



A REVIEW ARTICLE ON THE EFFICACY OF CALCAREA PHOSPHORICUM IN VITAMIN D DEFICIENCY

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ABSTRACT

Vitamin D is a fat-soluble vitamin. When 7-dehydrocholesterol is exposed to UV light, the skin produces vitamin D₃, a prohormone. It is physiologically inactive and has to be metabolized in the liver to 25-hydroxyvitamin D₃, and in the kidney to 1 α , 25-dihydroxy vitamin D₃ before its function. The 1 α , 25-dihydroxyvitamin D₃, acts through a nuclear receptor to carry out its many functions, including calcium absorption, phosphate absorption in the intestine, calcium mobilization in bone, and calcium reabsorption in the kidney. Homeopathy can correct the deficiency by dealing with the root cause of the disease. Homeopathy medicine helps in better assimilation in our body. This is a review article on “The efficacy of Homoeopathic medicine Calcarea Phosphoricum on Vitamin D deficiency” to study the effect of homeopathic medicine Calcarea phosphoricum in vitamin D and calcium deficiency.



INTRODUCTION

The organic form of vitamin D, often known as vitamin D₃ or cholecalciferol, is generated in the skin by the process of ultraviolet light and 7-dehydrocholesterol¹. The ICD Classification of Vitamin D deficiency is E55.9 based on the ICD 10 code. The primary source of vitamin D is UV radiation exposure on the skin¹. The food source is insufficient for vitamin D to meet a daily requirement¹. Vitamin D is from plant sources in the form of vitamin D₂, whereas in animal sources is vitamin D₃. These two forms have equivalent biological activity and are activated equally by the vitamin D hydroxylases in humans.³ Vitamin D enters the circulation and binds to vitamin D-binding protein (alpha globulin). The cycle of generation of vitamin D and its activation steps leading to 25(OH)D and the second hydroxylation is required for the formation of 1,25(OH)₂D [calcitriol] in the proximal convoluted tubule cells of kidney⁵. Calcitriol production in the renal cells are regulated by the PTH. The main function of vitamin D is in the control of calcium homeostasis and in turn the vitamin D metabolism is regulated by the factor that respond to plasma concentration of calcium and phosphate⁶. Calcitriol acts to reduce its synthesis by inducing the 24-hydroxylase and repressing the 1-hydroxylase in the kidney⁷. Calcitriol achieves the plasma calcium concentration by increasing intestinal absorption of calcium, it reduces the excretion of calcium by stimulating resorption in the distal renal tubules and it mobilizes bone mineral³. Fatigue, bone fragility, muscle weakness, and fractures are potential manifestations. Homeopathic treatment for deficiency focuses on improving the body's ability to absorb. In homeopathic practice medicine like *Calcarea phosphoricum* are often used to treat the bone related disease condition. This medicine is commonly employed by homoeopathic practitioners, either alone or in combination with other remedies, for the treatment of brittle bones in people of all ages.

DISCUSSION

Vitamin D and its functions

In the Intestine, vitamin D Promotes intestinal absorption of calcium and phosphorus². Bone Stimulates normal mineralization, enhances bone reabsorption, and affects collagen maturation. Increases tubular reabsorption of phosphate, variable effect on reabsorption of calcium in renal whereas the other Permits normal growth^{2 9}.

Vitamin D deficiency causes Decreased skin synthesis, Decreased bioavailability (malabsorption, obesity), Increased catabolism, breast milk (poor vitamin D content), liver

failure, CKD, Nephrotic syndrome (the half-life of 25-hydroxy Vitamin D is approximately 2 to 3 weeks; however it's dramatically shortened when vitamin D binding protein levels are reduced, as can occur with increased urinary losses)^{2 3}.In children, complications can result in rickets, and in adults, osteomalacia and osteoporosis⁴.

Pathophysiology of vitamin D:

A lack of vitamin D results in hypocalcemia, which further diminishes the amount of calcium deposited in bone by causing excess parathyroid hormone (PTH) and renal phosphorus loss^{2 8}. Early-stage rickets is characterized by a drop in serum calcium content. Following the parathyroid reaction, the calcium concentration frequently returns to a normal range, even when the level of phosphorus remains low². Alkaline phosphatase, which leaks into the extracellular fluids and reaches extremely high concentrations, is released by hyperactive osteoblast cells. Nutritional facts can be produced by secondary biochemical analysis and clinical presentation of liver or renal disease, as well as intestinal malabsorption of fat.

Calcarea Phosphoricum

Calcarea Phosphoricum is a biochemical homeopathic remedy in which the sphere of action of phosphate of lime includes all bone diseases, whether due to some inherited dyscrasia or to defective nutrition upon a proper distribution of lime molecules in the body. It is the bone cell salt without this element, no bone can be formed and hence it is a valuable remedy in childhood when the bones are in a condition of being formed. It corresponds to defective nutrition whether of childhood, puberty, or of old age. Predisposition to glandular and bone diseases. Rickets. Cramp in calves on a small spot, inside, when walking. Pain in joints and bones, esp. Shin bones. Calcarea phosphoricum for anemia, deficient development, bone affection dyspepsia, dentition disorder⁴. Calcarea also found in gastric juice plays an important part in the process of digestion and assimilation.³³

Biochemistry of Calcarea Phosphoricum

One of the most crucial properties of calcium phosphate salts is solubility. The solubility of calcium phosphates determines the path of various reactions, including phase transition, hydrolysis, precipitation, and absorption. In addition, calcium phosphate solubility is essential for biological processes such as the synthesis and resorption of hard tissues and pathological calcification ²⁹. One mineral that occurs naturally in food is calcium. The body needs calcium for a variety of regular processes, most notably the development and



preservation of bones. In addition, calcium has the ability to bind to other minerals, including phosphate, and aid in their clearance from the body. Calcium deficiency is treated and prevented with calcium phosphate³⁰

Calcium phosphate-based bone graft substitutes, particularly tricalcium phosphate or hydroxyapatite, are the bioceramics that most closely resemble bone minerals. This accounts for the remarkable osteoconductivity, biocompatibility, and biodegradability of calcium phosphate³¹ Calcarea phosphorica: Precipitated Phosphate of Calcium. PRESENT NAME- Calcium Phosphate, COMMON NAME-Phosphate of Lime. MOLECULAR WEIGHT-306³²

Pathophysiology of Calcarea Phosphoricum And its relation with vitamin D

Phosphate of lime salt works with albumen, carries it to bone, tissue or to any part of the body where it may be needed. It uses albumen as a cement to build up bone structure. Bone is fifty-seven percent. Phosphate of lime, the remainder gelatine: an albuminous, gluey substance, carbonate of soda, magnesium phosphate, and sodium chloride. Without the lime phosphate, no bone can be made³³.

Albumin's role is to transport various substances, and in this case, it carries a small portion of the total vitamin D. Low serum albumin levels can be a sign of various underlying health conditions like liver disease, malnutrition, or inflammation. When albumin levels are low, there's less available protein to bind and transport vitamin D. This can lead to lower vitamin D level. This is because the reduced albumin binding gives the impression of less overall vitamin D, even though some vitamin D may still be present but attached to VDBP.

Symptoms of Calcarea Phosphoricum

Calcarea phosphoricum corresponds to defective nutrition whether of childhood, puberty, or of old age. Predisposition to glandular and bone diseases. Rickets. Cramp in calves on a small spot, inside, when walking (cramping sensation in calf muscles is due to calcium deficiency). Pain in joints and bones, esp. Shin bones which are due to bone weakness³⁴. Vitamin D deficiency causes rickets in children and osteomalacia in children and adults. Calcarea phosphorica has the greatest sphere of action on soft and growth tissues, it's curative action on diseases such as fractured bone, unnatural growth, defective nutrition of bone, and textures found in rickets. In vitamin D deficiency pathology is developed due to lack of reabsorption of calcium, failure of deposition of calcium, inadequate mineralization so the bone gets easily fragile, and delay in the development of the dentition, non-union, mal union of bone. Calcarea phosphoric corresponds to defective nutrition whether in childhood,



puberty, or old age Predisposed to glandular and bone diseases. Slow development of teeth, fontanelles remain open too long, the skull is soft and thin, bow leg in children, slow in learning to walk. Pain in the lumbar, Knee, Arm, wrist, etc, Rheumatic pains, difficulty in walking, cramping muscles Weakness all over the body, and spinal curvature .vitamin D deficiency is associated with other diseases most notably osteoporosis, heart disease, infectious diseases like tuberculosis. Calcarea phosphorica has symptoms like Potts disease, neck weak unable to support, palpitation, trembling, and weakness³⁵.

MANAGEMENT OF VITAMIN – D DEFICIENCY IN VARIOUS SYSTEM OF MEDICINE:

Allopathy system: The main line of treatment for vitamin D deficiency is to correct the calcium and phosphate deficiency. In this system¹⁵, the amount of vitamin D required to treat the deficiency depends largely on the degree of the deficiency and underlying risk factors. To control the deficiency, they give initial supplementation for 8 weeks with vitamin D3, either 6,000 IU daily or 50,000 IU weekly, which can be considered. Once the serum 25-hydroxyvitamin D level exceeds 30ng/mL, a daily maintenance dose of 1,000 to 2,000 IU is recommended. a higher dose initial supplementation with vitamin D3 at 10,000 IU daily is needed in high-risk adults who are vitamin D deficient. Deficient children require 2000 IU/day of vitamin D3 or 50,000 IU of vitamin D3 once weekly for 6 weeks. According to the American academy¹⁶ of pediatrics, breastfeeding infants and children who consume less than 1 L of vitamin D- D-fortified milk need 400IU of vitamin D supplementation.

Calcitriol can be considered where the deficiency persists despite treatment with vitamin D2 and D3. The serum calcium level shall be closely monitored in individuals due to an increased risk of hypercalcemia secondary to calcitriol¹⁷.

Ayurvedic system: In this system¹², Vitamin D deficiency is often treated with a combination of herbs, minerals, and other natural substances. The typical treatment method will depend on the individual's unique constitution and the underlying causes of the deficiency. Here, are some common examples including ashwagandha, Shatavari, and Guduchi. These herbs can be taken as Ayurveda treatments for vitamin D deficiency. They also include Sun exposure, minerals, diet, and lifestyle changes. In Unani and siddha medicine also, they use these treatments in Vitamin D deficiency¹³.

In yoga system¹⁴ there is a yoga pose for every symptom-it just takes a few asanas for vitamin D deficiency symptoms to fade away. The asanas are Vrikshasana or tree pose,



Virabhadrasana or warrior pose, Trikonasana or triangle pose, Bhujangasana or cobra pose, Ardha antsyendrasana, or sitting half-spinal twist¹⁴. These are various kinds of management for vitamin D deficiency.

HOMOEOPATHIC APPROACH

Miasmatic and constitutional

The word 'miasm' means a stain, polluted material, infective material, and contagious effluvia from the human body¹⁸. The main miasms which are mentioned by Hahnemann are Psora, syphilis, sycosis and tubercular. In homeopathy, it is said that deficiency of some metabolic products and overflow of others may be due to deficiency of some unknown minute enzymes. These miasms are a result of deficiency or overflow of certain metabolic products¹⁹. Vitamin deficiency may result from malnutrition, but according to homeopathy, it is due to fundamental causes i.e., miasms. Whenever there is an imbalance in nutritional requirements and source, the deficient nutrients must be provided with the help of a balanced diet²⁰. But if the body is too weak for absorbing the nutrients, then there is a miasmatic predominance in the case. These situations require anti-miasmatic prescriptions. Mostly vitamin D deficiency occurs due to deficiency miasm psora. But its manifestations show a tubercular and syphilitic nature. According to the demand of the case, appropriate anti-miasmatic treatment can be given. Calcarea phophorica is formulated from calcium phosphate dilutions according to homeopathic principles²². Calcium phosphate is a main structural component in bone matrix. It has homeopathic action to heal diseases by remodeling bones and giving adequate strength to the bone²³. Constitution in homeopathy according to Stuart Close is defined as "that aggregate of hereditary characters, influenced more or less by the environment which determines the individual's reaction, successful or unsuccessful, to the stress of the environment"²⁴. Dr. Von Grauvogl classifies constitution into 3 types- Carbo- nitrogenoid, Oxygenoid, Hydrogenoid²⁵. Carbonitrogenoid constitution represents a functional deficiency which is characterized by excess of carbon and nitrogen causing inadequate nutrition and causes deficiency disorders²⁶. Another complication of Vitamin D deficiency is mostly seen in Oxygenoid constitutions where excessive oxygen in the system breaks hydrocarbons and nitrogen which leads to destruction of tissues and bones²⁷. Hence Vitamin D deficiency is mostly seen in Carbonitrogenoid and Oxygenoid constitutions. The remedy Calcarea Phosphorica shows a functional deficiency in its pathophysiology and hence it comes under the Carbonitrogenoid constitution of Grauvogl²⁸.



CONCLUSION

Phosphate of lime or Calcarea Phosphoricum works with the protein Albumin and helps in carrying it to the tissues of the body, where it acts like a cement for bone structure formation. The main role of Albumin is the transportation of various substances, which includes a small portion of total Vitamin D. When there is a deficiency of Albumin, there is less available proteins for the transport of Vitamin D which leads to Vitamin D deficiency. Hypoalbuminemia occurs mostly in nutrition deficiencies and liver pathologies. Plasma concentration of 25(OH)D are independently associated with albumin. Hence, Vitamin D deficiency and Hypoalbuminemia have a direct role which can be linked by the action of Calcarea Phosphoricum on Albumin. Homoeopathy works by initiating the body's inherent reaction, which then encourages the body to heal itself. Demineralization produces weak and brittle bones which are more prone to fracture¹¹. Albumin is a protein which carries small amounts of the total Vitamin D. The Homeopathic medicine Calcarea Phosphoricum has an action on Albumin. It uses albumin as a binding element for building bone structures. Also the concentration of the precursor of Vitamin D, 25(OH)D present in plasma is independently associated with albumin. Hence, from this article it may be concluded that Calcarea Phosphoricum has a role in the absorption of Vitamin D by acting on Albumin and hence have a scope in managing nutritional deficiencies.

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