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SERUM LEVEL OF VITAMIN D AND HYPERTENSIVEDISORDER IN PREGNANCY

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Abstract

Introduction: Hypertensive disorders of pregnancy, including gestational hypertension, preeclampsia (PE), and eclampsia, are among the major complications that account for approximately 14% of maternal mortality. The aim of this study is to determine the association between serum level of vitamin D and hypertensive disorder in pregnancy that include. Patients and Methods: This is a prospective case control study carried out in AL Basrah maternity &child hospital in the period from January 2021 till the 31 of January 2022.The study included 110 pregnant women who were divided in two groups; First group; (Cases) included women diagnosed with hypertensive disorders of pregnancy. Second group; (controls) normotensive pregnant women. **Result:** All 110 pregnant women enrolled in the study had either deficient (49 (98.0%) for cases and58 (96.7%) for controls) or insufficient level of vitamin D (1 (2.0%)for cases and2 (3.3) for controls). in our study we found there's NO association between serum level of Vitamin D and hypertensive disorder in pregnancy. Conclusion: in our study we found there's NO association between serum level of Vitamin D and hypertensive disorder in pregnancy.

Keywords: Serum, vitamin D, hypertensive, disorder, pregnancy

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Introduction:

Hypertensive disorders of pregnancy, including gestational hypertension, preeclampsia (PE), and eclampsia, account for approximately 14% of maternal mortality and complicate about 10% of pregnancies worldwide. PE is a major cause of maternal and perinatal morbidity and mortality, affecting 2% to 8% of pregnancies. Complications of PE include eclampsia, disseminated intravascular coagulation, HELLP syndrome, intrauterine growth restriction (IUGR), and fetal death [1-5]. PE has been hypothesized to be a two-stage disorder. In the first stage, reduced placental perfusion leads to defective placental implantation. In the second stage, reduced vascularization at the placental site activates a maternal inflammatory response, leading to generalized endothelial dysfunction and hypertension. A modified version of this hypothesis proposes that maternal factors in combination with normal inflammatory changes in pregnancy can lead to endothelial dysfunction with or without reduced placental perfusion [6-10]. Hypovitaminosis D has been associated with PE. Vitamin D's roles include modulating pro-inflammatory responses, decreasing oxidative stress in PE, promoting angiogenesis through VEGF gene modulation, and decreasing blood pressure through the renin-angiotensin system (RAS). Vitamin D status is determined by measuring circulating 25-hydroxyvitamin D [25(OH)D] levels [11-16]. Vitamin D is thought to play a significant role in PE as an immune modulator, helping to mount an appropriate maternal immune response to the placenta and preventing the release of anti-angiogenic factors. 1,25(OH)2D, the active form of vitamin D, has been shown to suppress T cell proliferation and down-regulate pro-inflammatory cytokines. Vitamin D also promotes angiogenesis in endothelial progenitor cells, possibly increasing VEGF expression and pro-MMP-2 activity [17-21]. The aim of this study is to determine the association between serum level of vitamin D and hypertensive disorder in pregnancy that include preeclampsia and gestational hypertension.

Method:

This is a prospective case control study carried out in AL Basrah maternity &child hospital in the period from January 2021 till the 31 of January 2022.The study included 110 pregnant women who were divided in two groups; First group; (Cases) included women diagnosed with hypertensive disorders of pregnancy. Second group; (controls) normotensive pregnant women. Both cases and controls were selected randomly from patients admitted to the labour ward and from obstetric outpatient in ALBasrah maternity and child hospital. All pregnant women in this study (cases and control) serum level of Vitamin D were measured at admission. Special printed questionnaire formula was used for each pregnant women including age, parity, gestational age, mode of delivery, neonatal outcome, admission to NICU, educational state, if she takes supplement of vitamin D during ANC or not. Vitamin D is considered adequate when 25(OH)D levels are above 50 nmol/L, as defined by the Institute of Medicine. A level between (30-50) nmol/L is considered insufficient, and less than 30 nmol/L, deficient [(22)].

Results:

A total of 110 women were involved in this study. The first group the cases were 50 pregnant women diagnosed with hypertension in pregnancy including gestational hypertension, and preeclampsia (PE), Pregnancy induced

hypertension, defined as blood pressure greater than 140/90 mmHg on two consecutive occasions ≥6 h apart occurring after 20 weeks of pregnancy, complicates approximately 10% of all pregnancies worldwide. Pre-eclampsia (PE) is hypertension and proteinuria (protein in urine ≥0.3 g/24 h (1+ dipstick) on two occasions ≥6 h apart) or edema, the second group were controls included 60 normotensive pregnant women. Their age ranged from 15-42 years old, and their mean age was 27.1±6.31 years. The majority of them were those between 21-40 years old (86.0% and 86.7% among case and control respectively). Regarding the parity, they range from 0-9, median equal to 2 children. Fifty-eight percent of mothers with hypertension have 1-4 children while mothers in the control group most of them having their first children (46.7%). There is no significant difference between both groups since the P- value = 0.148. Most of the women in the case group and control group had school education (62.0% and66.7% respectively). There is no difference in educational status (P-value=0.062) as showed in (Table 1).

Table 1: The sociodemographic characteristics among both studied group

Varibles	Case	Control	P-value
Age			
≤20	*6 (12.0%)*	*6 (10.0%)*	***0.890****
21-40	*43 (86.0%)*	*52 (86.7%)*	
≥41	*1 (2.0%)*	*2 (3.3%)*	
Parity			
Nuliparas	*15 (30.0%)*	*28 (46.7%)*	***0.148*** **
Para 1-4	*29 (58.0%)*	*24 (40.0%)*	
>4	*6 (12.0%)*	*8 (13.3%)*	
Educational status			
Illiterate	*8 (16.0%)*	*2 (3.3%)*	***0.062 ****
School education	*31 (62.0%)*	*40 (66.7%)*	
Higher education	*11 (22.0%)*	*18 (30.0%)*	
Total	*50 (100.0%)*	*60 (100.0%)*	
fisher-exact test ***chi-secure test***			

The mode of delivery, most of the women in both groups had a normal vaginal delivery (P-value = 0.265). Regarding the perinatal outcome, 24.0% of children born to women with hypertension need NCU admissions in comparison to 6.7% in normal mothers. There is a significant difference between groups (P-value=0.048). The women in both groups showed no

significant difference regarding the gestational age at delivery (P-value= 0.563). Regarding the association between hypertension in pregnancy and vitamin D3 levels, the majority of women in both groups had vitamin levels less than 30 nmol/l (98.0% and 96.7% among case and control respectively). P- value = 0.669 so there is no significant association between hypertension in pregnancy and vitamin D3 levels.

Table 3: Serum vitamin D3 among both studied groups

Vit D3 level	***Case***	***Control***	***P-value***
Defecient < 30 nmol/l	*49(98.0%)*	*58 (96.7%)*	***0.716****
Insuffecient (30-50) nmol/l	*1 (2.0%)*	*2 (3.3%)*	
Normal > 50 nmol/l	*0 (0.0%)*	*0(0.0%)*	
Total	*50 (100.0%)*	*60 (100.0%)*	
****fisher-exact test***			

The case group involved women with gestational hypertension and preeclampsia, Table 4 showed the vitamin D3 level among women with gestational hypertension and those with preeclampsia. The serum vitamin D3 level looked to be lower among women with preeclampsia than its level in women with Gestational

Varibles	***Case***	***Control***	***P-value***
Mode of delivery			
NVD	*39 (78.0%)*	*40 (66.7%)*	***0.265****
S/C	*11 (22.0%)*	*20 (33.3%)*	
Admission to NCU			
Yes	*12 (24.0%)*	*4 (6.7%)*	***0.048****
No	*38 (76.0%)*	*56 (93.3%)*	
Gestational age			
≥37 wk	*25 (50.0%)*	*26 (43.3%)*	***0.563****
38-40 wk	*25 (50.0%)*	*34 (56.7%)*	
>40 wk	*0 (0.0%)*	*0 (0.0%)*	
Total	*50 (100.0%)*	*60 (100.0%)*	
****fisher-exact test*** *****chi-sequre test***			

hypertension, still there is no significant difference (P-value = 0.073).

Table 4: Serum vitamin D3 among cases

PIH	S.vit D	P-value
Preeclampsia	*11.39 ± 3.11*	***0.073****
Gestational hypertention	*13.56 ± 4.82*	
***two sample independent t-test**		

The women in the study were asked about vitamin D3 supplementation during the current pregnancy, and most of them mention no history o vitamin D3 supplement intake (84.0% and 83.3% among case and control respectively). There is no difference between the case and control (P-value =0.925).

Table 5: The distribution of studied group in relation to the vitamin D3 supplementation: -

SupplemenT	Cases	Control	P-value
Yes	*8 (16.0%)*	*10 (16.7%)*	***0.925****
No	*42 (84.0%)*	*50 (83.3%)*	
Total	*50 (100.0%)*	*60 (100.0%)*	
***fisher-exact test**			

Discussion:

Vitamin D deficiency has emerged as a public health problem worldwide due to its important role in health and disease. Evidence from clinical and epidemiological studies support a possible relationship between low vitamin D level and hypertension, and there are some biological mechanisms as well. However, epidemiological studies are always vulnerable to multiple confounding factors that cannot be always controlled. Several studies have reported a high associations between Vitamin D and hypertensive disorder in pregnant women (Rose Mary J. Vatakencherry and L Saraswathy – Karen M.OCallaghan and Mairead kiely [23, 24]. This is in contrast to our study. Our results revealed there's no difference between normotensive pregnant women and pregnant women with hypertensive disorders regarding the level of vitamin D. The explanation for this finding is based on the fact that all the women in this study wear hijab and all their time spend indoors with less sun exposure because of elevated temperature in summer, and covering their bodies completely for cultural reasons that makes sun exposure difficult. Although in this study no association between vitamin D deficiency and hypertensive disorder among pregnant women was found,

over 90% of pregnant women in this study were vitamin D deficient in both cases and control. Vitamin D deficiency or insufficiency is not expected to be a cause of hypertensive disorder, but still vitamin D status becomes crucial for maternal health, fetal skeletal growth, and optimal maternal and fetal outcomes. Pregnant women have poor vitamin D supplementation practices and usually consume vitamins that are necessary for maternal and neonate health such as folic acid and iron [25, 26] so more efforts must be done by the health personals to encourage more vitamin D supply to all pregnant women

Conclusion:

There is no association between serum level of VIT D and hypertensive disorder in pregnancy found in this study.

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