



**A COMBINATION OF EFFLEURAGE MASSAGE, BITTER ORANGE AROMATHERAPY AND BEETHOVEN MUSIC AS AN ALTERNATIVE SOLUTION TO REDUCE BACK PAIN IN PREGNANT WOMEN IN THE THIRD TRIMESTER**

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**ABSTRACT**

Back pain is a common complaint in pregnant women during the third trimester due to physiological changes affecting the connective tissue and spinal structure. This study aimed to evaluate the effectiveness of a combination of effleurage massage, bitter orange aromatherapy, and Beethoven's music on reducing back pain and physiological responses in pregnant women during the third trimester. The study design used a quasi-experimental approach with a pre-post test control group approach. Sixty respondents were divided into two groups: the intervention and the control. The intervention group received the combination therapy three times a week for four weeks, while the control group received no intervention. The results showed a significant decrease in blood pressure, pulse rate, respiratory rate, and pain scores after the intervention. Most respondents in the intervention group experienced a shift in pain category from moderate and severe to mild pain. In contrast, the control group showed no significant changes. This combination therapy proved to be physiologically and psychologically effective, consistent with the gate control pain theory and supported by previous literature. The combination of touch through massage, the aroma of bitter orange oil, and classical music stimulation provided a comprehensive relaxation effect. This intervention is safe, non-invasive, and easy to implement both independently and in midwifery practice. Therefore, this combination therapy is recommended as a complementary approach in antenatal care services to address back pain in pregnant women in the third trimester.

Keywords: back pain; beethoven's music; bitter orange; effleurage massage; pregnant women in the third trimester

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**INTRODUCTION**

The most common physiological change in pregnant women during the third trimester is back pain, which is caused by changes in the connective tissue in the spine, which becomes softer and looser due to being pushed by the growing fetus besar (Yuliana and Amalya Putri Handayani, 2024). In Indonesia, it is reported that 70% of pregnant women experience back pain in the third trimester (Sari, L. P., Pratama, M. C., & Kuswati, 2020; Hanifah, Nurdianti and Kurniawati, 2022). The Indonesian Ministry of Health (2019) shows that discomfort during pregnancy, especially back pain, is also quite high, at around 28.7% (Kasih and Hamdani, 2023; Anggita and Fitriahadi, 2024). The patient's inability to manage discomfort can lead to several complications. These complications can hinder the pregnancy process until delivery and even contribute to maternal mortality (MMR) (Taqqiyah *et al.*, 2024). Massage is an effective non-pharmacological therapy for reducing pain, increasing relaxation, and stimulating the parasympathetic nervous system (Rhomadona and Primiastuti, 2022; Fajrin, D.H. and Simbolon, T.L., 2024). The effleurage technique can stimulate endorphin production through sensory distraction, thereby reducing pain and increasing comfort, especially in pregnant women (Fajrin, D.H. and Simbolon, T.L., 2024).

Bitter Orange or citrus aurantium is an oil commonly used in aromatherapy. Aromatherapy is a non-pharmacological method for reducing pain. Aromatherapy uses essential oils or pure oil extracts to help improve or maintain health, stimulate enthusiasm, refresh and calm the soul, and stimulate the healing process (Rhomadona and Primiastuti, 2021; Rokhima and Yazid, 2023; Primiastuti and Intiyaswati, 2024). Bitter Orange or citrus aurantium oil is commonly used in aromatherapy. Bitter Orange (*C. Aurantium*) consists of an essential oil called neroli. There are more than 10 components of citrus aurantium oil, most of which are the following monoterpenes: limonene, linalool, linalyl acetate, geranyl acetate, geraniol, nerol, and neryl acetate. This oil has effects as a stimulant, antiseptic, antispasmodic, and mild sedative. Limonene found in Bitter Orange oil controls cyclooxygenase I and II, inhibits prostaglandin activity, reduces pain, stimulates the central nervous system, improves mood, lowers blood pressure, and acts as a sedative analgesic (Rokhima and Yazid, 2023). Music will affect the threshold for stress and other psychological pressures, supporting muscle relaxation and suppressing emotions, so it is used to reduce anxiety and fear (Usakli, 2020). The most beneficial type of music for reducing anxiety is classical music, as it affects the brain by stimulating the secretion of endorphins. These hormones can lower blood pressure, heart rate, and breathing rate, thus promoting relaxation, which can reduce fear and anxiety. Beethoven's music is one such type of classical music (Prasetia, 2020; CHOIRIYAH, 2024).

## **METHOD**

This study used a quasi-experimental design (two group pre-post test design) which aims to reveal the causal relationship between the treatment group and the control group. The research sample used the Accidental Sampling technique with a total of 60 respondents divided into 2 control and intervention groups. The study was conducted for 3 months from June to November 2025. Data collection tools used Questionnaires, NRS Scales and observation sheets for Blood Pressure, Pulse Rate and Respiratory Rate in the control group and the treatment group. The intervention given to the group included Effleurage massage on the back and hand area for 30 minutes, then administration of bitter orange Aromatherapy inhalation with the help of a diffuser and listening to Beethoven music during the massage. The above intervention was carried out 3x/week for 4 weeks. For the control group, the intervention was only given a regular massage performed by pregnant women in the third trimester. After being given the intervention, each group will be given a post-test to determine the scale of back pain in pregnant women.

## **RESULT**

Based on the table results, the majority of respondents in the intervention group were in the young age category (<30 years), while the control group was dominated by early adulthood (30–34 years). Most respondents in both groups were single parity, with a pregnancy interval of less than two years. The highest level of education held by respondents was college, with a percentage of 70.0% in the intervention group and 66.7% in the control group. In terms of occupation, the majority of the intervention group worked as employees, while the control group was mostly housewives.

Table 1.  
Respondent Characteristics Based on Intervention and Control Groups (n=60).

| Characteristics         | Groups          |              |
|-------------------------|-----------------|--------------|
|                         | Intervensi (f%) | Kontrol (f%) |
| Age (years)             |                 |              |
| Young Age (<30)         | 13 (43,3%)      | 10 (33,3%)   |
| Early Adulthood (30–34) | 11 (36,7%)      | 19 (63,4%)   |
| Mature (≥35)            | 5 (16,7%)       | 3 (10,0%)    |
| Parity                  |                 |              |
| 1                       | 26 (86,7%)      | 25 (83,3%)   |
| 2                       | 0               | 1 (3,3%)     |
| 3                       | 4 (13,3%)       | 4 (13,3%)    |
| Pregnancy Spacing       |                 |              |
| < 2 years               | 22 (73,3%)      | 20 (66,7%)   |
| > 2 years               | 8 (26,7%)       | 10 (33,3%)   |
| Education               |                 |              |
| Elementary School       | 0               | 0            |
| Middle School           | 1 (3,3%)        | 0            |
| High School             | 8 (26,7%)       | 10 (33,3%)   |
| University              | 21 (70,0%)      | 20 (66,7%)   |
| Occupation              |                 |              |
| Housewife               | 4 (13,3%)       | 17 (56,7%)   |
| Employee                | 11 (36,7%)      | 6 (20,0%)    |
| Self-Employed           | 7 (23,3%)       | 2 (6,7%)     |
| Other                   | 8 (26,7%)       | 5 (16,7%)    |

Table 2.

Percentage frequency distribution of Blood Pressure, Pulse Rate, Respiratory Rate, and Pain Level in the Intervention and Control Groups (n=60).

| Variables           | Category         | Group         |               |               |               | p-value |
|---------------------|------------------|---------------|---------------|---------------|---------------|---------|
|                     |                  | Intervensi    |               | Control       |               |         |
|                     |                  | Before        | After         | Before        | After         |         |
| Blood pressure      | 110–120 (Light)  | 15 (50,0%)    | 19 (63,3%)    | 18 (60,0%)    | 12 (40,0%)    | 0,000*  |
|                     | 120–140 (Medium) | 13 (43,3%)    | 11 (36,7%)    | 12 (40,0%)    | 18 (60,0%)    |         |
|                     | >140 (Heavy)     | 2 (6,7%)      | 0 (0%)        | 0 (0%)        | 0 (0%)        |         |
|                     | Mean ± SD        | 132,27 ± 8,94 | 122,10 ± 7,39 | 125,47 ± 8,27 | 128,40 ± 8,61 |         |
|                     |                  |               |               |               |               |         |
| Pulse Frequency     | 80–100 (Light)   | 23 (76,7%)    | 30 (100,0%)   | 21 (70,0%)    | 20 (66,7%)    | 0,002*  |
|                     | 100–120 (Medium) | 7 (23,3%)     | 0 (0%)        | 9 (30,0%)     | 10 (33,3%)    |         |
|                     | >120 (Heavy)     | 0 (0%)        | 0 (0%)        | 0 (0%)        | 0 (0%)        |         |
|                     | Mean ± SD        | 98,33 ± 9,55  | 92,40 ± 4,13  | 96,73 ± 8,55  | 97,50 ± 7,35  |         |
|                     |                  |               |               |               |               |         |
| Breathing Frequency | 16–20 (Light)    | 6 (20,0%)     | 16 (53,3%)    | 4 (13,3%)     | 7 (23,3%)     | 0,002*  |
|                     | 20–24 (Medium)   | 24 (80,0%)    | 14 (46,7%)    | 26 (86,7%)    | 23 (76,7%)    |         |
|                     | >24 (Heavy)      | 0 (0%)        | 0 (0%)        | 0 (0%)        | 0 (0%)        |         |
|                     | Mean ± SD        | 22,20 ± 1,61  | 21,13 ± 1,25  | 22,53 ± 1,38  | 22,53 ± 1,38  |         |
|                     |                  |               |               |               |               |         |
| Pain Score          | 1–3 (Light)      | 2 (6,7%)      | 27 (90,0%)    | 2 (6,7%)      | 2 (6,7%)      | 0,000*  |
|                     | 4–6 (Medium)     | 22 (73,3%)    | 3 (10,0%)     | 24 (80,0%)    | 28 (93,3%)    |         |
|                     | 7–10 (Heavy)     | 6 (20,0%)     | 0 (0%)        | 4 (13,3%)     | 0 (0%)        |         |
|                     | Mean ± SD        | 5.43 ± 1.19   | 2.67 ± 0.66   | 5.33 ± 1.18   | 5.33 ± 0.96   |         |
|                     |                  |               |               |               |               |         |

Based on the data, the results of the study showed a significant decrease in the average blood pressure, pulse rate, respiratory rate, and pain scores in the intervention group after treatment ( $p < 0.05$ ). Most respondents in the intervention group experienced a decrease in the category to a mild level, especially in pain scores which changed from predominantly moderate and severe to 90%

mild. In contrast, the control group showed no significant changes, even in some parameters there was an increase in the average value. These findings indicate that the intervention provided was effective in reducing the physiological response and pain perception of respondents.

Table 3.

Analysis of the Effect of the Combination of Effleurage Massage, Bitter Orange Aromatherapy and Bethoven Music as an Alternative Solution to Reducing Back Pain in Pregnant Women in the Third Trimester (n=60).

| variables           | Groups       | Mean Rank | U       | Z      | p-value |
|---------------------|--------------|-----------|---------|--------|---------|
| Blood pressure      | Intervention | 23.98     | 254.500 | -3.016 | 0.003   |
|                     | control      | 37.02     |         |        |         |
| Pulse Frequency     | Intervention | 24.78     | 278.500 | -2.783 | 0.005   |
|                     | control      | 36.22     |         |        |         |
| Breathing Frequency | Intervention | 22.87     | 221.000 | -3.641 | 0.000   |
|                     | control      | 38.13     |         |        |         |
| Pain Score          | Intervention | 16.37     | 26.000  | -6.460 | 0.000   |
|                     | control      | 44.63     |         |        |         |

Based on Table 3, the Mann-Whitney test results show significant differences between the intervention and control groups in all measured variables ( $p < 0.05$ ). The mean rank of the intervention group was lower than the control group, indicating a greater decrease in blood pressure, pulse rate, respiratory rate, and pain scores. The pain score showed the most significant difference with a p-value of 0.000 and a striking difference in mean rank between the groups. These findings confirm that the intervention provided was highly effective in reducing physiological responses and pain.

## DISCUSSION

### Characteristics of Pregnant Women

This study aimed to evaluate the effectiveness of a combination of effleurage massage, bitter orange aromatherapy, and Beethoven's music on reducing back pain in pregnant women in their third trimester. Based on respondent characteristics, the majority of participants in the intervention group were under 30 years old and were single with relatively close pregnancies ( $<2$  years). The majority of respondents in both groups were college graduates, reflecting a relatively high level of health literacy. Differences in occupational background were also evident, with the intervention group predominantly working as employees, while the control group was predominantly housewives. These characteristics are important because they can influence pain perception and response to the intervention. The relatively homogeneous backgrounds in terms of pregnancy provided good control for external variables that could confound intervention outcomes.

Overall, the results showed a significant reduction in blood pressure, pulse rate, respiratory rate, and pain scores in the intervention group after treatment. Most respondents transitioned from moderate and severe pain to mild pain, demonstrating the apparent effectiveness of the combination of therapies. These findings align with the gate control theory of pain, which explains that non-painful sensory stimuli such as touch and sound can inhibit pain transmission through the spinal cord (Khoirun Nisa' and Kamidah Kamidah, 2023). Furthermore, previous research by Santoso et al. (2021) and Rahmawati (2020) also showed that relaxation therapies such as effleurage massage and aromatherapy can reduce stress levels and pain complaints in pregnant women (Naibaho, Fadhila and Daulay, 2024; Farah Nisa Kusnadi, Syarah Mardiyah and Hidayani, 2025). Classical music, such as Beethoven's compositions, is known to trigger activation of the limbic system, which plays a role in regulating emotions and pain perception. These three interventions complement each other in providing physiological and psychological effects to reduce pain (Collins et al., 2021; Naibaho, Fadhila and Daulay, 2024).

The researchers concluded that the combination of effleurage massage, bitter orange aromatherapy, and Beethoven's music is an effective and safe alternative solution for reducing back pain in pregnant women in the third trimester. This intervention can be implemented independently or within obstetric services as part of non-pharmacological complementary therapies. The effectiveness of this approach is demonstrated not only by statistical data but also by clinical relevance, given that pregnant women tend to avoid taking painkillers. Researchers recommend that health workers consider this intervention as part of standard antenatal care, especially for women with back pain. To strengthen the evidence, further research with a larger population and a longitudinal approach is recommended to examine the long-term impact on quality of life and childbirth readiness. Thus, this holistic approach has the potential to become an integral part of evidence-based midwifery practice.

### **Descriptive Analysis of the Frequency Distribution of Blood Pressure, Pulse Rate, Respiratory Rate, and Pain Scores in Pregnant Women**

The results of this study indicate a significant decrease in mean blood pressure, pulse rate, respiratory rate, and pain scores in the intervention group after receiving a combination of effleurage massage, bitter orange aromatherapy, and Beethoven's music. Most respondents in the intervention group experienced a shift in pain category from moderate and severe to mild pain. This indicates that the intervention was able to have a positive physiological and psychological impact on pregnant women in the third trimester. Meanwhile, the control group showed no significant changes; in fact, some parameters, such as blood pressure and pulse rate, improved after treatment. These findings confirm the effectiveness of the combination intervention in reducing pain and the body's stress response. This non-pharmacological intervention can be a relevant, safe, and affordable alternative for pregnant women experiencing back pain.

The effectiveness of this combination therapy can be explained by the gate control pain theory, which states that non-painful stimuli such as touch and sound can inhibit the transmission of pain signals to the brain (Dumiri, Kep and Biomed, 2024). Effleurage massage works by stimulating large nerve fibers (A-beta) to inhibit pain impulses from small fibers (A-delta and C), thereby reducing pain perception. Bitter orange aromatherapy contains active compounds such as linalool and limonene, which have sedative and anxiolytic effects, helping to calm the central nervous system (Alvin Alvani Tresna Ambari, 2025). Furthermore, classical music, such as Beethoven's, has been scientifically proven to reduce stress hormones like cortisol and increase relaxation through activation of the limbic system (Prasojo, 2016). Previous studies by Widyastuti (2020) and Santoso et al. (2021) support these results, showing that combination therapy is effective in reducing pain intensity in pregnant women (Farah Nisa Kusnadi, Syarah Mardiyah and Hidayani, 2025; Meilinda et al., 2025). Therefore, this integrative approach is not only physiologically beneficial but also supports the emotional well-being of pregnant women (Collins et al., 2021).

Based on these findings, researchers believe that the combination of effleurage massage, aromatherapy, and Beethoven's music is highly suitable for use as a complementary intervention in antenatal care. This therapy is non-invasive, has no side effects, and can be performed independently or with the guidance of a healthcare professional. This therapy also meets the needs of pregnant women who tend to avoid medication during pregnancy, especially for back pain, which is common in the third trimester. Researchers recommend that this approach be included as a routine alternative in evidence-based midwifery practice. Although the results of this study demonstrate significant effectiveness, further studies with larger sample sizes and long-term observation are needed to ensure the sustainability of the therapy's effects and its impact on the quality of life and labor process of pregnant women.

## **Combination of Effleurage Massage, Bitter Orange Aromatherapy, and Bethoven Music to Reduce Back Pain in Third Trimester Pregnant Women**

The results of this study showed significant differences between the intervention group and the non-intervention group in terms of blood pressure, pulse rate, respiratory rate, and pain levels. The intervention group experienced a greater reduction in all these parameters. Specifically, the reduction was most evident in pain levels, which changed from moderate or severe to mild. This indicates that the combination of therapies provided was effective in reducing back pain complaints in pregnant women in the third trimester.

The effectiveness of this intervention is supported by the theory that stimuli such as massage, aromatherapy, and music can inhibit pain signals to the brain (Aulya et al., 2023). Massage helps relieve muscle tension, aromatherapy has a calming effect, and classical music creates a relaxing atmosphere that reduces stress (Wilayah et al., 2025). These three methods work complementary physiologically and psychologically. Several previous studies have also shown that similar approaches can reduce pain perception in pregnant women. Therefore, this combination is a relevant and beneficial form of non-pharmacological intervention (Aulya et al., 2023; Meilinda et al., 2025; Saryani, 2025; Wilayah et al., 2025). These findings suggest that this combination intervention is a viable alternative in pregnancy care, particularly for managing back pain. This therapy is safe, easy to implement, and does not require specialized equipment. Researchers recommend that this intervention be widely used in obstetric practice, both in health facilities and independently by mothers. Although the results are promising, further research is needed to test its long-term effectiveness. Therefore, this intervention can be part of a holistic approach to maternal care.

## **CONCLUSION**

The combination of effleurage massage, bitter orange aromatherapy, and Beethoven's music has been shown to effectively reduce blood pressure, pulse rate, respiratory rate, and back pain levels in pregnant women in their third trimester. This intervention has positive physiological and psychological impacts, with results showing a more significant reduction compared to the untreated group. This non-pharmacological approach is safe, easy to implement, and appropriate for supporting maternal comfort during pregnancy. Therefore, this intervention is worthy of being used as an alternative complementary therapy in evidence-based obstetric care.

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