

# The Effect of Supplementation of Calcium on Prevention of Pre - Eclampsia in Pregnant Women at Kuta Baro Community Health Center Aceh Besar, Indonesia

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## Abstract

**Citation:** Anita A, Ramli N. The Effect of Supplementation of Calcium on Prevention of Pre - Eclampsia in Pregnant Women at Kuta Baro Community Health Center Aceh Besar, Indonesia. *Open Access Maced J Med Sci.* 2019 Apr 15; 7(7):1129-1132. <https://doi.org/10.3889/oamjms.2019.239>

**Keywords:** Supplementation of Calcium; Pre-eclampsia; Pregnant Women; Community Health Center

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**Received:** 09-Feb-2019; **Revised:** 21-Mar-2019; **Accepted:** 22-Mar-2019; **Online first:** 14-Apr-2019

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**Funding:** This research did not receive any financial support

**Competing Interests:** The authors have declared that no competing interests exist

**BACKGROUND:** Pre-eclampsia is a major cause of maternal death in Indonesia. Prevention of the incidence of pre-eclampsia is believed as one of the optional treatment that can be done by consuming calcium supplementation

**AIM:** This study aimed to investigate procalcitonin levels in non-small cell lung cancer patients.

**METHODS:** Observational study with prospective cohort design with a quantitative approach was conducted to see the validity and re ability of the question. The population was pregnant women in Kutabaro Health Center in 2018 who were pregnant women > 20 weeks from the appropriate inclusion and exclusion criteria of a total of 29 respondents. The intervention group who were given calcium and about 58 pregnant mothers were assigned for the controlled group. The sampling technique was the Multistage sampling method/ sampling, using purposive sampling and Total Population. Analysis of data using uni-variable, bi-variable and multiple variables. The statistical test used Chi-Square ( $\chi^2$ ) at the significance level of  $p < 0.05$ . To see the magnitude of the risk with the Relative Risk (RR) with a 95% confidence interval (CI).

**RESULTS:** A total of 68 lung cancer patients fulfilled the criteria of this study, 55 men (80.9%) and 13 women (19.1%). The highest percentage of cytology/histopathology type found was adenocarcinoma (80.9%), and 60.3% of those were diagnosed in stage IV. An increased procalcitonin level (greater than 0.01 ng/mL) occurred in 80.9% of Non-Small Cell Lung Cancer (NSCLC) patients. It appears that the higher the stage of lung cancer, the lower procalcitonin levels would be, although it was not statistically significant. There was no association between lung cancer subtype with procalcitonin levels.

**CONCLUSION:** An increased level of procalcitonin may be an indication not only for infection but also for NonSmall Cell Lung Cancer.

## Introduction

One of-of the Millennium Development Goals (MDGs) is to improve the health of pregnant women by reducing maternal mortality (RMM). Indonesian MDGs is reported the still high maternal mortality rate. The maternal mortality rate in Indonesia is still high at 359 per 100 000 live births [1]. The maternal mortality is dominated by three main causes, namely hypertension in pregnancy, bleeding and infection. Hypertension in pregnancy has increased in proportion, from 20% in 2007 to 30% in 2012 [2]. Hypertension in pregnancy (HDK) including pre-eclampsia is a major cause of maternal mortality

worldwide [3]. Prevention of the incidence of pre-eclampsia can be done with calcium supplementation. Calcium supplementation can reduce the risk of pre-eclampsia and prevent preterm birth [4].

The World Health Organization (WHO) has recommended calcium supplementation 1500-2000 mg/day in populations with low calcium intake as part of antenatal care (ANC) as prevention of pre-eclampsia in pregnant women, especially in pregnant women who have a high risk of hypertension [5]. Some regions in Indonesia provide calcium supplements to pregnant women when conducting pregnancy examinations to health centres. The implementation of calcium supplementation in the community health centre is not always the same in

terms of the time and amount of calcium supplements. Some research results in developing countries generally have low calcium intake. Research in Cameroon showed that as many as 94.6% of pregnant women had inadequate calcium intake, the average intake of pregnant women only fulfilled the recommended 62.3% calcium nutrient adequacy rate (RDA) [6].

Research in Thailand showed that as many as 55% of pregnant women had inadequate calcium intake with an average calcium intake of 493.2 mg/day, equivalent to 61.7% of the calcium RDA of Thai people [7]. Research in Peru shows the prevalence of pregnant women who have an inadequate calcium intake of 86% [8]. Research in Indonesia after the monetary crisis showed that the average calcium intake of pregnant women was  $360 \pm 140$  mg/day and 96% of pregnant women had inadequate calcium intake [9]. Calcium intake in pregnant women in developing countries is generally very low due to diet [10]. In contrast to developed countries which generally have high calcium intake due to the production and consumption of dairy products [11]. Some regions in Indonesia have calcium supplementation programs for pregnant women, one of which is the large Aceh District. The implementation of calcium supplementation in health centres in large Aceh is not always the same in terms of the time and amount of calcium supplements. Prevention of the incidence of pre-eclampsia can be done by giving calcium supplements by doctors, and midwives, especially in rural areas. The results of observations and data from the Aceh Besar Health Service showed the highest cases of pregnant women who experienced pre-eclampsia in the Kutabaro community health centre. In 2018 at the Pukesmas Kutabaro District of Aceh, there were 29 cases of pregnant women who had pre-eclampsia, 2 of whom were cases of eclampsia. The case of pregnant women who experience pre-eclampsia is increasing in the following year.

Pre-eclampsia events contribute to maternal deaths. Data from the Aceh Provincial Health Office in 2018 showed that the maternal mortality rate (MMR) in Aceh Province was 135/100,000 births [12]. Giving calcium is an effort to support the prevention of pre-eclampsia and prevent maternal mortality. Based on the background of the problem above, this study aims to determine the effect of Supplement calcium to prevent Pre-eclampsia in pregnant women at the Kuta Baro Health Center, Aceh Besar.

## Material and Methods

To get the data for this research, it used the observational technique with a quantitative approach and a prospective cohort research design. It was

conducted from July to November 2018 at the Kuta Baro Community Health Center. The population in this study were pregnant women who had a gestational age of more than 25 weeks, totalling 60 participants and 30 were assigned as the intervention group and 30 others as the controlled group. The local midwives/village officials who monitored calcium consumption in pregnant women are 30 participants. The population in this study were pregnant women who were at the Kuta Baro Health Center in 2018. The samples in this study were pregnant women with gestational age > 20 weeks, according to inclusion and exclusion criteria.

The number of samples in this study was 30 respondents for the group given calcium with a dose of 1000 mg and 30 respondents who were given calcium at a dose of 500 mg (ratio 1:1) — data analysis using chi-square statistical approach to the analysis of bivariate and multivariate regression analysis.

## Results

### Uni-variate Analysis

Table 1 shows the average calcium in the blood before intervention amounted to 9.1 with the lowest level 8 and the highest 10.2 while the average calcium in the blood after the intervention was 9.9 with the lowest grade value of 8.8 and the highest 13.5. 100% of pregnant women did not experience the occurrence of pre-eclampsia at the Kuta Baro Health Center, Aceh Besar.

**Table 1: Characteristics of Respondents in the study of the Effect of Giving Calcium Supplements by local midwives on calcium levels to prevent pre-eclampsia in pregnant women**

Variable		N mean $\pm$ SD	% Min-max
Calcium levels in blood	Before	9.1 $\pm$ 0.7	8 - 10.2
	After	9.9 $\pm$ 0.8	8.8 - 13.5
Pre-eclampsia	Yes	0	0
	Not	60	100
Education	High	34	56.7
	Low	26	43.3
Parity	At risk	25	41.7
	Not Risky	35	58.3
Mother's age	At risk	13	21.7
	Not Risky	47	78.3
Points antenatal care (ANC)	Midwife	56	93.3
	Hospital	4	6.7
Blood pressure	Sistole	116.0 $\pm$ 8.3	88 - 138
	Diastole	73.3 $\pm$ 7.9	50 - 90
Frequency of antenatal care (ANC)		2.3 $\pm$ 0.5	1 - 3

### Bi-variate Analysis

Data analysis is to see differences in the average effect of giving calcium supplements by midwives on calcium levels for the prevention of pre-eclampsia in pregnant women using a paired t-test. The effect of external variables on calcium levels in the blood of pregnant women using the independent t-test.

**Table 2: Paired t-test Effect of Calcium Supplement on calcium levels for the prevention of pre-eclampsia in pregnant women between the intervention and control groups**

Variable	Calcium		Difference	t	p
	Before	After			
	mean ± SD	mean ± SD			
Group Intervention	8.9 ± 0.7	9.8 ± 0.8	0.8	5.6	0.0001
Control	9.3 ± 0.6	10.0 ± 0.8	0.7	4.3	0.0002

The results of the analysis using a paired t-test showed that there was a significant change in the average blood calcium levels before and after intervention in the intervention group with a p-value of 0,0001. In the control group, there was a significant difference in the level of calcium in the blood before and after the intervention ( $p = 0,0002$ ).

**Table 3: Results of independent t-test variables outside the effect of giving calcium supplements by midwives on calcium levels to prevent pre-eclampsia in pregnant women**

Variable	n	Calcium	Difference	T	p	
		mean ± SD				
Group	Intervention	30	0.8 ± 0.84	0.1	0.41	0.68
	Control	30	0.7 ± 0.9			
Education	High	34	0.9 ± 1.1	0.2	1.0	0.32
	Low	26	0.7 ± 0.6			
Parity	At risk	25	0.9 ± 1.1	0.1	0.6	0.57
	Not risky	35	0.8 ± 0.8			
Mother's age	At risk	47	0.9 ± 1.0	1.3	1.1	0.29
	Not risky	13	0.6 ± 0.9			
ANC	> 2	19	0.9 ± 1.1	0.3	1.1	0.29
Frequency	≤ 2	41	0.7 ± 0.8			

Table 3 shows there is no difference in the average calcium in blood levels in the external variables for both. The results of the study using paired t-test showed that there were differences in the average calcium levels before and after calcium supplementation in the intervention group and the controlled group ( $p \leq 0.05$ ). The results of the study also showed that 100% of the study sample did not experience pre-eclampsia. The difference between groups of pregnant women who received calcium supplements amounted to 1000 mg with 500 mg which was equal to 0.1 mg and statistically the value of  $p \geq 0.05$ . The results showed an increase in blood calcium levels after calcium was given in the intervention group and the control group.

However, there was no difference in the increase in calcium levels in the blood of pregnant women between mothers who received 500 mg and 1000 mg calcium in the intervention and control groups. The results also showed that there was no relationship between the characteristics of participants with an increase in calcium levels in the mother's blood.

## Discussion

The results of the meta-analysis show that calcium supplementation during pregnancy effectively

reduces the occurrence of pre-eclampsia [13], [15].

Pregnant and breastfeeding women need more calcium than non-pregnant women. Calcium in pregnant women can support the formation of bones and teeth and fetal joints. Calcium deficiency in pregnant women can cause calcium requirements taken from calcium reserves in the mother's bones; this has the potential to cause osteoporosis in the mother. Giving calcium by midwives to pregnant women adequately is strongly recommended because it can prevent the occurrence of pre-eclampsia [14]. The results of the study conducted from a cohort study that there are several factors that can cause pre-eclampsia, namely diabetes, multiple pregnancy, nulliparous, family history of eclampsia, high body mass index and maternal age more than 40 years [15].

The results of the study showed that mothers at risk did not cause pre-eclampsia in the mother. The results of this study are different from the research conducted by Astuti, that the age of more than 30 years is at risk of experiencing pre-eclampsia, as well as mothers with a history of pre-eclampsia who have a 3 times greater risk of experiencing severe eclampsia compared with mothers who do not have a pre-eclampsia history [16]. Some studies suggest calcium supplements for pregnant women to prevent pre-eclampsia, especially in the second and third trimester of pregnancy, especially in low social-economic areas [17]. Calcium deficiency can increase the risk of pre-eclampsia, especially in young women. Calcium supplements can reduce the incidence of pre-eclampsia, although the effect of consumption of calcium supplements depends on the age and social-economic status of the mother, especially in areas with low calcium consumption geography [18].

In conclusion, there was a significant change in the average blood calcium levels before and after calcium supplements were given in the intervention and control groups ( $p < 0.05$ ). Supplementation Calcium in Pregnant Women at Kuta Baro Community Health Center can prevent the occurrence of pre-eclampsia.

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