

**Boost your Bone Health with
Special Focus on Vitamin D**

During Present Corona Crisis

While carrying out daily activities do you feel

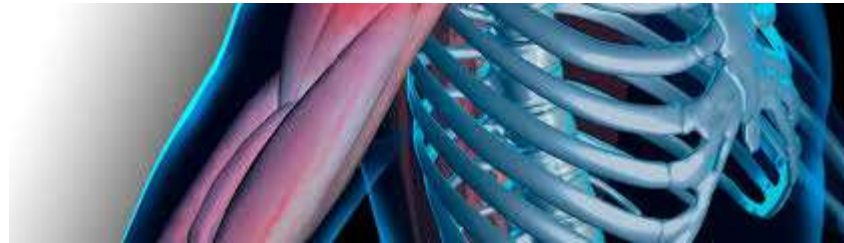
- Discomfort
- Pain
- Stiffness
- Fatigue



Poor Musculo- Skeletal Health - muscular weakness and reduced bone density



Musculo – Skeletal Health



Muscles, joints and bones work well together with ease without any pain, stiffness or fatigue

Why Bone Health is Important?

- Protects & supports the body
- Storehouse of minerals esp calcium, phosphorous, magnesium and zinc
- Produce blood cells (RBC) that nourish the body
- Produce blood cells (WBC) that protects the body against infection

How to Ensure Bone Health

- Proper intake of nutrients – Calcium, Vit D, protein and micronutrients like Magnesium, Vit K, Vit C, Zn etc
- Absorption of nutrients
- Regular Physical Activity

Calcium & Vit D

Interdependent Functions

- Vit D increases intestinal absorption of calcium
- Maintains normal blood levels of Ca & P
- In Vit D deficiency, calcium leaches out from bone making them brittle & hollow

Independent Functions

Calcium

- Formation of bone and teeth
- Muscle movement
- Blood clotting
- Transmission of nerve impulses
- Normal heart rhythm

Vit D

Improves

- Immunity
- Muscle co-ordination
- Muscle mass & its strength

1500 Kcal Vegetarian Diet Plan

Protein – 70 gm Calcium -1689 + mg

Food	Quantity	Household Measure	Calcium (mg)
Dairy Products	930 ml	2 cup milk (250 ml each) + 2 katori curd from skim milk (200 gm each)	1050 + 596
Pulse	75 gm	2 katori dal + a handful of bhuna chana (15 gm) or ½ katori sprouts (35 gm)	Variable
Cereal	120 gm	1 slices whole wheat bread + 20 gm Dalia/ Oats/ Suji + 4 chapati or 2 chapati + 1 Katori rice	Less
Vegetable A	200 gm	Spinach/ Sarson ka saag/ Methi/Lettuce/Bathua/Ghia/tinda/ tori	Variable
Vegetable B	400 gm	2 Katori cooked vegetable + 2 plate salad	Variable

Food	Quantity	Household Measure	Calcium (mg)
Fruit	300 gm	½ medium apple + 1 orange / ½ banana + 1 small guava / 2 slices pineapple	Variable
Fat	15 gm	3 tsp	-
Sugar	10 gm	2 tsp	-
Sunflower seeds	5 gm	1 tsp	4
Almonds	8 no.	8 no.	18
Prunes	5no.	5 no.	21

In case you are lactose intolerant include foods like paneer, tofu, soymilk, dry coconut, methi leaves, broccoli, sesame seeds, poppy seeds, chia seeds, moringa leaves

Calcium from Supplement

- **Types**

Calcium carbonate - to be taken with food.

Calcium citrate – can be taken with or without food

- **Don't take more than 500 mg at a time**



Maximizing Ca Absorption from Supplements

- Avoid Ca supplements with
 - Very high fiber meals -as it can bind with calcium
 - High salt and caffeine rich foods as they can interfere with Ca absorption
- If taking both calcium & iron supplement, keep a gap of 2-3 hrs between them
- Hypothyroids - avoid taking Calcium supplement at the same time with thyroxine to avoid negative interaction

Absorption of Calcium from Foods



Vit D - Sources

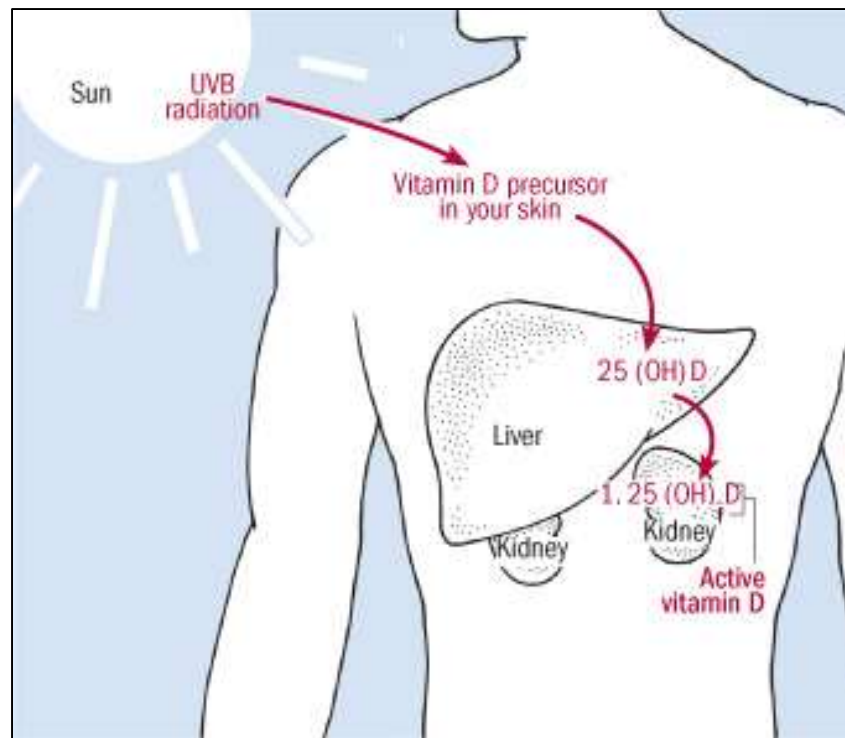
- Made in the skin by exposure to UVB rays from sunlight – D3
- Food source
 - Animal sources (fatty fish – mackeral, salmon , sardine, fish liver oil, egg)– Vit D3
 - Plant source (mushroom exposed to sunlight / UV light, yeast)– Vit D2
 - Fortified foods (breakfast cereals, milk, soymilk, tofu, orange juice)

Both D3 and D2 are inactive forms of Vit D

Requirement– 800 - 1000 IU/day



How The Body Makes Vit D

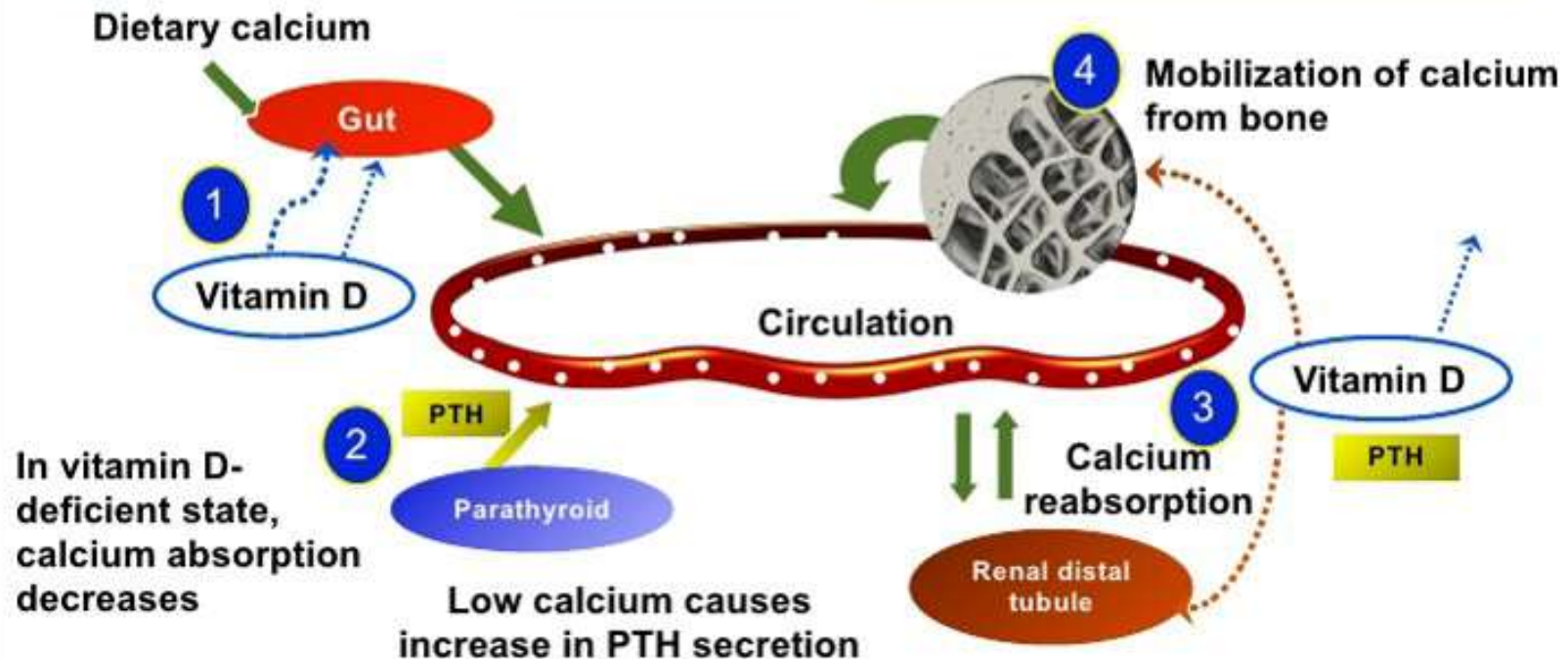


The sun's energy turns a chemical in the skin into vitamin D₃, which is carried to liver and then to kidneys to transform it to an active form of vitamin D (calcitriol)

Vitamin D and Bone Metabolism

Balanced System
Calcium absorption meets metabolic demands
Normal bone mineralization is maintained

Low Levels of Vitamin D
Calcium reservoir of bone is depleted to
correct for low calcium absorption in gut



Adapted from Holick M. *Curr Opin Endocrinol Diabetes*. 2002;9:87-98; DeLuca HF. *Am J Clin Nutr*. 2004;80(suppl 1):1689S-1696S; Lips P. *Endocr Rev*. 2001;22:477-501; Holick MF. *J Nutr*. 2005;135:2739S-2748S.

Effect of Inadequate Vit D

Vit D insufficiency



Reduced Ca absorption in intestine



Low blood levels of Ca



Compensatory increase in PTH hormone



Leaching out of Calcium from bones

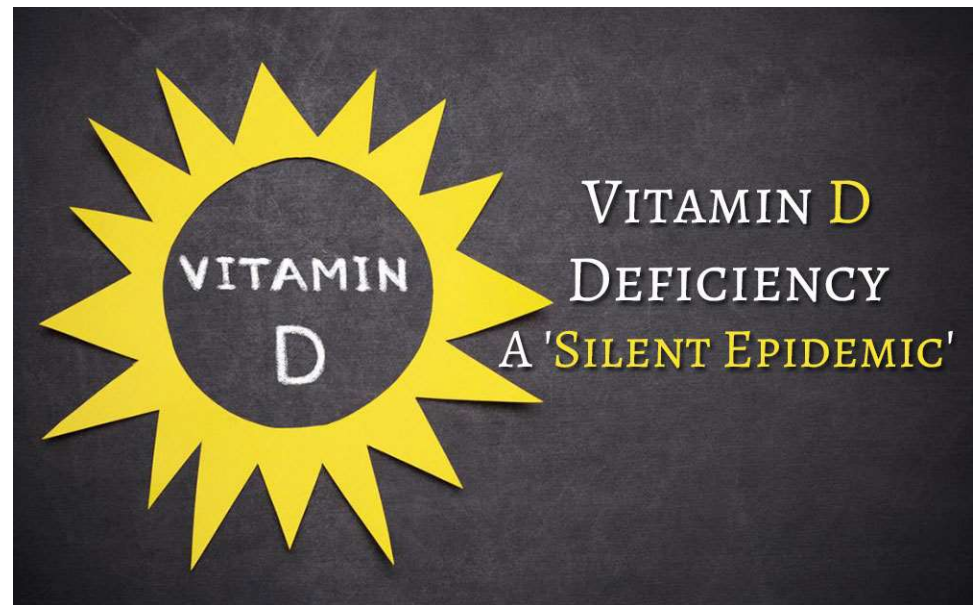


Reduced bone density
(Osteoporosis)



Vit D Deficiency - Prevalence

- Most prevalent and underdiagnosed medical condition in the world
- 70 – 90 % of healthy Indian population is Vit D deficient



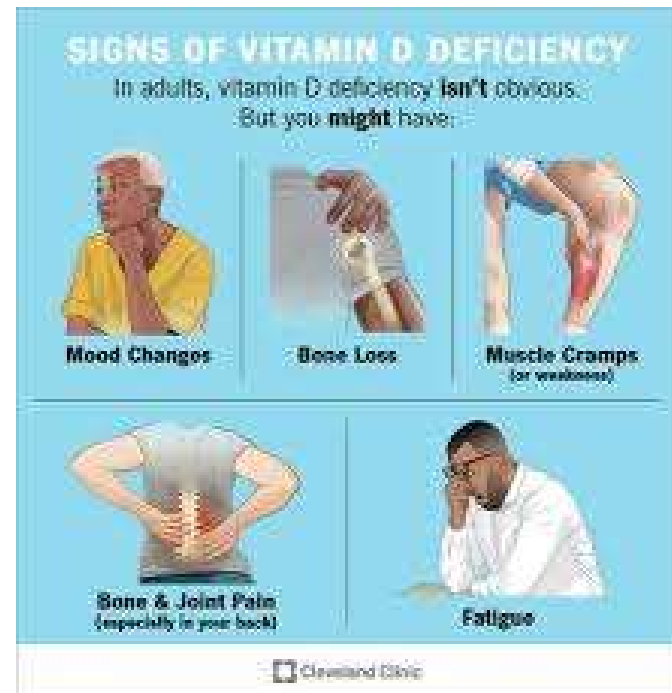
Why Don't We Get Enough Vit D?

- Difficult to measure how much we get from food & sunlight
- Lack of adequate sun exposure
 - Latitude, season
 - Skin colour
 - Use of sunscreen
 - Clothing cover
- Few natural foods rich in Vit D
- Lack of availability / cost of Vit D fortified foods

Supplement is the only choice

Symptoms of Vit D deficiency

- Sweaty forehead, but not the rest of the body
- Pain in bones
- Chronic fatigue
- Large waist circumference
- Fracture due to little force
- Frequent viral infections
- Low / depressed mood
- Slow wound healing
- Muscle ache
- Loss of hair



Diagnosis of Vit D Deficiency

- Low Blood Vit D level
- Increased PTH Level

Blood Vit D - 25 (OH) D Levels

Normal - 20-100 ng / ml

Toxicity - > 100 ng / mL

Maintain serum Vit D levels around 50 ng/ ml

How To Get Vit D From Sun

- **Time of day** – 11 am – 2 pm
- **Amount of skin exposed** -forearms, hands or lower legs should be exposed to sun without sunscreen
- **Duration** 15 min for light skin , 30 min for dark skin.
Can vary with season and based on skin sensitivity
- **Frequency** – 3-4 times / week



Sitting indoors by a sunny window does not produce Vit D as UVB rays can't penetrate through the glass.

Vit D Supplements

D2

- **Ergocalciferol** - Inactive form

D3

- **Cholecalciferol** - Inactive form. Granules / capsule
 - Superior than Vit D2 in potency
 - Increases and maintains blood levels of Vit D
 - **Preferred form of treatment for Vit D deficiency**
- **Alphacalcidol** - Active form
 - Prescribed for patients with liver disease
 - Not preferred for treatment of Vit D deficiency
- **Calcitriol** – Active form
 - Prescribed for patients with chronic kidney disease
 - Not preferred for treatment of Vit D deficiency
 - Requires regular blood Ca monitoring as may increase Ca levels.
 - Does not build Vit D stores in body.

Dosage

Immediate deficiency has to be followed by maintenance dose *

- Toxicity of Vit D
 - Increased blood Ca and phosphate levels
 - Calcium stones
 - Calcium deposit in arteries & other soft tissue



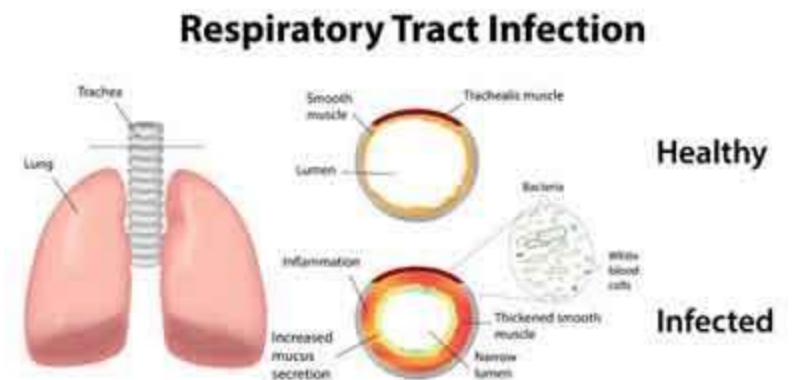
Vit D and Belly Fat

- If Waist circumference is
 - > 94 cm in Men
 - > 80 cm in womenpossibility of Vit D deficiency
- High waist circumference reduces the secretion of growth hormone which is essential for bone health



Vit D and Immunity

- Vit D superior than Vit C for enhancing immunity
- Vit D activates WBC (T & B cells) important for immune system & reduces inflammation in body
- Vit D deficiency - linked to respiratory infections such as asthma, pneumonia and bronchiolitis
- Vit D supplementation can decrease the frequency and severity of respiratory infections





Good Bone Health



Prevents Bacterial & Viral Infection



Healthy You

