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EFFECTS OF "STOP" MINDFULNESS ON DECREASING CORTISOL LEVEL IN PRIMIGRAVIDA MOTHERS

Anggorowati Anggorowati¹, Siti Munawaroh², Meidiana Dwidiyanti¹

1. Department of Nursing, Faculty of Medicine, Diponegoro University
2. Master Program in Nursing, Diponegoro University; STIKES Muhammadiyah Kendal

ABSTRACT

Stress in pregnant women may have different effects on pregnancy. Mindfulness is an intervention which can be practiced independently by primigravida mothers for stress management. Stress is indicated biologically by cortisol levels. Purpose of this research is to analyze the effects of Stop-Take a breath-Observe-Proceed (STOP) mindfulness on cortisol levels in primigravida mothers. This is a pretest-posttest quasi-experimental design with a control group was used. Sixty primigravida mothers who experienced stress in Semarang city, Indonesia, were divided into control and mindfulness intervention groups (n = 30 each). Sample size was calculated based on different proportions, and a consecutive sampling technique was used to select samples. Mindfulness using the STOP technique was practiced over four 60-min meetings. Before and after mindfulness intervention, 3 mL of blood was taken from each subject for cortisol examination. Data were analyzed using a paired Student's t-test. The majority of women (46.7%) were in their second trimester of pregnancy and aged 20–35 years-old (86.7%). The mean cortisol level significantly decreased after mindfulness intervention from 180.60 to 152.50 nmol/L (P = 0.000; $\alpha < 0.05$). Mindfulness using the STOP technique is effective for decreasing cortisol levels in primigravida mothers by increasing self-reliance for stress management.

Key words: Cortisol, STOP mindfulness, primigravida, stress

ABSTRAK

Stress pada ibu hamil berbeda-beda efeknya pada kehamilan. Mindfulness merupakan intervensi yang secara mandiri dilakukan pada primigravida untuk manajemen stress. Parameter biologi dari stress dapat menggunakan kadar kortisol. Tujuan penelitian untuk menganalisa efek dari Stop-Take a breath-Observe-Proceed (STOP) mindfulness terhadap kadar kortisol pada ibu primigravida. Desain penelitian ini adalah kuasi eksperimen pretes-postest dengan kelompok kontrol. Responden berjumlah enam puluh ibu primigravida yang mengalami stress di Semarang Indonesia dibagi menjadi kelompok kontrol (n=30) dan intervensi (n=30). Besar sampel dihitung berdasarkan rumus beda proporsi, pengambilan sampel secara konsekutif sampling. Mindfulness menggunakan teknik STOP dilakukan empat pertemuan selama 60 menit. Sebelum dan setelah intervensi mindfulness diambil darah 3 mL untuk diperiksa kadar kortisol. Data dianalisis dengan menggunakan uji t berpasangan. Sebagian besar ibu (46,7%) trimester kedua berusia 20-35 tahun (86,7%). Rata-rata kadar kortisol menurun setelah intervensi dari 180,60 menjadi 152,50 nmol/L (p=0,0000; $\alpha < 0,05$). Mindfulness menggunakan teknik STOP efektif menurunkan kadar kortisol pada ibu primigravida dengan meningkatkan kemandirian dalam manajemen stress.

Kata kunci: Kortisol, Mindfulness STOP, primigravida, stress

BACKGROUND

Maternal health during pregnancy is very important for ensuring the health of the baby. Stress during pregnancy is a risk factor that is harmful to mothers and children. Severe stress can negatively affect fetal growth and cause premature birth, low birth weight, or other fetal disorders as it physiologically induces vasoconstriction, affecting oxygen levels in the uterus (Coussons-Read, 2013).

Stress during pregnancy can also affect the temperament of the baby (Laplante, Brunet, & King, 2015) and increase the risk of preeclampsia and eclampsia in primigravida mothers (Black et al., 2016).

Stress hormones can pass through the placenta (Mancuso, Schetter, Rini, Roesch, & Hobel, 2004). Stress is indicated biologically by heightened cortisol levels. High levels of cortisol occurring over a long period of time can affect both maternal and fetal body weight, as well as cause depression and anxiety. Increased cortisol levels in early pregnancy have been shown to have an impact on preterm birth and slow growth after birth (Seng et al., 2018). In addition, mothers tend to experience disruption postpartum (Schetter, Tanner, & Angeles, 2015; Donnell, Connor, & Glover, 2009).

Regarding the prevalence of stress in pregnant women, a previous study showed that approximately 15–25% of pregnant women experience antenatal anxiety or mood disorders (Alderdice, McNeill, & Lynn, 2013). Vijayaselvi et al. (2015) reported a mean perceived stress score of 13.5 ± 5.02 , which occurred in the majority of groups (102, 65.4%); 57.7% of the total sample was primigravida. Some conditions known to cause stress during pregnancy include smoking, fear of complications, and physiological changes (Obel, Hedegaard, & Henriksen, 2005). In addition, unplanned pregnancy and spouse's occupational status are also a strong factor related to stress in pregnant women (Vijayaselvi et al., 2015).

Mind or thought control is one method of noninvasive stress management that can be practiced by pregnant women. Mindfulness is an awareness that is controlled with special

and sustained attention, intentionally, now, and without judgment (Zinn, 2012). When the cause(s) of the stress is known and the condition accepted, mindfulness is performed by increasing self-efficacy and using independent health targets to solve problems independently (Dwidiyanti, 2017). Mindfulness for childbirth and parenting during the perinatal period can elicit many psychological (maternal perceived stress and coping) and physical (neuroendocrine and autonomous) benefits (Duncan & Bardacke, 2010). Not only does it effectively reduce stress (Narimani, Khadijeh, & Musavi, 2015; Guardino, Schetter, Bower, Lu, & Smalley, 2014), mindfulness can also significantly increase pulse variability (Muthukrishnan, Jain, & Batra, 2016) and reduce blood pressure, depression, and anxiety (Dunn, Hanieh, Roberts, & Powrie, 2012). Furthermore, nurses can play active roles as educators by teaching mindfulness caring to improve calm, love, respect, and appreciation. Thus, mindfulness-based prenatal programs can be used as a safe and effective strategy for the management of stress during pregnancy (Simonian, 2015).

PURPOSE

The present study assessed the effects of Stop-Take a breath-Observe-Proceed (STOP) mindfulness on cortisol levels in primigravida mothers.

METHODS

This study used a pretest-posttest quasi-experimental design with a control group. Sixty primigravida mothers experiencing stress and living in Semarang city, Indonesia, were recruited using consecutive sampling and assigned to intervention ($n = 30$) or control who are pregnant women without practice mindfulness ($n = 30$) groups; sample size was calculated based on different proportions. The inclusion criteria were primigravida mothers who experienced stress with Depression Anxiety Stress Scale criteria, aged 17–50 years-old, hold a basic level of education (junior-high school) or higher, and were cooperative and willing to be a respondent.

STOP mindfulness was taught and practiced by respondents in the intervention group. This technique involves several steps. The first is to briefly stop what is being thought or done at a given point in time, then take a deep breath to feel the respiratory cycle in the body (there is also the intention to do something to maintain the pregnancy). Next, observe body sensations, mind, and emotions to realize one's abilities, and finally, determine the next steps for the present time by carrying out health targets independently. The intervention was carried out over four 60-min meetings refers to previous research (Kar, P.C., 2014). The first meeting was a presentation about mindfulness (mindful breathing, eating, sleeping, body scans, and being mindful with family) and mindfulness training. In the second meeting, mindfulness was practiced under supervision, and mindfulness ability was measured using a mindfulness questionnaire. The third meeting involved practicing mindfulness and identifying perceived obstacles, while the fourth was practicing mindfulness and counseling. Before and after the intervention, 3 mL of blood was sampled from each respondent to measure cortisol levels via enzyme-linked immunosorbent assay.

Data were analyzed using univariate and bivariate analyses. Descriptive analysis was performed using frequency and percentage. Differences in

the levels of cortisol before and after intervention were tested for normality. The results showed that the data were normally distributed, therefore, a paired Student's t-test was used. The differences between control and intervention groups were verified with an independent Student's t-test. A $P < 0.05$ was considered statistically significant.

The present study received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine, Diponegoro University, Semarang, Indonesia (approval no. 975/EC/FK-RSDK/XI/2017). It was also ensured that this study did not have any negative effects on primigravida mothers. Respondent participation was entirely voluntary, and the confidentiality of all information provided herein was maintained and only used for research purposes. This study fulfills the justice aspect by giving treatment to the control group after the post test measurement. The control group was given STOP mindfulness as given in the intervention group after the fourth meeting on intervention group. This research was conducted in accordance with the ethical principles as stated in the Declaration of Helsinki and the National Guidelines for Ethical Health Research, Ministry of Health, Republic of Indonesia, in 2011.

RESULTS

Table 1. Characteristics of primigravida mothers

Variables	Groups		χ^2	P-value
	Control n (%)	Intervention n (%)		
Age (years)				
<20	3 (10.0)	11 (36.7)	5.085	0.079
≥20	27 (90.0)	19 (63.3)		
Education				
Junior/high school	19 (63.3)	21 (70)	1.148	0.282
University	11(36.7)	9 (30)		
Employment				
Employed	17 (56.7)	18 (60)	0.069	0.793
Unemployed	13 (43.3)	12 (40)		
Gestational age				
Trimester I	4 (13.3)	4 (13.3)	0.080	0.961
Trimester II	14 (46.7)	11 (36.7)		
Trimester III	12 (40)	15 (50)		

Table 2. Cortisol levels before and after intervention

Levels of cortisol	Intervention group		Control group	
	n (%)		n (%)	
	Before	After	Before	After
Below normal (<80 nmol/L)	1 (3.3)	5 (16.7)	1 (3.3)	1 (3.3)
Normal (80–350nmol/L)	28 (93.3)	24 (80)	27 (90)	28 (93.3)
Above normal (>350nmol/L)	1 (3.3)	1 (3.3)	2 (6.6)	1 (3.3)

Table 3. Correlation between respondent characteristics and cortisol levels

Variables	R	P-value
Age	0.097	0.523
Education	-0.249	0.107
Employment	0.177	0.250
Gestational age	0.639	0.004

Table 4. Effects of mindfulness on cortisol levels before and after intervention

	Cortisol	Mean	SD	Min-Max	t	P-value
Intervention group	Pretest	180.60	74.30	53-419	3,269	0.003
	Posttest	152.50	74.08	43-353		
Control group	Pretest	180.80	82.49	66-400	0,840	0.408
	Posttest	179.63	84.03	32-410		

*paired Student's *t*-test; SD, standard deviation

Table 5. Cortisol differences between intervention and control groups

Cortisol (nmol/L)	Intervention group			Control group			t	P-value*
	Mean	SD	Min-Max	Mean	SD	Min-Max		
Pretest	180.60	74.30	53-419	180.80	70.91	66-400	0,014	0.989
Posttest	152.50	74.08	43-353	179.63	74.30	32-410	1,415	0.162
Delta	-28.1	47.08		-1	5.83		3,128	0.004

*independent Student's *t*-test; SD, standard deviation

Table 1 showed that the majority of respondents in this study were aged between 20-35 and were in the second trimester of the pregnancy.

The majority of primigravida mothers showed a normal cortisol level (table 2). Table 3 showed that age of pregnancy was correlated to cortisol levels. The gestational age correlated with cortisol levels but the control and the intervention have same characteristic.

Based on Table 4 and Table 5, it can be seen that the cortisol levels are decreasing after the intervention with a significance value of <0.05. The difference of cortisol levels showed from delta cortisol or the decreasing cortisol levels on posttest the other wise the posttest showed no significant difference between control and intervention group.

DISCUSSION

Respondents from control and intervention groups showed similarities in age, education, employment, and

gestational age (Table 1). The majority of respondents were 20–35 years-old and were in their second or third trimester of pregnancy. Most received basic education so that pregnant women could take part in education and information, and most were employed. The majority of mothers had normal cortisol levels both before and after intervention, similar to the control group (Table 2). The age of mothers and gestational age were both correlated with cortisol levels (Table 3); control and intervention groups had the same characteristics. Other factors that have been related to stress include obstetric history, sociodemographic factors, and cultural problems. In contrast, Vijayaselvi et al. (2015) showed that there were no effects of age, education, occupation, and gestational age on stress levels in primigravida mothers. Likewise, Cunha et al. (2017) reported no significant correlation between stress and sociodemographic variables, such as marital status, education, and age.

Cortisol is needed during pregnancy since it plays a role in maturing the central nervous system, retina, skin, digestive tract, and lungs of the fetus. However, high cortisol can inhibit the formation of leukocytes and prostaglandins, causing the decline of the immune system (Seth, Lewis, & Galbally, 2016). Respondents in the current study were primigravida mothers experiencing stress as demonstrated by the mean cortisol level of 180.60 nmol/L (Table 4). The normal range of cortisol in the morning is 140–700 nmol/L and 80–350 nmol/L in the afternoon. The mean cortisol levels before intervention were above normal, and significantly decreased after intervention to nearly normal (Table 4 and 5). The difference of cortisol levels showed from delta cortisol or the decreasing cortisol levels on posttest. Otherwise, the posttest showed no significant difference between control and intervention groups. These findings are in line with a study by Narimani et al. (2015) who reported that mindfulness-based cognitive therapy was significantly effective for reducing stress.

Mindfulness involves the acceptance of individual experiences without compulsion or judgment. The higher level of attention or focus will accelerate a person to realize their thoughts, words, and deeds. This condition must be maintained to achieve mindful awareness (Kiken & Shook, 2012). STOP mindfulness intervention taught to primigravida mothers in the present study included mindful breathing, eating, sleeping, body scans, and mindful family. In particular, the intervention implemented herein focused on mindful breathing as respondents had never practiced previous interventions in all STOP mindfulness techniques. This condition is consistent with a study by Dunn et al. (2012), who reported that many respondents complain of rapid breathing and chest tightness due to increased gestational age and stressful thoughts.

Pregnancy regardless of trimester carries risks of psychological disorders. The stress conditions of pregnant women especially primigravidas can occur and continue until postpartum. Strewlow et al. (2018) reported that primigravida mothers

have a 50–80% risk of postpartum depression. Antenatal care plays an important role in the safety of the mother and fetus, minimizes pregnancy risks, and reduces postpartum mortality. Antenatal care should be carried out in line with minimum standards so that pregnant women can have a safe and satisfying delivery process (Kurniawan, Ratep, Westa, & Denpasar, 2013).

LIMITATION

The time of taking blood for cortisol leveling among respondents is not the same, this can affect the peak levels of cortisol. However, in this study, the time of taking blood between pre and post was the same. Subsequent research recommended that blood sampling times should be the same for all respondents.

Gestational age has implications for psychological changes that can affect stress, but in this study there were no restrictions on gestational age. Future studies recommended the existence of gestational age restrictions in the selection criteria of respondents.

CONCLUSION AND RECOMMENDATION

STOP mindfulness is an effective technique for decreasing cortisol levels among primigravida mothers, and can be used to improve the self-reliance of pregnant women in managing stress. Importantly, such intervention should be implemented with older primigravida mothers and later gestational age since these characteristics are associated with cortisol levels. Furthermore, it is likely that all pregnant women would benefit from mindfulness intervention to reduce stress and increase comfort.

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