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Role of pregnancy and its trimesters in vitamin D deficiency in Thi-Qar province/South of Iraq:comparative study

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Abstract— Background**:** Vitamin D is an essential factor for body healthy especially in pregnant, deficiency of this vitamin is worldwide distributed health careincluding Middle East. The aim of the study is a determine the relationships between vitamin D concentration and some social and hematological parameters in pregnant women in Thi-Qar province/South of Iraq.
Method: A comparative analytical study design was used with in Bint Al-Huda public hospital-and Al-Rahman gynecology and obstetrics private hospital /Thi-Qar-Southern of Iraq. In a period from September to November/2020, list of questionnaire includings: age, occupation, residence, miscarriage and trimester. specific investigation involving complete blood count and vitamin D level assay were done by coulter counter and immune fluorescence technique..
Results: the result showed high prevalence of vitamin D insufficiency among the women under study with no significant differences among the group (p value = 0.887), and there are no significant relation between the age, occupation and residence with the vitamin D levels under (p value $\leq$ 0.05), while the results reveals significant differences in Hb, PCV and MCHC between groups under (p value = 0.014, 0.003, 0.045), respectively. Also, high level of correlation was seen between vitamin D concentration and hematologic parameters (Hb, PCV,MCHC) with significance correlation (p-value < 0.001).
Conclusion:the high percent of women including pregnant in Iraq suffer from vitamin D deficiency and insufficiency and the socio-economic factor play a role in this status with the high correlation between vit. D level and Hb, PCV and MCHC levels of blood, diagnosis and treatment of vit. D deficiency with adequate 25(OH)D concentrations are critical to maintain a good health care for pregnant women. More studies are required to detects others factors related to this deficiency in Iraqi populations.

Keywords: vitamin D deficiency, pregnancy, hematologic parameters

Introduction

Vitamin D deficiency is widespread and a main health problematicall over the place in both developed and developing countries,the prevalence of hypovitaminosis Dis much higher in Asia,where about 30-50% of people in India, Lebanon and Turkey, are deficient in vitamin D. As well as,the incidence of vitamin D deficiency was 96.8%in women in some area of China and half of them (44.8%) undergo severe deficiency[1,2,3,4].Highest prevalence of vitamin D deficiency was recorded in Middle East countries and its more prevalent in women when compared with men due to inadequate exposure to the sunlight and low dietary intake, which disclosures them to

the hazard of many diseases related vitamin deficiency [4,5]. During pregnancy, vitamin D deficiency is resultsfrom various mechanisms, including reduced vitamin D intake due to low dietary vitamin, fat malabsorption disorders and hydroxyl imbalance of vitamin D by the liver and kidneys to produce the vitamin. (25-OH). E 1,25 (OH) 2 vitamin D respectively, and insensitivity of the organs to metabolites of vitamin D [6,7]. The significance of vitamin D for reproductionwassustained by numerous studies. In humans, the reproductive health depends greatly on the relevant of vitamin D signaling. Also, there are some indications of hypovitaminosis Dand its related to fertility through an subsidiary effect that this leads to hypocalcemia and hypophosphatemia. Without vitamin D, the body engages up to 30% less calcium and 20% less phosphorus [8,9]. Vitamin D deficiency is prevalent among pregnant women and its found to be linked with an increased risk of infections,preterm labor, gestational diabetes, preeclampsia, and clinical conditions [10,11]. Vitamin D deficiency through pregnancy has significant consequences for the newborn, including fetal vitamin D deficiency, tetanus, neonatal rickets, and infantile rickets [12,13]. The study aimed to determine the relationships between vitamin D concentration and some social and hematological parameters in pregnant womenin Thi-Qar province/South of Iraq.

Methodology

A comparative analytical study design was used with in Bint Al-Huda public hospital- and Al-Rahman gynecology and obstetrics private hospital/Thi-Qar-Southern of Iraq. Period of study extended from 1st week of September till the end of November/2020, where no specific age criteria recruited. Age extended from 15 years till 65 years with mean age of 29. 719±9.64 years. Address (rural and urban studied in detail because the objective might be related to nutritional status), Occupation that addressed into its different characters (house wife, students retired and employers), obstetric history regarding their pregnancy status (pregnant and none), trimester of the pregnancy according to weeks of gestation (1st , 2nd and 3rd) parity and gravida (one, two, three and four and more), abortion history (positive and negative), specific investigation such complete blood count and vitamin D level assay,

Inclusion criteria: all women attending the gynecology and obstetricsoutpatient during the period of the study but must be without chronic medical illnesses such as hypertension, DM, heart diseases, chronic GIT problem(s), rheumatologic diseases, chronic nutritional disease, osteoarthritis, osteopenia, thyroid and parathyroid diseases, calcium related disease, known cases of vitamin D deficiency or insufficiency), chronic urinary tract problems and chronic hematological diseases (these were as an exclusion criteria).

A verbal consent was taken from all participant after explanation of the aims of the study, and full local authority permission was taken from all departments that might be engaged in the study. Data collected by well-structured questionnaires one for the pregnant and the second one for the non- pregnant obtaining full informative curriculum regarding the variables of interest listed above. Blood sample in EDTA tube was Labeling for each specimen was done serially coded, time and date of collection, then transported immediately Laboratory, CBC was detected by using coulter counter (Mendray-China). While, vitamin D concentration was measured by immune fluorescence assay using (i-chroma 2-Korea) according to the manufacturer instruction.

Statistical analysis: SPSS version 25 had been used for the analysis of the collected data. Where frequency, percentages, and proper statistical test (Chi-square , Fischer Exact, ANOVA tests, correlation regression analysis were used for the determining the differences and to relate the variables independently with outcome.

Results:

A comparative study recruiting 82 women, 41 pregnant, and 41 non pregnant, with mean age 29.7195 ±9.64720 years, a well cross matching regarding the age, address and occupation regarding the entities of the trimesters also consider in mind. Age mean , residence, occupation and abortion history were of non-significant difference, P value at level of 0.05 were more than the level of interest.

Table 1: Pregnancy state distribution according to residence, Job, and abortion status (some elective personal criteria)

		Pregnancy				Total	Fissure exact test
		None	1st T	2nd T	3rd T		
Address	Urban	19	9	4	9	41	1.415
		46.3 %	22.0%	9.8%	22.0%	100.0%	0.737
	Rural	22	10	4	5	41	
		53.7 %	24.4%	9.8%	12.2%	100.0%	
Job	House wife	34	14	3	14	65	16.148
		52.3 %	21.5%	4.6%	21.5%	100.0%	0.068
	Student t	3	1	2	0	6	
		50.0 %	16.7%	33.3%	0.0%	100.0%	
	Officer	3	4	3	0	10	
		30.0 %	40.0%	30.0%	0.0%	100.0%	
	Retired	1	0	0	0	1	
		100.0 %	0.0%	0.0%	0.0%	100.0%	
Abortion	Present	10	7	3	3	23	1.561
		43.5 %	30.4%	13.0%	13.0%	100.0%	0.748
	Absent	31	12	5	11	59	
		52.5 %	20.3%	8.5%	18.6%	100.0%	

Total		41	19	8	14	82
		50.0 %	23.2%	9.8%	17.1%	100.0%

Table 2: Mean difference of the age, vitamin D and CBC among studied groups:

Parameters		Mean	Std. Deviation	F	Sig.
Age	None	32.2683	11.66839	2.026	0.117
	1st T	26.7368	6.38437		
	2nd T	26.8750	5.66789		
	3rd T	27.9286	6.73069		
Vitamin D	Non	17.3583	9.7435	0.213	.887
	1st T	15.6732	4.78443		
	2nd T	16.0975	6.42558		
	3rd T	16.5364	6.32775		
RBC	None	8.8195	2.56615	.520	.670
	1st T	9.0526	3.24574		
	2nd T	9.7500	2.07709		
	3rd T	9.6071	1.50357		
WBC	None	4.8132	1.12238	2.723	.050
	1st T	4.4668	.59592		
	2nd T	4.0937	.30900		
	3rd T	4.2050	.45370		
Hb	None	11.8366	2.32236	3.795	.014
	1st T	11.5421	1.43423		
	2nd T	9.8500	1.50238		
	3rd T	10.371	1.16251		

		4			
PCV	None	39.1168	7.69490	5.181	.003
	1st T	36.8526	4.15216		
	2nd T	32.5500	4.28852		
	3rd T	31.7357	7.93906		
MCV	None	82.4073	8.46963	.389	.762
	1st T	82.8789	6.64911		
	2nd T	79.7125	10.46278		
	3rd T	80.8500	8.96375		
MCH	None	25.0732	3.27025	.679	.567
	1st T	25.9684	2.50756		
	2nd T	24.3250	3.68695		
	3rd T	24.7929	3.24048		
MCHC	None	303.5366	11.26964	2.802	.045
	1st T	313.0526	13.78596		
	2nd T	304.5000	12.29402		
	3rd T	306.2857	11.17985		

The WBC, Hemoglobin level, PCV and MCHC as a hematological parameters show significant statistical differences, when linked with different vitamin D level according to their state of pregnancy (p value < 0.05). The other hematological parameters doesn't show such differences (p value >0.05) as shown in table 2.

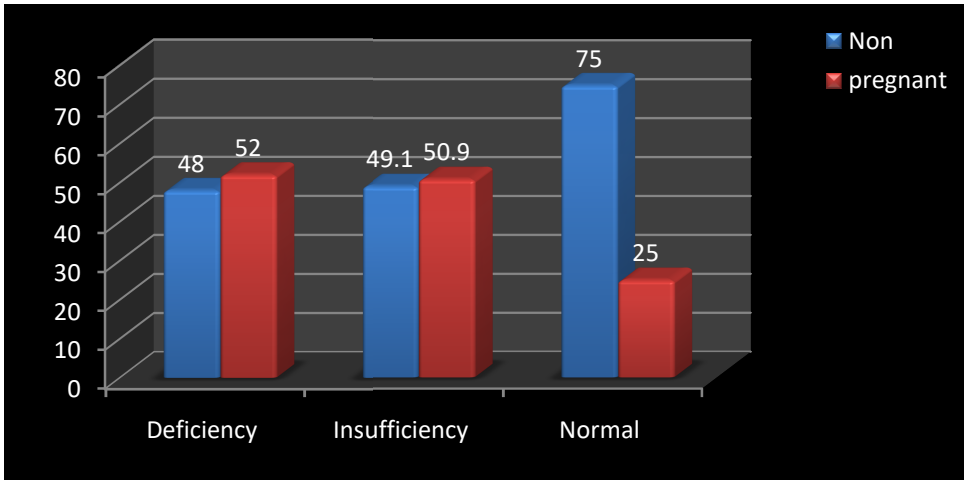

Figure1 : Cases and control according to vitamin D status.

Chi-square= 1.059, P value=0.343

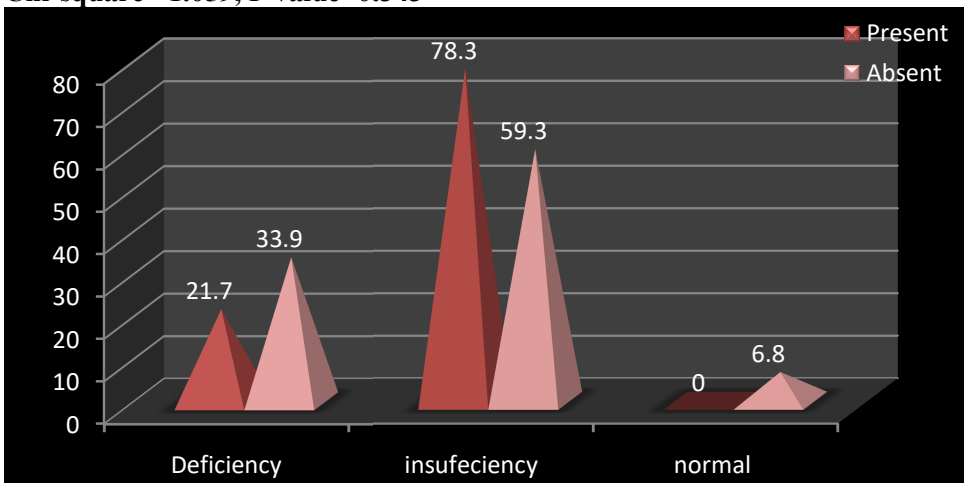

Figure 2 : Vitamin D statusaccording to abortion history.

Chi-square=3.821 , P value=0.47

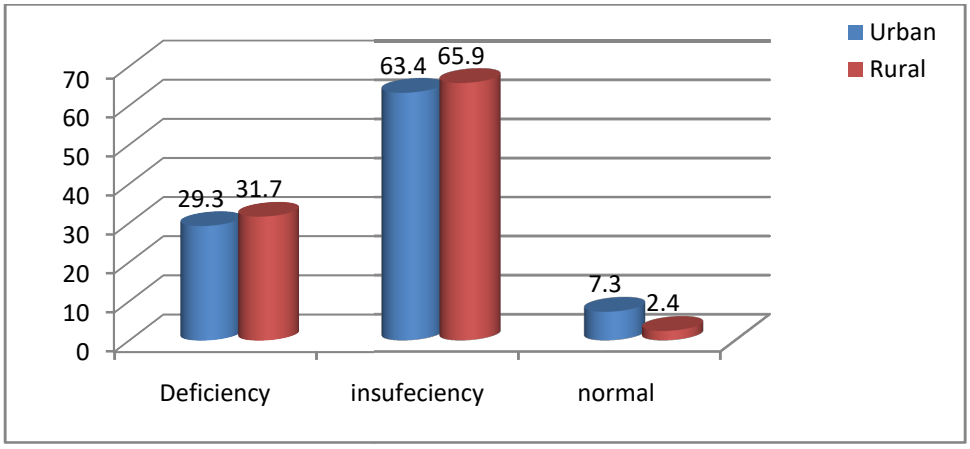

Figure3 : vitamin D status according to residence.

Chi-square= 1.059, P value=0.393

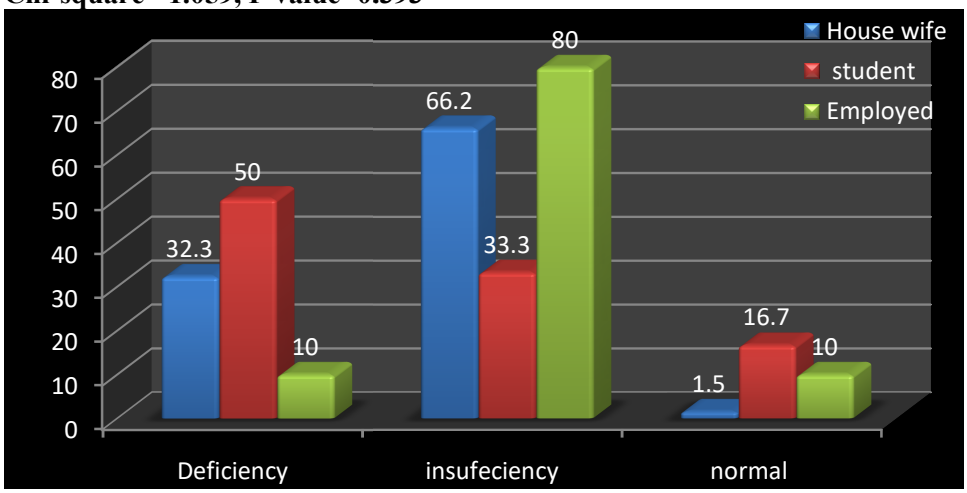

Figure 4 : Jobs relation with vitamin D status.

Chi-square= 26.728 , P value=0.013

Figure 1-4 show the relationship between the vitamin D levels as sub categories with cases and control, residence, jobs, and abortion, only jobs showing statistical differences, where P value < 0.05

Table3 :Vitamin D according to pregnancy state Cross tabulation

		Pregnancy				Total	Sig.
		None	1st T	2nd T	3rd T		
Vitamin D	Deficiency	12	6	3	4	25	2.195 0.446
		48.0%	24.0%	12.0%	16.0%	100.0 %	
	Insufficiency	26	13	5	9	53	
		49.1%	24.5%	9.4%	17.0%	100.0 %	
	Normal	3	0	0	1	4	
		75.0%	0.0%	0.0%	25.0%	100.0 %	
Total	Count	41	19	8	14	82	
	% within vitamin D	50.0%	23.2%	9.8%	17.1%	100.0%	

Table4 :Vitamin D according to trimesters of pregnancy

		pregnancy			Total	Sig.
		1st T	2nd T	3rd T		
Vitamin D	Deficiency	6	3	4	13	2.095 0.363
		46.2%	23.1%	30.8%	100.0%	
	Insufficiency	13	5	9	27	
		48.1%	18.5%	33.3%	100.0%	
	Normal	0	0	1	1	
		0.0%	0.0%	100.0%	100.0%	
Total	Count	19	8	14	41	
	% within vitamin D	46.3%	19.5%	34.1%	100.0%	

The cases as a total and as subtypes (according to trimesters) and control show no significant difference regarding vitamin D level as shown in table 3 and 4.

Table5: Correlation regression analysis of independent variable for vitamin D status

Parameters		Vitamin D	age	RBC	WBC	Hb	PCV	MCV
Age	Pearson Correlation	.006						
	Sig. (2-tailed)	.960						
RBC	Pearson Correlation	.038	-.132-					
	Sig. (2-tailed)	.734	.236					
WBC	Pearson Correlation	-.162-	.194	.071				
	Sig. (2-tailed)	.146	.080	.525				
Hb	Pearson Correlation	-.050-	.149	.078	.776**			
	Sig. (2-tailed)	.652	.181	.485	.000			
PCV	Pearson Correlation	-.058-	.143	.056	.786**	.867**		
	Sig. (2-tailed)	.602	.200	.619	.000	.000		
MCV	Pearson Correlation	.159	-.001-	.063	-.319-**	.290**	.134	
	Sig. (2-tailed)	.154	.992	.573	.003	.008	.23	

							0	
MCH	Pearson Correlation	.171	-.050-	.070	-.290-**	.344**	.159	.961**
	Sig. (2-tailed)	.124	.653	.534	.008	.002	.154	.000
MCHC	Pearson Correlation	.118	-.138-	.044	-.090-	.367**	.169	.492**
	Sig. (2-tailed)	.289	.217	.696	.421	.001	.129	.000
	N	82	82	82	82	82	82	82

The Hb, PCV, and MCHC are the independent variables that were statistically correlated with vitamin D levels.

Discussion

The main quantities of vitamin D is provides to human body through the cutaneous synthesis after exposure to the sunlight, while less amount are gets from dietary sources. Diversified Consequently, the world has observed a high prevalence of hypovitaminosis D.This vitamin has manifold roles in the metabolism and health of the body where its promotes the health of bones and supporting the functions of nervous and immune system[14,15]. ((**Vitamin D Status in South)) (Vit D benefits)**

The study showed a significant relationship under a probability level less than 0.05 between vitamin D levels and the blood variables represented by WBCs, Hb, PCV and MCHC,which is identical to several studies[16,17].This is clear evidence of vitamin D effects on the metabolic processes in the body like those that related to the formation of blood cells and hemoglobin, as most women suffer from a decrease in the hemoglobin concentration and the PCV value during pregnancy, the problem is further complicated by the decrease of vitamin D levels, which results from malnutrition due to the physiological effects of pregnancy and the drought of foods containing this vitamin [18,19].

There are no significant differences in vitamin D concentrations between pregnant, non-pregnant women and those who have suffered from miscarriages under study. This includes the different stages of pregnancy and is similar to what was found by [5,9,11,12], where its appeared that the problem of deficiency ofthis vitamin is a general health problem for all groups of women in the study because of social customs in Iraqi society that limit the movement of women and the types of clothing which greatly reduces their exposure to sunlight, which is an important source of vit. D productionin the body in addition to that of pregnant women already suffer from decreasing of movement and nutrition and scarcity of foods containing vitamin D, which is a major reason for this deficiency, as well as checking the concentration of this vitamin is not among the regular routine tests for pregnant women in the Iraqi health system, which leads to the failure to diagnose

and treatment a very large proportion of cases of vitamin D deficiency.Vitamin D deficiency during pregnancy has been linkedto an increased risk ofpreterm birth, pre-eclampsia, small-for-gestational age infants, gestational diabetes mellitus, reduced bone mass, decreased fetal skeletal formation leading to infant rickets and some tissue-specific conditions [20].So,socio-economic factorsplaysan important role in the limitationof the vitamin D dietary consumption and enough exposures to sunlight to preserveoptimum levels of 25-hydroxyvitamin D (25(OH)D).

There was no relationship between the residence of the women under study, whether rural or urban, with the concentration of vitamin D, and the reason is due to the similarity of social conditions, as all groups are subject to the same conditions that reduce exposure to sunlight, as well as the similarity found in dietary habits, which is similar to the findings of other studies [5,21].

In the current study, there is a large correlation between vitamin D concentrations and the decreasing of hematologic variables Hb, PCV andMCHC, this is due to the close relationship between the vitamin and the metabolic processes of the synthesis of blood cells in the body, such as its effect on metabolism Calcium, which is one of the important elements in cellular metabolism[22,23,24].

Conclusion

In conclusion, the high percent of women including pregnant in Iraq suffer from vitamin D deficiency and insufficiency and the socio-economic factor play a role in this status with the high correlation between vit. D level and Hb, PCV and MCHC levels of blood, diagnosis and treatment of vit. D deficiency with adequate 25(OH)D concentrations are critical to maintain a good health care for pregnant women. More studies are required to detects others factors related to this deficiency in Iraqi populations.

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