EFFECTIVENESS OF MUSIC THERAPY ON ANXIETY AND \( \beta \)-ENDORPHIN LEVELS IN PRIMIGRAVIDA DURING THE THIRD STAGE OF PREGNANCY

Surya Dayyana\(^1\), Suryono\(^2\), Melyana Nurul Widyawati\(^1\), Syarief Thaufik Hidayat\(^3\), Suryati Kumorowulan\(^1\)

\(^1\)Postgraduate Midwifery Program, Semarang Health Polytechnic, Semarang, Indonesia
\(^2\)Instrumentation and Electronic Laboratory, Physic Department, Faculty of Science and Mathematics, Diponegoro University of Semarang, Indonesia
\(^3\)Medical Staff Group of Obstetric Gynecology Department, Dr. Kariadi Hospital, Semarang, Indonesia

*Corresponding author:
Surya Dayyana
Postgraduate Nursing Program, Semarang Health Polytechnic
Jl. Tirto Agung, Pedalangan, Banyumanik Kota Semarang, Jawa Tengah, Indonesia (50268)
Email: suryadayyana44@gmail.com

Abstract
Objective: To examine the effectiveness of music therapy on anxiety and \( \beta \)-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 \( \beta \)-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 \( \beta \)-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 \( \beta \)-Endorphin levels \((p=0.394)\).

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

Keywords: music therapy; anxiety; \( \beta \)-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, Skouoliakou, & Liosis, 2009; Lee et al.,...
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, & Honarpavarvan, 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, 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
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 ± 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 ± 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 \( \beta \)-Endorphin levels of primigravida during the third stage of pregnancy

| Variable                  | Group          | n  | Mean ± SD       | (min-max) | p-value |
|---------------------------|----------------|----|-----------------|-----------|---------|
| Mean difference of anxiety levels | Experiment 1   | 13 | -7.23 ± 0.45    | -15 – 2   | 0.001   |
|                           | Experiment 2   | 13 | -10.85 ± 0.52   | -21 – 4   |         |
|                           | Control        | 13 | -1.23 ± 0.4     | -12 – 6   |         |
| Mean difference of \( \beta \)-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 Difference | p-value |
|----------|----------------|----|-----------------|---------|
| Anxiety levels | Experiment 1   | 13 | 3.615           | 0.410   |
|           | Control        | 13 | -6.000          | 0.048   |
|           | Experiment 2   | 13 | -3.615          | 0.410   |
|           | Control        | 13 | -9.615          | 0.001   |

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

| Variable | Group          | p-value |
|----------|----------------|---------|
| \( \beta \)-Endorphin levels | Experiment 1 | 0.287   |
|           | Experiment 2   | 0.034   |
|           | 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 \( \beta \)-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 \( \beta \)-Endorphin levels. Music therapy proved to be effective compared with counseling in the control group in reducing anxiety levels and increasing the levels of \( \beta \)-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.

Declaration of Conflicting Interest
None declared.

Funding
This study was supported by Postgraduate Midwifery Program, Semarang Health Polytechnic, Semarang, Indonesia.

Author Contribution
All authors contributed equally in this study.

References
Akiki, S., Avison, W. R., Speechley, K. N., & Campbell, M. K. (2016). Determinants of maternal antenatal state-anxiety in mid-pregnancy: Role of maternal feelings about the pregnancy. Journal of Affective Disorders, 196, 260-267.
Boso, M., Politi, P., Barale, F., & Emanuele, E. (2006). Neurophysiology and neurobiology of the musical experience. Functional Neurology, 21(4), 187.
Brandon, A. R., Trivedi, M. H., Hynan, L. S., Miltenberger, P. D., Labat, D. B., Rifkin, J. B., & Stringer, C. A. (2008). Prenatal depression in women hospitalized for obstetric risk. The Journal of Clinical Psychiary, 69(4), 635.
Chan, M. F., Wong, Z. Y., & Thayala, N. V. (2011). The effectiveness of music listening in reducing depressive symptoms in adults: A systematic review. Complementary Therapies in Medicine, 19(6), 332-348.
Chanda, M. L., & Levitin, D. J. (2013). The neurochemistry of music. Trends in Cognitive Sciences, 17(4), 179-193.
Chang, M. Y., Chen, C. H., & Huang, K. F. (2008). Effects of music therapy on psychological health of women during pregnancy. Journal of Clinical Nursing, 17(19), 2580-2587.
Cook, E. L., & Silverman, M. J. (2013). Effects of music therapy on spirituality with patients on a medical oncology/hematology unit: A mixed-methods approach. The Arts in Psychotherapy, 40(2), 239-244.
Ding, X.-X., Wu, Y.-L., Xu, S.-J., Zhu, R.-P., Jia, X.-M., Zhang, S.-F., . . . Tao, F.-B. (2014). Maternal anxiety during pregnancy and adverse birth outcomes: A systematic review and meta-analysis of prospective cohort studies. Journal of Affective Disorders, 159, 103-110.
Giakoumaki, O., Vasilaki, K., Lili, L., Skouroliaou, M., & Liosis, G. (2009). The role of maternal anxiety in the early postpartum period: Screening for anxiety and depressive symptomatology in Greece. Journal of Psychosomatic Obstetrics & Gynecology, 30(1), 21-28.
Grote, N. K., Bridge, J. A., Gavin, A. R., Melville, J. L., Iyengar, S., & Katon, W. J. (2010). A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. Archives of General Psychiatry, 67(10), 1012-1024.
Hamilton, M. (1960). A rating scale for depression. Journal of Neurology, Neurosurgery & Psychiatry, 23(1), 56-62.
Haruyama, S. (2015). The miracle of endorphin. Jakarta: Mizan Qantita.
Hatem, T. P., Lira, P. I. C., & Mattos, S. S. (2006). The therapeutic effects of music in children following cardiac surgery. Jornal de Pediatria, 82(3), 186-192.
Hawari, D. (2001). Manajemen stress, cemas dan depresi [Management of stress, anxiety, and depression]. Jakarta: Fakultas Kedokteran Universitas Indonesia.
Hosseini, S. E., Baghiri, M., & Honarparvaran, N. (2013). Investigating the effect of music on labor pain and progress in the active stage of first labor. European Review for Medical Pharmacological Sciences, 17(11), 1479-1487.
Krou, R. E. (2007). Music listening to facilitate relaxation and promote wellness: Integrated aspects of our neurophysiologic responses to music. The Arts in Psychotherapy, 34(2), 134-141.
Lai, H.-L., Chen, C.-J., Peng, T.-C., Chang, F.-M., Hsieh, M.-L., Huang, H.-Y., & Chang, S.-C. (2006). Randomized controlled trial of music during kangaroo care on maternal state anxiety and preterm infants’ responses. International Journal of Nursing Studies, 43(2), 139-146.
Lancaster, C. A., Gold, K. J., Flynn, H. A., Yoo, H., Marcus, S. M., & Davis, M. M. (2010). Risk factors for depressive symptoms during pregnancy: a systematic review. American journal of Obstetrics and Gynecology, 202(1), 5-14.
Lee, A. M., Lam, S. K., Lau, S. M. S. M., Chong, C. S. Y., Chui, H. W., & Fong, D. Y. T. (2007). Prevalence, course, and risk factors for antenatal anxiety and depression. Obstetrics & Gynecology, 110(5), 1102-1112.
Littleton, H. L., Bye, K., Buck, K., & Amacker, A. (2010). Psychosocial stress during pregnancy and perinatal outcomes: a meta-analytic review. Journal of Psychosomatic Obstetrics & Gynecology, 31(4), 219-228.
Pawlby, S., Hay, D. F., Sharp, D., Waters, C. S., & O’Keane, V. (2009). Antenatal depression predicts depression in adolescent offspring: prospective longitudinal community-based study. Journal of Affective Disorders, 113(3), 236-243.
Richards, T., Johnson, J., Sparks, A., & Emerson, H. (2007). The effect of music therapy on patients' perception and manifestation of pain, anxiety, and patient satisfaction. *Medsurgical Nursing, 16*(1), 7.

Shin, H. S., & Kim, J. H. (2011). Music therapy on anxiety, stress and maternal-fetal attachment in pregnant women during transvaginal ultrasound. *Asian Nursing Research, 3*(1), 19-27.

Simavli, S., Kaygusuz, I., Gunus, I., Usluogullari, B., Yildirim, M., & Kafali, H. (2014). Effect of music therapy during vaginal delivery on postpartum pain relief and mental health. *Journal of Affective Disorders, 156*, 194-199.

Teixeira, C., Figueiredo, B., Conde, A., Pacheco, A., & Costa, R. (2009). Anxiety and depression during pregnancy in women and men. *Journal of Affective Disorders, 119*(1), 142-148.

Thiagayson, P., Krishnaswamy, G., Lim, M. L., Sung, S. C., Haley, C. L., Fung, D. S. S., . . . Chen, H. (2013). Depression and anxiety in Singaporean high-risk pregnancies—prevalence and screening. *General Hospital Psychiatry, 35*(2), 112-116.

Todres, I. D. (2006). Music is medicine for the heart. *Jornal de Pediatria, 82*(3), 166-168.

Van den Bergh, B. R. H., Van Calster, B., Smits, T., Van Huffel, S., & Lagae, L. (2008). Antenatal maternal anxiety is related to HPA-axis dysregulation and self-reported depressive symptoms in adolescence: a prospective study on the fetal origins of depressed mood. *Neuropsychopharmacology, 33*(3), 536-545.

Yusuf, N., Hadisaputro, S., Runjati, R., Suwondo, A., Mashoedi, I. D., & Supriyana, S. (2017). The effectiveness of combination of kangaroo mother care method and lullaby music therapy on vital sign change in infants with low birth weight. *Belitung Nursing Journal, 3*(4), 352-359.

**Cite this article as:** Dayyana, S., Suryono, Widyawati, N. M., Hidayat, S. T., Kumorowulan, S. (2017). Effectiveness of music therapy on anxiety and β-endorphin levels in primigravida during the third stage of pregnancy. *Belitung Nursing Journal, 3*(6), 735-742. [https://doi.org/10.33546/bnj.298]