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RESEARCH

Difference in Mean Maternal Sodium Potassium Ratio Between Severe Preeclampsia and Eclampsia

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Abstract

Objective: To determine the difference in mean ratio of sodium content between pregnancy with severe preeclampsia and eclampsia.

Method: This is an analytical study using a cross sectional study design. The study was conducted in Maternity room of Dr. M. Djamil Padang from January 15th, 2016 to December 31st, 2017, there were 60 patients as subjects, the sample was divided into 2 groups: severe preeclampsia and eclampsia. Furthermore, history and physical examination to obtain data and clinical diagnosis. Data is recorded in a research form that has been provided, then performed blood electrolytes of Sodium and Potassium. Statistical analysis to assess significance using T-test.

Results: In the severe preeclampsia and eclampsia, multiparous parity had the highest respondent. This is consistent with the literature in which the incidence of preeclampsia is more common in late pregnancy.

Conclusions: There was no significant difference in the mean sodium ratio between normal severe preeclampsia pregnancy and normal pregnancy.

Keywords: pregnancy condition, severe preeclampsia, eclampsia, and sodium.

INTRODUCTION

Preeclampsia is a pregnancy-specific syndrome in the form of reduced organ perfusion due to vasospasm and endothelial activation that occurs after 20 weeks of gestational age. Whereas eclampsia is the occurrence of seizures in a woman with a preeclampsia not caused by anything else.¹

Research conducted in Perjan M. Djamil Padang in 1998-2002 found the incidence of preeclampsia was 5.5% or 663 cases and eclampsia 0.88% or 106 cases of 12034 deliveries, 65% of cases of preeclampsia are term pregnancies. Data from medical records of patients treated in Obstetrics and Gynecology Hospital Dr. DR. M. Djamil Padang in 2011 had 125 preeclampsia cases (8.31%) out of 1395 deliveries. This number is increasing every year, which is 193 cases (11.47%) of 1,682 deliveries during in 2012, and 206 cases (12.02%) of 1,714 deliveries during in 2013.

The etiology is certainly unknown, but it may be related to changes in electrolyte status. Electrolytes such as Sodium (Na⁺) and Potassium (K⁺) play an important role in preeclampsia and eclampsia because they contribute significantly to vascular smooth muscle function.⁴



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Sodium and potassium ions are the main ions in the formation of action potentials in muscle fibers that will cause muscle contractions. The main culprit that causes nerve membrane depolarization and repolarization events during action potentials is the gate voltage for the sodium channel. The gate voltage for the potassium channel also plays an important role in increasing the speed of membrane repolarization. These two voltage gate lines will support the Na pump⁺ - K⁺ and the leakage channel Na⁺-K⁺⁵.

The serum Na⁺ level was found to increase significantly in preeclampsia patients when compared to normal pregnant women. The exact mechanism of sodium retention in preeclampsia is unclear although retention may be due to vasoconstriction which leads to a reduction in glomerular filtration rate and a stimulation mechanism for angiotensin renin aldosterone.⁶

Significant hypokalemia was seen in preeclampsia patients compared to normal pregnant women. Changes in hypokalemia in normal pregnancy may be due to increased plasma levels aldosterone and other mineralocorticoids. Potassium deficit in the body as a result of conservassium not adequate by the kidneys & digestive tract, loss of potassium through feces can even exceed loss through urine.⁷

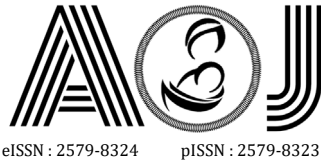
METHODS

This research is a descriptive analytic study with cross sectional study design. This research was conducted by looking at the status of the subject's medical record in accordance with the time and place of research. The study was conducted in the medical records of RSUP Dr. M. Djamil Padang starts from 15 January 2016 - 31 December 2017.

The study population was all medical records of pregnant women who suffer from pre-eclampsia and eclampsia in the obstetric and gynecology section of RSUP DR.M.Djamil padang in the period of 15 January 2016 to 31 December 2017. Samples in the study were all populations that met the inclusion criteria and there were no criteria exclusions taken by consecutive sampling technique. Secondary data collected from medical records in the Medical Records Section of the RSUP. Dr. M. Djamil Padang with independent variables sodium levels, potassium levels and ratio of sodium, potassium levels, the dependent variable is the incidence of preeclampsia and eclampsia. Data processing in this study uses the SPSS (Statistical Package of Social Science) version 16.0 program. the T-test analysis was done.

RESULTS

A study was conducted to determine the difference in mean maternal serum calcium ratio and mean serum potassium sodium ratio between severe preeclampsia and eclampsia in 60 study subjects consisting of 38 people with severe preeclampsia and 22 with eclampsia in January 15, 2016 to December 31, 2017 at RSUP DR. M. Djamil Padang.



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Characteristics of research subjects based on maternal age, gestational age and gravida between severe preeclampsia and eclampsia can be seen in table 1.

Table 1. Characteristics of Research Subjects between Severe preeclampsia and Eclampsia

Characteristics		Severe Preeclampsia n = 38	Eclampsia n = 22
Age		30,29 ± 5,55	30,95 ± 5,13
Parity	Nullipara	13 (34%)	6 (27,3%)
	Multipara	25 (64%)	16 (72,7%)
Gestasional age	Preterm	29 (76,3%)	10 (45,5%)
	Term	9 (23,7%)	12 (54,5%)

Table 1 above shows the mean characteristics of the study subjects by age, parity group and gestational age group. There was a similarity in the mean age of severe preeclampsia mothers 30.29 ± 5.55 years with eclampsia 30.95 ± 5.13 years. In the severe preeclampsia and eclampsia groups, multipara parity respondents had the highest respondents (64% and 72.7%). Preterm gestational age had the highest respondent in the severe preeclampsia group (76.3%).

Table 2. Difference in Mean Maternal Sodium Serum between Severe preeclampsia and Eclampsia

Variable	Mean (sb)	p-value*	Mean Differences (CI 95%)
Severe preeclampsia (n=38)	137,95 (4,59)	0,125	1,99 (-0,573 – 0,267)
Eclampsia (n=22)	135,95 (4,84)		

*independent sample t-test

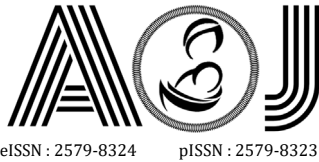
From the table data above it is known that the mean maternal serum sodium between Severe Preeclampsia and Eclampsia is not much different (137.95 and 135.95). Statistically, there were no significant differences between the mean Maternal Serum Sodium Ratios between Severe preeclampsia and Eclampsia ($p > 0.05$).

Table 3. Mean Differences in Maternal Potassium Serum between Severe preeclampsia and Eclampsia

Variable	Mean (sb)	p-value*	Mean Differences (CI 95%)
Severe preeclampsia (n=38)	3,818 (0,64)	0,529	-0,145 (-0,609 – 0,319)
Eclampsia (n=22)	3,964 (0,95)		

*independent sample t-test

From the table data above it is known that the mean maternal serum potassium between Severe Preeclampsia and Eclampsia is not much different (3,818 and 3,964). Statistically, there was no significant difference between the mean maternal serum potassium ratio between Severe preeclampsia and eclampsia ($p > 0.05$).



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Table 4. Mean Difference in Maternal Serum Sodium Ratio between Severe preeclampsia and Eclampsia

Variable	Mean (sb)	p-value*	Mean Differences (CI 95%)
Severe preeclampsia (n=38)	37,218 (6,94)	0,481	1,355 (-2,49 – 5,19)
Eclampsia (n=22)	35,864 (7,21)		

*independent sample t-test

From the table data above, it is known that the mean maternal serum potassium sodium between Severe Preeclampsia and Eclampsia is not much different (37,218 and 35,864). There was no statistically significant difference between the mean Maternal Serum Sodium Potassium Ratio between Severe preeclampsia and Eclampsia ($p > 0.05$).

DISCUSSION

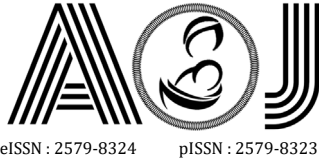
The study was conducted in the Obstetrics and Gynecology Section of the Faculty of Medicine of Andalas University / RS.Dr.M.Djamil Padang during the period of January 2016 to December 2017 of 60 research and control subjects. The study was analytic descriptive using a cross sectional study design by looking at the medical records of subjects according to the time and place of research. Samples are all medical records of pregnant women who suffer from pre-eclampsia and eclampsia in the obstetric and gynecology section of RSUP DR.D.Damil Padang, blood electrolyte levels were taken to assess the levels of sodium and potassium and the ratio of sodium and potassium levels.

Characteristics of Research Subjects

Characteristics of respondents according to the oldest age are 42 years, whereas the youngest age is 23 years also found in the severe preeclampsia group. This is slightly different from the literature which says that the risk factor for preeclampsia is ≥ 35 years or below 20 years¹. In the severe preeclampsia and eclampsia groups it was found that multipara parity had the highest respondents (64% and 72.7%), different from the gestational age at severe preeclampsia having the highest respondent in preterm pregnancies (76.3%). This is in accordance with literature and the occurrence of preeclampsia is more often found in approaching gestational age aterm.²

Mean Difference in Maternal Serum Potassium Sodium Ratio between Severe Preeclampsia and Eclampsia

The mean maternal serum sodium level at severe preeclampsia 137.95 mmol / L and Eclampsia 135.95 mmol / L, with $p = 0.125$ means no significant difference was found in mean maternal serum Potassium levels between severe preeclampsia 3,818 mmol / L and Eclampsia 3,964 mmol / L, with a value of $pp = 0.529$ not significant). The mean maternal serum



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potassium levels in severe preeclampsia and eclampsia were 0.609 mmol / L which statistically the difference was not significant ($p > 0.05$).

The mean maternal serum potassium sodium ratio in severe preeclampsia was 37,218 mmol / L while on eclampsia 35,864 mmol / L, with $p > 0,005$ means that there is no significant difference.

SUGGESTION

Because of the limited time and number of samples in this study it is necessary to further research by paying attention to the exclusion criteria in this study.

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