



UTERINE ATONY; ASSOCIATION OF LOW SERUM VITAMIN D

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INTRODUCTION

Uterine atony is one of the commonest causes of postpartum hemorrhage leading to maternal morbidity and mortality¹. There are many risk factors reported to be associated with atonic uterus like grandmultiparity, multiple pregnancy, preeclampsia, chorioamnionitis and prolonged labour². Vitamin D is part of a complex steroid hormone system which is known to be involved in the bone metabolism. But recently Vitamin D has been found to be concerned with different physiological processes as vascular health, immune function, metabolism and placental function³. Vitamin D deficiency was associated with an increased risk of gestational diabetes, pre-eclampsia and small for gestational age infants.

ABSTRACT... Background: Uterine atony is one of the causes of postpartum hemorrhage, resulting in increased maternal morbidity and mortality. **Objective:** To determine the association of low serum vitamin D level with uterine atony, among women delivering in a tertiary care hospital. **Subjects and Methods: Study design:** Case control Study. **Setting:** Gynae and Obstetrics department of Sheikh Zayed Medical College, Rahim Yar Khan. **Duration:** 1st January to 31st December, 2013. A total of 130 patients were recruited and grouped as A (Cases) including patients with uterine atony (100 patients) and group B (Controls) patients having no uterine atony (30 patients) after cesarean section or vaginal delivery and fulfilling the inclusion or exclusion criteria. The test for 25 OH vitamin D was performed on Elecsys 2010 Roche by using electrochemiluminescence technique. Oral informed consent was taken from all subjects and approval from institutional ethical committee was obtained. Chi square test was applied to compare atony and non atony groups in terms of presence or absence of vitamin D deficiency. The data was entered and analysed on SPSS version 17. **Results:** It was noted that those who have uterine atony 87% were having vitamin D deficiency or insufficiency as compared to 68% in group with no uterine atony. This difference was statistically significant. ($p=0.02$) so uterine atony was significantly associated with vitamin D deficiency or insufficiency. In atony group mean age was 25 ± 4 years, gravida 2.64 ± 1.2 , gestational age, 37 ± 1.2 , blood loss 1032 ± 400 , and serum vitamin D level 15.9 ± 6 , ng/ml. In non atony group, group mean age was 26 ± 3 years, gravida 2.7 ± 1 , gestational age, $38\pm .8$, blood loss 309 ± 92 , and serum vitamin D level 23 ± 9 ng/ml. The mean level of serum vitamin D level was significantly low (15.9 ± 6 ng/ml) in atony group as compared to non atony group (23 ± 9 ng/ml). Mean blood loss was significantly high (1032ml) in atony group as compared to non atony group (309ml). **Conclusion:** Our results revealed that low vitamin D level is strongly associated with uterine atony and hence is a risk factor for uterine atony.

Key words: Vitamin D deficiency, Uterine atony, Postpartum Hemorrhage

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Pregnant women with low 25-hydroxy vitamin D levels had an increased risk of bacterial vaginosis and low birth weight infants and delivery by caesarean section⁴.

Vitamin D exerts its effect by binding to the vitamin D receptors (VDR) which is a nuclear hormone receptor. VDRs are found in many tissues and organs including the small intestine, colon, osteoblasts, activated T and B Lymphocytes, pancreatic B islets cells, brain, heart, skin, gonads, prostate, breast, mononuclear cells, as well as skeletal and smooth muscles⁵.

It was reported that women who were severely vitamin D deficient at the time of delivery had

almost 4 times the odds of cesarean births than women who were not deficient. This may be due to the fact that skeletal and smooth muscles contains the vitamin D receptor and vitamin D deficiency has been associated with proximal muscle weakness as well as with suboptimal muscle performance and strength. Serum calcium status which is regulated by vitamin D, plays a role in smooth muscle function in early labour. Higher serum calcium levels were reported in pregnant women at the time of vaginal delivery as compared to term women who were not in labour and delivered by caesarean section⁶. It was speculated that the higher serum calcium levels played a role in the mechanism of initiation of labour, which is the result of the adequate level of uterine smooth muscle contraction⁷. Serum vitamin D deficiency which causes decrease in serum calcium, thereby affecting the contractility of uterine smooth muscle, may result in atonic uterus and post partum hemorrhage, so present study was conducted to determine the association of low serum vitamin D level with uterine atony, among women delivering in a tertiary care hospital.

SUBJECTS AND METHODS

This was a retrospective, case control study, conducted in the Gynae and Obstetrics department of Sheikh Zayed Medical College, Rahimyar Khan, from 1st January to 31st December, 2013. A total of 130 patients were recruited and grouped as A (Cases) including patients with uterine atony (100 patients) and group B (Controls) patients having no uterine atony (30 patients) after cesarean section or vaginal delivery and fulfilling the inclusion or exclusion criteria. Cases of uterine atony were taken when there was loss of tone of uterine muscle OR failure of the myometrium to contract after the delivery of the placenta associated with the bleeding from the placental site, >500ml after normal delivery and >1000ml after cesarean section. Controls were similar to cases except that they do not have uterine atony. Exclusion criteria was grandmultipara (≥ 5), multiple gestation, polyhydramnios, preeclampsia, chronic renal or liver diseases, bleeding disorders, retained

products of conception and patients having bleeding from cervix or vaginal tear. Their blood samples were taken for serum Vitamin D (25 OH vitamin D) levels. The serum vitamin D levels were categorized as Normal level of vitamin D as 25 OHD concentrations >30ng/ml. Serum Vitamin D insufficiency was taken as 25 OHD of 20-30ng/ml. Vitamin D deficiency was taken as 25 OHD level of <20ng/ml. The test for 25 OH vitamin D was performed on Elecsys 2010 Roche by using electrochemiluminescence technique. Oral informed consent was taken from all subjects and approval from institutional ethical committee was obtained. Chi square test was applied to compare atony and non atony groups in terms of presence or absence of vitamin D deficiency. T-test was also used to compare mean level of vitamin D and blood loss in both groups. Pearson correlation was applied to correlate serum vitamin D with blood loss. The data was entered and analysed on SPSS version 17.

RESULTS

A total of 130 study subjects were included, with mean age of 25 ± 4 years, mean gravida of 2.6 ± 1 . It was noted that those who have uterine atony 87% were having vitamin D deficiency or insufficiency as compared to 68% in group with no uterine atony. This difference was statistically significant. ($p=0.02$) so uterine atony was significantly associated with vitamin D deficiency or insufficiency. (Figure 1)

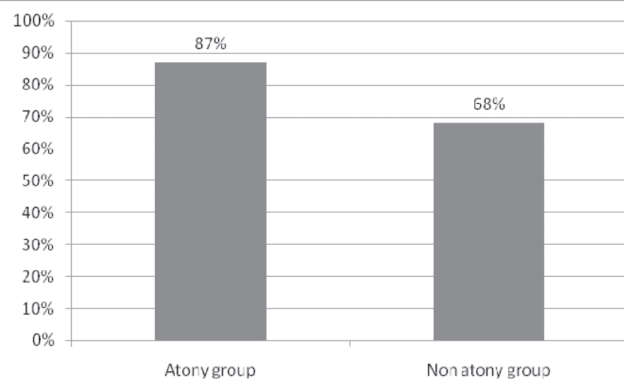


Figure-1. Comparison of Low serum 25 OH vitamin D level (<30 ng/ml) in both groups

It was noted that 84% in normal vaginal delivery patients as compared to 85% in cesarean section

Characteristics	Patient groups		P value
	Cases (Atony group)	Controls (Non atony group)	
Age in years (Mean±SD)	25±4	26±3	0.56
Gravida (Mean±SD)	2.64±1	2.7±1	0.72
Gestational age in weeks (Mean±SD)	37±1.2	38±0.8	0.53
Blood loss in ml (Mean±SD)	1032±400	309±92	0.00
Serum Vitamin D in ng/ml (mean±SD)	15.9±6	23±9	0.00

Table-I. Comparison of both groups (Case and Control)

patients have atony. The difference was not statistically significant. ($P=0.65$) and 86% among primi para patients as compared to 82% among multipara (2-4) have atony. The difference was not statistically significant. ($p=0.6$) whereas, 85% among < 30 years age patients as compared to 68% among >31 years age have atony. The difference was close to statistical significance. ($p=0.6$).

In atony group mean age was 25 ± 4 years, gravida 2.64 ± 1.2 , gestational age, 37 ± 1.2 , blood loss 1032 ± 400 , and serum vitamin D level 15.9 ± 6 , ng/ml. In non atony group, group mean age was 26 ± 3 years, gravida 2.7 ± 1 , gestational age, $38\pm .8$, blood loss 309 ± 92 , and serum vitamin D level 23 ± 9 , ng/ml. When t test was applied it was noted that the difference was significant among both groups for blood loss and serum vitamin d level. ($p=0.00$ for each) This means the mean level of serum vitamin D level was significantly low (15.9 ± 6 , ng/ml) in atony group as compared to non atony group (23 ± 9 , ng/ml). Mean blood loss was significantly high (1032ml) in atony group as compared to non atony group (309ml). (Table I) When pearson correlation was applied to assess correlation between blood loss and serum vitamin D level it was noted that there was negative correlation reflected by increase in blood loss with decrease in serum 25 OH vitamin D level.

DISCUSSION

In this study we have assessed the association of Vitamin D deficiency with uterine atony, a life threatening condition, which may lead to emergency hysterectomy and increased maternal morbidity and mortality. Uterine atony or diminished uterine contractility, accounts for 80% of post partum hemorrhage⁸. In current study, we

found that low serum vitamin D level was strongly associated with uterine atony.

Uterotonic drugs such as, oxytocin and prostaglandins increase the contraction of uterine smooth muscle by increasing intracellular calcium level^{9,10}. This is similar to the effects of vitamin D, thus suggesting the role of this vitamin in uterine atony as revealed by our findings.

It was thought for long time that only the kidney has the capacity to metabolize 25(OH)D, however, metabolism of 25 (OH)D has been demonstrated in many other organs in the body⁷. It has been reported that during pregnancy, the placenta is one of the most prominent site for extrarenal activation of vitamin D⁸. It has also been suggested that the extrarenal function of vitamin D has to do more with immune function than with calcium metabolism¹¹. Lisa M Bodnar et al, have concluded in their study that Low maternal serum 25(OH) D at 26 weeks gestation or earlier was associated with a increased risk of spontaneous preterm birth before 35 weeks among non white mothers¹². This further suggests that vitamin D receptors have also been found in endometrium, and vitamin D level has something to do with the uterine muscle ability to contract and its deficiency may lead to atony.

In a previous study, primiparity was associated with PPH and atony, however in our study, primiparity was not significantly associated with uterine atony¹³. Currently treatment options of severe hemorrhage secondary to uterine atony begin with uterotonic agents (oxytocin, methylergonovine, and prostaglandins). Further conservative interventions are intrauterine ballon tamponade, uterine compression sutures,

different pelvic devascularization techniques and vascular occlusion. Failure to achieve control of bleeding with the above measures prompts aggressive procedures such as abdominal hysterectomy¹⁴. Our study goes beyond these conventional measures and suggests that serum vitamin D and so the serum calcium level may be considered as a primary factor for uterine atony.

Nifedipine, a calcium channel blocker, used during delivery was reported to be associated with uterine atony, suggesting that low serum calcium, so low vitamin D level may be associated with uterine contractility thus uterine atony¹¹. The prostaglandins are uterotonic agents which cause an increase in myometrial intracellular calcium levels leading to an increase in myosin light chain kinase activity and uterine contractility¹⁵. This favors our findings that as vitamin D also increases serum calcium levels so its deficiency may lead to uterine atony. High maternal age has been considered as a risk factor for post partum hemorrhage due to uterine atony however, a previous study did not find any significant association of high age with uterine atony and this is comparable to our findings¹⁶.

CONCLUSION

Our results revealed that low vitamin D level is strongly associated with uterine atony and hence is a risk factor for uterine atony. We suggest that gynecologists should consider vitamin D deficiency as a primary risk factor for uterine atony and oral or injectible vitamin D prophylaxis may be used.

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Trust is like a paper,
once it's crumbled it can't be perfect.

Unknown

