

Research Article

Serum F2-Isoprostane Levels in Preterm Deliveries Compared to Normal Preterm Pregnancies

Kadar F2-Isoprostan Serum pada Persalinan Preterm dibandingkan dengan Kehamilan Preterm Belum Inpartu

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Abstract

Objective: To determine the difference between serum F2-isoprostane levels in women with preterm deliveries compared to women in normal preterm pregnancies.

Method: Our study is a cross sectional study. During the period of January to August 2012, we collected 72 samples in the Emergency Department and Obstetrics and Gynecology outpatient clinic of Sanglah hospital, Denpasar. Our sample was divided into two groups, 36 cases of preterm deliveries at 28-37 weeks gestational age and 36 preterm normal pregnancies at 28-37 weeks gestational age. We collected 3 ml of blood sample from the cubital vein and quantified the F2-isoprostane levels at the Biology Molecular Laboratory, Faculty of Medicine University of Udayana, Denpasar. Data was analyzed using the Shapiro Wilk test and independent t-test with significance of $\alpha = 0.05$.

Result: The mean F2-isoprostane level for preterm deliveries and preterm normal pregnancies were 0.315 0.292 pg/ml and 0.017 0.018 pg/ml.

Conclusion: We can conclude from this study that there is a difference in F2-isoprostane serum level in preterm labor and normal preterm pregnancies.

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Keywords: F2-Isoprostane, normal preterm pregnancy, preterm delivery

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Abstrak

Tujuan: Untuk mengetahui perbedaan kadar F2-isoprostan serum pada persalinan preterm dibandingkan dengan pada kehamilan preterm tidak inpartu.

Metode: Penelitian ini menggunakan metode potong lintang. Pada periode Januari sampai Agustus 2012, dikumpulkan 72 sampel di IRD dan Poliklinik Obstetri dan Ginekologi RSUP Sanglah Denpasar. Sampel dibagi menjadi dua kelompok, 36 sampel dengan hamil preterm tidak inpartu dan 36 sampel dengan persalinan preterm pada usia kehamilan 28-37 minggu. Pengambilan darah pada vena cubiti sebanyak 3 ml lalu diperiksa kadar F2-isoprostan pada Laboratorium Biologi Molekular Fakultas Kedokteran Universitas Udayana, Denpasar. Dari data yang terkumpul dilakukan pengujian normalitas data dengan tes Shapiro Wilk, kemudian dilakukan analisa data dengan t-test untuk sampel independen dengan tingkat kemaknaan $\alpha = 0,05$.

Hasil: Rerata kadar serum F2-isoprostan pada kelompok hamil preterm tidak inpartu sebesar 0,017 0,018 pg/ml. Sedangkan rerata kadar serum F2-isoprostan kelompok persalinan preterm sebesar 0,315 0,292 pg/ml.

Kesimpulan: Dari penelitian ini didapatkan kadar F2-isoprostan serum pada kelompok persalinan preterm lebih tinggi secara signifikan dibandingkan dengan kelompok hamil preterm tidak inpartu ($p < 0,05$).

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Kata kunci: hamil preterm tidak inpartu, kadar F2-isoprostan, persalinan preterm

INTRODUCTION

Preterm delivery brings its own burden either medically, psychologically, or economically for families. It is defined as delivery occurring at less than 37 weeks gestational age or 259 days. Preterm delivery is the responsible for 75% of perinatal death. Infant mortality in Indonesia in 1999 amounted to 71/1000 live births. In Indonesia we still could not acquire the incidence of prematurity,¹ whereas the incidence was found to be around 5%-9% in European countries, and approximately 12.7% in the United States.²

Along with the development of medical science, numerous researchers have given a lot of attention to factors that can predict preterm labor. One of the theories that is currently evolving is the production of Reactive Oxygen Species (ROS), prostaglandins, pro-inflammatory cytokines and proteases as the initiation of labor and preterm labor, with bacterial infection found in 10% of patients with preterm delivery, and 38% of patients with preterm rupture of amniotic membranes. Oxidative stress contributes to the etiology of chorioamnionitis, and is believed to be the cause of preterm

delivery. Chorioamnionitis leads to dysregulation of the Cyclooxygenase-2 (COX-2) enzyme in the placenta and the increase of prostaglandin synthesis. A previous study claimed that 4-hydroxy-2-nonenal, an example of oxidative stress marker, is associated with increased expression of COX-2 and prostaglandin E₂ in the placenta.³

There are several markers for oxidative stress, but currently F2-isoprostane is the best marker of lipid peroxidation, which is new, very stable, and significantly more accurate than other markers.⁴⁻⁶

METHODS

We carried out a cross sectional study. The subjects were pregnant preterm women from 28 weeks until less than 37 weeks gestational age who had antenatal care at the outpatient clinic and emergency room of obstetrics and gynecology department at Sanglah hospital, Denpasar. We collected samples from January to August 2012. The total sample was grouped into two, consisting of 36 subjects with normal preterm pregnancies and 36 subjects with preterm deliveries, after which we checked the levels of serum F2-isoprostane in the laboratory of Molecular Biology, faculty of medicine Udayana University, Denpasar.

Inclusion criteria were pregnant women more than 28 weeks gestational age until less than 37 weeks gestational age. Meanwhile, exclusion criteria were pregnant women with multiple pregnancy, antepartum bleeding, polyhydramnion, history of systemic disease (diabetes mellitus, hypertension, preeclampsia/eclampsia), and history of cervical surgery.

RESULTS

Basic characteristics of our study subjects are displayed in the following table:

Table 1. Basic Characteristics

Variable	Preterm delivery (n = 36)	Normal preterm pregnancy (n = 36)	p
Average age (years)	26.69	29.06	0.067
Gravidity	1.75	2.03	0.191
History of abortion	0.08	0.14	0.514

From Table 1, it was shown that there is no significant difference in terms of average age, gravidity, and history of abortion between the preterm delivery group and the normal preterm pregnancy group ($p > 0.05$).

To study the difference in average levels of serum F2-isoprostane in this study, we carried out an independent sample t-test. The result of the analysis is presented in Table 2.

Table 2. Average Serum F2-Isoprostane Level in Pre-term Delivery Group and Normal Preterm Pregnancy Group

Group	F2-isoprostane Serum level (pg/ml)		p
	Average	SD	
Normal preterm pregnancy	0.017	0.018	0.001
Preterm delivery	0.315	0.292	

The average serum F2-isoprostane level in the normal preterm pregnancy group is 0.017 pg/ml (SD=0.018 pg/ml). Meanwhile, the average serum F2-isoprostane level in the preterm delivery group is 0.315 pg/ml (SD=0.292 pg/ml). From statistical analysis, the two groups differ significantly ($p < 0.05$). Thus, we concluded that the average level of serum F2-isoprostane between these two groups differ significantly.

DISCUSSION

Serum F2-isoprostane levels of women who experienced preterm delivery were increased according to the research conducted by Temma in 2004. Furthermore, Matsubara stated that uterine contractions might be induced by oxidative stress, which in turn affects the occurrence of preterm delivery.^{3,7}

When chorioamnionitis occurs, phagocytes will migrate, surround, and digest bacteria with the purpose to protect the mother and fetus from bacterial infection. Phagocytic NADPH oxidase produces very strong ROS such as superoxide, hydrogen peroxide, and radical hydroxy. In chorioamnionitis, NADPH oxidase rises significantly, whereas the ROS produced has the ability to destroy lipid membrane component. This process can be measured using a marker of oxidative stress. In this research we used F2-isoprostane as the marker of oxidative stress, thereby indicating the extent of oxidative stress.

Although from this research, increased levels of serum F2-isoprostane shows to be quite meaningful in preterm deliveries, the time when levels of serum F2-isoprostane increases is still unknown. Furthermore, whether the increased levels of serum F2-isoprostane induced the occurrence of preterm delivery is also unknown yet.

CONCLUSION

The average levels of serum F2-isoprostane in preterm delivery group is 0.315 0.292 pg/ml, while the average levels in normal preterm pregnancy group is 0.017 0.0179 pg/ml. We can see that the average serum F2-isoprostane level is significantly

higher in preterm delivery compared to normal preterm pregnancy currently not in labor. However, further studies are needed to determine the onset of serum F2-isoprostane elevation and the relationship of this increase in inducing preterm delivery.

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