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Relation between Serum Cortisol Hormone Levels and Parenting Self-Efficacy (PSE) in Postpartum *Sectio Caesarea* Mothers

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ABSTRACT

Delivery with *Sectio Caesarea* (SC) can trigger an increase in the Hypothalamic Pituitary Adrenal (HPA) Axis and have an impact on the release of cortisol by the adrenal cortex. The hormone cortisol increases when the body feels any kind of response that occurs both physically and psychologically so that it triggers a stress stimulus and increases the secretion of Adrenocorticotropic Hormone (ACTH). This can cause various problems in postpartum mothers. One of them is changes in the mother's mood which will affect the care of her baby with Parenting Self-Efficacy (PSE) and can also reduce the mother's confidence in caring for newborns. This study aimed to determine the relation between cortisol and parenting self-efficacy (PSE) in postpartum mothers with Sectio Caesarea (SC). This research used correlative analytic method with cross sectional design on 26 postpartum mothers with Sectio Caesarea (SC) in Dr. Reksodiwiryo Hospital in March-June 2020 with consecutive sampling technique. Cortisol levels were measured by using the ELISA method in the Cell Culture Laboratory of Pharmacy Faculty, Andalas University and the calculation of the Parenting Self-Efficacy (PSE) score was done by using the questionnaire of Salonen et al, 2008, 2009. The results of the study used the Spearman correlation test. The results showed that the median serum cortisol level in postpartum mothers with Sectio Caesarea was 621.899 ng/ml. The mean level of Parenting Self-Efficacy (PSE) was 6.11 ± 1.04. The results of the study with the Spearman correlation test showed that there was no relation between cortisol and Parenting Self-Efficacy (PSE) and the p value = 0.38, the value of r = -0.177, which showed the strength of the extremely weak relation between cortisol levels and Parenting Self-Efficacy (PSE). It can be concluded that there was no significant relation between serum cortisol levels and parenting self-efficacy (PSE) in postpartum mothers with Sectio Caesarea (SC).

Keywords: Cortisol, Parenting Self-Efficacy, Sectio Caesarea

INTRODUCTION

The process of pregnancy, childbirth, and postpartum is an extremely important phase for a woman to become a mother. One of the most influential stages is the childbirth process. It often experiences obstacles and must be done through Sectio Caesarea (SC) surgery to save the fetus and mother (Novianti, Ika, Dwi, 2017). Childbirth via SC can be at risk of causing physiological and psychological disorders, especially in unplanned SC (Connor & Butterfield, 2003).

The World Health Organization (WHO) determines the indicator for SC delivery at 5-15% for each country. According to WHO, the increase in childbirth with SC in all countries occurred from 2007 to 2008, namely 110,000 per birth throughout Asia (Gibbsons et al, 2010). Data from Basic Health Research 2013 stated that SC delivery was 9.8% with the highest proportion in Special Capital

Region of Jakarta of 19.9% and the lowest in Southeast Sulawesi of 3.3% and in general, SC delivery according to the characteristics showed the highest proportion in the top ownership index quintile of 18.9 %, living in an urban area of 13.8%, working as an employee of 20.9% and having tertiary education/graduate from university of 25.1% (Basic Health Research, 2013).

In Dr. M. Djamil Hospital in Padang, the SC incidence rate in 2016 was 76.28%, increasing to 83.57% in 2017 and increasing again in 2018 by 85.77%. It is same at Dr. Reksodiwiryo Hospital, the SC delivery rate was 99.09% in 2017 and increased to 90.88% in 2018. This shows an increase in the incidence of SC each year. By this fact, the author is interested in making this research with the objective to know the relation between serum cortisol and parenting self-efficacy in postpartum mother with Sectio Caesarea.

Postpartum SC mothers usually feel various discomforts, such as anxiety in the mother (Pawatte, Pali, Opod, 2013), pain from abdominal incisions, fear for the safety of her baby and side effects of anesthesia due to surgical procedures (Potter & Perry, 2005; Somera et al. , 2010). This can cause various problems in postpartum mothers. One of them, mothers are lazy to do early mobilization and if pain occurs, the mother will focus on herself without caring for the baby and will also cause anxiety and confidence in the mother. In postpartum mothers, there are physiological, psychological and endocrine changes. Physiological changes, especially in involution and lactation (Wiklund et al, 2018). Endocrine changes occur in the hormones estrogen, progesterone, cortisol and prolactin (Rahmaningtyas et al, 2019; Reeder, 2011; Green, 2012; Kennerley, 1989; Levy, 1987).

Parenting self-efficacy is the belief of parents in their ability to care for babies under certain conditions. This belief will influence the practice of babysitting and is one of the foundations for the growth and development of the next child (Bandura, 1997; Montigny, Lacharite, 2005). PSE plays a mediating role among knowledge, education and behaviour. The results of Porter and Hui-Chin's research found that mothers who had high PSE had better abilities in doing parental duties, were more responsive to responding to every baby's cues and needs and had better interaction relationships with babies. This is highly influential on the behavioural and cognitive functions of children in their environment, will increase the responsibility of the mother in caring for the baby, and reduce the incidence of violence in infants and children (Porter & Hsu, 2003).

LITERATURE REVIEW

Definition of Cortisol

Cortisol is the main glucocorticoid secreted by the adrenal cortex (Sherwood, 2014). Cortisol is known as the hypothalamic-pituitary-adrenal (HPA) end-effector point (Tsigos & Chrousos, 2002). The regulation of cortisol secretion is the same as other hormones whose mechanism of action is influenced by three hierarchical commands, namely the corticotrophin releasing hormone (CRH) which comes from the hypothalamus which stimulates the release of adrenocorticotropic releasing hormone (ACTH) from the anterior pituitary. ACTH will then stimulate the release of cortisol from the adrenal cortex to be precise in the fasciculate and reticular zones. This regulation is influenced by the diurnal system (highest levels in the morning around 08.00-09.00 or when starting to move and the lowest at night or at rest (Sherwood, 2014; Kammerer, Taylor & Glover, 2006).

Definition of Parenting Self-Efficacy

Self-efficacy is a person's belief in their ability in their environment to exercise a number of control measures for their self-function and given tasks (Bandura, 2005; Kohlhoff & Barnett, 2013). Parenting Self-Efficacy is a belief or assessment of a person's ability to succeed in playing the

role of being a parent who is effectively able to manage tasks in any condition (Coleman PK, Karraker KH, 2000). It has a major role in regulation through individual motivation and specified work achievement (Bandura, 1997). Someone who has strong Self-Efficacy will use her best efforts to overcome obstacles, while someone with low Self-Efficacy will tend to reduce her effort or run away from existing obstacles. Mothers who have strong self-efficacy have good abilities in shaping character and managing and carrying out a series of tasks related to childcare (Jones & Prinz, 2005; Montigny & Lacharite, 2005).

MATERIALS & METHODS

This is a correlative analytic study using a cross sectional approach to determine the relation between cortisol and parenting self-efficacy (PSE) in postpartum mothers with Sectio Caesarea (SC). The materials used cover maternal venous blood serum, material from the subject's blood serum using the Enzyme Linked Immunosorbent Assay (ELISA) method of Cortisol, the Parenting Self-Efficacy Questionnaire (PSE) Scale and the Social Support Questionnaire.

The data that have been obtained are recorded in the research form and then proceed with data processing through editing, coding and tabulating processes. Editing was carried out when data collection was done by double checking the contents of each questionnaire question to ensure that the respondent's answers were complete and that all question items had answers. The researcher provided a code for each respondent to facilitate data processing and data analysis. After all data was coded and entered into a computer program, the data were then processed using statistical software so that the data can be analyzed. The researcher carried out cleaning of all data in order to be free from errors before data analysis was carried out, both errors in coding and in reading the code, errors may also occur when the researcher entered the data into the computer. After the data were obtained, rechecking was done to make sure whether data were wrong or not.

Statistical Analysis

All data obtained were processed using the Statistical Package for the Social Science (SPSS). Analysis of the data used in this study included: 1) numerical data obtained from the results of the study, the data normality test was carried out using the Shapiro Wilk Test (sample <50) to determine the normality of data distribution. The data distribution is normal (normally distributed) when p value> 0.05; and 2) a bivariate test was conducted to determine the relation between two numerical data variables, namely cortisol levels and parenting self-efficacy (PSE) in postpartum mothers with Sectio Caesarea. The Pearson parametric test was performed if the data is normally distributed; if the data distribution is not normal, the nonparametric spearman test is used.

RESULT

Univariate Analysis

Research Respondents' Criteria

Table 1: Research Respondents' Characteristics

Variables	n	Median	Mean ± SD	Min-Max
Cortisol Level (ng/ml)	26	621,899	585,000 ± 109,606	304,253-723,665
PSE	26	6,11	6,11 ± 1,04	4,03-8,14

Respondents in this study were taken based on patients who came to the hospital where the study was conducted based on respondents' characteristics.

Based on Table 1, it shows that mother age is at least 15 years old and a maximum of 40 years old, the number of parity is at least 1 person and a maximum of 7 people, the lowest education is elementary school and the highest is tertiary education, the lowest is self-employed and the highest is housewife, social support is low and high.

Normality Test

The normality test in this study used the Shapiro Wilk normality test (data ≤ 50 samples). The result obtained showed that the cortisol level was p = 0.005 because the p value was <0.05 so that the data were not

normally distributed, then the data was transformed using Log10, Ln and Sqrt, the value of p = 0.000 was obtained so that the data were not normally distributed. In PSE score, p value = 0.472, which means the data were normally distributed. After the parametric test requirements were not fulfilled due to the distribution of data that is not normal, then the non-parametric Spearman test was carried out to see the relation between cortisol and PSE levels in postpartum mothers with SC.

Mean Cortisol and Parenting Self-Efficacy (PSE)

Univariate analysis was performed to determine the distribution of variable data on cortisol levels and PSE scores. The following table shows the mean and standard deviation of each variable.

Table 2: Mean Cortisol Levels and PSE Scores in Postpartum Mothers with Sectio Caesarea

Risk Factors	N(%)	Median	Min-Max
Mother Age (Year)	26	27,50	15-40
Parity	26	1	1-7
Education	26	High School	Elementary School-Tertiary Education
Occupation	26	Housewife	Self-Employed-Housewife
Social Support	26	High	Low-High

SD = Standard Deviation

In table 2, it can be seen that the median cortisol level in postpartum mothers with SC is 621.899 ng/ml with a minimum value of 304.253 and a maximum value of 723.665. The mean PSE score is 6.11 ± 1.04.

Bivariate Analysis

Correlation between Cortisol Hormone and Parenting Self-Efficacy (PSE) in Postpartum Mothers with Sectio Caesarea (SC)

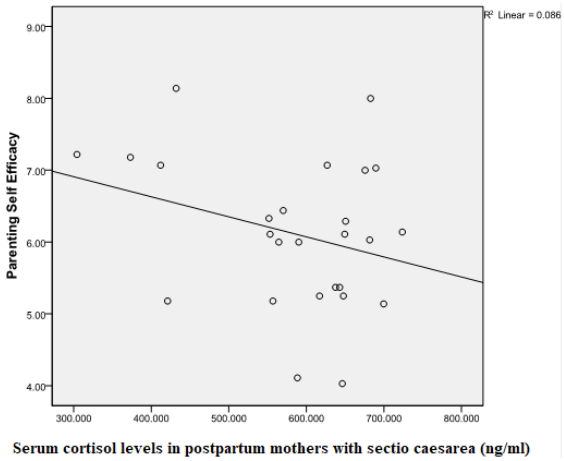
To determine the correlation between cortisol levels and PSE, a statistical test was performed using the Spearman correlation test. The correlation of these two variables can be seen in the following table:

Based on table 3 and graph 1, it shows that there is no correlation between cortisol and PSE levels with a value of r = -0.177 and a value of p = 0.38 (p> 0.05). Thus, it can be concluded that there is no significant correlation between serum cortisol levels and PSE scores and shows a negative direction in the two variables tested. It is also obtained from the graph above that the value of R2 = 0.086, which means that cortisol affects PSE by 8.6%, while 91.4% is influenced by other factors.

Table 3: Correlation between Cortisol Levels and PSE in Postpartum Mothers with SC

		PSE
Cortisol Level	r	-0.177
	p	0.38
	n	26

**Spearman Correlation Test*



Graph 1 Scatter Plot of Correlation between serum Cortisol Levels in postpartum mothers with SC and Parenting Self-Efficacy

DISCUSSION

Univariate Analysis

Age is one of the risk factors for Sectio Caesarea delivery. The safe reproductive age is 20-35 years old and is considered to be at risk at the age of less than 20 years old and over 35 years old. Based on the research results, the median age of the respondents in this study was 27-50 years old. Ages who are classified as low risk (20-35 years) experience more increases in the hormone cortisol due to the influence of poor adaptation patterns to the stress experienced. In addition, respondents aged > 35 years old have a better adaptation pattern to stress because of their previous experience in dealing with various types of stress so that increased cortisol due to stress can be avoided (Usman, 2018).

In this study, the highest amount of parity was the delivery of the first child. Childbirth with SC that occurred in primiparous mothers had a higher level of stress than mothers with multiparous so that psychological aspect extremely influenced childbirth and postpartum processes. In primiparous mothers, the transition period to become a mother will have an impact on further development (Harwood et al, 2007). The mother's parity status is related to her previous experience of caring for the baby.

The level of education is one of the factors that influence PSE in postpartum mothers with SC in preparing for delivery and acceptance of new family members. Jackson, Choi, Bentler (2009) stated that the high level of education in the mother affects the psychological function of the mother to be able to perform the role completely so that it can affect the behavioral and cognitive functions of the child later. In this study that has been conducted, the most respondents have high school education level.

Based on table 1, in terms of occupation, the median is housewives. Theoretically, occupation is one of the factors that influence PSE in postpartum mothers with SC. The working mothers, if they cannot control well psychologically, will cause an increase in the cortisol hormone and decrease the estrogen or progesterone hormones which can decrease breast milk production. If breast milk production decreases, it will have an impact on the success of exclusive breastfeeding.

Based on table 1, in terms of social support in this study, the median is high social support. This shows that social support is tremendously influential in the postpartum period to help mothers both in doing household activities and caring for their babies (Haggman-Laitila, 2003)

Mean Cortisol Hormone Levels and PSE in Postpartum Mothers with Sectio Caesarea

Mean of Cortisol Hormone Level in Postpartum Mothers with Sectio Caesarea

Table 2 shows the minimum serum cortisol level in this study is 305.769 ng/ml and the maximum level is 722.979 ng/ml. The median serum cortisol value in this study is 621,899 ng/ml.

Cortisol levels increase early in pregnancy until delivery, cortisol production continues to increase significantly, and reaches a maximum cortisol level of 331-1380 Nmol/L in the third trimester (Kuo et al, 2010; Akinloye et al, 2013). This cycle can change when a person changes sleep habits and when there are excessive stressors (Guyton & Hall, 2014; Nurdin, 2014). The magnitude of the increase in cortisol is generally equivalent to the intensity of stress stimulation. The severe stress response causes a greater increase in cortisol than mild stress (Sherwood, 2011). The increase in cortisol is influenced by various factors such as nutritional adequacy, increased blood cholesterol levels, a history of using hormonal contraceptives before pregnancy and psychological stresses such as anxiety and stress facing changes in pregnancy (Sherwood, 2011; Stewart et al, 2015).

Stress is a state caused by a stressor. It can also be interpreted as a homeostatic disorder that causes changes in physiological balance resulting from physical and psychological stimuli. The types of stressors that can induce a stress response are: physical (trauma, surgery, intense heat or cold), chemical (decreased O2 supply, acid-base imbalance), physiological (strenuous exercise, hemorrhagic shock, pain), infectious (bacterial invasion), psychological or emotional (anxiety, fear, sadness) and social (personal conflict, lifestyle changes). As an adaptive response to stress, changes in serum levels of various hormones including CRH, cortisol and epinephrine occur. These changes may be necessary for an individual's fight response to stress (Ranabir & Reetu, 2011).

The cortisol levels obtained in this study were lower when compared to the results obtained by Stjernholm et al, (2016)

in Karolinska Sweden who obtained a value of 831 ± 257 nmol/L. Different types of surgery could cause the results of this study to differ. Stjernholm et al took samples only on elective SC, whereas in this study, the samples were taken by elective and emergency SC mothers.

Mean of Parenting Self-Efficacy (PSE) in Postpartum Mothers with Sectio Caesarea

The mean score of Parenting Self-Efficacy in this study is 6.11 ± 1.04. Self-efficacy can be influenced by various factors, depending on the type of task that must be completed by the individual. Several factors include mother's age, education, parity, delivery type, family support and baby's health status (Potter and Perry; 2006). The early postpartum period is a time full of happiness and anxiety, which can cause fatigue and overwhelming, especially for new mothers. PSE is an important part in achieving identity and role as a mother. Measurement of PSE at the beginning of postpartum makes it possible to identify beliefs and abilities in caring for newborns (Leahy-Warren and McCarthy, 2011) and to detect mothers who are at risk of experiencing postpartum blues and postpartum depression (Salonen et al, 2009).

The mean of PSE score obtained in this study was higher when compared to the results obtained by Fauziah, 2012 at the Hajj Hospital in Medan which got a mean value of 5.10 ± 0.39 (5.8-6.2).

The difference in the baby's health status and the delivery type is another factor that affects the mother's PSE score (Fauziah, 2012). According to Kurth et al. (2010), mothers who have babies with health problems will have a higher level of difficulty in caring for their babies so that the PSE value obtained is lower. Infectious diseases, acute respiratory problems or physical discomfort make the baby cry a lot and increase the mother's inability to cope with the problems.

PSE assessment should be carried out during pregnancy so that if a low PSE result is obtained during the examination, this condition can still be improved by providing education, discussion and training in preparing to play a role as a parent during infant care which can increase the PSE value.

Correlation between Serum Cortisol Levels and Parenting Self-Efficacy in Postpartum Mothers with Sectio Caesarea

Based on 3, it showed that there was no correlation between the serum cortisol variable and the PSE score in this study. The result of statistical test with correlation value r = - 0.177 and p value = 0.38. There was an insignificant negative relation with very weak strength between cortisol and PSE. The conclusion of the statistical analysis is that the higher the cortisol level, the smaller the PSE score in postpartum mothers with SC. This is because PSE is not only influenced by cortisol, but also by other factors which were not examined in this study. In this study, the maximum serum cortisol level was 723,665 ng/ml, the minimum was 304,253 ng/ml and the mean PSE score was 6.11.

Chronic pain that occurs after SC surgery is likely the result of nerve entrapment, cesarean scar defects or pelvic adhesions. Chronic pain after SC was reported in 12.3% of women, within 10 months after the SC procedure, and 5.9% of them experienced pain every day or almost every day (Gupta & Vandana, 2018).

The SC delivery method is generally used if the condition of the mother with complications of pregnancy and childbirth is life-threatening (Begum et al, 2017). This complicated pregnancy turns out to be a risk factor for low maternal confidence in achieving her role (Maehara, 2016).

Parenting self-efficacy (PSE) can be defined as parents' beliefs about their ability to successfully raise children (Wittkowski, 2017). According to the researcher, one of the factors that caused a decrease in the ability of mothers with a history of SC childbirth to perform their role was a decrease in the ability to mobilize mothers due to incision wound pain (an impact on

increasing cortisol levels). Post-SC pain levels are heterogeneous, both in expression and intensity (Lim et al, 2018). Pain can contribute to stress and other negative emotional states such as anxiety, fear, and depression (Solowiej, 2009). Surgery involves surgical procedures that cause stress and trauma and has an impact on increasing cortisol secretion (Kwon et al, 2019). This results in decreased mother's confidence in caring for her baby (Parenting Self-Efficacy) and makes the mother vulnerable to depression.

The results of this study are in line with the results of the study done by Stirrat et al. 2017, in which the mean of cortisol hormone level in the type of Sectio Caesarea delivery was lower, namely 928.7 (SD 398.0) compared to the mean of cortisol level in vaginal delivery, namely 1225.7 (SD 473.5). The p-value was 0.266, which means that there is no significant relation between cortisol levels and the delivery type.

The low mean of cortisol level in SC delivery type was also found in the study of Stjrnholm et al., 2015. The results of their study showed that the serum cortisol level in the SC group was lower than the vaginal delivery group. The cortisol level was 1368 ± 479 in vaginal delivery during the third phase of labor until 2 hours after the placenta was born. In addition, the cortisol level was 831 ± 257 at Sectio Caesarea delivery at 2 hours postoperatively.

Similar results were also found in the research of Riazanova et al, 2018, in which the result of maternal blood cortisol levels at 6 hours postpartum was 2310.91 nmol/l in mothers with SC birth compared to maternal blood cortisol without pain management (normal delivery), namely amounting to 2673.82 nmol/l. This shows that the type of vaginal delivery has a higher level of stress than that of the SC.

CONCLUSION

From the research that has been conducted, it eventually obtains three points of conclusion namely: 1) the median serum cortisol level in postpartum mothers with SC was 621,899 ng/ml with a minimum - maximum value (304,253 -723,665); 2) the mean PSE score was 6.11 with a minimum-maximum score (4.03-8.14); and 3) there was no significant correlation between maternal serum cortisol levels and the Parenting Self-Efficacy score in postpartum mothers with SC.

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