

ARTIKEL PENELITIAN

Differences in Levels of 25-hydroxyvitamin D, Human Chorionic Gonadotropin (hCG), and Progesterone in Normal Pregnancy and First Trimester Abortion

Afkara Husna Firdanisa¹, Fika Tri Anggraini², Bobby Indra Utama³

1. Master Program in Biomedical Sciences, Faculty of Medicine, Andalas University, Padang; 2. Physiology Department, Faculty of Medicine, Andalas University; 3. Sub Division of Urogynecology, Obstetrics and Gynecology Department, Faculty of Medicine, Andalas University, Dr. M. Djamil Central General Hospital Padang

Korespondensi: afkarahf69@gmail.com

Abstract

Objectives: This study purpose is to see the difference in the mean levels of 25-hydroxy vitamin D, hCG levels and progesterone levels in normal pregnancy and first trimester abortion. This research is a comparative analytic study with a cross sectional approach. **Methods:** The samples consisted of 80 people who were divided into 2 groups consisting of normal pregnant women and women who had abortions in the first trimester of pregnancy, the sampling technique was consecutively taken. The research was conducted at Unand Hospital Padang, Hermina Hospital Padang, Reksodiwiry Hospital Padang, Dr. M. Djamil Hospital Padang in April 2022-June 2022. The normality of data was tested with the Saphiro Wilk test and data analysis with the Independent T test. **Results:** The results showed the characteristics of the research subjects; mean age in the abortion group (29.73 ± 4.237 years) slightly larger than the normal group (29.63 ± 4.118 years). Average gestational age in the abortion group was smaller (7.45 ± 2.56) weeks compared to the normal group (8.43 ± 2.57) weeks. The mean BMI values of the two groups were not significantly different, namely $23,505 \pm 3,088$ kg/m² vs $23,381 \pm 3,423$ kg/m² in the abortion group vs the normal group. Based on parity, primigravida (parity = 0) amounted to 15 people (37.5%) vs 16 people (40%) in the normal group vs Abortion. Secondary gravida (parity = 1) 14 people (35%) vs. 12 people (30%) in the normal vs. abortion group. History of parity 2 times and 3 times the same in both groups, namely as many as 9 people (22.5%) and 2 people (5%), respectively. History of parity 4 times, 1 person (2.5%) vs none in the normal group vs the abortion group. Data normality test with Saphiro Wilk obtained data with normal distribution ($p > 0.005$). **Conclusion:** The conclusion in this study was that the average level of 25-hydroxyvitamin D, Human Chorionic Gonadotropin(hCG), and Progesterone were significantly different between normal pregnancies and pregnancies that had abortions in the first trimester.

Keywords: 1st trimester pregnancy; abortion; 25-hydroxyvitamin D; Human Chorionic; Gonadotropins(hCG); and Progesterone

INTRODUCTION

Early pregnancy failure or early pregnancy failure was defined as the failure of an intrauterine pregnancy less than 12 weeks old (Rossen, Ahrens and Branum, 2018). Abortion is a pregnancy complication that often occurs in 15% to 20% in the world. The prevalence of abortion is 4.2 million annually in Southeast Asia, 750,000 to 1.5 million in Indonesia¹. In Indonesia, the prevalence of abortion is 2 million/year, contributing to MMR reaching². In West Sumatra, the prevalence of abortion increases according to maternal age, which is 9-12% in women aged 35 years, and increases to 50% in women aged over 40 years³. About 80% of abortions occur in the first trimester⁴. Early pregnancy failure can be caused by many things, such as; immunological causes, implantation abnormalities, and endocrine disorders (Pinar et al., 2018).

In normal pregnancy, the hormone hCG plays a role in the hormonal interaction of the fetal-placental-maternal unit⁵. While the hormone progesterone plays a very important role in maintaining the fetus in the uterus⁶. The role of vitamin D is believed to function in regulating the production of hCG (human chorionic gonadotropine) and progesterone which will affect the outcome of early pregnancy⁷. In the study of Bärebring et al in 2018 found that lower vitamin D status in early pregnancy is associated with miscarriages that occur in the first trimester⁸.

RESULTS AND DISCUSSION

The results of this study indicate the characteristics of the research subjects; mean age in the abortion group (29.73 ± 4.237 years) slightly larger than the normal group (29.63 ± 4.118 years). On the contrary, average gestational age in the

Abortion or early pregnancy loss in the first trimester has a close relationship with vitamin D deficiency in pregnant women¹. Various cells in the placenta are known to respond to local synthesis of vitamin D $1,25(\text{OH})_2\text{D}$ and this response is very important in early pregnancy, especially in the trophoblast invasion process by regulating the production of hCG and progesterone⁹. Understanding the role of vitamin D in regulating the production of hCG and progesterone is believed to help with the success of early pregnancy (Ganguly et al., 2018). In this study, the levels of vitamin D, hCG and progesterone production were examined in early pregnancy in the first trimester.

METHODS

This research is a comparative analytic study with a cross sectional approach. The sample of this study amounted to 80 people who were divided into 2 groups consisting of normal pregnant women and abortions in the 1st trimester of pregnancy with consecutive sampling techniques. The research was conducted at RSPTM Unand Padang, RS. Hermina Padang, RS. Army Reksodiwiryo Padang, Dr. RSUP. M. Djamil Padang in April 2022-June 2022. The normality test of the data was carried out using the Saphiro Wilk test and data analysis using the Independent T test.

abortion group was smaller (7.45 ± 2.56) weeks compared to the normal group (8.43 ± 2.57) weeks. Systolic and diastolic blood pressure in the abortion group was slightly higher than the normal group. In the abortion group, the mean systolic blood pressure was 114.83 ± 11.167 mmHg with a value range of

111.25 – 118.40 mmHg (95% CI), and the average diastolic blood pressure was 77.18 ± 7.352 mmHg with a value range of 74.82 – 79.53 mmHg (95% CI). While in the normal group, the mean systolic blood pressure was 113.98 ± 11.104 mmHg with a value range of 110.42 – 117.53 mmHg (95% CI), and the average diastolic blood pressure was 76.22 ± 6.431 mmHg with a value range of 74, 17 – 78.28 mmHg (95% CI). The mean BMI values of the two groups were not significantly different, namely $23,505 \pm 3,088$ kg/m² in the abortion group and $23,381 \pm 3, 423$ kg/m² in the normal group. Based on parity, primigravida (parity = 0) were 15 people (37.5%) in the abortion group and 16 people (40%) in the normal group. Secondary gravida (parity = 1) amounted to 14 people (35%) in the abortion group and 12 people (30%) in the normal group. While the number of people with a history of parity 2 times and 3 times in the abortion group and the normal ± 4.818 ng/mL with a value range of 8.97 – 27.74 ng/mL (95% CI), the mean serum Hcg level was 65.786 ± 5.414 ng/mL with a value range of 51.49 – 75.47ng/mL (95% CI), and the mean serum progesterone level was 17.486 ± 3.286 ng/mL with a value range of 11.49 – 25.06 ng/mL (95% CI). In normal pregnancy in the 1st trimester, the mean serum vitamin D level was 36.577 ± 6.644 ng/mL with a value range of 18.15 – 54.01 ng/mL (95% CI), the mean serum hCG level

group were the same, namely 9 people (22.5%) and 2 people (5%), respectively. On the other hand, only 1 person (2.5%) in the normal group had a history of parity 4 times, and none in the abortion group. Based on the history of previous abortions, 33 people (82.5%) in the abortion group and 30 people (75%) in the normal group had never experienced it. While there were 5 people (12.5%) in the abortion group and 9 people (22, 5%) in the normal group had experienced (2.5%) in the abortion group had a history of 3 abortions. person (2.5%) each who had experienced 2 previous abortions. However, only 1 person.

The results of the research from the research variables obtained are in 1 failed early pregnancy. In both the abortion group and the normal group, there was only 1 pregnancies that experienced abortion in the 1st trimester, the mean serum vitamin D level was 19/120 was 130.818 ± 11.579 ng /mL with a range of the value was 110.83 – 155.17 ng/mL (95% CI), and the mean serum progesterone level was 62.268 ± 7.224 ng/mL with a value range of 50.04 – 77.00 ng/mL (95% CI).

The characteristics of the sample assessed in this study were the age of pregnant women, gestational age, systolic blood pressure, diastolic blood pressure, and BMI (Table 1)

Table 1. Characteristics of Research Sample

No	Characteristics	mean	SD	median	Min – Max (CI 95%)
1	MA (years)				
	Abortion	29.73	4,237	28,50	28.37 – 31.08
	Normal	29.63	4.118	29,00	28.31 – 30.94
2	GA (weeks)				
	Abortion	7.45	2.56	7.00	6.63 – 8.27
	Normal	8.43	2.57	8.00	7.60 – 9.25
3	SBP (mmHg)				
	Abortion	114.83	11.167	117.50	111.25 – 118.40

	Normal	113.98	11.104	110.00	110.42 – 117.53
4	DBP (mmHg)				
	Abortion	77.18	7,352	79.00	74.82 – 79.53
	Normal	76.22	6,431	79.00	74.17 – 78.28
5	BMI (kg/m ²)				
	Abortion	23,505	3.088	23.01	22.518 – 24,493

Seen from Table 1, the mean age in the abortion group ($29.73 \pm 4,237$) slightly larger than the normal group (29.63 ± 4.118). On the contrary, average gestational age in the abortion group was smaller (7.45 ± 2.56) than the normal group (8.43 ± 2.57). Systolic and diastolic blood pressure in the abortion group was slightly higher than the normal group. In the abortion group, the mean systolic blood pressure was 114.83 ± 11.167 with a value range of $111.25 - 118.40$ (95% CI), and the mean diastolic blood pressure

was 77.18 ± 7.352 with a value range of $74.82 - 79.53$ (95% CI). While in the normal group, the mean systolic blood pressure was 113.98 ± 11.104 with a value range of $110.42 - 117.53$ (95% CI), and the average diastolic blood pressure was 76.22 ± 6.431 with a value range of $74.17 - 78.28$ (95% CI). The mean BMI values of the two groups were not significantly different, namely $23,505 \pm 3,088$ in the abortion group and $23,381 \pm 3,423$ in the normal group.

Table 2. Normality Test for Vitamin D, hCG, and Serum Progesterone Levels in Abortion and Normal Pregnancy in the 1st Trimester

Variable	Normality Test Results	
	Abortion	Normal
Vitamin D Serum	0.123	0.141
hCG Serum	0.102	0.077
Serum Progesterone	0.086	0.120

Through the data normality test using the Kolmogorov Smirnov test, the results of the data on levels of vitamin D, hCG, and serum progesterone, both in the abortion

group and in the normal pregnancy group in the 1st trimester, were normally distributed ($p > 0.005$).

Tabel 3. Average Levels of Vitamin D, hCG, and Progesterone Serum in normal Pregnancy Trimester 1

Variables in the Normal Group (N=40)	mean	SD	median	Min – Max (CI 95%)
Vitamin D (ng/ml)	36,577	6,644	36.56	18.15 – 54.01
hCG (mIU/ml)	130.818	11,579	129.09	110.83 – 155.17
Progesterone (ng/ml)	62.268	7,224	64.09	50.04 – 77.00

From Table 3 it is found that in normal pregnant women in the 1st trimester, the average serum vitamin D level is 36.577 ± 6.644 with a value range of $18.15 - 54.01$ (95% CI), the average serum hCG level is

130.818 ± 11.579 with a value range of $110,83 - 155.17$ (95% CI), and the mean serum progesterone level was 62.268 ± 7.224 with a value range of $50.04 - 77.00$ (95% CI).

Table 4. Comparison of Average Serum Vitamin D, -hCG and Progesteron Levels in Pregnant Women with Abortions and Normal Pregnant Women in Trimester 1

Variable	mean	SD	P value*	Average Difference
Vitamin D (ng/dL)				
Abortion	19,120	4,818	<0.05	17,457
Normal	36,577	6,644		
-hCG (mIU/dL)				
Abortion	65.786	5,414	<0.05	65.032
Normal	130.818	11,579		
Progesteron (ng/dL)				
Abortion	17,486	3,286	<0.05	44,782
Normal	62.268	7,224		

Based on the results of bivariate analysis using the Unpaired T Test, it was found that the mean serum vitamin D level in pregnant women with abortion was significantly lower than that obtained in normal first trimester pregnant women ($p < 0.05$). The mean serum vitamin D3 level in the abortion group was 19.120 ± 4.818 and in the normal group was 36.577 ± 6.644 , with a difference in the mean value of 17.457.

Based on the results of bivariate analysis using the Unpaired T Test, it was found that the mean serum -hCG level in pregnant women with abortion was significantly lower than that obtained in

normal first trimester pregnant women ($p < 0.05$). The mean serum -hCG level in the abortion group was $65.786 \pm 5,414$ and in the normal group was $130.818 \pm 11,579$, with a difference in the mean value of 65.032.

Based on the results of bivariate analysis using the Unpaired T Test, it was found that the mean serum progesterone level in pregnant women with abortion was significantly lower than that obtained in normal first trimester pregnant women ($p < 0.05$). The mean serum progesterone level in the abortion group was $17,486 \pm 3,286$ and in the normal group was $62.268 \pm 7,224$, with a difference in the mean value of 44,782.

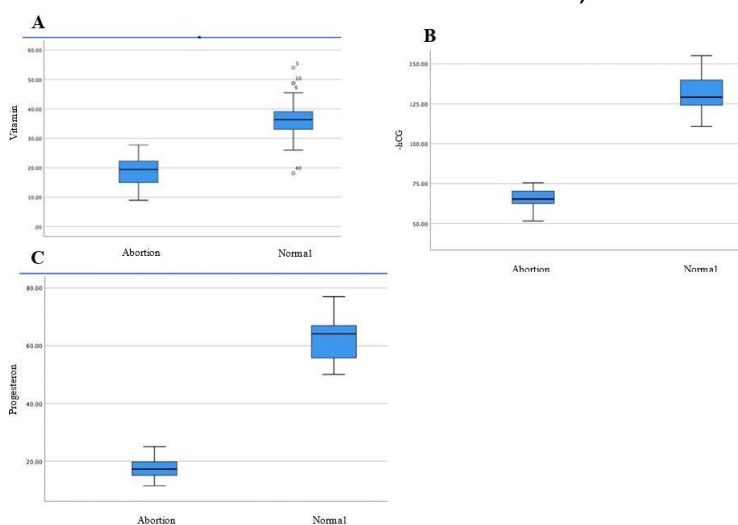


Figure 1. Histogram of Vitamin D, -hCG and Progesteron Levels Between Normal Pregnancy and 1st Trimester Abortion

Data normality test with Saphiro Wilk, distribution of data on levels of vitamin D, hCG, and serum progesterone, both in the abortion group and in the 1st trimester normal pregnancy group, were normally distributed ($p > 0.005$). The results of the bivariate analysis using the Unpaired T Test, it was found that the mean serum vitamin D level in pregnant women with abortion was significantly lower than that obtained in normal first trimester pregnant women ($p < 0.05$). The mean serum vitamin D3 level in the abortion group was 19.120 ± 4.818 ng/mL and in the normal group was 36.577 ± 6.644 , ng/mL with a difference in the mean value of 17.457 ng/mL. The mean serum -hCG level in pregnant women with abortion was significantly lower than that

found in normal first trimester pregnant women ($p < 0.05$). The mean serum -hCG level in the abortion group was 65.786 ± 5.414 ng/mL and in the normal group was 130.818 ± 11.579 ng/mL with a difference in the mean value of 65.032 ng/mL. The mean serum progesterone level in pregnant women with abortion was significantly lower than that found in normal first trimester pregnant women ($p < 0.05$). The mean serum progesterone level in the abortion group was $17,486 \pm 3,286$ ng/mL and in the normal group was $62.268 \pm 7,224$, ng/mL with a difference in the mean value of 44,782 ng/mL.

CONCLUSION

In this study, the average level of 25-hydroxyvitamin D, Human Chorionic Gonadotropin(hCG), and Progesterone were significantly different between normal pregnancies and pregnancies that had an abortion in the 1st trimester.

ACKNOWLEDGEMENT

None.

CONFLICT OF INTEREST

None.

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