EFFECTIVENESS OF MUSIC THERAPY ON ANXIETY AND B-ENDORPHIN LEVELS IN PRIMIGRAVIDA DURING THE THIRD STAGE OF PREGNANCY

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Abstract

Objective: To examine the effectiveness of music therapy on anxiety and β-endorphin levels in primigravida during the third stage of pregnancy.

Methods: This was a quasi-experimental study with pretest-posttest control group design. The research was conducted in December 2016 - January 2017. There were 39 respondents selected using purposive sampling technique, which 13 assigned in the experiment group 1 (music therapy with a sound pressure of 40 dB), experiment group 2 (music therapy with a sound pressure of 62 dB) and control group (health counseling). Anxiety levels were measured using the HARS (Hamilton Anxiety Rating Scale), and β-endorphin hormone levels were measured using ELISA (Enzyme-Linked Immunosorbent Assay) method. Data were analyzed using Paired t-test, One-Way ANOVA test with post-hoc Bonferroni, and Kruskal Wallis test with post-hoc Mann Whitney.

Results: Findings revealed that there was a decrease of the mean of anxiety levels in the experiment group 1 from 31.92 (pretest) to 24.69 (posttest), and the experiment group 2 from 34.54 (pretest) to 25 (posttest) with p-value <0.05. There was an increase of the mean of β-Endorphin levels in the experiment group 1 from 53.63 (pretest) to 63.24 (posttest), and the experiment group 2 from 48.55 (pretest) to 64.9 (posttest) with p-value <0.05. However, there was no effect of counseling in the control group on anxiety levels (p=0.413) and β-Endorphin levels (p= 0.394).

Conclusion: Music therapy is effective in reducing anxiety levels and increasing β-endorphin levels. Thus, music therapy can be used as an alternative treatment for pregnant mothers at home who experienced anxiety.

Keywords: music therapy; anxiety; B-Endorphin; pregnant women

INTRODUCTION

During pregnancy, pregnant women experience some changes in both physical and psychological changes. The changes that occur during pregnancy can cause discomfort and anxiety during pregnancy. The anxiety experienced by pregnant women especially during the third trimester is associated with a sense of worry about maternal and fetal health, such as the fear of childbirth, fear if the fetus is born disabled and if there are complications during childbirth or after delivery. Primigravida Pregnant women have more experienced anxiety when compared with multigravida pregnant women. The anxiety experienced during the first and third trimesters of pregnancy is more severe than anxiety during the second trimester of pregnancy (Giakoumaki, Vasilaki, Lili, Skouroliakou, & Liosis, 2009; Lee et al.,

2007; Teixeira, Figueiredo, Conde, Pacheco, & Costa, 2009).

Anxiety accompanied by negative thoughts can lead to an increase in sympathetic nerve work, activating the hypothalamus-pituitary to release the hormones cortisol, epinephrine and adrenaline in the body that trigger the heart to pump blood faster and heart rate grows stronger and faster (Pawlby, Hay, Sharp, Waters, & O'Keane, 2009; Van den Bergh, Van Calster, Smits, Van Huffel, & Lagae, 2008). Uncomfortable feeling, anxiety and increased release of stress hormones will adversely affect the health of pregnant women themselves and the health of the fetus, such as increase the risk of delivering babies with low birth weight, premature birth, asthma, infant disease, autism, IUGR (Intrauterine Growth Retardation) and postpartum stress (Ding et al., 2014; Grote et al., 2010; Littleton, Bye, Buck, & Amacker, 2010).

Secretion of β-endorphin hormone in the body can improve mood or change the mood, especially in pregnant women in the third trimester who experience anxiety. Although β-endorphin can be secreted naturally in the body but β-endorphin can also be secreted when the body and mind are in a state of relaxation. One alternative that can be done to stimulate the secretion of the hormone β-endorphin is by doing music therapy (Haruyama, 2015).

Music therapy is the use of music as complementary therapy with the aim to reduce or minimize diseases that affect the physical, emotional and / or spiritual. Music is an effective coping mechanism for one's negative emotions (Hosseini, Bagheri, & Honarparvaran, 2013). Musical stimulation is processed by and through the brain (the limbic system), which has a positive effect on nerve function and hormonal activity (Boso, Politi, Barale, & Emanuele, 2006; Todres, 2006).

Previous studies revealed that listening to music in one period could help reduce symptoms of depression in adults. In addition, music therapy can also improve relaxation, mood, quality of life, and reduce stress and anxiety. Structure in music can make the patient feel comfortable and peaceful (Chan,

Wong, & Thayala, 2011; Cook & Silverman, 2013; Hatem, Lira, & Mattos, 2006; Richards, Johnson, Sparks, & Emerson, 2007). The use of music therapy can reduce the anxiety level in pregnant women during transvaginal ultrasound examination (Shin & Kim, 2011). Moreover, music therapy performed during labor can lower the level of anxiety and postpartum pain, increased vaginal delivery satisfaction and reduced postpartum depression (Simavli et al., 2014).

The results of preliminary study at the Community Health Center of Bandarharjo Semarang showed that there were 92 primigravida pregnant women in trimester III among 395 pregnant women. The results of interviews with 10 primigravida pregnant women indicated that there were 7 pregnant women who experienced anxiety with the existence of sleep disorders and worried if delivery did not run smoothly. In addition, the mothers also worried if the baby was not healthy. They also said that midwives had done counseling about labor preparations, however, most of them were still feeling anxiety. Therefore, this study aimed to examine the effectiveness of music therapy on anxiety levels and β-endorphin levels in primigravida during the third stage of pregnancy.

METHODS
Study design
This was a quasi-experimental study with pretest-posttest control group design.

Settings
The research was conducted in the working area of the Community Health Center of Bandarharjo and the Community Health Center of Telogosari Kulon Semarang City Indonesia in December 2016 - January 2017.

Sample
The calculation of the number of samples used a paired numerical comparative sample formula. There were 39 respondents selected using purposive sampling technique and divided into 3 groups (2 groups of intervention and 1 control group) in which each group amounted to 13 respondents. The distribution of respondents in the working

area of the Community Health Center of Bandarharjo was assigned as intervention groups and respondents in the working area of the Community Health Center of Telogosari Kulon assigned as control group (counseling). The inclusion criteria of the sample in this study were: 1) primigravida pregnant women during the third stage of pregnancy, 2) there was no physical limitations and hearing impairments, 3) no consuming cardiovascular drugs, sedatives and related drugs, 4) willing to be a respondent. The exclusion criterion of the sample was pregnant women with mental disorders.

Intervention
Music therapy was given to the experiment groups. The experiment group 1 received music therapy with sound pressure of 40 dB and the experiment group 2 received music therapy with sound pressure of 62 dB. The implementation of music therapy was done for 30 minutes per day for 2 weeks at each respondent's home to minimize the noise during therapy. The music therapy used Mp3 and speaker containing natural sound. A control group was given a counseling about the inconvenience of a third trimester of pregnancy and labor preparation. Counseling begun with a material explanation by the researchers and then continued question and answer and discussion between researchers and respondents. Counseling was done at home of each respondent.

Instrument
Anxiety levels were measured using the HARS (Hamilton Anxiety Rating Scale) questionnaire introduced by Max Hamilton (Hamilton, 1960). HARS scale has been proven to have high enough validity and reliability. The questionnaire consisted of 13 items (feelings of anxiety, tension, fear, sleep disturbances, intelligence disorders, depressed feelings, somatic symptoms, sensory symptoms, cardiovascular symptoms, respiratory symptoms, gastrointestinal symptoms, urogenital symptoms, and autonomic symptoms), with Likert scale 0 = never, 1 = rare, 2 = often, 3 = always. The questionnaire was adopted from previous study in Indonesian version with validity of r value of 0.39-0.79 and Cronbach's alpha was 0.94 (Hawari, 2001). β-endorphin hormone levels were measured using ELISA (Enzyme-Linked Immunosorbent Assay) method, as a biochemical technique mainly used in the field immunologists that utilize specific bonds between antibodies and antigens. Normal values of β-endorphin hormone levels are 0.01-100 ng/ml. Measurement of anxiety level and β-endorphin hormone levels were done two times, before and after intervention.

Ethical consideration
Ethical approval was obtained from the Research Ethics Committee of POLTEKKES Semarang with Number: 272/KEPK/ Poltekkes-SMG/EC / 2016. The researchers have confirmed that each respondent in this study has signed an appropriate informed consent.

Data analysis
Data analysis used paired t-test, One-way ANOVA test with post hoc Bonferroni, and Kruskal Wallis test with post hoc Mann Whitney.

RESULTS & DISCUSSION
Figure 1 shows that the average age of respondents in the experiment group 1 was 27.62 years old, experiment group 2 was 23 years old, and the control group was 24.62 years old. This range of age is considered as productive age. Thus, it could be said that pregnant women with productive age had more anxiety than pregnant women with unproductive age. However, age is one of the factors that affect anxiety. Young age is more prone to stress than old age (Akiki, Avison, Speechley, & Campbell, 2016; Thiagayson et al., 2013). Homogeneity test showed p-value >0.05 indicated that there was no different characteristic of respondent based on age.
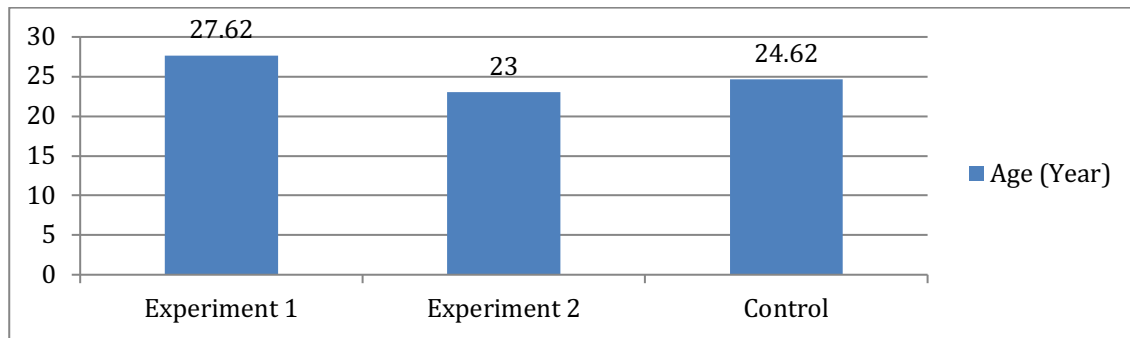
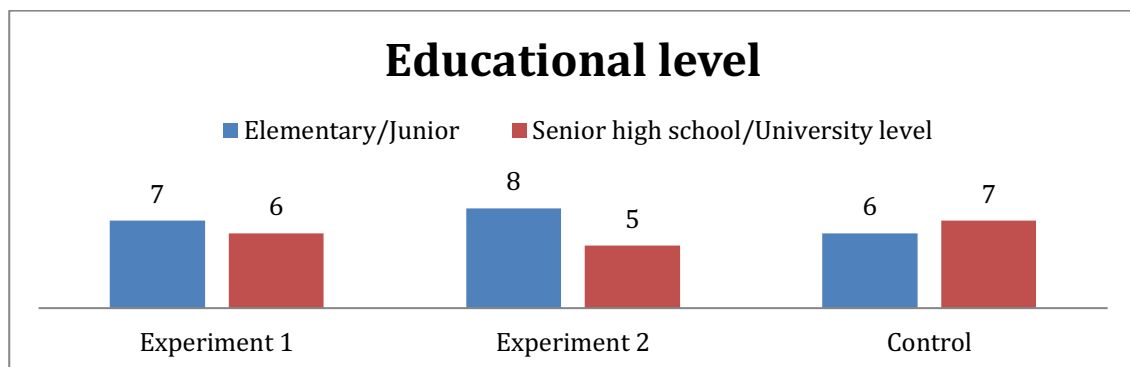**Figure 1** Characteristic of respondents based on age

Figure 2 Characteristic of respondents based on educational level

Figure 2 shows that the respondents in the experiment group 1 had elementary/junior high school background (7 people) and senior high school and university level (6 people), while respondents in the experiment group 2 had elementary/junior high school background (8 people) and senior high school and university level (5 people), and respondents in the control group had elementary/junior high school background (6 people) and senior high school and university level (7 people). Homogeneity test showed p-value >0.05 indicated that there was no different characteristic of respondent based on educational level.
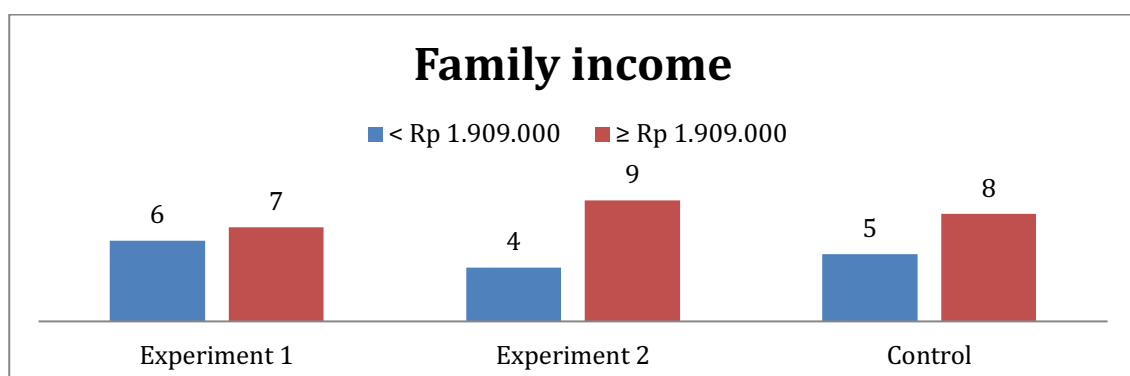

Figure 3 Characteristic of respondents based on family income

Figure 3 shows that the majority of respondents (24 people) in the three groups had family income ≥ Rp. 1.909.000. Homogeneity test showed p-value >0.05 indicated that there was no different characteristic of respondent based on family

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income. Literature stated that educational levels and family income are mediators that affect maternal anxiety levels (Brandon et al., 2008; Lancaster et al., 2010). However,

because the three groups were homogeneous, so the characteristics of respondents did not affect the outcome of this study.

Table 1 Effect of music therapy on anxiety levels of primigravida during the third stage of pregnancy using paired t-test

Group		n	Mean ± $\overline{\text{SD}}$	(min-max)	p-value
Experiment 1	Pretest	13	31.92 ± 0.57	21-42	0.001
	Posttest	13	24.69 ± 0.67	14-39	
Experiment 2	Pretest	13	34.54 ± 0.64	22-48	0.000
	Posttest	13	25 ± 0.65	14-39	
Control	Pretest	13	35.15 ± 2.7	23-53	0.413
	Posttest	13	40.49 ± 0.83	16-54	

The results of paired t-test of anxiety level as shown in the Table 1 showed there was a decrease of the mean of anxiety levels in the experiment groups. The experiment group 1 showed a decrease of anxiety levels from 31.92 (pretest) to 24.69 (posttest), and the experiment group 2 showed a decrease of

anxiety levels from 34.54 (pretest) to 25 (posttest), with p-value <0.05, which indicated that there was a statistically significant effect of music therapy on anxiety levels. There was no effect of counseling in the control group on anxiety levels with p-value 0.413 (>0.05)

Table 2 Effect of music therapy on β-Endorphin levels of primigravida during the third stage of pregnancy using paired t-test

Group		n	Mean ± $\overline{\text{SD}}$	(min-max)	p-value
Experiment 1	Pretest	13	53.63 ± 1.39	29.61-80.25	0.027
	Posttest	13	63.24 ± 1.42	34.15-92.14	
Experiment 2	Pretest	13	48.55 ± 1.61	24.58-99.31	0.003
	Posttest	13	64.9 ± 2.7	30.72-162.3	
Control	Pretest	13	56.14 ± 1.39	30.85-90.41	0.394
	Posttest	13	50.59 ± 1.24	27.74-90.88	

The results of paired t-test of β-Endorphin levels as shown in the Table 2 showed there was an increase of the mean of β-Endorphin levels in the experiment groups. The experiment group 1 showed an increase of β-Endorphin levels from 53.63 (pretest) to 63.24 (posttest), and the experiment group 2 showed an increase of β-Endorphin levels from 48.55 (pretest) to 64.9 (posttest), with p-value <0.05, which indicated that there was a statistically significant effect of music therapy on β-Endorphin levels. There was no effect of counseling in the control group on β-Endorphin levels with p-value 0.394 (>0.05).

While One-way ANOVA test as shown in the Table 3 shows that the mean difference of anxiety levels before and after intervention in the experiment group 1 was -7.23, the experiment group 2 was -10.85, and the

control group was -1.23. It seems that the experiment group had a greater mean than the other groups. P-value was 0.001 (<0.05) indicated that there was a significant difference of mean difference in anxiety levels among the three groups.

While Kruskal Wallis test as shown in the Table 3 shows that the mean difference of β-Endorphin levels before and after intervention in the experiment group 1 was -7.23, the experiment group 2 was -10.85, and the control group was -1.23. It seems that the experiment group had a greater mean than the other groups. P-value was 0.019 (<0.05) indicated that there was a significant difference of mean difference in β-Endorphin levels among the three groups.

Table 3 Mean difference of Effect of music therapy on anxiety levels and *β-Endorphin* levels of primigravida during the third stage of pregnancy

Variable	Group	n	Mean ± $\overline{SD}$	(min-max)	p-value
Mean difference of anxiety levels	Experiment 1	13	-7.23 ± 0.45	-15 – 2	
	Experiment 2	13	-10.85 ± 0.52	-21 – 4	0.001
	Control	13	-1.23 ± 0.4	-12 – 6	
Mean difference of *B-Endorphin level*	Experiment 1	13	9.66 ± 1.06	-10.60 – 38.76	
	Experiment 2	13	16.34 ± 1.24	-3.27 – 62.98	0.019
	Control	13	-5.53 ± 1.73	-30.68 – 40.76	

Table 4 Effect of music therapy on anxiety levels of primigravida during the third stage of pregnancy using post hoc Bonferroni

Variable	Group		n	Mean Different	p-value
Anxiety levels	Experiment 1	Experiment 2	13	3.615	0.410
		Control	13	-6.000	0.048
	Experiment 2	Experiment 1	13	-3.615	0.410
		Control	13	-9,615	0.001
	Control	Experiment 1	13	6.000	0.048
		Experiment 2	13	9.615	0.001

Table 5 Effect of music therapy on β-Endorphin levels of primigravida during the third stage of pregnancy using post hoc Mann Whitney

Variable	Group		p value
β-Endorphin levels	Experiment 1	Experiment 2	0.287
	Experiment 1	Control	0.034
	Experiment 2	Control	0.012

Table 4 shows that there was no significant difference of the effect of intervention in the experiment group 1 and 2 (p=<0.05), while there was a significant difference between the effect of intervention between the control group and experiment group 1 and 2 (p=>0.05); while Table 5 shows that there was no significant difference of the effect of intervention in the experiment group 1 and 2 with p-value 0.287 (>0.05), while there was a significant difference between the effect of intervention between the control group and experiment group 1 (p=0.034) and experiment group 2 (p=0.012) on β-Endorphin levels.

The results of this study revealed that there was a significant effect of music therapy with sound pressure of 40 dB and 62 dB on anxiety levels and β-Endorphin levels. Music therapy proved to be effective compared with counseling in the control group in reducing anxiety levels and increasing the levels of β-Endorphin levels.

As literature stated that music therapy is one of the non-pharmacological therapies that can be used as one of the relaxation techniques that have a positive influence on the level of anxiety and endocrine system work. The stimulation of music captured by the five senses will be transmitted to the brain, which will affect the autonomic nervous system to decrease the work of the sympathetic nervous system and enhance the work of the parasympathetic system. So, music can make a person feel more relaxed and comfortable. In addition, stimulation of music in the brain also affects the anterior pituitary work to suppress the production of catecholamine or stress hormones (Chanda & Levitin, 2013; Krout, 2007).

The results of this study were in line with previous research in which music therapy could reduce the level of anxiety in pregnant women, and postpartum mothers. The results of previous studies showed that maternal anxiety levels were lower after given music therapy and there was a significant difference in anxiety levels between the intervention and control group (Chang, Chen, & Huang, 2008; Lai et al., 2006; Shin & Kim, 2011; Simavli et al., 2014; Yusuf et al., 2017).

This study provides the insight of evidence that music therapy with natural sound with

sound pressure 40 dB and 62 dB for 30 minutes in 2 weeks could reduce anxiety levels and β-Endorphin levels in primigravida during the third stage of pregnancy. However, further research is needed to examine the variation of music pressure levels, duration and frequency of the treatment.

CONCLUSION

It can be concluded that there was a significant effect of music therapy in reducing anxiety levels and increasing β-Endorphin levels in in primigravida during the third stage of pregnancy. Thus, music therapy is recommended to be an alternative treatment for pregnant mothers at home who experienced anxiety.

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