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EFFECTS OF 'STOP' MINDFULNESS ON DECREASING

CORTISOL LEVEL IN PRIMIGRAVIDA MOTHERS

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ABSTRACT

Background: Stress in pregnant women may give different effects on the development of pregnancy. Mindfulness is an intervention which can be practiced independently by primigravida mothers for stress management. Stress is indicated by a biological parameter of cortisol levels.

Purpose: This study aimed to analyze the effects of mindfulness on decreasing cortisol levels in primigravida mothers.

Methods: This study used a pretest-posttest quasi experimental design with a control group. The samples were 30 primigravida mothers who experienced stress in the area of public health centers in Semarang city. A consecutive sampling technique was used to select the samples. Mindfulness with STOP technique (Stop-Take a breath-Observe-Proceed) was given for four meetings for 60 minutes each. Before and after the implementation of mindfulness, 3 ml of blood was taken from the samples for the cortisol examination. Data were analyzed using a paired t-test.

Results: The results showed that the majority of women (46.7%) were in the second trimester of pregnancy, and aged 20-35 years old (86.7%). The mean of cortisol level before and after the intervention was 180.60 and 152.50, respectively. There was a decrease in the level of cortisol after the implementation of mindfulness with a p-value of 0.000 ($\alpha < 0.05$).

Conclusion: Mindfulness is effective in decreasing cortisol levels in primigravida mothers. Mindfulness can be used as an intervention to increase the self-reliance of pregnant women for stress management.

Keywords: Cortisol, mindfulness 'STOP', primigravida, stress

INTRODUCTION

Maternal health during pregnancy is very important to ensure that the baby is in a healthy condition. Severe stress during pregnancy can affect the growth of the baby in the womb as stress physiologically causes vasoconstriction which affects the blood flow in the uterus and oxygen levels (Upton, 2012). Stress can also inhibit the growth of the fetus and cause premature birth due to the excessive production of stress hormones

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which passes through the placenta in the mothers (Mancuso, Schetter, Rini, Roesch, & Hobel, 2004).

Stress in pregnancy is a risk factor that is harmful to mothers and children. Stress during pregnancy can cause premature birth, low birth baby weight (LBW), or other baby disorders. In addition, the mothers tend to experience disruption during postpartum (Schetter, Tanner, & Angeles, 2015; Donnell, Connor, & Glover, 2009). Stress during pregnancy can also affect the temperamental status of the baby (Laplante, Brunet, & King, 2015), and trigger more risk of preeclampsia and eclampsia in mothers with first pregnancy (Black et al., 2016).

Stress is indicated by high cortisol levels. High levels of cortisol occurring in a long time can affect body weight, depression, and anxiety. Increased cortisol levels in early pregnancy can also have an impact on preterm birth and slow growth after birth (Seng et al., 2018).

Regarding the prevalence of stress in pregnant women, a previous study showed that approximately 15 to 25% of pregnant women experience antenatal anxiety or mood disorders (Alderdice, McNeill, & Lynn, 2013). Results of a study by Vijayaselvi et al. (2015) reported that 57.7% of the total samples were primigravida. In their study, the mean score of the perceived stress was 13.5 ± 5.02 , which occurred in the majority of groups (102; 65.4 %).

Some conditions are reported to be the cause of stress, such as smoking and fear of pregnancy complications (Obel, Hedegaard, &

Henriksen, 2005). In addition, unplanned pregnancy and husband's occupational status have also become a strong factor related to the stress in pregnant women (Vijayaselvi et al., 2015).

In dealing with maternal stress, nurses can play their active roles as educators by teaching mindfulness to pregnant women. Mindfulness is an awareness, which is controlled with special and sustained attention, intentionally, now, and without judgment (Zinn, 2012). Mindfulness for childbirth and parenting during the perinatal period can give many psychological (maternal perceived stress and coping) and physical benefits (neuroendocrine and autonomous) (Duncan & Bardacke, 2010). Mindfulness caring is a nursing intervention which is carried out by someone with awareness, calming down, loving, respecting and appreciating oneself. The person knows the causes of stress, accepts the conditions, and perform mindfulness by increasing self-efficacy and using independent health targets to solve the problems and stress independently (Dwidiyanti, 2017).

Mindfulness is effective to reduce stress in pregnant women (Narimani, Khadijeh, & Musavi, 2015); Guardino, Schetter, Bower, Lu, & Smalley, 2014). Mindfulness has an effect on reducing blood pressure and increasing pulse variability significantly ($p < 0.05$) (Muthukrishnan, Jain, & Batra, 2016). Mindfulness can reduce the level of depression, stress, and anxiety (Dunn, Hanieh, Roberts, & Powrie, 2012). Mindfulness-based prenatal programs can be used as an effective strategy for the management

of stress by providing safe and effective interventions during pregnancy (Simonian, 2015).

PURPOSE

This study aimed to analyze the effects of 'STOP' mindfulness on decreasing cortisol levels in primigravida mothers.

METHODS

This study used a pretest-posttest quasy experimental design with a control group. The samples were 60 primigravida mothers living in the area of Semarang city recruited using consecutive sampling. They were assigned to the intervention group (n=30) and the control group (n=30). The inclusion criteria included the primigravida mothers who: (a) experienced stress, (b) aged 17-50, (c) hold the basic level of education (junior-high school) or higher education, and (d) were cooperative and willing to be a respondent.

In this study, mindfulness 'STOP' (Stop-Take a breath-Observe- Proceed) was applied to the respondents in the intervention group. It consists of several steps. The first is to stop briefly from what we think or do during the pregnancy at this time, and the second is to take a deep breath to feel the respiratory cycle in the body (there is also the intention to do something to maintain the pregnancy). The third is observation, which is observing body sensations, mind and emotions to see one's abilities. The

fourth is determining the next steps for the present time by carrying out health targets independently.

Before the implementation of mindfulness, a pre-test was conducted by taking the blood sample of 3 ml. The intervention was carried out for four meetings. The first meeting was a presentation about mindfulness (mindful breathing, mindful eating, mindful sleeping, mindful body/body scan, and mindful with family) and mindfulness training. The second meeting was the practice of mindfulness under supervision. Mindfulness ability is measured using the mindfulness questionnaire. The third meeting was practicing mindfulness with the mothers and identifying the perceived obstacles. The fourth meeting was practicing mindfulness with the mothers and counseling. The post-test was administered by taking the blood sample of 3 ml. The blood samples were then examined for cortisol levels using ELISA technique.

The collected 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 the intervention were tested for normality. The results showed that the data were normally distributed, and therefore, the paired t-test with a statistical significance of $p < .05$ was used.

This study has received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine, Diponegoro University with number 975/EC /FK-RSDK/XI/2017. It was also ensured that this study did

not cause any negative effects for primigravida mothers. The respondents' participation was entirely voluntary, and the confidentiality of all information provided in this study was maintained and only used for research purposes. 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, the Republic of Indonesia in 2011.

RESULTS AND DISCUSSION

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

Table 1. Characteristics of primigravida mothers

Variables	Groups		X ²	p-value
	F	%		
Age				
< 20	3 (10.0)	11 (36.7)	5.085	0.079
20-35	26 (86.7)	19 (63.3)		
>35	1 (3.3)	0		
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 the intervention

Levels of cortisol	Intervention group		Control group	
	Before	After	Before	After
Lower than normal (<80nmol/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%)

The majority of primigravida mothers showed a normal cortisol level.

Table 3. Correlation between respondents' characteristics and cortisol levels

Variabel	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 3 shows that age of pregnancy is correlated to cortisol levels.

Table 4. Effects of mindfulness on cortisol levels before and after the intervention of mindfulness 'STOP' in the intervention group

	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	183.30	82.49	66-400	0.871	0.391
	Posttest	174.83	84.03	32-410		

*pair t-test

Based on table 4, it can be seen that the cortisol levels are decreasing after the intervention with a significance value of <0.05 .

The respondents in this study are primigravida mothers who experience stress. This condition is consistent with the level of cortisol as measured by a mean of 180.60 nmol/L. The normal range of cortisol levels in the afternoon is 80-350 nmol/L and in the morning is 140-700 nmol/L. The level of cortisol before the intervention is above normal, and after the intervention, the level is decreasing to nearly normal. The stress conditions of pregnant women especially primigravidas can occur and continue until postpartum. A study by Strewlow et al. (2018) reported that primigravida mothers have a 50-80% risk of postpartum depression.

Cortisol is needed during pregnancy since it plays a role in the maturing of the central nervous system, retina, skin, digestive tract and lungs of the fetus. The results of this study show that after the intervention, the minimum level of cortisol is in the normal range. However, high cortisol can inhibit the formation of leukocytes and prostaglandins which affects the decline of the immune system (Seth, Lewis, & Galbally, 2016).

One of the characteristics of pregnant women which is correlated to cortisol levels is the gestational age. Meanwhile, the maternal age, education, and employment are not related to cortisol levels. A study by Vijayaselvi et al. (2015) showed that there were no effects of age, education, occupation, and gestational age on stress levels in primigravida mothers.

Factors related to stress include the obstetric history in the past, planning of socio-demographic factors for pregnancy or cultural problems. This finding is also supported by Cunha et al. (2017) who reported that there was no significant correlation between stress and sociodemographic variables, such as marital status, education, and age.

Pregnancy in each trimester has its risks of psychological disorders. Antenatal care plays an important role in the safety of the mother and fetus, minimizes the risks of pregnancy, and reduces postpartum mortality. Antenatal care should be carried out in line with the minimum standards so that pregnant women can have a safe and satisfying delivery process (Kurniawan, Ratep, Westa, & Denpasar, 2013).

After the implementation of mindfulness for four times, a decrease in the level of cortisol as much as 28.1 nmol/L was obtained. This finding is in line with a study by Narimani (2015), which reported that that mindfulness-based cognitive therapy (MBCT) was significantly effective in reducing stress ($F [1.29] = 57.58; p < 0.0005$) (Narimani et al., 2015). Differences in gestational age are related to cortisol levels. However, this condition does not affect the changes in the cortisol levels before and after the intervention of mindfulness. The mean score of cortisol in the control group and intervention group is almost equal as shown by the p-value of > 0.05 .

Mindfulness involves the acceptance of individual experiences without compulsion or judgment. The higher level of attention or focus will

accelerate a person to realize his thoughts, words, and deeds. This condition must be maintained to achieve mindful awareness (Kiken & Shook, 2012).

Mindfulness intervention given to primigravida mothers includes mindful breathing, mindful eating, mindful sleeping, mindful body scans, and mindful family. The intervention in this study is focused on mindful breathing as the respondents had never practiced previous interventions in all mindfulness techniques. This condition is consistent with a study by Dunn et al. (2012). Some respondents complain of rapid breathing and chest tightness due to the increasing age of pregnancy and thoughts. The intervention is aimed at helping the mothers control the breathing better.

CONCLUSION

Mindfulness is effective in decreasing cortisol levels among primigravida mothers. Mindfulness can be used as an intervention to improve the self-reliance of pregnant women in managing stress. The implementation of such intervention should regard the gestational age since the age of gestation is associated with cortisol levels.

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HASIL REVIEW REVIEWER B

EFFECTS OF ‘STOP’ MINDFULNESS ON DECREASING CORTISOL

LEVEL IN PRIMIGRAVIDA MOTHERS

A. Anggorowati¹, Munawaroh², Meidiana Dwidiyanti³

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ABSTRACT

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Methods: This study used a pretest-posttest quasy experimental design with a control group. The samples were 30 primigravida mothers who experienced stress in the area of public health centers in Semarang city. A consecutive sampling technique was used to select the samples. Mindfulness with STOP technique (Stop-Take a breath-Observe-Proceed) was given for four meetings for 60 minutes each. Before and after the implementation of mindfulness, 3 ml of blood was taken from the samples for the cortisol examination. Data were analyzed using a paired t-test.

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Conclusion: Mindfulness is effective in decreasing cortisol levels in primigravida mothers. Mindfulness can be used as an intervention to increase the self-reliance of pregnant women for stress management.

Keywords: Cortisol, mindfulness 'STOP', primigravida, stress

INTRODUCTION

Maternal health during pregnancy is very important to ensure that the baby is a healthy condition. Severe stress during pregnancy can affect the growth of the baby in the womb as stress physiologically causes vasoconstriction which affects the blood flow in the uterus and oxygen levels (Upton, 2012). Stress can also inhibit the growth of the fetus and cause premature birth due to the excessive production

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of stress hormones which passes through the placenta in the mothers (Mancuso, Schetter, Rini, Roesch, & Hobel, 2004).

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In dealing with maternal stress, nurses can play their active roles as educators by teaching mindfulness to pregnant women. Mindfulness is an awareness, which is controlled with special and sustained attention, intentionally, now, and without judgment (Zinn, 2012). Mindfulness for childbirth and parenting during the perinatal period can give many psychological (maternal perceived stress and coping) and physical benefits (neuroendocrine and autonomous) (Duncan & Bardacke, 2010). Mindfulness caring is a nursing intervention which is carried out by someone with awareness, calming down, loving, respecting and appreciating oneself. The person knows the causes of stress, accepts the conditions, and perform mindfulness by increasing self-efficacy and using independent health targets to solve the problems and stress independently (Dwidiyanti, 2017).

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METHODS

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Commented [s3]: What are you give to control group?

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The third meeting was practicing mindfulness with the mothers and identifying the perceived obstacles. The fourth meeting was practicing mindfulness with the mothers and counseling. The post-test was administered by taking the blood sample of 3 ml. The blood samples were then examined for cortisol levels using ELISA technique.

The collected 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 the intervention were tested for normality. The results showed that the data were normally distributed, and therefore, the paired t-test with a statistical significance of $p < .05$ was used.

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RESULTS AND DISCUSSION

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

Commented [s5]: The mindfulness technique are done only two times in third and forth meeting. Why? Is there any research that shows only two times is enought?

Table 1. Characteristics of primigravida mothers

Variables	Groups		X ²	p-value
	F	%		
Age				
< 20	3 (10.0)	11 (36.7)	5.085	0.079
20-35	26 (86.7)	19 (63.3)		
>35	1 (3.3)	0		
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 the intervention

Levels of cortisol	Intervention group		Control group	
	Before	After	Before	After
Lower than normal (<80nmol/L)	1 (3.3%)	5 (16.7%)	1(3.3%)	1(3.3%)
Normal (80-350nmol/L)	28 (93.3%)	24 (80%)	2(6.6%)	28 (93.3%)
Above normal (>350nmol/L)	1 (3.3%)	1 (3.3%)		1(3.3%)

The majority of primigravida mothers showed a normal cortisol level.

Table 3. Correlation between respondents' characteristics and cortisol levels

Variabel	R	p value
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Commented [s6]: What is it for? Is there a theory that education level and employment corelates with cortisol level?

Age	0.097	0.523
Education	-0.249	0.107
Employment	0.177	0.250
Gestational age	0.639	0.004

Table 3 shows that age of pregnancy is correlated to cortisol levels.

Table 4. Effects of mindfulness on cortisol levels before and after the intervention of mindfulness ‘STOP’ in the intervention group

	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	183.30	82.49	66-400	0.871	0.391
	Posttest	174.83	84.03	32-410		

*pair t-test

Based on table 4, it can be seen that the cortisol levels are decreasing after the intervention with a significance value of <0.05.

The respondents in this study are primigravida mothers who experience stress. This condition is consistent with the level of cortisol as measured by a mean of 180.60 nmol/L. The normal range of cortisol levels in the afternoon is 80-350 nmol/L and in the morning is 140-700 nmol/L. The level of cortisol before the intervention is above normal, and after the intervention, the level is decreasing to nearly normal. The stress conditions of pregnant women especially primigravidas can occur and continue until postpartum. A study by Strewlow et al. (2018) reported that primigravida mothers have a 50-80% risk of postpartum depression.

Cortisol is needed during pregnancy since it plays a role in the maturing of the central nervous system, retina, skin, digestive tract and lungs of the fetus. The results of this study show that after the intervention, the minimum level of cortisol

is in the normal range. However, high cortisol can inhibit the formation of leukocytes and prostaglandins which affects the decline of the immune system (Seth, Lewis, & Galbally, 2016).

One of the characteristics of pregnant women which is correlated to cortisol levels is the gestational age. Meanwhile, the maternal age, education, and employment are not related to cortisol levels. A study by Vijayaselvi et al. (2015) showed that there were no effects of age, education, occupation, and gestational age on stress levels in primigravida mothers. Factors related to stress include the obstetric history in the past, planning of socio-demographic factors for pregnancy or cultural problems. This finding is also supported by Cunha et al. (2017) who reported that there was no significant correlation between stress and sociodemographic variables, such as marital status, education, and age.

Pregnancy in each trimester has its risks of psychological disorders. Antenatal care plays an important role in the safety of the mother and fetus, minimizes the risks of pregnancy, and reduces postpartum mortality. Antenatal care should be carried out in line with the minimum standards so that pregnant women can have a safe and satisfying delivery process (Kurniawan, Ratep, Westa, & Denpasar, 2013).

After the implementation of mindfulness for four times, a decrease in the level of cortisol as much as 28.1 nmol/L was obtained. This finding is in line with a study by Narimani (2015), which reported that that mindfulness-based cognitive therapy (MBCT) was significantly effective in reducing stress ($F [1.29] = 57.58$; $p < 0.0005$) (Narimani et al., 2015). Differences in gestational age are related to

cortisol levels. However, this condition does not affect the changes in the cortisol levels before and after the intervention of mindfulness. The mean score of cortisol in the control group and intervention group is almost equal as shown by the p-value of >0.05 .

Mindfulness involves the acceptance of individual experiences without compulsion or judgment. The higher level of attention or focus will accelerate a person to realize his thoughts, words, and deeds. This condition must be maintained to achieve mindful awareness (Kiken & Shook, 2012).

Mindfulness intervention given to primigravida mothers includes mindful breathing, mindful eating, mindful sleeping, mindful body scans, and mindful family. The intervention in this study is focused on mindful breathing as the respondents had never practiced previous interventions in all mindfulness techniques. This condition is consistent with a study by Dunn et al. (2012). Some respondents complain of rapid breathing and chest tightness due to the increasing age of pregnancy and thoughts. The **intervention** is aimed at helping the mothers control the breathing better.

Commented [s7]: What is the limitation in this study?

CONCLUSION

Mindfulness is effective in decreasing cortisol levels among primigravida mothers. Mindfulness can be used as an intervention to improve the self-reliance of pregnant women in managing stress. The **implementation** of such intervention should regard the gestational age since the age of gestation is associated with cortisol levels.

Commented [s8]: What is the clinical implication of this research?

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REVISI ARTIKEL #revisi 1

EFFECTS OF ‘STOP’ MINDFULNESS ON DECREASING CORTISOL LEVEL IN PRIMIGRAVIDA MOTHERS

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ABSTRACT

Background: Stress in pregnant women may give different effects on the development of pregnancy. Mindfulness is an intervention which can be practiced independently by primigravida mothers for stress management. Stress is indicated by a biological parameter of cortisol levels.

Purpose: This study aimed to analyze the effects of mindfulness on decreasing cortisol levels in primigravida mothers.

Methods: This study used a pretest-posttest quasi experimental design with a control group. The samples were 60 primigravida mothers divide into control and interventioan group, who experienced stress in the area of public health centers in Semarang city. Sample size calculated based on different proportion. A consecutive sampling technique was used to select the samples. Mindfulness with STOP technique (Stop-Take a breath-Observe-Proceed) was given for four meetings for 60 minutes each. Before and after the implementation of mindfulness, 3 ml of blood was taken from the samples for the cortisol examination. Data were analyzed using a paired t-test.

Results: The results showed that the majority of women (46.7%) were in the second trimester of pregnancy, and aged 20-35 years old (86.7%). The mean of cortisol level before and after the intervention was 180.60 and 152.50, respectively. There

was a decrease in the level of cortisol after the implementation of mindfulness with a p-value of 0.000 ($\alpha < 0.05$).

Conclusion: Mindfulness is effective in decreasing cortisol levels in primigravida mothers. Mindfulness can be used as an intervention to increase the self-reliance of pregnant women for stress management.

Keywords: Cortisol, mindfulness 'STOP', primigravida, stress

INTRODUCTION

Maternal health during pregnancy is very important to ensure that the baby is a healthy condition. Severe stress during pregnancy can affect the growth of the baby in the womb as stress physiologically causes vasoconstriction which affects the blood flow in the uterus and oxygen levels (Upton, 2012). Stress can also inhibit the growth of the fetus and cause premature birth due to the excessive production of stress hormones which passes through the placenta in the mothers (Mancuso, Schetter, Rini, Roesch, & Hobel, 2004).

Stress in pregnancy is a risk factor that is harmful to mothers and children. Stress during pregnancy can cause premature birth, low birth baby weight (LBW), or other baby disorders. In addition, the mothers tend to experience disruption during postpartum (Schetter, Tanner, & Angeles, 2015; Donnell, Connor, & Glover, 2009). Stress during pregnancy can also affect the temperamental status of the baby (Laplante, Brunet, & King, 2015), and trigger more risk of preeclampsia and eclampsia in mothers with first pregnancy (Black et al., 2016).

Stress is indicated by high cortisol levels. High levels of cortisol occurring in a long time can affect body weight, depression, and anxiety. Increased cortisol levels in early pregnancy can also have an impact on preterm birth and slow growth after birth (Seng et al., 2018).

Regarding the prevalence of stress in pregnant women, a previous study showed that approximately 15 to 25% of pregnant women experience antenatal anxiety or mood disorders (Alderdice, McNeill, & Lynn, 2013). Results of a study by Vijayaselvi et al. (2015) reported that 57.7% of the total samples were primigravida. In their study, the mean score of the perceived stress was 13.5 ± 5.02 , which occurred in the majority of groups (102; 65.4 %).

Some conditions are reported to be the cause of stress, such as smoking and fear of pregnancy complications (Obel, Hedegaard, & Henriksen, 2005). In addition, unplanned pregnancy and husband's occupational status have also become a strong factor related to the stress in pregnant women (Vijayaselvi et al., 2015).

In dealing with maternal stress, nurses can play their active roles as educators by teaching mindfulness to pregnant women. Mindfulness is an awareness, which is controlled with special and sustained attention, intentionally, now, and without judgment (Zinn, 2012). Mindfulness for childbirth and parenting during the perinatal period can give many psychological (maternal perceived stress and coping) and physical benefits (neuroendocrine and autonomous) (Duncan & Bardacke, 2010). Mindfulness caring is a nursing intervention which is carried out by someone with awareness, calming down, loving, respecting and appreciating oneself. The person knows the causes of stress, accepts the conditions, and perform mindfulness by increasing self-efficacy and using independent health targets to solve the problems and stress independently (Dwidiyanti, 2017).

Mindfulness is effective to reduce stress in pregnant women (Narimani, Khadijeh, & Musavi, 2015); Guardino, Schetter, Bower, Lu, & Smalley, 2014).

Mindfulness has an effect on reducing blood pressure and increasing pulse variability significantly ($p < 0.05$) (Muthukrishnan, Jain, & Batra, 2016). Mindfulness can reduce the level of depression, stress, and anxiety (Dunn, Hanieh, Roberts, & Powrie, 2012). Mindfulness-based prenatal programs can be used as an effective strategy for the management of stress by providing safe and effective interventions during pregnancy (Simonian, 2015).

PURPOSE

This study aimed to analyze the effects of 'STOP' mindfulness on decreasing cortisol levels in primigravida mothers.

METHODS

This study used a pretest-posttest quasy experimental design with a control group. The samples were 60 primigravida mothers living in the area of Semarang city recruited using consecutive sampling. They were assigned to the intervention group ($n=30$) and the control group ($n=30$). The inclusion criteria included the primigravida mothers who: (a) experienced stress with DASS criterion, (b) aged 17-50, (c) hold the basic level of education (junior-high school) or higher education, and (d) were cooperative and willing to be a respondent.

In this study, mindfulness 'STOP' (Stop-Take a breath-Observe-Proceed) was applied to the respondents in the intervention group. It consists of several steps. The first is to stop briefly from what we think or do during the pregnancy at this time, and the second is to take a deep breath to feel the respiratory cycle in the body

(there is also the intention to do something to maintain the pregnancy). The third is observation, which is observing body sensations, mind and emotions to see one's abilities. The fourth is determining the next steps for the present time by carrying out health targets independently.

Before the implementation of mindfulness, a pre-test was conducted by taking the blood sample of 3 ml. The intervention was carried out for four meetings. The first meeting was a presentation about mindfulness (mindful breathing, mindful eating, mindful sleeping, mindful body/body scan, and mindful with family) and mindfulness training. The second meeting was the practice of mindfulness under supervision. Mindfulness ability is measured using the mindfulness questionnaire. The third meeting was practicing mindfulness with the mothers and identifying the perceived obstacles. The fourth meeting was practicing mindfulness with the mothers and counseling. The post-test was administered by taking the blood sample of 3 ml. The blood samples were then examined for cortisol levels using ELISA technique.

The collected 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 the intervention were tested for normality. The results showed that the data were normally distributed, and therefore, the paired t-test with a statistical significance of $p < .05$ was used. The differences between control and intervention groups were tested with independent t test.

This study has received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine, Diponegoro University with number

975/EC /FK-RSDK/XI/2017. It was also ensured that this study did not cause any negative effects for primigravida mothers. The respondents' participation was entirely voluntary, and the confidentiality of all information provided in this study was maintained and only used for research purposes. 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, the Republic of Indonesia in 2011.

RESULTS AND DISCUSSION

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.

Table 1. Characteristics of primigravida mothers

Variables	Groups		X ²	p
	Control f (%)	Intervention n f (%)		
Age				
< 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 the intervention

Levels of cortisol	Intervention group		Control group	
	Before	After	Before	After
Lower than normal (<80nmol/L)	1 (3.3%)	5 (16.7%)	1(3.3%)	1(3.3%)

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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%)

The majority of primigravida mothers showed a normal cortisol level.

Table 3. Correlation between respondents' characteristics and cortisol levels

Variabel	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 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.

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

	Cortisol	Mean	SD	Min-Max	p
Intervention group	Pretest	180.60	74.30	53-419	0.003
	Posttest	152.50	74.08	43-353	
Control group	Pretest	180.80	82.49	66-400	0.408
	Posttest	179.63	84.03	32-410	

*pair t-test

Table 5. The difference of cortisol levels on intervention and control group

Cortisol (nmol/L)	Intervention group			Control group			p-value *
	Mean	SD	Min-Max	Mean	SD	Min-Max	
Pretest	180.60	74.30	53-419	180.80	70.91	66-400	0,989
Posttest	152.50	74.08	43-353	179.63	74.30	32-410	0,162
Delta	-28.1	47.08		-1	5.83		0,004

*independent t test

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.

Characteristic respondents from control and intervention group showed similarities in age, education, employment and gestational age. The age of respondents above 20 years is a good age for to primigravida. The education of respondents mostly received basic education so that pregnant women could take part in education and information. Most respondents are worker so that they have the same level of stress. Most gestational age is third trimester which is the period of the pregnant women facing labor.

The respondents in this study are primigravida mothers who experience stress. This condition is consistent with the level of cortisol as measured by a mean of 180.60 nmol/L. The normal range of cortisol levels in the afternoon is 80-350 nmol/L and in the morning is 140-700 nmol/L. The level of cortisol before the intervention is above normal, and after the intervention, the level is decreasing to nearly normal. The stress conditions of pregnant women especially primigravidas can occur and continue until postpartum. A study by Strewlow et al. (2018) reported that primigravida mothers have a 50-80% risk of postpartum depression.

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CONCLUSION

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EFFECTS OF ‘STOP’ MINDFULNESS ON DECREASING CORTISOL LEVEL IN PRIMIGRAVIDA MOTHERS

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ABSTRACT

Background: Stress in pregnant women may give different effects on the development of pregnancy. Mindfulness is an intervention which can be practiced independently by primigravida mothers for stress management. Stress is indicated by a biological parameter of cortisol levels.

Purpose: This study aimed to analyze the effects of mindfulness on decreasing cortisol levels in primigravida mothers.

Methods: This study used a pretest-posttest quasi experimental design with a control group. The samples were 30 primigravida mothers who experienced stress in the area of public health centers in Semarang city. A consecutive sampling technique was used to select the samples. Mindfulness with STOP technique (Stop-Take a breath-Observe-Proceed) was given for four meetings for 60 minutes each. Before and after the implementation of mindfulness, 3 ml of blood was taken from the samples for the cortisol examination. Data were analyzed using a paired t-test.

Results: The results showed that the majority of women (46.7%) were in the second trimester of pregnancy, and aged 20-35 years old (86.7%). The mean of cortisol level before and after the intervention was 180.60 and 152.50, respectively. There was a decrease in the level of cortisol after the implementation of mindfulness with a p-value of 0.000 ($\alpha < 0.05$).

Conclusion: Mindfulness is effective in decreasing cortisol levels in primigravida mothers. Mindfulness can be used as an intervention to increase the self-reliance of pregnant women for stress management.

Keywords: Cortisol, mindfulness ‘STOP’, primigravida, stress

INTRODUCTION

Maternal health during pregnancy is very important to ensure that the baby is a healthy condition. Severe stress during pregnancy can affect the growth of the baby in the womb as stress physiologically causes vasoconstriction which affects

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the blood flow in the uterus and oxygen levels (Upton, 2012). Stress can also inhibit the growth of the fetus and cause premature birth due to the excessive production of stress hormones which passes through the placenta in the mothers (Mancuso, Schetter, Rini, Roesch, & Hobel, 2004).

Stress in pregnancy is a risk factor that is harmful to mothers and children. Stress during pregnancy can cause premature birth, low birth baby weight (LBW), or other baby disorders. In addition, the mothers tend to experience disruption during postpartum (Schetter, Tanner, & Angeles, 2015; Donnell, Connor, & Glover, 2009). Stress during pregnancy can also affect the temperamental status of the baby (Laplante, Brunet, & King, 2015), and trigger more risk of preeclampsia and eclampsia in mothers with first pregnancy (Black et al., 2016).

Stress is indicated by high cortisol levels. High levels of cortisol occurring in a long time can affect body weight, depression, and anxiety. Increased cortisol levels in early pregnancy can also have an impact on preterm birth and slow growth after birth (Seng et al., 2018).

Regarding the prevalence of stress in pregnant women, a previous study showed that approximately 15 to 25% of pregnant women experience antenatal anxiety or mood disorders (Alderdice, McNeill, & Lynn, 2013). Results of a study by Vijayaselvi et al. (2015) reported that 57.7% of the total samples were primigravida. In their study, the mean score of the perceived stress was 13.5 ± 5.02 , which occurred in the majority of groups (102; 65.4 %).

Some conditions are reported to be the cause of stress, such as smoking and fear of pregnancy complications (Obel, Hedegaard, & Henriksen, 2005). In

addition, unplanned pregnancy and husband's occupational status have also become a strong factor related to the stress in pregnant women (Vijayaselvi et al., 2015).

In dealing with maternal stress, nurses can play their active roles as educators by teaching mindfulness to pregnant women. Mindfulness is an awareness, which is controlled with special and sustained attention, intentionally, now, and without judgment (Zinn, 2012). Mindfulness for childbirth and parenting during the perinatal period can give many psychological (maternal perceived stress and coping) and physical benefits (neuroendocrine and autonomous) (Duncan & Bardacke, 2010). Mindfulness caring is a nursing intervention which is carried out by someone with awareness, calming down, loving, respecting and appreciating oneself. The person knows the causes of stress, accepts the conditions, and perform mindfulness by increasing self-efficacy and using independent health targets to solve the problems and stress independently (Dwidiyanti, 2017).

Mindfulness is effective to reduce stress in pregnant women (Narimani, Khadijeh, & Musavi, 2015; Guardino, Schetter, Bower, Lu, & Smalley, 2014). Mindfulness has an effect on reducing blood pressure and increasing pulse variability significantly ($p < 0.05$) (Muthukrishnan, Jain, & Batra, 2016). Mindfulness can reduce the level of depression, stress, and anxiety (Dunn, Hanieh, Roberts, & Powrie, 2012). Mindfulness-based prenatal programs can be used as an effective strategy for the management of stress by providing safe and effective interventions during pregnancy (Simonian, 2015).

PURPOSE

This study aimed to analyze the effects of ‘STOP’ mindfulness on decreasing cortisol levels in primigravida mothers.

METHODS

This study used a pretest-posttest quasy experimental design with a control group. The samples were 60 primigravida mothers living in the area of Semarang city recruited using consecutive sampling. They were assigned to the intervention group (n=30) and the control group (n=30). The inclusion criteria included the primigravida mothers who: (a) experienced stress, (b) aged 17-50, (c) hold the basic level of education (junior-high school) or higher education, and (d) were cooperative and willing to be a respondent.

In this study, mindfulness ‘STOP’ (Stop-Take a breath-Observe-Proceed) was applied to the respondents in the intervention group. It consists of several steps. The first is to stop briefly from what we think or do during the pregnancy at this time, and the second is to take a deep breath to feel the respiratory cycle in the body (there is also the intention to do something to maintain the pregnancy). The third is observation, which is observing body sensations, mind and emotions to see one’s abilities. The fourth is determining the next steps for the present time by carrying out health targets independently.

Before the implementation of mindfulness, a pre-test was conducted by taking the blood sample of 3 ml. The intervention was carried out for four meetings. The first meeting was a presentation about mindfulness (mindful breathing, mindful eating, mindful sleeping, mindful body/body scan, and mindful with family) and

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mindfulness training. The second meeting was the practice of mindfulness under supervision. Mindfulness ability is measured using the mindfulness questionnaire. The third meeting was practicing mindfulness with the mothers and identifying the perceived obstacles. The fourth meeting was practicing mindfulness with the mothers and counseling. The post-test was administered by taking the blood sample of 3 ml. The blood samples were then examined for cortisol levels using ELISA technique.

The collected 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 the intervention were tested for normality. The results showed that the data were normally distributed, and therefore, the paired t-test with a statistical significance of $p < .05$ was used.

This study has received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine, Diponegoro University with number 975/EC /FK-RSDK/XI/2017. It was also ensured that this study did not cause any negative effects for primigravida mothers. The respondents' participation was entirely voluntary, and the confidentiality of all information provided in this study was maintained and only used for research purposes. 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, the Republic of Indonesia in 2011.

RESULTS AND DISCUSSION

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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.

Table 1. Characteristics of primigravida mothers

Variables	Groups		X ²	p
	f (%)	f (%)		
Age				
< 20	3 (10.0)	11 (36.7)	5.085	0.079
20-35	26 (86.7)	19 (63.3)		
>35	1 (3.3)	0		
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)		

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Table 2. Cortisol levels before and after the intervention

Levels of cortisol	Intervention group		Control group	
	Before	After	Before	After
Lower than normal (<80nmol/L)	1 (3.3%)	5 (16.7%)	1(3.3%)	1(3.3%)
Normal (80-350nmol/L)	28 (93.3%)	24 (80%)	2(6.6%)	28 (93.3%)
Above normal (>350nmol/L)	1 (3.3%)	1 (3.3%)		1(3.3%)

The majority of primigravida mothers showed a normal cortisol level.

Table 3. Correlation between respondents' characteristics and cortisol levels

Variabel	r	p
Age	0.097	0.523
Education	-0.249	0.107
Employment	0.177	0.250
Gestational age	0.639	0.004

Table 3 showed that age of pregnancy was correlated to cortisol levels.

Table 4. Effects of mindfulness on cortisol levels before and after the intervention of mindfulness 'STOP' in the intervention group

	Cortisol	Mean	SD	Min-Max	t	p
Intervention group	Pretest	180.60	74.30	53-419	3.269	0.003
	Posttest	152.50	74.08	43-353		
Control group	Pretest	183.30	82.49	66-400	0.871	0.391
	Posttest	174.83	84.03	32-410		

*pair t-test

Based on Table 4, it can be seen that the cortisol levels are decreasing after the intervention with a significance value of <0.05 .

The respondents in this study are primigravida mothers who experience stress. This condition is consistent with the level of cortisol as measured by a mean of 180.60 nmol/L. The normal range of cortisol levels in the afternoon is 80-350 nmol/L and in the morning is 140-700 nmol/L. The level of cortisol before the intervention is above normal, and after the intervention, the level is decreasing to nearly normal. The stress conditions of pregnant women especially primigravidas can occur and continue until postpartum. A study by Strewlow et al. (2018) reported that primigravida mothers have a 50-80% risk of postpartum depression.

Cortisol is needed during pregnancy since it plays a role in the maturing of the central nervous system, retina, skin, digestive tract and lungs of the fetus. The results of this study show that after the intervention, the minimum level of cortisol is in the normal range. However, high cortisol can inhibit the formation of leukocytes and prostaglandins which affects the decline of the immune system (Seth, Lewis, & Galbally, 2016).

One of the characteristics of pregnant women which is correlated to cortisol levels is the gestational age. Meanwhile, the maternal age, education, and employment are not related to cortisol levels. A study by Vijayaselvi et al. (2015) showed that there were no effects of age, education, occupation, and gestational age on stress levels in primigravida mothers. Factors related to stress include the obstetric history in the past, planning of socio-demographic factors for pregnancy or cultural problems. This finding is also supported by Cunha et al. (2017) who reported that there was no significant correlation between stress and sociodemographic variables, such as marital status, education, and age.

Pregnancy in each trimester has its risks of psychological disorders. Antenatal care plays an important role in the safety of the mother and fetus, minimizes the risks of pregnancy, and reduces postpartum mortality. Antenatal care should be carried out in line with the minimum standards so that pregnant women can have a safe and satisfying delivery process (Kurniawan, Ratep, Westa, & Denpasar, 2013).

After the implementation of mindfulness for four times, a decrease in the level of cortisol as much as 28.1 nmol/L was obtained. This finding is in line with

a study by Narimani (2015), which reported that that mindfulness-based cognitive therapy (MBCT) was significantly effective in reducing stress ($F [1.29] = 57.58$; $p < 0.0005$) (Narimani et al., 2015). Differences in gestational age are related to cortisol levels. However, this condition does not affect the changes in the cortisol levels before and after the intervention of mindfulness. The mean score of cortisol in the control group and intervention group is almost equal as shown by the p-value of > 0.05 .

Mindfulness involves the acceptance of individual experiences without compulsion or judgment. The higher level of attention or focus will accelerate a person to realize his thoughts, words, and deeds. This condition must be maintained to achieve mindful awareness (Kiken & Shook, 2012).

Mindfulness intervention given to primigravida mothers includes mindful breathing, mindful eating, mindful sleeping, mindful body scans, and mindful family. The intervention in this study is focused on mindful breathing as the respondents had never practiced previous interventions in all mindfulness techniques. This condition is consistent with a study by Dunn et al. (2012). Some respondents complain of rapid breathing and chest tightness due to the increasing age of pregnancy and thoughts. The intervention is aimed at helping the mothers control the breathing better.

CONCLUSION

Mindfulness is effective in decreasing cortisol levels among primigravida mothers. Mindfulness can be used as an intervention to improve the self-reliance of pregnant

women in managing stress. The implementation of such intervention should regard the gestational age since the age of gestation is associated with cortisol levels.

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EFFECTS OF “STOP” MINDFULNESS ON DECREASING CORTISOL LEVEL IN PRIMIGRAVIDA MOTHERS

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ABSTRACT

Background: 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: To analyze the effects of Stop-Take a breath-Observe-Proceed (STOP) mindfulness on cortisol levels in primigravida mothers.

Methods: 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.

Results: 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 ($P = 0.000$; $\alpha < 0.05$).

Conclusion: Mindfulness using the STOP technique is effective for decreasing cortisol levels in primigravida mothers by increasing self-reliance for stress management.

Keywords: Cortisol, STOP mindfulness, primigravida, stress

INTRODUCTION

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 (Upton, 2012).

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. 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 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 AND DISCUSSION

Table 1. Characteristics of primigravida mothers

Variables	Groups		X^2	<i>P</i> -value
	Control <i>n</i> (%)	Intervention <i>n</i> (%)		
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	
	<i>n</i> (%)		<i>n</i> (%)	
	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	<i>R</i>	<i>P</i> -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

Intervention group	Cortisol	Mean	SD	Min-Max	<i>P</i> -value
	Pretest	180.60	74.30	53-419	
Posttest	152.50	74.08	43-353	0.003	

Control group	Pretest	180.80	82.49	66-400	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			P-value*
	Mean	SD	Min-Max	Mean	SD	Min-Max	
Pretest	180.60	74.30	53-419	180.80	70.91	66-400	0.989
Posttest	152.50	74.08	43-353	179.63	74.30	32-410	0.162
Delta	-28.1	47.08		-1	5.83		0.004

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

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).

CONCLUSION

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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REVISI ARTIKEL #REVISI 3

EFFECTS OF “STOP” MINDFULNESS ON DECREASING CORTISOL LEVEL IN PRIMIGRAVIDA MOTHERS

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ABSTRACT

Background: 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: To analyze the effects of Stop-Take a breath-Observe-Proceed (STOP) mindfulness on cortisol levels in primigravida mothers.

Methods: 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.

Results: 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 ($P = 0.000$; $\alpha < 0.05$).

Conclusion: Mindfulness using the STOP technique is effective for decreasing cortisol levels in primigravida mothers by increasing self-reliance for stress management.

Keywords: *Cortisol, STOP mindfulness, primigravida, stress*

ABSTRAK

Latar belakang: 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.

Metode: Desain kuasi eksperimen pretes-posttest 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 cortisol. Data dianalisis dengan menggunakan uji t berpasangan.

Hasil: sebagian besar ibu (46,7%) trimester kedua berusia 20-35 tahun (86,7%). Rata-rata kadar cortisol menurun setelah intervensi dari 180,60 menjadi 152,50 nmol/L ($p=0,0000$; $\alpha < 0,05$).

Kesimpulan: Mindfulness menggunakan teknik STOP efektif menurunkan kadar cortisol 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.

METHOD

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.

RESULT

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. Theoretically, 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.

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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 RECOMENDATION

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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Suplemen : table 1 – table 5

Table 1. Characteristics of primigravida mothers

Variables	Groups		X^2	P-value
	Control	Intervention		
	n (%)	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
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	<i>n</i> (%)		<i>n</i> (%)	
	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	<i>P</i> -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	<i>t</i>	<i>P</i> -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			<i>t</i>	<i>P</i> -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

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17 Sep
2019,
19.21

kepada Mekar

Terima kasih atas kesempatannya atas artikel kami untuk bisa terbit di bulan Nov. kami akan segera tindak lanjutnya.

Salam,

Anggorowati

A

Table 1. Title (font : Arrial Narrow, size 12, bold, position justify)

Note: A: Intervention Group; B: Control Group

Anggorowati Anggorowati <anggorowati@fk.undip.ac.id>

7 Okt
2019,
15.37

kepada Mekar

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Yth Chief editor JKS

Bersama ini kami sampaikan manuskrip terakhir setelah kami proof reading.

Terima kasih.

Salam,

Anggorowati

REVISI ARTIKEL #REVISI 4

EFFECTS OF “STOP” MINDFULNESS ON DECREASING CORTISOL LEVEL IN PRIMIGRAVIDA MOTHERS

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ABSTRACT

Background: 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: To analyze the effects of Stop-Take a breath-Observe-Proceed (STOP) mindfulness on cortisol levels in primigravida mothers.

Methods: 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.

Results: 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 ($P = 0.000$; $\alpha < 0.05$).

Conclusion: Mindfulness using the STOP technique is effective for decreasing cortisol levels in primigravida mothers by increasing self-reliance for stress management.

Keywords: Cortisol, STOP mindfulness, primigravida, stress

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INTRODUCTION

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 (Upton, 2012).

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. 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 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 AND DISCUSSION

Table 1. Characteristics of primigravida mothers

Variables	Groups		χ^2	<i>P</i> -value
	Control <i>n</i> (%)	Intervention <i>n</i> (%)		
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	
	<i>n</i> (%)		<i>n</i> (%)	
	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	<i>P</i> -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	P-value
Intervention group	Pretest	180.60	74.30	53-419	0.003
	Posttest	152.50	74.08	43-353	
Control group	Pretest	180.80	82.49	66-400	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			P-value*
	Mean	SD	Min-Max	Mean	SD	Min-Max	
Pretest	180.60	74.30	53-419	180.80	70.91	66-400	0.989
Posttest	152.50	74.08	43-353	179.63	74.30	32-410	0.162
Delta	-28.1	47.08		-1	5.83		0.004

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

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).

CONCLUSION

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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Rab, 30 Okt
2019, 12.08

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JURNAL KEPERAWATAN SOEDIRMAN

Dear Ibu Anggoro,

Please revise your article as follows.

1. Tambahkan abstrak bahasa indonesia sesuai format JKS.
2. Penggunaan kata "STOP Mindfulness" konsisten dari abstrak sampai kesimpulan.
3. Apa yang dilakukan oleh peneliti terhadap kelompok kontrol untuk memenuhi asas keadilan dalam penelitian?
4. Tambahkan referensi alasan terapi Mindfulness dilakukan dua kali.
5. Tambahkan keterbatasan penelitian ini.
6. Tambahkan hasil t test di tabel (tidak hanya p value).

Thank you.

Editor,
Mekar Dwi Anggraeni

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Anggorowati Anggorowati <anggorowati@fk.undip.ac.id>

Kam, 31 Okt
2019, 20.21

kepada Mekar

Kepada Yth
Chief Editor JKS

Bersama ini kami sampaikan revisi sesuai masukan editor.

(page number)

Besar harapan kami untuk dapat dipublikasi artikel kami.
Terima kasih,
Anggorowati
Departemen Ilmu Keperawatan FK UNDIP

REVISI ARTIKEL #REVISI 5

EFFECTS OF “STOP” MINDFULNESS ON DECREASING CORTISOL LEVEL IN PRIMIGRAVIDA MOTHERS

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ABSTRACT

Background: 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: To analyze the effects of Stop-Take a breath-Observe-Proceed (STOP) mindfulness on cortisol levels in primigravida mothers.

Methods: 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.

Results: 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 ($P = 0.000$; $\alpha < 0.05$).

Conclusion: Mindfulness using the STOP technique is effective for decreasing cortisol levels in primigravida mothers by increasing self-reliance for stress management.

Keywords: *Cortisol, STOP mindfulness, primigravida, stress*

ABSTRAK

Latar belakang: *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 abreath-Observe-Proceed (STOP) mindfulness terhadap kadar kortisol pada ibu primigravida.*

Metode: *Desain kuasi eksperimen pretes-postest dengan kelompok kontrol. Responden berjumlah enampuluh 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.*

Hasil: *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; $\alpha < 0,05$).*

Kesimpulan: *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.

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PURPOSE

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

METHOD

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.

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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.

RESULT

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. However, 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 RECOMENDATION

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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Suplemen : table 1 – table 5

Table 1. Characteristics of primigravida mothers

Variables	Groups		X^2	<i>P</i> -value
	Control <i>n</i> (%)	Interventio n <i>n</i> (%)		
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 <i>n</i> (%)		Control group <i>n</i> (%)	
	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	<i>P</i> -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	<i>t</i>	<i>P</i> -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			<i>t</i>	<i>P</i> -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. Title (font : Arial Narrow, size 12, bold, position justify)

Note: A: Intervention Group; B: Control Group

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