Heinz

In Touch

HEINZ NUTRITION FOUNDATION INDIA

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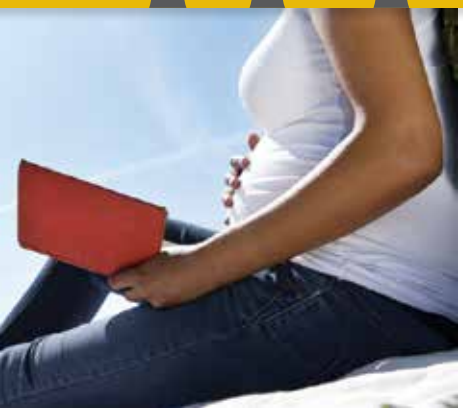

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Contents

Dear Readers,
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MESSAGE FROM Mr. HERVE LE FAOU,

VP, HEAD OF HEINZ INDIA AND NEW RIMEA MARKETS

World Health Organization in its Guidelines on Vitamin D supplementation[1] for pregnant women states that the guidelines provide global, evidence-based recommendations on vitamin D supplementation during pregnancy as a public health intervention for the purpose of improving maternal and infant health outcomes. Vitamin D supplementation in a single or continued dose during pregnancy increases serum vitamin D concentrations as measured by 25-hydroxyvitamin D at term. However, they say, that the clinical significance of this finding and the potential use of this intervention as a part of routine antenatal care are yet to be determined as the number of high quality trials and outcomes reported is too limited to draw conclusions on its usefulness and safety. Thus some authorities find that further rigorous randomised trials are required to evaluate the role of vitamin D supplementation during pregnancy.

After all, vitamins are vital nutrients which are not manufactured in humans and hence have to be obtained from dietary sources. But it is observed that Vitamin D is not a vitamin because it is manufactured in the human skin with the help of sunlight. Vitamin D occurs in different forms as cholecalciferol, calcidiol and calcitriol.

This issue of In Touch carries an article by Dr. Prema Ramachandran which provides a lot of interesting information for readers on the subject. She states Osteomalacia in young women leading to formation of tri-radiate pelvis and obstructed labour was a well-recognized and the dreaded clinical entity that could lead to rupture in uterus and in some cases even demise of both mother and the offspring.

She also points out that prevalence of biochemical vitamin D deficiency was shown to be quite high even among persons habitually exposed to sun for several hours in a day. ICMR Expert Committee considered all the available data and recommended that increasing the RDA and providing more vitamin D through food cannot be a substitute as much as increasing the out-door physical activity and exposure to sun as means of meeting the requirement of Vitamin D.

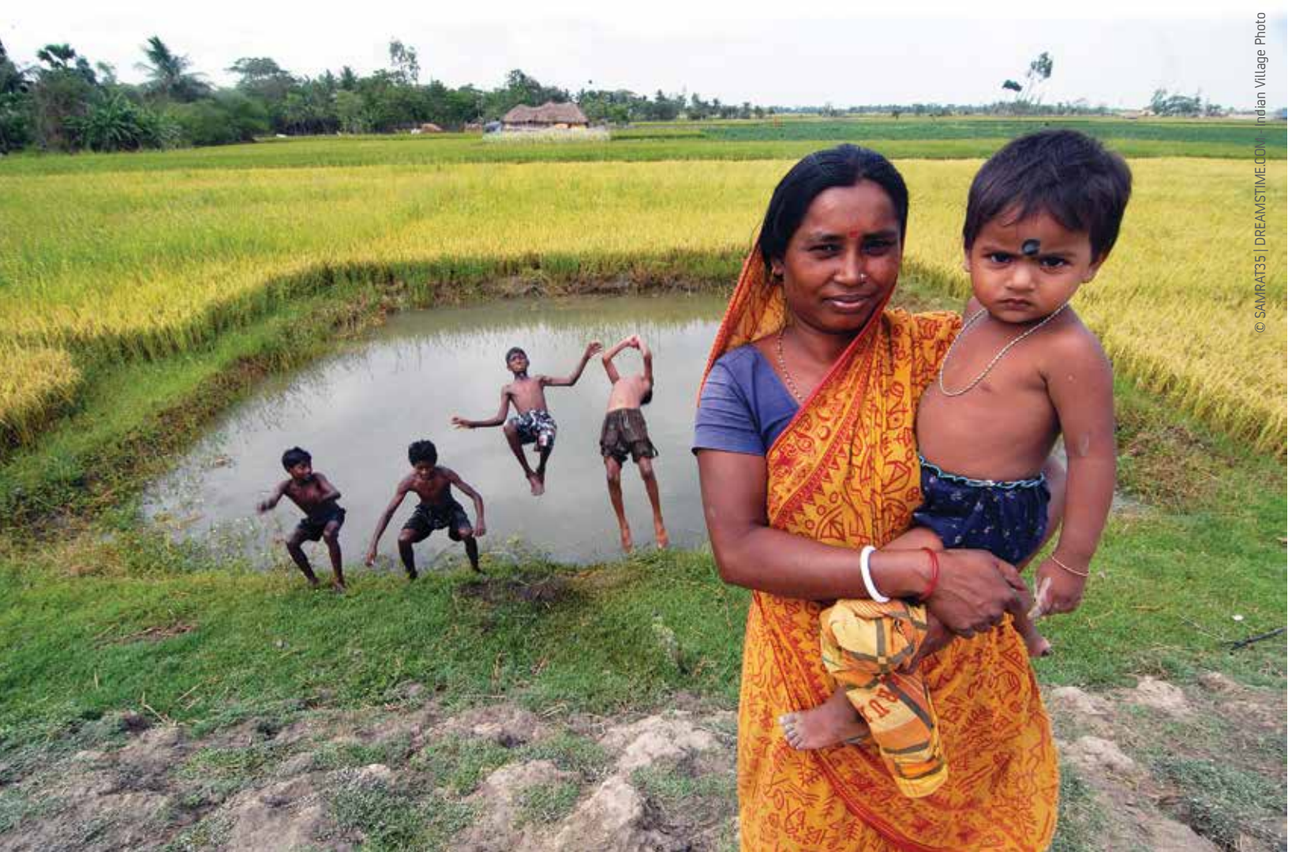
[1] World Health Organization Guideline - Nutrition Section, Vitamin D Supplementation in Pregnant Women

VITAMIN D DEFICIENCY IN PREGNANCY

PREMA RAMACHANDRAN
Director, Nutrition Foundation of India, New Delhi

INTRODUCTION

India's concern about Vitamin D deficiency and its health consequences began nearly 100 years ago, with the description of osteomalacia in *purdha*-wearing North Indian women. Osteomalacia in young women, leading to formation of tri-radiate pelvis and obstructed labour, was well-recognised and the dreaded clinical entity could lead to a rupture uterus, death of both- the mother and the offspring. Obstetricians also reported that some pregnant women who did not have any clinical sign of osteomalacia, delivered infants who had hypo-calcaemic tetany or cranio tabes. Rickets in young children was a common worrying problem for paediatricians. All clinicians focused their efforts on early diagnosis and effective management of these clinical problems and prevention of associated adverse health consequences. By mid-twentieth century, osteomalcia in women, and congenital rickets were no longer common and obstetricians' interest in the Vitamin D status of pregnant women waned. By 70s, rickets in children was no longer commonly seen in hospitals. This apparent reduction in clinical manifestations of Vitamin D deficiency led to the widespread belief that in sunny India, Vitamin D deficiency is unlikely to be a major problem except in segments of population that is not exposed to sunlight[1] .



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In the late 70s, there was a revival of interest in the area of Vitamin D deficiency in pregnancy, following the reports of neonatal hypocalcaemia and tetany among Asian immigrants in the UK. This was attributed to the fact that these women from India were deprived of sun exposure in the UK and became Vitamin D deficient. British obstetricians recommended Vitamin D supplementation during pregnancy to the 'at risk' Asian mothers as a component of antenatal care[2] and this led to elimination of neonatal tetany in Asian mothers. In India, improved access to health care resulted in substantial increase in hospital deliveries, over time; however, there were no reports of neonatal tetany and it was assumed that Indians in India did not face this problem.

With the availability of 25(OH)D assays it, became possible for research scientists to assess prevalence of asymptomatic biochemical Vitamin D deficiency[3]. Over the last two decades, studies of Vitamin D levels carried out in different countries of the world, and different regions of India, in apparently healthy pregnant women, children and adult men living in different latitudes, and with varying degree of sun exposure, showed that prevalence of subclinical asymptomatic Vitamin D deficiency was high in all groups[4]. Reports of neonatal hypocalcaemia and tetany first from Asian Indians residing in the UK in the 70s and Indians from different regions in India in the last decade have led to growing concern about Vitamin D deficiency in pregnancy[5-7]. This article will briefly review the physiological roles of Vitamin D, health consequences of Vitamin D deficiency in pregnancy and strategies for prevention, detection and management of Vitamin D deficiency in pregnancy.

SOURCES OF VITAMIN D

Vitamins are vital nutrients, which are not manufactured in humans and hence have to be obtained from dietary sources. By this definition, Vitamin D is not a vitamin because it is manufactured in the human skin. Vitamin D occurs in different forms: cholecalciferol, calcidiol [25(OH)D], and calcitriol [1,25$(OH)_2D_3$]. Vitamin D_2 (*ergocalciferol*) is derived from plants and vegetable sources. *Cholecalciferol* is the naturally occurring form of Vitamin D in humans. The two forms *ergocalciferol* and *Cholecalciferol* are metabolised similarly in humans and are equal in potency from a nutritional perspective. Cholecalciferol is synthesised in substantial quantities when skin is exposed to sunlight. During exposure to the sun, the UVB photons (290-315 nm) that enter the epidermis cause a photochemical transformation of 7-dehydrocholesterol (7-DHC) (provitamin D_3) into cholecalciferol (previtamin D_3). D3 is transported to the liver where it is metabolised into the prehormone, *Calcidiol*, or 25-hydroxyvitamin D [25(OH) D]. The1,25-(OH)2D compound, like all Vitamin D metabolites, is present in the blood complexed to a specific a-globulin, the Vitamin D-binding protein.

FACTORS GOVERNING VITAMIN D PRODUCTION

It has long been assumed that those residing in the tropics can produce enough Vitamin D_3 in the skin throughout the year. The ability of the skin to synthesise previtamin D_3 decreases whenever there is a reduction in the sun rays reaching the skin. Increasing latitude beyond 42o N and below 42o S, winter season, persistent cloudy weather and atmospheric pollution reduce solar radiation and Vitamin D synthesis. Clothes, dark skin pigmentation, and application of sun protection factor (SPF), individually or in combination can reduce UVB penetration into epidermis thereby limiting the production of previtamin D3 by the skin. With advancing age, the cutaneous 7-DHC levels decline, reducing the skin's capacity to produce vitamin D_3.

Vitamins are vital nutrients, which are not manufactured in humans and hence have to be obtained from dietary sources. By this definition, Vitamin D is not a vitamin because it is manufactured in the human skin.

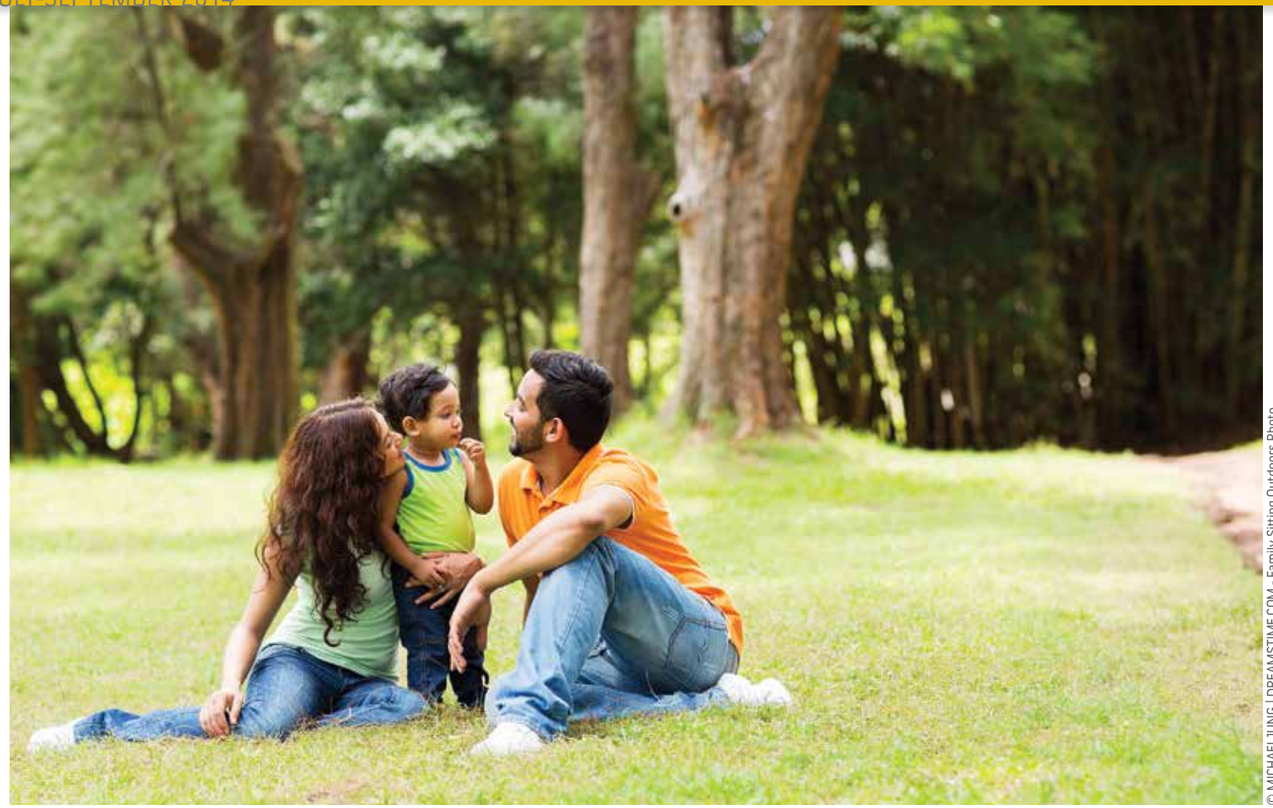
FUNCTIONS OF VITAMIN D

Vitamin D is required to maintain normal blood levels of calcium and phosphate, needed for the normal mineralization of bone, muscle contraction, nerve conduction, and general cellular function in all cells of the body. 1,25-(OH)2D stimulates intestinal absorption of calcium and phosphate, and mobilizes calcium and phosphate by stimulating bone resorption. These functions are aimed at restoring blood levels of calcium and phosphate to normal, when concentrations of the two ions are low. In calcium homeostasis, 1,25-(OH)2D works in conjunction with parathyroid hormone (PTH) to produce its beneficial effects on the plasma levels of ionized calcium and phosphate.

Calcidiol has steroid-like properties. After hepatic conversion of cholecalciferol into calcidiol [25(OH)D], calcitriol[1,25$(OH)_2D_3$] is produced in the kidneys and in other tissues. Calcitriol is the most potent steroid hormone derived from cholecalciferol. Vitamin D modulates the transcription of cell cycle proteins, decreasing cell proliferation and increasing cell differentiation of a number of specialised cells of the body (osteoclastic precursors, enterocytes, keratinocytes). This property accounts for the actions of Vitamin D in bone resorption and intestinal calcium transport. Vitamin D also possesses immune-modulatory properties that may alter responses to infections *in vivo*. Several recent studies have reported associations between Vitamin D deficiency and metabolic diseases such as type 2 diabetes, autoimmune diseases, infections such as tuberculosis and some malignancies. The mechanisms by which these effects are mediated are being investigated.

REQUIREMENT OF VITAMIN D

The FAO/WHO Expert Consultation[8] affirmed that in most locations in the world in a broadband around the equator (between latitudes 42°N and 42°S), the most physiologically relevant and efficient way of acquiring Vitamin D is to synthesize it endogenously in the skin from 7-dehydrocholesterol by 30 minutes of skin exposure of the arms and face to sun. However persons residing in latitudes beyond 42°N and 42°S, those who are working indoors and seldom go out in the sun, or those who for any reason do not expose their skin to sun will require dietary intake of Vitamin D; this may be through plant or animal food rich in Vitamin D precursors or food fortified with Vitamin D



or Vitamin D given as supplements.

The WHO Expert Committee in 1988 recommended daily Vitamin D intake of 100 Units (2.5 µg) for adult males who live in latitudes beyond 42°N and 42°S or whose exposure to sunlight is very low due to any factor. In 2004, the Expert Committee doubled the recommended daily intake to 200 Units (5 µg), because there had been a progressive reduction in the exposure to sunlight in many countries[8]. Some countries defined the *adequate* intake (AI) for Vitamin D from diet as the intake required to maintain plasma 25-OH-D levels necessary to ensure normal bone health for their population. In many developed countries foods such as milk and vegetable oils are subjected to mandatory fortification with Vitamin D in order to ensure sufficient Vitamin D intake by their population for prevention of chronic diseases.

It was believed that in India adequate amounts of Vitamin D can be synthesised in the body by simple exposure to bright sunlight for 30 min per day. However with increasing urbanisation and modernisation, large segments of population work indoors throughout the day and do not get any exposure to sunlight. Habitual Indian diets do not provide even 10% of the requirement. Recent studies have shown high prevalence of Vitamin D deficiency in both rural and urban population, adults and children living in north as well as south India. Prevalence of biochemical Vitamin D deficiency was shown to be quite high even among persons habitually exposed to sun for several hours in a day. The ICMR Expert Committee considered all the available data and recommended that increasing the RDA and providing more Vitamin D through food cannot be a substitute for increasing outdoor physical activity and exposure to sun as means of meeting the requirement of Vitamin D. Outdoor physical activity is also needed for prevention of overweight and obesity in the population. Therefore the ICMR Expert Committee did not make any recommendations on the Vitamin D intake for Indians. However, under situations of minimal exposure to sunlight for any reason, a daily supplement of 400 IU (10 µg) daily was recommended[9].

VITAMIN D REQUIREMENTS IN PREGNANCY

In the second and third trimester of pregnancy, Vitamin D plays an important role in the active transport of calcium, which is important for the foetus' bone growth. Approximately 25-30 gms of calcium is transferred to the foetal skeleton during the last trimester of pregnancy. There is an increase in the maternal plasma levels of Vitamin D during pregnancy—the reported increase in pregnant women ranges from relatively small to threefold. This increase is thought to be partly due to improvement in Vitamin D absorption from the gut and partly due to placental synthesis of Vitamin D. There is a good correlation between maternal and cord blood 25 OHD levels and Vitamin D stores in the infant.

VITAMIN D DEFICIENCY

Vitamin D deficiency leads to abnormal calcium homeostasis resulting in defective mineralization of the growing long bones and rickets in children. Severe and sustained Vitamin D deficiency in adults results in osteomalacia; less severe sustained Vitamin D deficiency leads to decrease in the mineral content of the matrix of the bones and osteoporosis. While the severe clinical deficiencies such as rickets and osteomalacia are no longer seen, there has been a growing recognition that milder forms of deficiency, which is asymptomatic is seen across the globe and in India, in all segments of population and in all age groups.

Serum 25-hydroxyvitamin D [25(OH) D], Calcidiol, the storage form of vitamin D which reflects Vitamin D from cutaneous synthesis and absorption from the diet has now been accepted as the parameter for assessing deficiency/adequacy of the Vitamin D. Several recent studies have used plasma 25-OH-D as a measure of Vitamin D status, and shown that there is a strong relationship of this and bone status. Biochemically, levels of 25(OH)D >30 ng/ml are considered as 'normal'. Levels between 20 and 30 ng/ml are defined as 'insufficiency', and levels <20 ng/ml are defined as 'deficiency'. In research studies parathyroid hormone levels are estimated along with calcium and Vitamin D levels and hypovitaminosis D is defined as the concentration of 25(OH)D at which PTH begins to increase[3].

Available global data indicate that Vitamin D deficiency (VDD) and Vitamin D insufficiency are common in both, black and white population across countries (USA,UK, Africa, and Middle-Eastern countries)[4]. Prevalence of VDD during the winter months is higher as compared to summer months and higher among pregnant women living in temperate zones. Growing urbanization, reduced physical activity and low exposure to sunlight appear to have contributed to the reported recent spurt of Vitamin D deficiency identified by low circulating Vitamin D levels. Data from India indicate very high prevalence of biochemical Vitamin D deficiency in all age groups. Prevalence of Vitamin D insufficiency and deficiency was reported even in physically active soldiers and farmers in South India, who were exposed to sunlight for more than 4 hours with at least 35% of their body surface area exposed to sunlight[4].

VITAMIN D DEFICIENCY IN PREGNANCY

Studies from developed and developing countries have shown that prevalence of biochemical Vitamin D deficiency is common in pregnancy. Data from studies on Vitamin D status in pregnant women both from north and south India showed a very high prevalence of asymptomatic vitamin hypovitaminosis D (84-93%). Dietary intake of calcium in habitual Indian diets is low and there is no increase in calcium intake during pregnancy.

There are changes in maternal Vitamin D and calcium metabolism during pregnancy which are aimed at ensuring adequate calcium for foetal bone mineral accretion. Dietary calcium deficiency is known to predispose to hypovitaminosis D by rapid inactivation of circulating 25(OH) D. The problem of hypovitaminosis D is worsened in pregnant women because of the active transplacental transport of calcium to the foetus[4].

VITAMIN D STATUS IN FOETUS AND INFANTS

Foetal Vitamin D concentrations are dependent on maternal concentrations. Low Vitamin D levels in mothers, result in low Vitamin D levels in offspring. Studies from India have shown significant correlations in 25(OH)D levels between mother-infant pairs. Vitamin D is known to be involved in skeletal formation, growth and calcium and Vitamin D homeostasis *in utero*. Neonatal tetany due to hypocalcemia is being reported across the country in India[7] .

Breast milk content of Vitamin D is quite low even in women who have normal Vitamin D levels. Lactation does not impose additional maternal requirement for Vitamin D because breast milk levels of Vitamin D levels are low. Vitamin D levels and prevalence of biochemical deficiency of Vitamin D in lactating women is similar to Vitamin D status in pregnant women. Infants especially exclusively breast-fed infants have low 25(OH)D levels and may have to utilise their storage of Vitamin D for growth during the first few months. Offsprings of Vitamin D deficient mothers, have low Vitamin D stores and low Vitamin D blood levels; they may become Vitamin D deficient when they are exclusively breast fed[4] .

HEALTH CONSEQUENCES OF MATERNAL VITAMIN D DEFICIENCY

VITAMIN D STATUS AND COURSE AND OUT COME OF PREGNANCY

Maternal Vitamin D deficiency in pregnancy has been reported to be associated with an increased risk of pre-eclampsia and increase in maternal and perinatal morbidity. Women with pre-eclampsia have been shown to have lower concentrations of 25-hydroxyvitamin D compared with women with normal blood pressure. The low levels of urinary calcium (hypocalciuria) in women with pre-eclampsia may be due to a reduction in the intestinal absorption of calcium, impaired by low levels of Vitamin D. Association between pre-eclampsia and Vitamin D deficiency might be due to immune dysfunction and excessive inflammatory response. Maternal Vitamin D deficiency in early pregnancy has been reported to be associated with elevated risk for gestational diabetes mellitus. But not all studies have confirmed these associations[10].

VITAMIN D STATUS AND PRETERM BIRTH AND LOW BIRTHWEIGHT

Infants born to severely Vitamin D-deficient mothers may have tetany due to severe hypocalcemia. Some observational studies suggest that Vitamin D levels during pregnancy can influence fetal bone development and children's growth. Vitamin D is known to be involved in skeletal homeostasis in utero and there have been speculations that maternal Vitamin D deficiency may be one of the factors responsible for the increase in low birth-weight rates in India. Poor control of maternal diabetes in early pregnancy and low maternal Vitamin D status have been reported to be correlated with low bone mineral content in infants. However so far none of the studies from India have reported that maternal Vitamin D deficiency has adverse impact on course and out come of pregnancy or on the birth weight of the offspring. Some studies from developed countries have reported an association between maternal Vitamin D status and pre-term births. However several studies have not found such an association. These conflicting results might be partly attributable to the variations in prevalence of Vitamin D deficiency in pregnancy and prevalence of pre-term births and low birth weight between the populations studied. Children of mothers who had higher dietary intake of calcium rich foods during pregnancy had higher spinal bone mineral content. Intrauterine exposure of foetus to low Vitamin D concentrations is associated with less muscle mass and insulin resistance. Foetal Vitamin D deficiency is also likely to adversely affect childhood

bone development and innate immune function[10].

VITAMIN D STATUS AND POSTNATAL GROWTH

Some studies have shown significant associations between maternal calcidiol levels and weight, length and circumferential measurements of the offspring at birth and the first few months of life. Association of maternal Vitamin D status and child's bone mass and head circumference have been reported. One study from the Middle East reported that Vitamin D deficiency (serum levels lower than 25 nmol/L) was seen in 92% of rachitic (having rickets) Arab children and 97% of their mothers compared with 22% of nonrachitic children and 52% of their mothers[10] . There is a need for large scale epidemiological studies to explore the associations if any between Vitamin D levels and course and out come of pregnancy and growth of the offspring.

VITAMIN D SUPPLEMENTATION

In view of the high prevalence of biochemical Vitamin D deficiency, and potential adverse consequences of poor Vitamin D status on the mother-child dyad, calcium and Vitamin D supplementation during pregnancy had been advocated to improve course and outcome of pregnancy and neonatal outcomes. The Food and Nutrition Board from the US Institute of Medicine conducted a systematic review of randomised and observational studies on Vitamin D supplementation on pre-eclampsia, caesarean section, obstructed labor and bacterial vaginosis. None of the placebo-controlled randomised clinical trials identified a causal relationship between Vitamin D and preeclampsia; and two observational studies suggested that supplementary Vitamin D may be associated with lower incidence of preeclampsia. The data on associations between maternal serum 25OHD level and preeclampsia were not conclusive. None of the studies provided conclusive evidence to support Vitamin D supplementation to pregnant women[10].

A recent Cochrane review[10] evaluated the effects of Vitamin D supplementation alone or in combination with calcium and other vitamins and minerals during pregnancy. The number of studies which critically explored the effect of supplementation were small. All the studies which undertook Vitamin D supplementation prior to and after Vitamin D supplementation reported that there was significant improvement in maternal Vitamin D levels after supplementation. Because of the small number of trials and small number of women investigated in the trials, it was not possible to evaluate the impact if any of Vitamin D supplementation on course (pre-eclampsia, gestational diabetes, impaired glucose tolerance, caesarean section) and out come of pregnancy (preterm birth, or very preterm birth, stillbirth, neonatal death, Apgar score less than seven at five minutes, admission to intensive care unit during the neonatal period, neonatal infection). None of the studies evaluated the effects of Vitamin D plus calcium versus calcium nor Vitamin D plus calcium and other micronutrients in comparison with other micronutrients (but not vitamin D), in comparison with the group that received no intervention or a placebo. Two studies reported that there was a trend to decrease the incidence of low birth weight babies the Vitamin D supplemented group, but the decrease was not statistically significant. One study reported that children born to women who received Vitamin D supplements during pregnancy had a larger head circumference at birth than infants born to women who did not receive Vitamin D supplements but the functional significance of this observation is not clear.

Some studies have reported that Vitamin D supplementation in young children resulted in significant increase in SD scores for weight, length and arm circumference and a decrease in the proportion of children with stunted growth[10]. One recent study in India explored the effect of Vitamin D and calcium supplementation to low birth weight on growth and morbidity and reported that during the first six months of life, there was no reduction in morbidity (personal communication). A placebo-controlled double blind study on daily supplementation of calcium and Vitamin D to infants and young children till two years of age conducted in Delhi did not show any differences in growth or morbidity between infants and children who received the placebo or the supplement (NFI study). It is possible that the observed lack of impact might be due to the fact that in these children, Vitamin D deficiency is one among the many factors that result in poor growth or high morbidity; in the absence of comprehensive interventions to combat other adverse factors, Vitamin D supplement alone cannot improve growth or reduce morbidity.

SUMMARY AND CONCLUSIONS

India's concern about Vitamin D deficiency and its health consequences began nearly a hundred years ago. Obstetricians dreaded osteomalacia in *purdha*-wearing north Indian women resulting in tri-radiate pelvis, leading to obstructed labour, rupture of uterus and death of both, mother and the offspring. Paediatricians were concerned about osseous manifestations of Vitamin D deficiency in children ranging from neonatal tetany, cranio-tabes, rickets in infants and young children. Clinicians focussed their efforts on early diagnosis and effective management of these clinical problems and prevention of associated adverse health consequences. By the middle of the last century the severe clinical forms of the Vitamin D deficiency affecting the skeletal systems disappeared in India. Clinicians and nutritionists believed that in subtropical sunny India there is sufficient skin exposure to solar rays for manufacture of adequate Vitamin D and prevent Vitamin D deficiency.

The FAO/WHO Expert Consultation affirmed that in most locations in the world in a broadband around the equator (between latitudes 42° N and 42° S), the most physiologically relevant and efficient way of acquiring Vitamin D, is to synthesize it endogenously in the skin from 7-dehydrocholesterol by 30 minutes of skin exposure of the arms and face to sun. However, persons residing in latitudes beyond 42° N and 42° S, those who are working indoor and seldom go out in the sun, or those who for any reason do not expose their skin to sun, will require dietary intake of Vitamin D; this may be through plant or animal food rich in Vitamin D precursors or food fortified with Vitamin D; Vitamin D may have to be given as supplements to vulnerable groups. Several developed countries in temperate regions have embarked on Vitamin D fortification for achieving adequate intake and prevention of the long-term risk of osteoporosis and noncommunicable diseases. The ICMR Expert Committee on RDA considered all the available data and recommended that increasing the RDA and providing more Vitamin D through food cannot be a substitute for increasing outdoor physical activity and exposure to sun as means of meeting the requirement of Vitamin D, so did not make any recommendations on the Vitamin D intake for Indians. However, under situations of minimal exposure to sunlight for any reason, a daily supplement of 400 IU (10 µg) daily was recommended[9].

© DHAMMABUM | DREAMSTIME.COM - Indian Mother With Her Child Photo

With the availability of 25(OH)D assays it became possible for research scientists to assess prevalence of asymptomatic biochemical Vitamin D deficiency. Studies from different countries of the world and different regions of India in apparently healthy adult men and women, pregnant women and children and living in different latitudes, with varying degree of sun exposure, showed that prevalence of subclinical asymptomatic Vitamin D deficiency was high in all groups. Growing urbanization, reduced physical activity and low exposure to sunlight appear to have contributed to the reported spurt of Vitamin D deficiency identified by low circulating Vitamin D levels.

Several studies have reported association between low maternal vitamin D levels in pregnancy and increased risk of pre-eclampsia, increase in maternal and perinatal morbidity, poor foetal growth, and increased risk for gestational diabetes mellitus. However these studies have not explored whether the associations are casual or casual; many of these associations have not been confirmed by other studies. There has been a clear and consistent association between the low maternal Vitamin D levels and increased risk of neonatal tetany; conflicting trends have been reported from studies exploring the association between low maternal Vitamin D levels and preterm births, low birth weight, poor growth in neonatal period, infancy and childhood.

Benefits of calcium and Vitamin D therapy for management of neonatal tetany and osseous manifestations of Vitamin D deficiency such as rickets have been well-documented and there are clear clinical guidelines for therapy. In view of the high prevalence of biochemical Vitamin D deficiency, and potential adverse consequences of poor Vitamin D status of the mother, calcium and Vitamin D supplementation during pregnancy to improve course and outcome of pregnancy and neonatal outcomes had been advocated. There has been advocacy for calcium and Vitamin D supplementation for low birth weight infants and infants with poor growth. A Cochrane Review of all the available data based on observational studies and randomised clinical trials on Vitamin D and calcium supplementation did not show any benefits in terms of course and outcome of pregnancy and growth or morbidity in the offspring. However the number of studies and sample size of the studies have been small.There is a need to undertake large scale studies in pregnant and lactating women and preschool children in areas with known high prevalence of biochemical Vitamin D deficiency to document beneficial effects if any of Vitamin D and calcium supplementation on the course and outcome of pregnancy and growth of infants and children so that rational guidelines can be evolved

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Paradox of ample sunlight and vitamin D deficiency in India

Presumption about adequacy of vitamin D through natural source from sunlight in India has been proved wrong as most of the population avoids exposure to sunlight and those who are exposed still remain vitamin D deficient for variety of reasons. Hence vitamin D deficiency is nearly universal in India in all age groups. However it has different connotations in pregnant women and young children. Vitamin D deficiency results in significant morbidity in pregnant women and also increases risk of tetany in neonates. "In-Touch" presents an excellent review of vitamin D deficiency in pregnancy by Dr Prema Ramachandran. It is important to note that vitamin D deficiency may remain asymptomatic but irrational supplement of vitamin D must be avoided.

In Touch – Newsletter

This newsletter is published by Heinz Nutrition Foundation India on a quarterly basis. Over sixty issues have been published and distributed free to all interested readers. Our readers have appreciated our efforts to print and release these issues on a regular basis over last sixteen years particularly because

- **In Touch** endeavours to publish only original articles by scientists, nutritionists or practicing doctors based on their learning experience or structured studies.
- **In Touch** had covered a variety of subjects all within the broad classification of nutrition or applied nutrition, like deficiency disorders, treatment of disorders due to life-style and improper nutrition.
- **In Touch** had covered nutritional requirements of infants, children, pregnant women and young mothers. There were special issues covering subjects like treatment of persons suffering from life-style disorders and geriatric groups.

In Touch would ensure it provides such useful information in all its future issues. To facilitate it to do so we request our readers to introduce new authors from research institutes, academic hospitals and practicing consultants, like nutritionists, scientists and research scholars to contribute articles. Please address all mails to managing editor.

Printing of physical copies and posting them involves exorbitant costs. We have been making requests to our readers to provide their email IDs so that we can send them an e-copy of the issue and save on paper, printing ink and postage. We have been getting response from readers who empathize with us. While we thank them, our request continues for the rest of the readers to do so.

- P. Jagannivas,
Managing Editor

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