

# Assessment of the Factors of Vitamin D Deficiency among Pregnant Women at IBN Sina College, Jeddah, Saudi Arabia

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**Abstract:** Background: Vitamin D is an essential fat soluble vitamin and a key modulator of calcium metabolism in children and adults. Because calcium demands increase in the third trimester of pregnancy, vitamin D status becomes crucial for maternal health, fetal skeletal growth, and optimal maternal and fetal outcomes. Vitamin D deficiency is common in pregnant women (5–50%) and in breastfed infants (10–56%), despite the widespread use of prenatal vitamins, because these are inadequate to maintain normal vitamin D levels ( $\geq 32$  ng/mL). Adverse health outcomes such as preeclampsia, low birthweight, neonatal hypocalcemia, poor postnatal growth, bone fragility, and increased incidence of autoimmune diseases have been linked to low vitamin D levels during pregnancy and infancy. Studies are underway to establish the recommended daily doses of vitamin D in pregnant women. This review discusses vitamin D metabolism and the implications of vitamin D deficiency in pregnancy and lactation. Objective: To assess the factors of Vitamin D deficiency among pregnant Women at Ibn Sina College, Jeddah, Saudi Arabia. Method: A cross-sectional survey was conducted at outpatient clinics for Obstetrics' & Gynecology, Ibn Sina College, Jeddah, Saudi Arabia. Assessment checklist and investigation tests was carried out by the researcher in identifying the factors beyond vitamin D-deficiency among the pregnant women was provided to 200 pregnant women in the research setting to assess the factors of Vitamin D deficiency among pregnant Women at Ibn Sina College, Jeddah ,Saudi Arabia. Results: This study finding showed that awareness towards Occupational Injury among some periodontal staff at dental clinics was variable. The majority (95.0%) of the pregnant woman had vitamin D-deficiency due to Limited sun exposure. While , ( 91.0%) of the studied sample had vitamin D-Deficiency due to Mal-absorptive syndromes .Furthermore, regular use of sunscreens (87.5%) constitutes one of the major variable behind of the vitamin D-deficiency of pregnant woman among the studied sample. The third factors causing vitamin D-deficiency within the current study findings was Extensive clothing cover, which showed (82.0%).On the other hand , the lowest level of vitamin D-deficiency was (75%) of the studied sample caused by obesity and aging. Conclusions: The current study results revealed that the majority of the pregnant woman had vitamin D-deficiency due to Limited sun exposure, followed by Mal-absorptive syndromes .Furthermore; regular use of sunscreens constitutes the third major variable behind of the vitamin D-deficiency of pregnant woman among the studied sample.

**Keywords:** lactation, Pregnancy, Vitamin D deficiency

## 1. Introduction

Vitamin D deficiency has long been allied with deprived bone development and has been recognized as the cause of rickets. Even though the incidence of rickets has declined with the existing daily recommendations of vitamin D intake, the prevalence and further consequences of low serum vitamin D levels have not been recognized until recently, (Taufield, et al., 2002). The quantity of serum vitamin D in pregnancy has assist the researchers set up the prevalence of vitamin D deficiency and elucidate adverse maternal and fetal outcomes associated with it, Mannion, Gray-Donald, Koski, (2007). Anticipation of these diseases and decline of the risk for childhood illnesses that are linked to early vitamin D deficiency are potential with superior perceptive of vitamin D physiologic components, risk factors for vitamin D deficiency, and methods of supplementation to attain optimal levels in pregnant and lactating women. (Hulter et al., 2001).

Concerning the Vitamin D physiologic component it was mentioned that Vitamin D is a prohormone that is derived from cholesterol. The nutritional forms of vitamin D include  $D_3$ (cholecalciferol), which is generated in the skin of humans and animals, and vitamin  $D_2$  (ergo-calciferol), which is resulting from plants; both forms can be absorbed in the gut and used by humans. Debate exists as to whether  $D_2$  or

$D_3$  is more effective in sustaining circulating levels of vitamin D in non-pregnant women , and specific data during pregnancy is unidentified, Olsen, et al., (2007). Based on evidence vitamin D always implies either vitamin  $D_2$  or  $D_3$ . Vitamin D found naturally in fish and some plants but is not found in considerable amounts in meat, poultry, dairy products (without fortification), or the most commonly eaten fruits and vegetables. The Food and Nutrition Board's current recommendation for adequate intake of vitamin D is 200 IU/d for both pregnant and non-pregnant individuals aged 0–50 years.<sup>6</sup> Wild salmon (3.5 oz) provides 600–1000 IU; farmed salmon has approximately 25% of this amount per serving (Podar et al., 2004). The same amount of mackerel, sardines, or tuna fish provides 200–300 IU. Cod liver oil (1 tsp) provides 600–1000 IU. One of the few plant sources of vitamin D is shiitake mushrooms, which provide 1600 IU. In the United States, the major dietary sources of vitamin D are fortified foods. for instance, 8 ounces of fortified milk, orange juice, or yogurt, 3 ounces of fortified cheese, or a serving of fortified breakfast cereal each provides 100 IU of vitamin D. (Odd Cathrine, et al., (2007). However, the virtual involvement of dietary vitamin D is low in humans, compared with endogenous production from sunlight, Mannion, Gray-Donald, Koski ,(2006).

According to Kuo .et al., (2006), exposure to sunlight, especially ultraviolet B (UVB) photons, initiates conversion

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in the skin of provitamin D<sub>3</sub> to previtamin D<sub>3</sub>, which binds to vitamin D binding protein for transport in the circulation and is rapidly stored in fat or metabolized in the liver.(Cockburn,2000).Numerous hepatic cytochrome P-450 enzymes have been shown to 25-hydroxylate vitamin D compounds. The process is regulated poorly, so serum levels of 25-hydroxy vitamin D (25[OH]D) increase in proportion to vitamin D synthesis and intake, which represents the best marker of vitamin D status., Sabour,et al., (2006).

According to , Mallet , et al., (2000) , numerous tissues (including placenta, prostate, breast, colon, lung, bone, parathyroid, pancreas, immune system, and vascular wall) articulate the vitamin D receptor and the 1 $\alpha$ -hydroxylase and are able to transform 25(OH)D to its active hormonal form,Villar,(2006).Locally produced 1,25(OH)2D serves as an autocrine / paracrine factor that is fundamental for cell-specific proliferation, differentiation, and function early in life. (Rapiti, et al., 2005). Effect of calcium and vitamin D supplementation on toxemia of pregnancy.As an individual becomes deficient in vitamin D, intestinal calcium and phosphorous absorption decrease; serum ionized calcium levels drop, and synthesis of parathyroid hormone (PTH) is stimulated. Increased plasma PTH maintains serum calcium in the normal range by enhancing renal production of 1, 25(OH)2D, increasing bone turnover, accelerating bone loss, and promoting tubular calcium re-absorption and phosphate excretion. Increased 1, 25(OH) 2D induces intestinal calcium and phosphorus absorption and stimulates osteoclast activity, thereby increasing calcium and phosphorous availability in the blood.(Marya, Rathee & Manrow,2001)

The efficiency of vitamin D synthesis depends on a variety of factors, most significantly the number of UVB photons that penetrate the epidermis. More time depleted indoors and prevalent use of sunscreen have resulted in condensed sun exposure and less vitamin D production. Latitude and season of the year also verify both the quantity and quality of UVB radiation. Skin production of vitamin D declines after August and virtually ceases from November until March at latitudes of >42° N (Boston),Specker ,et al., (2000).Other factors, such as aging and increased melanin in dark-skinned people, reduce the efficiency by which sunlight converts provitamin D, thereby decreasing vitamin D synthesis, Weiler,etal., (2005). Plasma 25(OH)D levels during the winter therefore depend on vitamin D intake, which is largely from food additives or supplements. To the greatest of our understanding, the attentiveness of periodontal staff in relation to knowledge and awareness about identifying and handling the factors causes vitamin d deficiency among the pregnant women within the work setting. Consequently, conducted this study to assess the factors of Vitamin D deficiency among pregnant Women at Ibn Sina College, Jeddah, Saudi Arabia.

## 2. Participants and Methods

This study was conducted in March, 2016. Assessment checklist and investigation tests was carried out by the researcher in identifying the factors beyond vitamin D-deficiency among the pregnant women was provided to 200

pregnant women in the research setting to assess the factors of Vitamin D deficiency among pregnant women at Ibn Sina College, Jeddah ,Saudi Arabia.

The participants were selected from the selected obstetrics' & Gynecology clinics within the study setting. After signing an informed written consent form, the researcher in carried out the assessment check list and the lab investigation in identifying the factors beyond vitamin D-deficiency within in the research setting. The purpose of the study was explained to each respondent and confidentiality of the information guaranteed.

The research was carried out by the authors who were appropriately trained in administering the informed consent and the assessment checklist. In this cross-sectional study, a structured assessment check list prepared by the author was utilized by the researcher. Prior to carry out the assessment checklist and performing lab investigation to the studied women to identify the factors of vitamin D deficiency within the study setting, a pilot study was done on a selective group of pregnant women with vitamin D deficiency, the researcher seek the assistance from group of jury in the same field and their remarks and criticism was carried out. Minor changes were then made to the final tool.

## 3. Results

### Percentage of the factors of Vitamin D deficiency among pregnant Women at Ibn Sina College, Jeddah, Saudi Arabia

Factors	No	%
Limited sun exposure	190	95.0 %
Regular use of sunscreens	175	87.5%
dark skin	164	71.5
Obesity	150	75%
Extensive clothing cover	143	82.0%
Aging	150	75%
Mal-absorptive syndromes (cystic fibrosis, cholestatic liver disease, inflammatory bowel disease, short gut syndrome)	182	91%

## 4. Discussion

Concerning identifying the factors beyond vitamin D-deficiency among the pregnant women was provided to 200 pregnant women in the research setting to assess the factors of Vitamin D deficiency among pregnant women at Ibn Sina College, Jeddah,Saudi Arabia. (Table 1). This study finding showed that the majority (95.0%) of the pregnant woman had vitamin D-deficiency due to Limited sun exposure. While , ( 91.0%) of the studied sample had vitamin D-Deficiency due to Mal-absorptive syndromes .Furthermore, regular use of sunscreens (87.5%) constitutes the second major variable behind of the vitamin D-deficiency of pregnant woman among the studied sample. The third factors causing vitamin D-deficiency within the current study findings was Extensive clothing cover, which showed (82.0%).On the other hand , the lowest level of vitamin D-deficiency was (75%) of the studied sample caused by obesity and aging.

This study findings congruent with the result of the research carried out by Resnick, et al., (2002), who focused on Calcitropic hormones in pre-eclampsia: a renewal of interest, it was reported that Limited sun exposure is the main reason beyond vitamin d deficiency among the pregnant women. On the other hand, the study carried by Seely, (2007), focused on Chronic continuous PTH infusion results in hypertension in normal subjects., showed that only 96% of the studied sample from the pregnant women were had vitamin D deficiency due to limited sun exposure and Mal-absorptive syndromes (cystic fibrosis, cholestatic liver disease, inflammatory bowel disease, short gut syndrome), which constant with the current study results.

This research findings is congruent with the findings of the study carried out by (Bodnar, et al., 2007), the study focus on maternal vitamin D deficiency increases the risk of preeclampsia who found that 92% of the studied sample from the pregnant women were had vitamin D deficiency due to Obesity and aging which constant with the current study results.(Levine,2000).

According to Olsen, Secher, (2005), who carried out a study on investigating a possible preventive effect of low-dose fish oil on early delivery and pre-eclampsia in relation to indications from a 50-year-old controlled trial. Recent evidence demonstrates that the prevalence of vitamin D deficiency in the general population and in women of child-bearing age is surprisingly high. However, the influence of vitamin D deficiency on calcium metabolism during pregnancy has not been well-characterized. Vitamin D deficiency is known to be associated with an increased prevalence of preeclampsia, which a common cause of increased mortality rates in pregnancy. In children, it is also associated with small infant size and the development of common childhood diseases, such as asthma and type 1 DM. Current recommendations for daily vitamin D intake (200 IU) are inadequate to maintain serum levels of 25(OH)D in the normal range during pregnancy and lactation. Further studies are needed to determine the serum levels and the degree of supplementation that is required to optimize maternal and fetal outcomes. However, because vitamin D supplementation is simple and cost-effective with a low likelihood of toxicity, we recommend increased supplementation in all pregnant women to keep serum levels of 25(OH)D in the normal range for adults (>32 ng/mL).

Training and education have been found to be of paramount importance to developing awareness among health care workers in identifying the factors of vitamin D deficiency among the pregnant women which could be prevented and manipulated in early period of pregnancy, as well as improving adherence to high-quality clinical practice. Especially, within area like Saudi Arabia, in which the community culture and tradition require extensive health education during antenatal period of follow up as there are majority of the pregnant woman had vitamin D-deficiency due to limited sun exposure regular use of sunscreens.

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