

# VITAMIN D DEFICIENCY AMONG PREGNANT WOMEN ATTENDING A TERTIARY CARE HOSPITAL

Shazia Majid Khan,<sup>1</sup> Ghulam Mustafa,<sup>2</sup> Shahida Aslam<sup>1</sup>

## ABSTRACT

**Background:** Vitamin D deficiency was considered to be the sole cause of rickets and osteomalacia but now by the discovery that most tissues and cells in the body have vitamin D receptors and many tissues have enzymes that convert primary circulating form of vitamin D to its active form has provided new insight into the function of this vitamin. In different studies, its role has been highlighted in decreasing the incidence of autoimmune diseases, infectious diseases and cardiovascular diseases. **Objective:** To determine the frequency of vitamin D deficiency among pregnant women attending a tertiary care hospital. **Subjects and Methods:** Study Site: Department of Gynaecology and Obstetrics, Sheikh Zayed Medical College and Hospital Rahim Yar Khan. A total of 108 pregnant women were recruited from SZMC/Hospital with the exclusion criteria of women having chronic renal or liver diseases, known asthmatic or diabetics and women on antituberculous or antiepileptic drugs. This was a descriptive study, a part of an ongoing prospective study. All pregnant women irrespective of age or gestational age were selected. Data was collected on a predesigned proforma and analyzed in SPSS version 17. **Results:** A total of 108 pregnant women were included. 77 women (71%) were deficient in vitamin D, 18 women (16.7%) were insufficient and only 13 (12%) women were having normal vitamin D levels with the mean level of 15.9ng/dl. There was no statistically significant association between vitamin D levels and any specific age groups, parity and gestational ages. **Conclusion.** There is high prevalence of Vitamin D deficiency among pregnant women and vitamin D deficiency is present in all age groups, with any parity and gestational ages. This raises concerns about the health consequences for the mother and baby. Awareness programs should be started at local and national levels regarding importance of exposure to sunlight and intake of healthy diet. A targeted screening strategy to detect and treat women at risk of severe vitamin D deficiency is required in Pakistan.

**Key words:** Vitamin D deficiency, Pregnant Woman, Parity

## INTRODUCTION

Vitamin D status is a well known determinant of bone health.<sup>1,2</sup> Vitamin D deficiency increases the risk of osteoporosis and fractures while when it is severe it causes rickets in children and osteomalacia in adults.<sup>3-6</sup> The presence of vitamin D receptors particularly in placenta suggests that vitamin D may have other roles as well. Adequate vitamin D intake is associated with a lower risk of cancer.<sup>7-10</sup> Cardiovascular diseases, autoimmune diseases, neurological disorders and diabetes.<sup>11-15</sup> In addition an increasing number of studies suggested that vitamin D deficiency during pregnancy is associated with multiple adverse

health outcomes in mothers like preeclampsia and gestational diabetes, wheezing in neonates and low bone mineral density, type 1 diabetes, eczema in children.<sup>16,17</sup>

Our body gets vitamin D from exposure to sunlight, diet and dietary supplement. As few food items contains or are fortified with vitamin D, the skin synthesis of vitamin D induced by ultraviolet B radiation is the main determinant of vitamin D status in the population.<sup>18</sup> Vitamin D once synthesized in the skin is metabolized into 25 Hydroxy vitamin D in the liver. Due to its longer half life, 25 Hydroxy Vitamin D is the best biomarker of vitamin D status.<sup>18</sup> 25 hydroxy vitamin D is metabolized in the kidney by the 1 alpha hydroxylase to the active steroid hormone 1, 25-dihydroxy vitamin D. Several modifications of vitamin D metabolism occur during pregnancy. The expression of 1 alpha hydroxylase is increased in the kidney and placenta and the concentration of serum 1, 25 dihydroxy vitamin D increases in normal pregnancy from the 1<sup>st</sup> to 3<sup>rd</sup> trimester. The role of 1, 25 dihydroxy vitamin D during pregnancy to increase intestinal calcium absorption is since long acknowledged.<sup>19</sup>

1. Department of Gynae and Obstetrics, Sheikh Zayed Medical College/ Hospital, Rahim Yar Khan. University of Health Sciences, Lahore.

2. Department of Community Medicine, Sheikh Zayed Medical College/ Hospital, Rahim Yar Khan. University of Health Sciences, Lahore.

**Correspondence:** Dr. Shazia Majid Khan, Associate Professor, Department of Gynae and Obstetrics, Sheikh Zayed Medical College/ Hospital, Rahim Yar Khan. University of Health Sciences, Lahore.

Phone: +92-3026554416

Email: drshaziamajid@yahoo.com

Received: 12-02-2013, Accepted: 23-01-2014, Published: 28-03-2014

There is a growing concern about the health consequences of the high prevalence of vitamin D deficiency worldwide among the general population including pregnant women. Although previous small surveys suggest that vitamin D deficiency among women is common in Pakistan, there are no reliable country wide estimate of vitamin D among pregnant women in Pakistan. This study is based on the preliminary results of a prospective study of association of vitamin D deficiency with uterine atony and PPH without any obvious reason. The study was conducted, to determine the prevalence of Vitamin D deficiency among pregnant population attending a tertiary care hospital.

## SUBJECTS AND METHODS

This was a descriptive study, a part of an ongoing prospective study. A total of 108 pregnant women were recruited from Sheikh Zayed Medical College/Hospital, Rahim Yar Khan, which caters to predominantly lower and middle socioeconomic groups. Hospital serves both booked pregnant women which are mainly urban and unbooked women who mainly belong to rural areas. All pregnant women regardless of the gestational age were selected and their blood samples for Vitamin D levels were taken. Exclusive criteria was chronic renal or liver diseases, asthma, known diabetics and patients on antiepileptic and antituberculous drugs. Oral informed consent was obtained from all subjects and approval from institutional ethical committee was obtained. The level of vitamin D was categorized as Normal vitamin D level: > 30ng/ml. Vitamin D insufficiency: 20 to 30 ng/ml. Vitamin D deficiency: < 20ng/ml. The data was entered and analyzed in SPSS version 17.

## RESULTS

A total of 108 women were included in our study, in whom blood samples were taken for vitamin D levels. Only 13 women (12%) out of 108 were found to have normal Vitamin D levels, 77 women (71%) were having deficiency and 18 (16.7%) were having insufficient levels of vitamin D as shown in Figure I. Mean age of the pregnant women was  $25 \pm 4$  years, mean gravida was  $2.75 \pm 1.3$ , mean gestational age was  $32 \pm 7$  weeks and mean vitamin D level was  $15.9 \pm 1$  ng/dl, whereas median was 12.5ng/dl. In age category of < 20

years there were 13 (12%) women, out of which 10 (76.9%) were deficient in vitamin D and 3 (23.1%) were having normal levels. Between 21-30 years age group there were a total of 82 (75.9%) women, out of which 73(89%) have vitamin D deficiency and 9 (11%) have normal vitamin D level. Between 31-40 years age group there were 13 (12%) women, out of which 12 (92.3%) were deficient and only 1 (7.7%) has normal vitamin D level.

Figure I: Vitamin D Status of Pregnant Women

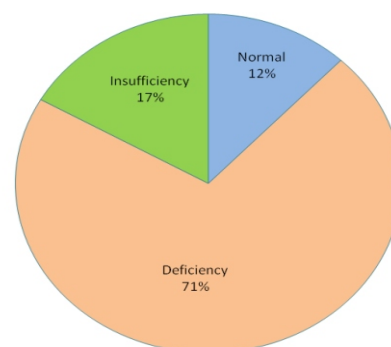
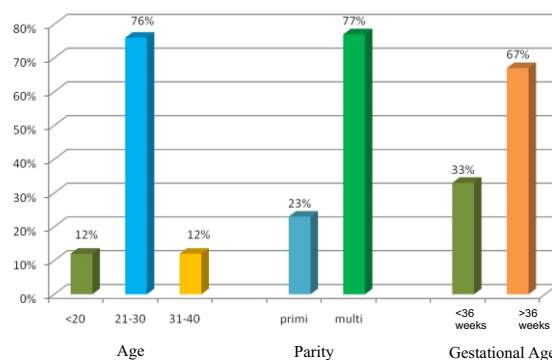


Figure II: Distribution of age, Gravida & Gestational age among study subjects



Out of 108 pregnant women, primigravida were 25 (23%), out of which 22 (88%) were deficient in vitamin D and 3(12%) have normal levels. There were 83(77%) multigravidas in whom 73(88%) were deficient in vitamin D and 10(12%)women have normal levels, however, the difference was not statistically significant. (p=0.9)

According to gestational age, there were 36(33.3%) women who were at <36 weeks and 72(66.6%) were at >36 weeks with the mean of 32.72 weeks. In <36 weeks group, 29(80.6%) were having vitamin D deficiency and 7(19.4%) women have normal levels. In >36 weeks gestational age group, out of 72 women 66 (91.7%) were vitamin D deficient and 6(8.3%) women have normal levels, however, the difference was not statistically significant.(p=0.09)

## DISCUSSION

Our study was based on the partial data of an ongoing prospective study is planned to determine the association of vitamin D deficiency with certain maternal problems. In this study, there was high prevalence of vitamin D deficiency of upto 88.9% which is comparable with the study of Hossain N that also showed the prevalence of vitamin D deficiency of upto 89%,<sup>20</sup> and the study of Kanaz Zahra Naqvi that showed the prevalence of vitamin D deficiency in Karachi population of upto 69.9%.<sup>19</sup> In a study done by Robert J Scroth that reviewed different studies and showed high proportion of pregnant women found to have vitamin D levels below 25nmol/L during summer in Delhi, at delivery in Pakistan and in Addis Ababa in Ethiopia.<sup>21</sup>

In our study, we have found that Vitamin D deficiency was present among all age groups ( $p=0.9$ ) and in all gravida ( $p=0.1$ ) and gestational ages ( $p=0.7$ ). This shows that vitamin D deficiency is not specifically associated with any age group or any gravida or gestational age, and is present across the board among all age groups, in any parity and gestational age.

Our results showed that 89% of the pregnant women in our study were vitamin D deficient, with 71% severely deficient ( $<20\text{ng/ml}$ ). It is very surprising that this much high level of vitamin D deficiency exists in Rahimyar khan which has an abundant sunshine throughout the year. This may be because of lack of exposure to sunshine and diet poor in calcium and vitamin D. Moreover, majority have dark skin and observe pardah/veil, which may prevent the absorption of ultraviolet B radiation.

The current vitamin D recommendations of 400iu per day is clearly insufficient to prevent or even treat the vitamin D deficient women, therefore a prudent step should be taken to increase the dose of upto 800iu.<sup>22</sup> Even in the last published guidelines the treatment of vitamin D deficient women is not specifically discussed.<sup>18</sup>

## CONCLUSION

There is high level of vitamin D deficiency among pregnant women attending our tertiary care hospital. Awareness programs should be started at local and national levels regarding proper exposure to the sunlight and that should be at least 20 minutes daily between 10am to 3pm with face neck and arm uncovered. While several

observational studies point to correlations between vitamin D deficiency and maternal or neonatal ill health, so large scale supplementation clinical trials are required to inform health policy. A targeted screening strategy to detect and treat women at high risk of severe vitamin D deficiency is clearly needed.

## REFERENCES

1. Valimaki VV, Alftan H, Lehmuskallio E, Loytyniemi E, Sahi T, et al. Vitamin D status as a determinant of peak bone mass in young Finnish men. *J Clin Endocrinol Metab* 2004;89: 76-80.
2. Ooms ME, Roos JC, Bezemer PD, van der Vijgh WJ, Bouter LM, et al. Prevention of bone loss by vitamin D supplementation in elderly women: a randomized double-blind trial. *J Clin Endocrinol Metab* 1995; 80: 1052-1058.
3. Lips P, Van Schoor NM. The effect of vitamin D on bone and osteoporosis. *Best Pract Res Clin Endocrinol Metab* 2011;25: 585-591.
4. Jackson C, Gaugris S, Sen SS, Hosking D. The effect of cholecalciferol (vitamin D3) on the risk of fall and fracture: a meta-analysis. *QJM* 2007;100: 185-192.
5. Pettifor JM, Prentice A. The role of vitamin D in paediatric bone health. *Best Pract Res Clin Endocrinol Metab* 2011; 25: 573-584.
6. Bhan A, Rao AD, Rao DS. Osteomalacia as a result of vitamin D deficiency. *Endocrinol Metab Clin North Am* 2010;39: 321-31.
7. Gorham ED, Garland CF, Garland FC, Grant WB, Mohr SB et al. Optimal vitamin D status for colorectal cancer prevention: a quantitative meta analysis. *Am J Prev Med* 2007;32: 210-216.
8. Garland CF, Gorham ED, Mohr SB, Grant WB, Giovannucci EL et al. Vitamin D and prevention of breast cancer: pooled analysis. *J Steroid Biochem Mol Biol* 2007; 103: 708-711.
9. Lappe JM, Travers-Gustafson D, Davies KM, Recker RR, Heaney RP. Vitamin D and calcium supplementation reduces cancer risk: results of a randomized trial. *Am J Clin Nutr* 2007; 85: 1586-1591.
10. Grant WB, Garland CF. Evidence supporting the role of vitamin D in reducing the risk of cancer. *J Intern Med* 2002;252: 178-179.
11. Dobnig H, Pilz S, Scharnagl H, Renner W, Seelhorst U. Independent association of low serum 25-hydroxyvitamin d and 1,25-dihydroxyvitamin d levels with all-cause and cardiovascular mortality. *Arch Intern Med* 2008; 168: 1340-1349.
12. Zittermann A. Vitamin D in preventive medicine: are we ignoring the evidence? *Br J Nutr* 2003; 89: 552-572.
13. Holick MF. Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. *Am J Clin Nutr* 2004; 80: 1678-1688.
14. Martini LA, Wood RJ. Vitamin D status and the metabolic syndrome. *Nutr Rev* 2004; 64: 479-486.
15. Dror DK. Vitamin D status during pregnancy: maternal, fetal, and postnatal outcomes. *Curr Opin Obstet Gynecol* 2011; 23: 422-426.
16. Hensel KJ, Randis TM, Gelber SE, Ratner AJ.

- Pregnancy- specific association of vitamin D deficiency and bacterial vaginosis. *Am J Obstet Gynecol* 2011;20(4): 41-49.
17. Holick MF. Vitamin D deficiency. *New Engl J Med* 2007; 357: 266-281.
  18. Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA et al. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab* 2011;96: 1911-1930.
  19. Kaniz Zahra Naqvi, S. Tahir Ali, Savita Thontia, Madiha. Prevalence of vitamin D deficiency in pregnant population at term attending a tertiary care Hospital Karachi, Pakistan. *Pak J Surg* 2012;28(2):122-125.
  20. Hossain N, Khanani R, Hussain-Kanani F, Shah T, Arif S, Pal L. High prevalence of vitamin D deficiency in Pakistani mothers and their newborns. *Int J Gynaecol obstet* 2011;112(3):229-33.
  21. Robert J Scroth, Christopher LB Lavelle, Michael EK Moffatt. A review of vitamin D deficiency during pregnancy: Who is affected? *International Journal of Circumpolar Health* 2005; 64:(2)112-120
  22. Stefanie Vandevijvere, Sihame Amsalkhir, Herman Van Oyen, Rodrigo Moreno-Reyes. High Prevalence of Vitamin D Deficiency in Pregnant Women: A National Cross-Sectional Survey. *PLoS ONE* 2012; 7(8):e43868. doi:10.1371/journal.pone.0043868.