

The Effect of Hypnotherapy on Serum Cortisol Levels in Post-Cesarean Patients

Inne Rizkiani¹⁾, Supriyadi Hari Respati¹⁾, Sri Sulistyowati²⁾,
Uki Retno Budihastuti¹⁾, Hanung Prasetya³⁾

¹⁾Department of Obstetrics and Gynecology, Faculty of Medicine,
Universitas Sebelas Maret / Dr. Moewardi Surakarta Hospital, Indonesia

²⁾Department of Obstetrics and Gynecology, Faculty of Medicine,
Universitas Sebelas Maret / UNS Hospital

³⁾Health Polytechnic, Ministry of Health Surakarta, Central Java

ABSTRACT

Background: After cesarean section, there is often an increase in stress and anxiety which can have a negative effect on pain perception. Cortisol is the main stress hormone that regulates the duration and intensity of the stress response. Hypnotherapy is a therapy with a hypnotic method to reach someone's subconscious mind. Hypnotherapy is thought to be able to help patients in the post-section coping method because it can cause feelings of pleasure, satisfaction, safety, comfort and can make a person feel they have the strength of themselves to deal with the anxiety they experience. This study aims to analyze the effect of hypnotherapy on serum cortisol levels in post-areal section patients.

Subjects and Method: This study was an experimental single-blind randomized controlled trial post-test group design which was conducted in the Obstetrics and Gynecology wards of Dr. Moewardi Hospital Surakarta and Dr. R Soetijono Blora Hospital. The subjects of the study were post-sectional patients who were hospitalized and met the inclusion and exclusion criteria. Subjects were divided into 2 groups, namely the hypnotherapy group which consisted of 15 post-sectional patients who received hypnotherapy and the control group which consisted of 15 post-areal patients who

did not receive hypnotherapy. All subjects were examined for cortisol levels in the Prodia laboratory using the Chemiluminescent micro-particle immunoassay (CMIA) method. The data of both groups were analyzed using the Mann-Whitney test.

Results: The median, minimum, and maximum cortisol levels in the hypnotherapy group were 3.60, 2.10, and 4.40 respectively, while the median, minimum and maximum cortisol values in the control group were 10.50, 8.20 and 32.80 respectively. Effect size= -2,2. The results of the analysis test showed a significant difference in mean values ($p < 0.001$).

Conclusion: Hypnotherapy has an effect on decreasing cortisol levels in post-cesarean section patients.

Keywords: Hypnotherapy, Cortisol, Post-cesarean section

Correspondence:

Inne Rizkiani. Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Sebelas Maret/ Dr. Moewardi Hospital, Surakarta, Jl. Kolonel Sutarto, Jebres, Surakarta, Central Java 57126. Email: drinerizki@gmail.com

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BACKGROUND

Caesarean section is an action to deliver a fetus which is performed by performing

surgery on the abdominal wall (laparotomy) and uterus (hysterotomy) (Saint Lewis et al., 2018). This surgical procedure

is performed when complications occur during pregnancy or childbirth, making it too risky for vaginal delivery. The procedure of the caesarean section is a major operation with a high maternal and perinatal risk, the incidence rate has increased drastically worldwide at the end of this decade. Recent data from 150 countries show that currently 18.6% of deliveries occur by caesarean section. The highest rates of caesarean section were in Latin America and the Caribbean region (40.5%), followed by North America (32.3%), Oceania (31.1%), Europe (25%), Asia (19.2%) and Africa (7.3%). A trend analysis obtained from 121 countries shows that the global average caesarean section rate increased by 12.4% (from 6.7% to 19.1%) with an annual average rate of increase of 4.4% over the period 1990 and 2014. (Betrán et al., 2016) In 2014 alone, as many as 31.8% of pregnant women in Germany gave birth by caesarean section procedure (Hepp et al., 2016)

Changes that can occur in a pregnant woman's body include increased levels of cortisol, corticosteroid-binding globulin (CBG), corticotropin-releasing hormone (CRH) and adrenocorticotrophic hormone (ACTH). This increase can lead to increased sensitivity on the Adrenal Pituitary Hypothalamus (HPA) axis and increase physiological hypercortisolism (Jung et al., 2011). The process that occurs in childbirth has an important role as an additional stressor due to psychological changes and perceptions in postpartum patients, this can lead to a process on the HPA axis that can increase (Betrán et al., 2016) the release of cortisol. In addition, during pregnancy CRF is also produced by the placenta which further modulates the release of cytokines (Nezi et al., 2015).

Patients with post-traumatic stress and anxiety have an increase in symptoms

of post-traumatic stress, which can have a negative effect on pain perception and use of analgesics after surgery. Anxiety itself will cause an increase in the hormone cortisol (Hepp et al., 2018). Cortisol is a steroid hormone that is synthesized from fat and cholesterol. Cortisol, the main stress hormone, increases sugar (glucose) in the bloodstream, increases the use of glucose by the brain and increases the availability of substances that repair tissue when stress occurs (Hannibal et al., 2014).

Hypnotherapy is a therapy with a hypnotic method to reach a person's subconscious mind. The main key of hypnosis is the absence of suggestions or strength to fight a positive action based on the concept of thinking so that it has positive energy to carry out an action. Hypnotherapy in surgery can provide a comfortable and relaxing experience for patients. Hypnotherapy itself is thought to be able to help patients in the coping method after surgical section. Hypnotherapy in theory can cause feelings of pleasure, satisfaction, safety, comfort and can make a person feel they have the strength of themselves to fight or reduce the level of anxiety they experience (Budiman, Putra and Jatnika, 2018).

Based on the data that there is anxiousness of pregnant women in dealing with the surgical treatment and limited pharmacological options, another alternative is needed in dealing with anxiety that can be done with hypnotherapy. Physiologically, patients whose anxiety decreases will decrease their cortisol levels. Cortisol levels can drop to dangerously low levels during hypnotherapy. This indicates a relationship between hypnotherapy and the HPA axis. Hypnotherapy has a statistically significant effect on reducing the patient's serum cortisol levels from depression and anger conditions before hypnotherapy to a

hypnotherapy-induced happy state (Scardino, 2014).

Caesarean section itself is often associated with the emergence of psychological risks in patients, namely post partum anxiety and depression (Schantz et al., 2016). The caesarean section is associated with adverse psychological consequences for the mother, including postpartum depression. Post partum depression affects about 10% of women after childbirth and has a negative impact on parental behavior, child welfare and children's progress (Xu et al., 2017). Meanwhile, the psychological response that often occurs in patients who undergo surgery is the emergence of anxiety. This is because in addition to patients who think about the condition for themselves, they also think about the condition of their babies (Sriningsih et al., 2014). This theory is similar to the results of a study on the meta-analysis of the effect of cesarean delivery with post partum depression which shows that childbirth with caesarean section can increase the incidence of post partum depression (Xu et al., 2017). One of the interventions that can be done is hypnotherapy, such as research on the impact of hypnotherapy on anxiety levels. The results showed that there were differences in anxiety levels, namely moderate anxiety before hypnotherapy and mild anxiety after hypnotherapy (Sriningsih et al., 2014).

Research on the effect of hypnotherapy on cortisol levels in post-sectional patients is still small, therefore in this study the researchers wanted to know the effectiveness of using hypnotherapy to reduce cortisol levels in post-sectional patients.

SUBJECTS AND METHOD

1. Study Design

This was an experimental single-blind randomized controlled trial post-test group

design which was conducted from July to September 2020. The study was conducted in the Obstetrics and Gynecology Room at Dr. Moewardi Hospital Surakarta, Blora Regional General Hospital and Prodia Surakarta laboratory.

2. Population and Sample

The research subjects were post-sectional patients who met the inclusion criteria in the form of non-elective, emergency primary post-section patients with spinal anesthesia who were willing to participate in the study as respondents; getting ketorolac as a postoperative analgesic; able to communicate well using Indonesian, hearing within normal limits, able to read and write; able to attend hypnotherapy sessions and at least complete elementary education who is treated in the Obstetrics and Gynecology Room Dr. Moewardi Surakarta and Blora Hospital. Patients who are admitted to the intensive care unit; have a previous history of mental disorders and have complications such as heart disease, preeclampsia with complications, chronic renal failure, and other comorbidities that interfere with the body's metabolism, including the exclusion group. The sample size in this study was determined using a hypothesis testing formula, 15 patients were determined for each control and treatment group.

3. Study Variables

In this study, hypnotherapy was included in the independent variable, while cortisol levels were the dependent variable.

4. Operational Definition of Variables

Hypnotherapy is an intervention action by giving suggestions to post-sectional patients in a trance/ hypnosis condition, the suggestions given contain advice, invitations, orders that are intended to reduce anxiety levels in post-sectional section mothers so that it is hoped that there will be a decrease in cortisol levels. Suggestions

are given by the researcher using a suggestion recording on MP3 or a prepared cellular phone. Hypnotherapy in this study used the Hanung induction method, while the cortisol hormone is a steroid hormone produced by the cortex of the adrenal glands which is bound by Corticoid Binding Protein (CBP) and albumin. Normal value 5-25µg/ 100ml. Blood samples were taken 6-12 hours after the procedure, namely 5cc blood samples were taken. And examined using the immulitecortisol method (solid phase two site chemiluminescent enzyme immunoassay). Samples from the patient, conjugated polyclonal alkaline phosphatase and cortisol antibody were incubated for 30-60 minutes at 37° C, then the unbound conjugate enzymes were cleaned by centrifuge. Furthermore, this sample is added to the substrate and incubated for 10 minutes so that the cortisol concentration in the sample can be measured.

5. Research Technic

The treatment group was given hypnotherapy 6-12 hours after post-surgical section and the subject was confirmed to be free from anesthetic reactions, while the control group was not treated with hypnotherapy. Hypnotherapy intervention is carried out with the following procedures: preinduction (discussion and giving informed consent), suggestibility test (testing the patient's response to certain suggestions), induction (changes in consciousness with the INDUCTION NAME technique), deepening, deep level test (doing a hypnotic depth test), suggestion (give suggestions that refer to the attached text to form a feeling of calm and reduce anxiety) and Awakening.

The control group and the treatment group were then tested for plasma cortisol levels in the Prodia laboratory. The subject's blood was taken 5cc, left to stand for 30-60 minutes, then centrifuged. After

being centrifuged, the blood sample is sent to the Prodia laboratory with an interval of 1 x 24 hours, while waiting for it to be sent to the laboratory, the blood sample is stored in a cold box or refrigerator with the condition that the sample cannot be frozen. Cortisol levels were checked by the Chemiluminescent Microparticle Immunoassay (CMIA) method using the Architect Cortisol brand reagent 8D15, 2015.

6. Data Analysis

The results of the data normality test with the Shapiro-Wilk test showed that the data were not normally distributed. So that the hypothesis test using non-parametric, namely Mann-Whitney.

7. Research Ethics

This research has received ethical approval from the ethics commission of Dr Moewardi Hospital Surakarta dated Number 1.045 / VIII / HREC / 2020.

RESULTS

1. Characteristics of Subjects

Before further analysis is carried out, the characteristics of the study subject of each group are first explained, including demographic variables such as education level, income, occupation, and financing methods as well as clinical variables, namely the amount of parity.

The study subjects with a low secondary education level were 16 subjects and the remaining 14 were highly educated. For the distribution of the number of parity in the study subjects, there were 12 primiparous patients and 18 multiparous patients. Income for study subjects, 22 respondents had income above the Regional Minimum Wage (UMR) and the remaining 8 had income below the UMR. Of the 30 respondents, 19 respondents worked and 11 respondents were housewives. As for the financing method factor, 22 respondents

used collateral while 8 respondents used the financing in general (Table 1).

Table 1. Sample characteristics

Variable	N	Percentage (%)
Level of education		
Low-Middle (PS, JHS, SHS)	16	53.33
High(College)	14	46.67
Total Parity		
Primipara	12	40
Multipara	18	60
Income		
Over the minimum wage (IDR 1,798,979)	22	73.33
Under the minimum wage (IDR 1,798,979)	8	26.67
Profession		
Working	19	63.33
Housewife	11	36.67
Financing		
Insurance (BPJS, other insurance)	22	73.33
Private (Self-payment)	8	26.67

2. Analysis of Cortisol Levels

Table 2 Characteristics of Samples in the Hypnotherapy Group and the Non-Hypnotherapy Group

Hypnotherapy Group	Cholesterol Levels				
	Mean	Median	SD	Min.	Max.
Intervention	3.513	3.60	0.658	2.10	4.40
Control	12.933	10.50	6.252	8.10	32.80

Table 3. Differences in Cortisol Levels between the Hypnotherapy Group and the Non-Hypnotherapy Group after the Intervention

Cholesterol Levels	Median	SD	95% CI		p
			Lower Limit	Upper Limit	
Hypnotherapy	3.60	0.658	3.14	3.87	<0.001
Control	10.50	6.252	9.47	16.39	

Before the results of the normality test of cortisol levels in the hypnotherapy group, the p was <0.001, which indicates that cortisol were not normally distributed, while in the control group (p= 0.384) indicated that the cortisol levels were normally distributed (Table 3). Because there is one data that is not normally distributed, an analysis will be carried out using a non-parametric test. The data on cortisol levels was tested for homogeneity, namely using the One Way ANOVA test with the results of p <0.001 which indicates that the data is not homogeneous (Table 3). Because cortisol levels

were not normally distributed and not homogeneous, the bivariate test selected was the non-parametric test, namely the Mann-Whitney test. Cortisol levels in the two groups were analyzed using a non-parametric test, namely the Mann-Whitney test to determine the mean difference in cortisol levels between groups treated with hypnotherapy with the control group. From the results of the Mann-Whitney test, it was found that p<0.001, which indicates that there is a significant difference between the mean cortisol levels in the hypnotherapy

treatment group compared to the control group.

DISCUSSION

Stress plays an important role in depression. Cortisol is released in response to stress and is a key physiological marker for activation of the stress response. There is substantial debate among experts regarding the role of cortisol in depression in general and particularly during pregnancy and postpartum. Cortisol is a glucocorticoid steroid hormone, synthesized from cholesterol in the adrenal cortex and its release is regulated via the hypothalamus-pituitary-adrenal (HPA) system. Usually in response to cognitive assessments of significant stressors (which can be real or imagined), corticotropin-releasing-hormone (CRH) is produced in the paraventricular nucleus of the hypothalamus and released into the pituitary gland. CRH then stimulates the release of adrenocorticotrophic-releasing-hormone (ACTH) in the anterior pituitary which in turn induces the adrenal cortex to release a number of glucocorticoids, including cortisol in humans. The HPA axis operates in a negative feedback loop in which the release of cortisol returns to the brain regions of the hypothalamus and hippocampus which triggers the cessation of CRH release (Jung et al., 2011).

In the initial stressor phase, cortisol increases adaptive responses by motivating high survival value behaviors such as alertness, acuity, arousal and attention. Cortisol binds to two different receptors whose action regulates the duration and intensity of the stress response. Mineralocorticoid receptors in the limbic brain region help mediate the cortisol response by acting at the membrane level during the initial stimulant phase initiated by the stressor to determine the appropriate threshold for cortisol secretion and then regulate gene

transcription. In the later phases of the stress response, glucocorticoid receptors mediate the cessation of the response, suppress information unrelated to the initial stressor, and promote recovery through mobilization of energy sources. Therefore, when cortisol secretion is high enough, CRH output is reduced, which in turn, decreases the levels of pituitary ACTH and adrenal cortisol. The complex set of endocrine functions often results in multiple points of dysfunction. For example, a stress response can lead to hypercortisolemia (excess excretion of CRH and cortisol) and many studies have shown that this excessive secretion of cortisol increases susceptibility to depression (Jung et al., 2011).

In this study, post-sectional section patients were divided into an intervention group that was treated with hypnotherapy and a control group that was not treated with hypnotherapy. Then the two groups were examined and analyzed for cortisol levels. From the Mann-Whitney test indicates a significant difference between the mean of cortisol in the hypnotherapy group compared to the control group ($p < 0.001$). The mean of cortisol in the hypnotherapy group (3.50 ng/ml) was lower than the control group (12.90 ng/ml). It indicates that the use of hypnotherapy was more effective at reducing cortisol in post-sectional patients than those who did not receive hypnotherapy intervention.

The results of this study are in line with Rohaeti et al. (2018) who showed that in 40 trimester III primigravida pregnant women. The results showed that the cortisol levels in the two groups after the intervention showed a significant difference ($p = 0.001$) between the mean of cortisol in the control group (Mean= 103.88; SD= 45.3) and the treatment group (Mean= 65.147; SD= 17.6). In addition, this study also ana-

lyzed cortisol levels before and after the intervention and obtained significant results ($p= 0.001$) in both groups. The mean of cortisol in the control group before the intervention (Mean= 170.44; SD= 39.9) was higher than after the intervention (Mean= 103.88; SD= 45.3).

The anxiety experienced by the patient will cause perceptual signals / impulses that travel to the brain through sensory, visual and auditory pathways and reach the thalamus. These impulses then travel to the sensory cortex and continue to the transitional cortex for cognitive control processes. After completing the process in the cortex, these impulses are projected to the hippocampus to be stored as memory. These impulses are also projected to the amygdala and other organs that are involved and then expressed outward. These cognitive signals go to the Hypothalamus. The hypothalamus responds to stress impulses that continuously travel upwards to the thalamus by releasing CRF, then a response occurs through the hypothalamic-pituitary axis (HPA) which ultimately produces cortisol (Scardino, 2014).

Anxiety causes stressors on the cerebral cortex which can influence the hypothalamus to release the neuropeptide CRH-ACTH in the mother's endocrine system, one of which is an increase in the level of the hormone cortisol. At the same time the hypothalamus in the anterior pituitary affects the sympathetic nerves which stimulate the adrenal medulla to release epinephrine and norepinephrine so that anxiety increases. One way that can be used to reduce anxiety and stress levels in mothers is by doing hypnotherapy. This technique affects brain waves from beta to alpha and then to theta, and simultaneously the posterior pituitary stimulates the sympathetic nerves for relaxation and anxiety levels, cortisol levels and fetal heart rate

can decrease to normal (Akbarzade et al., 2015).

Electroencephalographic (EEG) studies show that people who are hypnotized have electrical patterns similar to those of people who are completely conscious and attentive and unlike those found during sleep. Increased alpha activity and theta strength in the left frontal region have been reported in highly hypnotized patients compared to those who are less hypnotized, these differences exist in the trance and nontrance conditions. A Positron emission tomography (PET) study comparing regional brain blood flow in hypnotized and non-hypnotized subjects provides further evidence against the hypothesis that hypnosis exerts some effect on low-level brain modalities. Hypnosis commands for adding color to visual images results in increased blood flow to the lingual and fusiform gyri, the brain's color vision processing center; while the command to remove color has the opposite effect. Likewise, the intensity and noxiousness of pain are believed to be processed by different regions of the brain, since different areas of blood flow are reduced when each is minimized through hypnosis. The role of anterior brain regions such as the frontal lobe in hypnosis has been shown physiologically by a positive correlation between the concentration of homovanillic acid in cerebral spinal fluid and the degree of hypnotic ability. The frontal cortex and basal ganglia contain a large number of neurons that use dopamine, the metabolite of which is homovanillic acid. This may explain why enhancing pharmacological hypnosis is difficult, although it is difficult, especially with dopaminergic agents, such as amphetamines. Increased activation of the basal ganglia can be associated with increased automatic motor behavior in hypnosis (Sadock et al., 2017).

Hypnotherapy is a therapy using hypnosis method to reach someone's subconscious mind. The main key of hypnosis is the absence of suggestions or strength to fight a positive action based on the concept of thinking so that it has positive energy to carry out an action. Hypnotherapy in surgery can provide a comfortable and relaxing experience for patients. Hypnotherapy itself is thought to be able to help patients in the coping method after surgical section. Hypnotherapy in theory can cause feelings of pleasure, satisfaction, safety, comfort and can make a person feel they have the strength of themselves to fight or reduce the level of anxiety they experience (Budiman, Putra and Jatnika, 2018).

Other studies have shown supporting results that hypnotherapy can help reduce stress levels in a person. An assessment of stress levels was carried out on 6 study subjects using the Depression Anxiety Stress Scale (DASS) before and after hypnotherapy. The results show that there is a significant reduction in stress in the study subjects. The use of hypnotherapy is effective in reducing the level of stress felt by study subjects (Alizamar et al., 2018). The use of hypnotherapy can reduce stress, because it can reduce excess hormone levels so that it affects stress itself. Using a hypnotherapy approach changes the thinking style of the subject, because in a hypnotic state, the counselor / therapist can reduce stress and increase awareness (Olendzki et al., 2020). Stress due to various physical, environmental, and mental conditions, including during surgical procedures, will be responded to by the central nervous system and immune system through the hypothalamus-pituitary-adrenal axis (HPA axis) to maintain homeostasis through cortisol secretion.

Hypnotherapy has an effect on decreasing cortisol levels in post-surgical pati-

ents. Cortisol levels can drop to dangerously low levels during hypnotherapy. This indicates a relationship between hypnotherapy and the HPA axis. Hypnotherapy has a statistically significant effect on reducing the patient's serum cortisol levels from depression and anger conditions before hypnotherapy to a hypnotherapy-induced happy state (Scardino, 2014).

AUTHOR CONTRIBUTION

Inne Rizkiani, Supriyadi Hari Respati, Sri Sulistyowati, Uki Retno Budihastuti, Hanung Prasetya contributed to research design and implementation, results analysis and script writing.

CONFLICT OF INTEREST

The authors state that the research was conducted in the absence of a commercial or financial relationship which could be construed as a potential conflict of interest.

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