



KK Women's and
Children's Hospital
SingHealth

Vitamin D Levels in Singapore Women in early Pregnancy

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Introduction

Vitamin D has been established to play an essential role in bone and mineral metabolism. There is increased interest in understanding prevalence of Vitamin D deficiency in pregnant patients as many studies report association of low vitamin D levels with obstetric complications (e.g. pre-eclampsia, intrauterine growth restriction) and neonatal sequelae (Rickets, convulsions etc). Although guidelines have been established in many developed countries on Vitamin D supplementation, there is still a paucity of local studies in Singapore evaluating the levels of vitamin D levels in women in the first trimester of their pregnancies.

Hypothesis

Singapore women in first trimesters are Vitamin D deficient

Aim

Assess prevalence of Vitamin D deficiency in early pregnancy at a tertiary referral center and hence determine the role for screening of Vitamin D levels in our population

Clinical significance

By establishing the prevalence of Vitamin D deficiency in our population, we can aim to include universal screening of vitamin D levels into our routine antenatal investigations.

This will potentially help us to identify and supplement Vitamin D deficiency women in our population and reduce sequelae from obstetric and neonatal complications

Methodology

A prospective cohort study of 93 patients was recruited over a 6 months period from 2020-2021 from the outpatient clinics of our study members at the KK Women's and Children's Hospital in Singapore. Maternal demographics and health factors were recorded via an investigator-led standardized questionnaire. Patient had their blood collected via venepuncture in their first trimester and serum levels of 25-hydroxyvitamin D (25-OH Vit D) were recorded in our database. They were stratified into sufficient ≥ 30 , insufficient ≥ 20 and < 30 , moderately deficient ≥ 10 and < 20 and severely deficient < 10 .

Selection Criteria

Inclusion

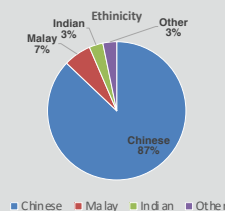
- ≥ 21 years old
- 1st trimester pregnancy determined by ultrasound

Exclusion

- Pre-existing diabetes mellitus
- Renal or cardiovascular disease
- Use of anti-convulsants

Results

Figure 1: Ethnicity



Mean age of patients was 32.1. The average gestational age was 12.2 weeks. 87% were Chinese, 7% were Malay, 3% Indians and 3% of other races. The mean weight was 58.1 with average BMI of 22.5. Of our population, the average 25-OH D levels were 20.0 ng/ml.

Results Table 1 Descriptive statistics

Category	Severely Deficient	Moderately Deficient	Insufficient	Sufficient
Vitamin D level (ng/mL)	< 10	≥ 10 and < 20	≥ 20 and < 30	≥ 30
No of subjects	N= 2	N= 43	N= 46	N= 2
Continuous variables	Mean, $\pm$ SD			
	Median, IQR (25%-75%)			
Age	30.5 $\pm$ 0.7	31.3 $\pm$ 3.7	32.8 $\pm$ 3.6	32.5 $\pm$ 6.4
	30.5, NA	31.0 IQR (29.0-34.0)	33.0 IQR (31.0-35.0)	32.5, NA
Gestational Age (GA)	10.8 $\pm$ 0.3	12.2 $\pm$ 1.2	12.2 $\pm$ 1.4	12.2 $\pm$ 1.4
	10.8, NA	12.4 IQR (11.3-13.0)	12.4 IQR (10.7-13.6)	12.4, NA
Weight (kg)	66.0 $\pm$ 1.4	60.5 $\pm$ 14.5	55.9 $\pm$ 8.7	55.9 $\pm$ 8.7
	66.0, NA	58.0 IQR (51.9-68.0)	55.0 IQR (49.0-63.0)	55.0, NA
BMI	25.2 $\pm$ 1.2	23.2 $\pm$ 4.9	21.8 $\pm$ 3.2	21.8 $\pm$ 3.2
	25.2, NA	21.8 IQR (20.2-26.8)	21.4 IQR (19.3-24.1)	21.4, NA

Dependent variable: Vitamin D Level (Deficient, < 20ng/mL)	Univariate	Multivariable
Age	Odds ratio (95% CI) p value	Odds ratio (95% CI) p value
Weight (every 5 kg increase)	0.89 (0.79, 1.01) p = 0.052	0.89 (0.79, 1.00) p = 0.050
BMI	1.23 (1.01, 1.50) p = 0.043	1.24 (1.01, 1.53) p = 0.042
Gestational age	1.10 (0.99, 1.23) p = 0.079	
	0.90 (0.66, 1.23) p = 0.510	
Education		
Secondary/JC/Polytechnic/vocation/ITE	Reference	
University & above	1.02 (0.41, 2.56) p = 0.964	
Gravida		
0-1	Reference	
2	1.45 (0.59, 3.54) p = 0.418	
3-4	0.95 (0.27, 3.34) p = 0.936	
Parity		
0	Reference	
1-2	1.53 (0.67, 3.53) p = 0.315	
Smoker		
100% non-smoker	Reference	
Periconceptual Multivitamin Supplementation		
No	Reference	
Yes	0.60 (0.26, 1.38) p = 0.229	
Hours of Sun Exposure/day (hours)		
< 1 hour	Reference	
≥ 1 hour	1.14 (0.51, 2.56) p = 0.758	

Table 2 Association

Discussion

Only 2.2% of our study population had sufficient vitamin D levels. In women In women who had insufficient vitamin D levels, the heavier the weight, the more likely to be deficiency in vitamin D. Interestingly, we also note that the older the age, the less likely they are to be deficient in vitamin D. In women with periconceptual multivitamin supplementation, the average vitamin D level for those with supplementation was 2.10ng/ml higher than those without.

Limitations

Our study was performed during the COVID-19 restrictive period where activities were restricted. There is the possibility that less outdoor activities could have contributed to lower Vitamin D levels. A majority of our patients were also recruited from a single study member's patient pool who were mostly Chinese. This may imply that the level of Vitamin D levels in our general obstetric patients with higher BMI and darker skinned colour may even be lower.

Conclusion

Indeed, the prevalence of hypovitaminosis D was proven in our local cohort study. Moving forward, we hope to evaluate the association of low vitamin D levels with obstetric complications and aim to implement screening of vitamin D levels as part of antenatal investigations in the first trimester.

Acknowledgements

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