

Conference Paper

## Study of Vitamin D Deficiency on Pregnancy Women in Rupert Utara District Bengkalis Regency Riau Province

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### ABSTRACT

Vitamin D is a potent steroid hormone calcitriol precursor which is known to have important roles during pregnancy, especially for fetal growth. Previous research proved vitamin D supplementation during pregnancy can decrease the risk for women to give birth to small for gestational age babies. Rupert Utara District is a remote area and located far from secondary health care facilities or hospitals, therefore it became one of the most concerning areas in Bengkalis Regency due to the high number of stunting cases. This is why complete examination in pregnant women with vitamin D deficiency risks living in Rupert Regency is important to lower the number of stunting cases. This study is aimed to describe the prevalence and understand the factors that can contribute to vitamin D deficiency conditions in pregnant women. This study used the descriptive method. The sample recruited was pregnant women living in Rupert Utara District and 35 pregnant women matched the inclusive and exclusive criteria for the study. The result showed that the number of vitamin D deficiencies was 60%. Subjects with vitamin D deficiency mostly were in the third semester gestational age (42.9%), Melayu ethnicity (71.4%), not working (81.0%), being outside for less than 1 hour/day (71.4%), and not regularly taking vitamin D supplementation before the study (57.1%). This high number of vitamin D deficiency in Rupert Utara District reflected how vitamin D supplementation during pregnancy is important.

*Keywords: Vitamin D deficiency, pregnancy*

### Introduction

Vitamin D is known to have an important role during pregnancy, especially in fetal growth. Vitamin D is a precursor to the potent steroid hormone calcitriol known as 1,25-dihydroxyvitamin D<sub>3</sub> (1,25(OH)<sub>2</sub>D<sub>3</sub>). Research has shown that vitamin D supplementation during pregnancy can reduce the risk of small for gestational age or low birth weight babies (Ioannou et al., 2012; Hajizadeh et al., 2019; Kiely et al., 2017; American College of Obstetricians and Gynecologists, 2011).

Oral vitamin D<sub>3</sub> or vitamin D is converted to 25(OH)D in the liver and then into a hormonal metabolite, namely 1,25(OH)<sub>2</sub>D (calcitriol) in the kidneys or other organs as needed. When compared to non-pregnant or postpartum women, women in the third trimester of pregnancy produce twice as much 1,25(OH)<sub>2</sub>D as those in the other trimesters of pregnancy (Cunningham et al., 2020).

Vitamin D supplementation during pregnancy has been associated with a reduced incidence of preeclampsia, gestational diabetes, and primary cesarean sections in women who are at term,

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according to observational studies and randomized controlled trials. RCT studies of vitamin D supplementation have consistently shown efficacy in increasing 25 (OH) D levels in pregnant women and neonates despite varying doses of 25 (OH) D.2 (Hajizadeh et al., 2019). Vitamin D deficiency in pregnant women is an important public health problem because it has been hypothesized that Low maternal vitamin D may be associated with decreased fetal growth (Ioannou et al., 2012). Although vitamin D supplementation during pregnancy has received many recommendations, there is currently no guideline for pregnant women to take vitamin D regularly. Therefore, this study aimed to describe the incidence of vitamin D deficiency in pregnant women in North Rupa, Bengkalis, Riau.

### Material and Methods

This study was a quantitative, observational study with a cross-sectional approach to describe the incidence of vitamin D deficiency in North Rupa District in 35 samples of pregnant women. The study was conducted in Rupa District, Bengkalis Regency, Riau Province from June 2022 to August 2022. The sample of this study was pregnant women in North Rupa sub-district. The inclusion criteria were pregnant women with vitamin D deficiency while the exclusion criteria were pregnant women with vitamin D allergies, having impaired vitamin D absorption. Statistical analysis was performed using SPSS software (Statistical Package for Social Sciences, Chicago, IL, USA). Univariate analysis (numerical data, categorical) is presented in a description of the characteristics of the research subjects presented in tabulated form and described.

### Results and Discussion

The penalty for paying compensation is a consequence of deceit or corruption that endangers the country's finances or the country's economy. A Juridical means is needed to recover the losses, namely in the remittance of replacement money. Replacement money is an additional form of punishment (criminal) in corruption cases. In essence, both legally and doctrinally, judges are not required to always impose additional penalties.

The results showed that the rate of vitamin D deficiency was 60%. Subjects with vitamin D deficiency were mostly in the third semester of pregnancy (42.9%), ethnic Malay (71.4%), not working/unemployed (81.0%), being outside less than 1 hour/day (71,4%), and did not routinely take vitamin D supplementation before the study (57.1%).

Table 1. Characteristics of research subjects (N=35)

Characteristic	n = 35	%
Deficiency of Vitamin D		
Yes	21	60%
Tidak	14	40%
Gestational Age		
Semester I	10	28,55%
Semester II	10	28,55%
Semester III	15	42,90%
Ethnicity		
Malay	25	71,40%
Non-Malay	10	28,60%
Occupational Status		
Unemployed	28	81%
Employed	7	19%

*To be continued...*

Being Outdoors		
<1 hour/day	25	71,40%
>1 hour/day	10	28,60%
Supplementation of Vitamin D		
Not routine	20	57,10%
Routine	15	42,90%

The results showed that the rate of vitamin D deficiency was 60%, of which 57.1% of these pregnant women did not regularly take vitamin D supplementation. A low vitamin D status in adults and children is defined by the Institute of Medicine of the United States as serum 25-hydroxyvitamin D (25(OH)D) concentrations < 50 nmol/L (20 ng/mL). According to clinical laboratory categorization, vitamin D deficiency is defined as concentrations 50 to <80 nmol/L ( $\geq$  20 to < 32 ng/mL) while adequate concentrations are 80 nmol/L ( $\geq$  32 ng/mL). The United States Institute of Medicine indicates that a serum concentration (25(OH)D) > 50 nmol/L (or 20 ng/mL) is adequate for pregnant women (Hajizadeh et al., 2019).

Because serum 25(OH)D reflects both an individual's dietary vitamin D intake and cumulative sun exposure, it is mainly identified as the best biochemical biomarker of vitamin D status. For the diagnosis and follow-up of vitamin D deficiency, measurement of circulating 25(OH)D levels is crucial. As a result of how pregnancy's physiological changes affect fetal availability, vitamin D requirements during pregnancy may be significantly affected. Circulating vitamin D-binding protein (DBP) and serum 1,25-dihydroxyvitamin D [1,25(OH)2D] levels are both increased beginning at the end of the first trimester and lasting well after delivery. At 8 to 10 weeks of gestation, DBP levels start to rise, followed by a continuous rise in serum 1,25(OH)2D that starts about two weeks later. Although the actual mechanism causing the rise in circulating DBP during pregnancy is not known, estrogen modulation is hypothesized to be a factor. Due to increased renal 1,25(OH)2D synthesis as well as placental or decidual tissue production, pregnant women have almost twice the circulating levels of 1,25(OH)2D than non-pregnant women at term (Kiely et al., 2017; ACOG, 2011). When compared to non-pregnant or postpartum women, women in the third trimester of pregnancy produce twice as much 1,25(OH)2D as those in the other trimesters of pregnancy. The research indicates that 1,25(OH)2D promotes implantation, maintains a healthy pregnancy, promotes fetal growth by calcium supplementation, regulates placental hormone secretion, and suppresses the release of pro-inflammatory cytokines (Cunningham et al., 2020).

## Conclusion

Considering the high prevalence of vitamin D insufficiency in North Rupert Regency, it's important to take supplements of vitamin D when pregnant. Future researchers are expected to be able to look for other factors through multivariable modeling involving confounding variables or looking for a modifying effect on the incidence of vitamin D deficiency.

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