]

## SOURCES OF CALCIUM:

### 1. Dairy foods as a source of Calcium :

Milk and other dairy foods are the major source of calcium available in food supply. Some food sources provide calcium naturally in such a concentrated amount as in milk. But some vegetables contain phytates and oxalates, which can reduce the intestinal absorption of calcium. In an analysis of food sources of calcium, milk, and milk products provided 83% of the calcium in the diets of young children, 77% of the calcium in adolescent female's diets and between 65% and 72% of calcium in adults' diets. Dairy foods contain substantial amount of vitamin D, A and B12, protein, potassium, riboflavin, niacin and phosphorus[28,29,30,31]. Our body easily absorbs calcium from dairy products than other sources. Hence, dairy products make an excellent source of calcium.[3]

### 2. Nondairy foods naturally containing calcium

Green leafy vegetables, soy milk, almonds, dried figs, tofu, white beans, sunflower seeds, broccoli, sesame seeds, sweet potato, mustard

and collard green are good sources of calcium.

Out of all nuts, almonds are the only rich source of calcium. About 20 nuts give 72mg of calcium. Dried figs are packed with antioxidants, fiber along with calcium. 8 dried figs gives 107mg calcium.[34,35]

The herbs or spices such as mint, thyme basil and cinnamon just don't add flavor to taste buds but they do provide calcium to body. These herbs are quite rich in calcium. Apart from these, ginger and cumin seeds also contain calcium.

## CALCIUM RICH HERBS:

1. *Sahejan (Moringa Oleifera)* : The leaves of *Moringa* are rich in calcium, can provide up to 1000 mg while *Moringa* powder can provide up to 4000mg of calcium.
2. *Amalaki (Phyllanthus emblica)*: *Amla* is rich in vitamin C and many other vitamins and also a source of calcium.
3. *Guduchi (Tinospora cordifolia)* : The leaves, stems, roots all are consumable.
4. *Ashwagandha (Withania somnifera)*: Its antioxidant and anti inflammatory properties. It also helps in treating calcium deficiency.
5. *Guggul (Commiphora mukul)*: it improves calcium deficiency and bone density.

6. *Arjuna (Terminalia arjuna)*: the bark of the tree contain calcium

carbonate, tannins and other compounds.

Produce	Serving size	Estimated calcium
Collard greens, cooked	1 cup	266 mg
Broccoli , cooked	1 cup	100 mg
Soybeans, cooked	1 cup	175 mg
Oranges	1 whole	55 mg
Milk, skim, low fat, whole	8 oz	300 mg
Yogurt	6 oz	310 mg
Cereals, fortified	8oz	100-1000mg

## CALCIUM CONTAINING DRUGS IN AYURVEDA

In Ayurveda, drugs are classified into three depending upon the origin viz *Jangamam dravyas*, *Oudbhida dravyas*, *Parthiva dravyas*. The drugs rich in calcium from the animal origin and mineral origin were discussed in detail in *Rasasatra (Ayurveda mineralogy)*. The drugs rich of marine origin and animal origin rich in calcium are grouped under *Sudha varg dravyas*. The amount of calcium in herbal drugs was elaborated recently after more advances in herbal drug research. Here are the drugs rich in calcium in *ayurveda*.

Sr. No	Name of the drug	Common name	Percentage of calcium
1.	<i>Sudha</i>	Lime	-
2.	<i>Khatika</i>	Chalk	-
3.	<i>Godanti</i>	Gypsum	95.99%

**Table 1:** *Pathidravys*, containing calcium and their respective concentrations.[26]

Sr. No.	Name of the drug	Scientific name	Percentage of calcium
1.	<i>Sankha</i>	Conch shell	63.94%
2.	<i>Shambhuka</i>	Snail	-
3.	<i>Mutasukti</i>	Pearl oyster shell	82.90%
4.	<i>Kaparda</i>	Cowery shell	67.48%
5.	<i>Kurma prishta</i>	Turtie shell	-
6.	<i>Samundra phena</i>	Cuttle fishbone	-
7.	<i>Pravala</i>	Coral	72.07%
8.	<i>Mukta</i>	Pearl	-

9.	<i>Mrigasringa</i>	Deer anthers	-
10.	<i>Kukkutandatwak</i> <i>Bhasma</i>	Hen's egg shell	76.55%
11.	<i>Ajasthi</i>	Goat's bone	Calcium-phosphate

**Table 2:** *Jangam dravyas containing calcium and their percentage.[27]*

Sr. No.	Name of the drug	Scientific name	Percentage of calcium
1.	<i>Asthisamhara</i>	<i>Cissus quadrangularis</i>	Stem- 1.76g Leaf- 1.68g Root-1.51
2.	<i>Satavari</i>	<i>Asparagus racemosus</i>	961-2115 mg/kg
3.	<i>Sigru</i>	<i>Moringa oilfera</i>	1.16g/100 mg-leaves
4.	<i>Tlla</i>	<i>Sesamum indicum</i>	2.41-1.16g/100 g
5.	<i>Adraka</i>	<i>Zingiber officianale</i>	64-69 mg/100 mg
6.	<i>Haridra</i>	<i>Curcuma longa</i>	0.2%
7.	<i>Ashwagandha</i>	<i>Withania somnifera</i>	3.3 mg/100g
8.	<i>Silajatu</i>	<i>Asphaltum punjabinum</i>	Contain calcium salts of humic acid and fulvic acid
9.	<i>Arujna</i>	<i>Terminalia arjuna</i>	Contain calcium oxalate

**Table 3:** The Audbhida dravyas containing calcium and their percentage.[9-14,25]

Sr. No	Name of drug	Research finding
1.	<i>Godanti</i>	<i>Godanti bhasma</i> contains 42.3% calcium oxide when analyzed by gravimetric method.
2.	<i>Sankha</i>	TGA study shows that chemical present in <i>Sankha bhasma</i> is calcium oxide.
3.	<i>Muktasukti</i>	Calcium carbonate and aragonite are present with an immense reduction in particle size which allows penetration of drug at the cell level.
4.	<i>Pravala</i>	Found effective in prevention of calcium and estrogen deficient bone

		loss.
5.	<i>Mukta</i>	Calcium carbonate and aragonite are present with an immense reduction in particle size which allows penetration of drug at the cell level.
6.	<i>Kukkutanda twak</i>	SEM analysis shows the presence of calcium, magnesium, and sulfur.
7.	<i>Asthisamhara</i>	Contain a high amount of anabolic steroidal substances, calcium, and phosphorous. Helps in fracture healing and quick mineralization.
8.	<i>Tila</i>	Inhibit excessive loss of calcium in urine, reduce serum alkaline phosphatase activity.
9.	<i>Satavari</i>	The fruit extract shows a positive effect on calcium balance and preventing bone loss.
10.	<i>Sigru</i>	Seeds are rich in calcium, copper, and manganese. Reduces pain and swelling arthritis.
11.	<i>Ardaka</i>	Ginger oil extract supplementation reduced urinary excretion calcium, phosphate, and hydroxyproline.

**TABLE 4:** The recent research finding of the calcium containing drugs in Ayurveda.[9-15]

## DAILY REQUIREMENTS:

According to the office of dietary supplements (ODS), people need the following amounts of calcium per day.

- 0-6 months: 200 milligrams (mg)
- 7-12 months: 260 mg
- 1-3 years: 700 mg
- 4-8 years: 1000 mg
- 9-18 years: 1,300 mg
- 19-50 years: 1,000 mg
- 51-70 years: 1,000 mg for males and 1,200 mg for females

Pregnant and breastfeeding women require 1000-3000 mg depending on age.[4,5,6]

## HEALTH BENEFITS OF CONSUMING CALCIUM-RICH FOODS

Consuming calcium-rich foods, particularly dairy foods, not only increases calcium intake but also improves the overall nutritional adequacy of the diet. Intake of these foods also helps to lower the risk for the following disorders, many of which are responsible for considerable morbidity and mortality.

### *Osteoporosis*

Accumulating scientific evidence indicates that consuming an adequate intake of calcium-rich foods such as markers of cell differentiation occurred in the group consuming additional dairy foods. A

randomized, double-blind trial of 930 adults with a recent history of colorectal adenomas found that increasing calcium intake by 1200 mg/day reduced the incidence of recurrent adenomatous polyps by 19% and the total number of tumors by 24% in less than one year. Whether similar beneficial effects on the recurrence of colonic adenomatous polyps would be found following intake of food sources of calcium such as dairy products is unknown.[33]

### **Stroke**

Calcium intake, particularly from dairy foods, may potentially reduce the risk for stroke, the third leading cause of death worldwide. Calcium intake was inversely associated with the incidence of stroke in nearly 86,000 middle-aged women who participated in the Nurses' health study. This inverse association was stronger for dairy calcium (ex., calcium from milk, yoghurt, hard cheese, ice cream) than for nondairy calcium or calcium supplements. These findings support earlier observations linking milk intake to a lower risk for stroke. Additional investigations, including clinical trials, are needed to substantiate these observational findings.[38]

### **Kidney stones**

Although calcium restriction was once recommended to treat patients with kidney stones, new research indicates that this approach may actually increase the risk for kidney stones. Two prospective observational studies have demonstrated that increasing dietary calcium intake, particularly from dairy foods, reduces the

incidence of kidney stones in adult males and females. In both of these studies, food sources of calcium such as skim and low fat milk were protective against kidney stones, whereas calcium supplements increased the risk for kidney stones. A high calcium intake is thought to reduce kidney stone risk by forming an insoluble calcium-oxalate complex, thereby decreasing the intestinal absorption and excretion of oxalate found in foods such as vegetables, beans and whole grains. The researchers speculate that calcium supplements may increase kidney stone risk because they tend to be taken between meals when there would be little or no opportunity to bind with oxalate in the intestine. Increasing dietary calcium, especially from dairy foods, offers to be a promising strategy to reduce the risk for kidney stones. However, clinical trials are needed to demonstrate the effectiveness of this approach.[39,40,41]

### **Weight control**

Calcium, and particularly dairy foods, may play a beneficial role in controlling body fat and reducing the risk for obesity. When transgenic mice expressing the agouti gene in adipocytes were fed diets varying in the amount and source (ex. Calcium carbonate or nonfat dry milk) of calcium for six weeks, the high calcium diets reduced weight gain and fat pad mass by 26% to 39%. Also, in the mice fed the high calcium diets the expression and activity of adipocyte fatty acid synthase, as well as stimulation of lipolysis, were reduced by 3.4- to 5.2-fold. In this study, calcium in the form of dairy food (nonfat dry milk) reduced the animals'



fat deposition more than did elemental calcium.

To determine whether these findings in experimental animals apply to humans, the researchers examined epidemiological data from NHANES III. An inverse association was found between calcium intake and body fat, particularly for women, after controlling for energy intake, physical activity, age, and other variables. Additional study is necessary to confirm these findings, particularly the potential advantage of dairy foods in controlling body fat.[3]

### **Other disorders**

Potential beneficial roles for calcium in other disorders such as premenstrual syndrome, polycystic ovarian syndrome, lead intoxication and periodontal disease have been demonstrated. Most of these studies used calcium supplements. However, because dairy foods are a major source of calcium in the diet, it is expected that these food sources of calcium also confer beneficial effects in the above disorders.[42,43]

### **Side effect of calcium supplements**

Some people report gastrointestinal symptoms such as bloating, constipation, gas or a combination of all three when using calcium supplements.

Calcium citrate usually has fewer and less pronounced side effects than calcium carbonate.

### **Complications of calcium supplements**

- Very high level of calcium can lead to
- Kidney problems
- Calcification of soft tissue and blood vessels
- Kidney stones
- Constipation

## **DISCUSSION**

The dietary supplements have a wide range of calcium supplements which ensures the adequate fulfillment of the daily requirement. The greatest advantage of dietary supplements is that they are easy to digest and metabolize producing lesser harmful waste and are loaded with other mineral, vitamins and other health elements.

The assimilation of these compounds is way better in our body than the modern calcium supplements due to its natural origin.

The Ayurvedic drugs are also better option to fulfill the requirement as herbs are loaded with multiple health benefits. In addition suitable anupan have also been described in classic text to ensure the absorption in optimum quantity.

## **CONCLUSION:**

Educational interventions are necessary to help individuals about meeting the needs of calcium. Nutritional education strategies should be used to inform calcium's expanding beneficial roles in health, optimizing calcium intake, without risk of calcium toxicity or under consumption. To achieve this food should be the first priority in meeting calcium needs.

Consuming calcium-rich foods is the preferred approach to achieving is the preferred approach to achieving optimal intakes. Dairy foods are the major source of calcium considering calcium's expanding beneficial role in health, optimizing calcium intake, without risk of calcium toxicity or under consumption of other essential nutrients, is of critical importance. Research has found conflicting evidence regarding the benefits and drawbacks of supplement use. Most experts agree that it is better to obtain nutrients from natural food sources.

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