



Original research article

Relaxation response, brainwaves, and quality of life in women with nausea and vomiting during pregnancy

Santi Wahyuni * , Badriah, Komarudin, Yanti Cahyati , Tifanny Gita Sesaria

Poltekkes Kemenkes Tasikmalaya, Department of Nursing, Tasikmalaya, West Java, Indonesia

Abstract

Aim: This study aims to assess the effectiveness of ATHP-HC on the severity of nausea and vomiting, relaxation state, brainwaves, and quality of life in women with Nausea and Vomiting in Pregnancy (NVP).

Methods: A quasi-experimental study was conducted on 62 pregnant women randomly allocated into intervention and control groups using a pre-post-test. Researchers provided ATHP-HC to the intervention group and Cirebon Gamelan audio therapy to the control group. The research instruments included PUQE-24-hour scoring, measurement of vital signs, brainwaves using NeuroSky MindWave Mobile II, and WHOQOL-BREF. The data collected were processed with SPSS version 24.0 and analyzed using the statistical formula paired *t*-test.

Results: The results of the study showed that there were significant differences between nausea and vomiting scores ($p = 0.000$), relaxation levels ($p = 0.003$ in the intervention group and $p = 0.000$ in the control group), and quality of life ($p = 0.000$), before and after the treatment in the intervention group and the control group. There was a significant difference in the state of relaxation after the intervention in the two groups of respondents ($p = 0.001$). There was no significant difference in the proportion of increased meditation in the two groups of respondents ($p = 0.707$).

Conclusion: As relaxation and meditation music, ATHP-HC can be a complementary therapy for pregnant women to overcome NVP.

Keywords: Audio Therapy for Healthy Pregnancy-Harmoni Cinta (ATHP-HC); Brainwaves; Nausea and Vomiting in Pregnancy (NVP); Quality of life; Relaxation

Introduction

Pregnancy is a developmental task experienced by women during the reproductive period. More than 80% of pregnant women worldwide experience nausea and vomiting during pregnancy (Matthews et al., 2015). NVP are the most common complications that occur during pregnancy in up to 85% of pregnant women (McParlin et al., 2016). Nausea and vomiting are common in pregnancy, affecting 70–85% of pregnant women (ACOG Practice Bulletin No. 189, 2018). Approximately 4,000,000 women in the United States and 350,000 women in Canada are affected by nausea and vomiting during pregnancy (Lee and Saha, 2011; Mazzotta et al., 2000). A severe form of NVP is Hyperemesis Gravidarum (HG), affecting between 0.3% and 3.6% of pregnant women, disrupting their quality of life and the ability to eat and drink normally (Nelson-Piercy et al., 2024). The clinically recorded prevalence of NVP/HG was 9.1%: 2.1% were hospitalized, 3.4% were treated with antiemetics only in primary care, and 3.6% were recorded only at the time of diagnosis (Fiaschi et al., 2019). The incidence of women who experience NVP in Indonesia reaches 50–90% (Prawirohardjo, 2014). Symptoms of NVP include nausea and/or vomiting which commonly occurs before

16 weeks of gestation and has no other cause (Nelson-Piercy et al., 2024). Generally, these symptoms will disappear within 22 weeks (Bustos et al., 2018). NVP events affect four-fifths of pregnant women. It is one of the most common indications for hospital admission in pregnant women during their first and second trimesters. The average length of stay is between three and four days (Nelson-Piercy et al., 2024). NPV in early pregnancy often occurs during initial treatment. In severe cases, it requires hospitalization with five days average length of stay (Wong et al., 2022).

The high incidence of nausea and vomiting among pregnant women in the first trimester in the community requires pregnant women to understand how to deal with NVP (Iskandar, 2017). One of the methods pregnant women use to overcome this problem is complementary therapy (Wong et al., 2022). The therapies for NPV include acupuncture, acupressure, ginger, and aromatherapy (Liu et al., 2022; Somoyani, 2018). The advantages of these therapies are that they are non-invasive, cheap, simple, effective, and without adverse side effects for the mother and fetus. Another example of complementary therapy is audio therapy. This is expected to improve coping mechanisms, reduce stress levels, and increase endorphin hormones so that pregnant women feel more comfortable, calm, and relaxed during their pregnancy.

* **Corresponding author:** Santi Wahyuni, Poltekkes Kemenkes Tasikmalaya, Department of Nursing, Tasikmalaya, West Java, Indonesia; e-mail: santiwahyuni@dosen.poltekkestasikmalaya.ac.id
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One example of audio therapy to overcome various complaints experienced by mothers in the first trimester of pregnancy is Audio Therapy Healthy Pregnancy (ATHP). This provides a relaxing effect and reduces brainwaves. The ATHP mechanism works by balancing hormones and increasing the immunity of pregnant women through brainwave stimulation and special music (Putra, 2022). Brainwave stimulation can be adjusted to produce brainwaves as needed (Prasmadika, 2015). Several studies on the effect of audio therapy on anxiety and depression levels have been conducted. One of them is the research by Jabbari et al. (2020) that discusses the use of the Holy Quran as an audio therapy for 168 pregnant women. The study found that listening to the Holy Quran for four to eight weeks reduced their anxiety, stress, and depression.

In addition, audio therapy can help reduce the anxiety level of pregnant women and have a positive effect on the results of the Non-Stress Test (NST). Studies that involved music applications in the field of obstetrics have shown that music provides relaxation during pregnancy and can reduce anxiety from State-Trait Anxiety Inventory (STAI-S) scores (Çatalgöl and Ceber Turfan, 2022).

ATHP-HC is another type of complementary therapy, which was developed by the research team's R&D in 2022. It combines Cirebon Gamelan instruments with brainwave therapy to treat NPV symptoms. ATHP-HC has been assessed by a team of experts (art and culture experts, brainwave therapists, obstetricians, gynaecologists, and multimedia experts) and passed the validity test, and was declared feasible in a limited group test (Wahyuni et al., 2022). Therefore, this study aimed to determine the effectiveness of ATHP-HC on the severity of nausea and vomiting, relaxation state, brainwaves, and quality of life of pregnant women with morning sickness.

Materials and methods

Research design

The research method was quasi-experimental with a pre-test-post-test group approach and a larger sample size. It involved two groups: an intervention and a control group. The intervention group was treated by listening to the ATHP-HC that was produced from our research in 2022. ATHP-HC contains a combination of Gunung Sari Cirebon Gamelan instruments and brainwave therapy. The control group only listened to Javanese Gamelan instruments without brainwaves. Before and after the treatment, the severity of nausea and vomiting, blood pressure, pulse frequency, respiratory frequency, and oxygen saturation, quality of life measurement, and the state of the brainwaves of pregnant women (increased meditation or attention) were recorded.

Population and sample

This research involved pregnant women in the working area of the Cirebon Regency Health Center. The sampling method was carried out using the purposive sampling technique. The inclusion criteria were 15–35 years old, in their first or second pregnancy (no history of repeated abortions or stillbirths), gestational age ≤ 12 weeks, experiencing complaints of nausea and vomiting, and able to read and write. Exclusion criteria included undergoing treatment in the hospital due to HG, having a history of comorbidities, and pregnancy complications. The sample size in this research was determined using the formula:

$$n = \frac{2(Z_1 - \alpha/2 + Z_1 - \beta)^2 \sigma^2}{(U_1 - U_2)^2}$$

Based on this calculation, a sample size of 30.73 respondents was obtained, rounded up to 31 people for each group. Thus, this study divided respondents into two groups: an intervention group with 31 respondents and a control group with 31 respondents.

Research instruments

The research instruments include: (1) *Pregnancy Unique Quantification of Emesis and Nausea (PUQE)-24* scoring system developed by Koren et al. (2002), which has been validated by Koren et al. (2005) for measuring the severity of nausea and vomiting; (2) Standard Operating Procedures (SOP) for measuring blood pressure, pulse rate and respiratory rate, and oxygen saturation; (3) NeuroSky MindWave Mobile II for measuring brainwaves; (4) WHOQOL-BREF issued by WHO (Mardiati et al., 2016) for measuring quality of life. It contains 26 questions regarding the respondent's feelings regarding the quality of life, health, and other things that the respondent has thought, felt, and experienced over the last two weeks. The instrument uses a Likert scale with five choices.

Data collection procedure

Research data collection procedures: (1) giving and teaching the respondents guidelines for using ATHP-HC tools in the form of Grotic handsfree and MMC containing ATHP-HC soft files, (2) conducting pre-test data collection, including measuring the severity of nausea and vomiting using the 24-hour PUQE score; the relaxation response based on heart rate; and measuring the quality of life using WHOQOL-BREF scoring, as well as brainwave examination using NeuroSky MindWave Mobile II, (3) implementing ATHP-HC treatment in the intervention group, and Cirebon gamelan audio therapy in the control group every day for two weeks, (4) monitoring the implementation of the ATHP-HC, (5) conducting post-test data collection with the same measurement indicators as the pre-test.

Statistical analysis

Statistical analysis uses univariate and bivariate analysis. Researchers conducted further analysis to compare test results in the intervention and control groups. The Paired-Sample *T*-test was used to carry out parametric statistical tests because the research data was normally distributed.

Ethical considerations

Research ethics applies the principles of anonymity (providing guarantees in using research subjects), informed consent (providing explanations and asking for respondents' willingness to take part in research without coercion), and confidence (providing guarantees of confidentiality of research results). This research was carried out after it had passed the ethical review of the Health Research Ethics Commission of the Mahardika Institute of Technology and Health (no. 091/KEPK.ITEKES-MA/VI/2023).

Results

The study respondents were pregnant women in the first trimester who experienced symptoms of nausea and vomiting during their pregnancy. They came from Community Health Centers in the Cirebon Regency area. Based on the sample calculation results, there were 62 respondents (31 in the intervention group and 31 in the control group). Below is the data from the univariate analysis.

Table 1 shows that most respondents in the intervention group were primigravida (54.8%), while the majority of those in the control group were multigravida (54.8%). Regarding education level, most respondents had middle-school education (58.10% in the intervention group and 71% in the control group). Most respondents were housewives (96.8% in the intervention group and 93.5% in the control group). In terms of brainwave condition before the treatment, the brainwaves in most respondents of both groups were in a state of increased attention: 74.2% in the intervention group and 80.6% in the control group. After the treatment, the brainwaves experienced an increase in meditation by 90.3% in the intervention group and 83.90% in the control group.

Table 1. Characteristics of respondents based on gravida status, education background, employment status, and brainwaves

Variable	Intervention (%)	Control (%)
Gravida status		
Primigravida	54.80	45.20
Multigravida	45.20	54.80
Education background		
Elementary school	25.80	16.10
Middle school	58.10	71.00
University	16.10	12.90
Employment status		
Housewife	96.80	93.50
Employed	3.20	6.50
Brainwaves		
Before		
Increase in attention	74.2	80.6
Increase in meditation	25.8	19.4
After		
Increase in attention	9.7	16.1
Increase in meditation	90.3	83.9

Table 2 shows that the average maternal age was 26.97 years in the intervention group and 28.19 years in the control group. The average gestational age of the intervention and control group respondents was 9–10 weeks. In the intervention group, the PUQE-24-hour score before the treatment was 7.42 and after the treatment was 3.52. In the control group, the score before the treatment was 7.55, and after the treatment was 4.00. The average level of relaxation in the intervention group before the treatment was 93.48, and after the treatment was 86.61. In the control group, the score before the treatment was 87.77, and after the treatment was 80.94. The average quality of life score in the intervention group before the treatment was 88.84, and after the treatment was 99.45. In the control group, the score before the treatment was 82.90, and after the treatment was 92.97.

The results of the bivariate analysis are presented in Table 3. It shows the average nausea and vomiting score before the treatment in the intervention group (7.42) and after the treatment (3.52). In the control group, the score before the treatment was 7.55, and after the treatment it was 4.00. Statistical test results obtained a p -value of 0.000 in both groups. Thus, it can be concluded that there is a significant difference between nausea and vomiting scores before and after the treatment in both the intervention and control groups. Besides that, the average relaxation rate before the treatment

Table 2. Respondent characteristics based on the mother's age, gestational age, nausea and vomiting score, relaxation rate, and quality of life

Variable	Intervention	Control
Mother's age	26.97 years old	28.19 years old
Gestational age	10.10 weeks	9.58 weeks
Nausea and vomiting score		
Before	7.42	7.55
After	3.52	4.00
Relaxation rate		
Before	93.48	87.77
After	86.61	80.94
Quality of life score		
Before	88.84	82.90
After	99.45	92.97

was 93.48, while after the treatment it was 86.61. In the control group, it was 87.77, while after the treatment it was 80.94. Statistical test results obtained a p -value of 0.000 in the intervention group, and 0.003 in the control group. Therefore, it can be said that there is a significant difference between relaxation rate scores before and after the treatment in both the intervention and control groups. In terms of the average quality of life score, in the intervention group before treatment it was 88.84, and after the treatment it was 99.45. In the control group, it was 82.90, and after treatment it was 92.97. Statistical test results obtained a p -value of 0.000 in both groups. Thus, it can be concluded that there is a significant difference between the quality-of-life scores before and after the treatment in the intervention and control groups.

Table 4 shows the average nausea and vomiting score after the treatment in the intervention group (3.52). In the control group it was 4.00. Statistical test results obtained a p -value of 0.009, meaning that at $\alpha = 5\%$, there was no significant difference in the average nausea and vomiting score after the

Table 3. Distribution of average severity of nausea and vomiting, state of relaxation, and quality of life before and after the treatment in the intervention and control groups

Nausea and vomiting	Mean	SD	SE	p -value
Intervention				
1. Before	7.42	2.57	0.46	0.000
2. After	3.52	0.63	0.11	
Control				
1. Before	7.55	2.76	0.50	0.000
2. After	4.00	0.78	0.14	
Relaxation rate				
Intervention				
1. Before	93.48	14.54	2.61	0.003
2. After	86.61	7.23	1.30	
Control				
1. Before	87.77	10.91	1.96	0.000
2. After	80.94	5.78	1.04	
Quality of life				
Intervention				
1. Before	88.84	12.50	2.25	0.000
2. After	99.45	8.87	1.59	
Control				
1. Before	82.90	11.97	2.15	0.000
2. After	92.97	9.76	1.75	

Table 4. Distribution of differences in mean severity of nausea and vomiting, relaxation state, and quality of life after the treatment in the intervention and control groups

Group	Mean	SD	SE	p-value
Severity of nausea and vomiting				
Intervention	3.52	0.63	0.11	0.009
Control	4.00	0.78	0.14	
Relaxation state				
Intervention	86.61	5.78	1.04	0.001
Control	80.94	7.23	1.03	
Quality of life				
Intervention	99.45	8.87	1.59	0.008
Control	92.97	9.76	1.75	

treatment in the two groups. The average relaxation rate after the treatment in the intervention group was 86.61, and in the control group it was 80.94. Statistical test results obtained a *p*-value of 0.001, meaning that at $\alpha = 5\%$, there was a significant difference in the relaxation state after the treatment in the two groups. The average quality of life after the treatment in the intervention group was 99.45, and in the control group it was 92.97. Statistical test results obtained a *p*-value of 0.008, meaning that at $\alpha = 5\%$, there was no significant difference in the average quality of life after the treatment in the two groups.

Analysis was conducted using the Chi-square test to monitor the effect of ATHP-HC and audio therapy treatment on brainwaves. The results of the analysis can be seen in Table 5.

Table 5. Distribution of respondents according to brainwave state

Group	Brainwaves				Total		p-value
	Increased attention		Increased meditation				
	n	%	n	%	n	%	
Intervention	3	9.7	28	90.3	31	100	0.707
Control	5	12.9	26	83.9	31	100	
Total	8	12.9	54	87.1	62	100	

The analysis of the relationship between providing ATHP-HC treatment and Gamelan audio therapy with brainwave images showed that most respondents (90.3%) in the intervention group experienced increased meditation. In comparison, in the control group, it was 83.9%. The statistical test results obtained a *p*-value of 0.707, so it can be concluded that there was no difference in the proportion of increased meditation between respondents who received ATHP-HC treatment and Gamelan audio therapy.

Discussion

Since the time of Al-Farabi and Ibnu Sina, music or audio therapy has been one of the treatments used to help alleviate the complications associated with health problems. Music therapy is an established health profession in which music is used within a therapeutic relationship to address the physical, emotional, cognitive, and social needs of individuals (AMTA – American Music Therapy Association, 2020). As a medical treatment, music therapy has many functions. According to Ibnu Sina and Ikhwan al-Safa, these are: to entertain, soothe, relieve, or reduce pain; to strengthen the body's immunity (antibodies) to diseases; to help in healing, and to distract attention from pain and calm down to facilitate the recovery process (Sidik et al., 2022).

Several studies have used gamelan music as an intervention in overcoming health problems. This music has become the cultural identity of the Indonesian people because it has lived in a culture and has become a tradition in people's lives for a very long time. Gamelan officially became Indonesia's 12th World Intangible Cultural Heritage on December 15, 2021 (Gandhawangi, 2021). Gamelan is a type of ensemble music, played using other musical instruments to produce a melodious sound (Siregar et al., 2021). Gamelan uses musical instruments that are played by a group of people who follow certain rules so that the music can sound beautiful (Sudana et

al., 2020). Gamelan music can be used to reduce anxiety (Yusli and Rachma, 2019) and stress (Meliyana et al., 2023). When someone listens to and enjoys music, they will feel comfortable and more relaxed, reducing their tension and anxiety. Listening to music with a slow tempo (around 60–100 bpm) can slow down and balance brainwaves, which indicates calmness (Shalehuddin, 2010). Other research has shown that there is a relationship between the intensity of gamelan music practice and emotional intelligence (Jarmani et al., 2022).

NVP are common conditions that can affect the health of pregnant women and the foetus in the womb. Nausea and vomiting can affect up to 70–85% of pregnant women (ACOG Practice Bulletin No. 189, 2018). Pregnant women who experience mild nausea and vomiting feel discomfort, but this does not limit their main activities. In contrast, at severe levels, nausea and vomiting cause misery and often limit daily activities, including limitations in self-care (Fejzo et al., 2019). It can cause various health problems, both physical and psychological, such as fatigue, anxiety, and depression, which can reduce the overall quality of life (Li et al., 2021). Music therapy or audio therapy can be applied to pregnant women who experience NVP complaints. This is supported by the research results of Çetinkaya (2019) which prove that listening to music can reduce the severity of nausea and vomiting in patients. Mothers with moderate and severe levels of nausea and vomiting are more likely to report poor sleep quality compared to those in the mild category (Li et al., 2021). Music therapy treatment positively affects sleep problems in pregnant women (Shimada et al., 2021).

The present study is the first to conduct a comprehensive follow-up analysis of Audio Therapy Healthy Pregnancy-Harmony Cinta (ATHP-HC) before and after the treatment on nausea and vomiting scores, relaxation conditions, quality of life, and brainwaves. ATHP-HC model product, produced by the research in 2022, was designed as relaxation music to help pregnant women overcome nausea and vomiting. Relaxation music can provide stimulation that has mental and physical ef-

fects. Music can slow down and balance brainwaves, influence vital signs, influence muscle tension, improve body movement and coordination, regulate stress-related hormones, change the perception of space and time, and increase body endurance (Azizah et al., 2021).

Our study results show a significant difference between nausea and vomiting scores in the intervention and control groups before and after the treatment. The intervention group has lower scores after being given ATHP-HC. This is in line with the results of previous research conducted by Irianti et al. (2015). It shows that the number of respondents with nausea and vomiting in the first trimester of pregnancy was 78.47%. Based on the severity level, 52.2% of the respondents were at the mild level, 45.3% at the moderate level, and 2.5% at the severe level. This result also supports Li et al. (2021) research which stated that 2,494 respondents experienced different levels of nausea and vomiting: 49.1% mild level, 49.3% moderate level, and 1.6% severe level.

The anxiety and stress experienced by pregnant women will trigger a physiological response in the body, including an increase in vital signs (Suryani et al., 2021). During a stress response, the autonomic nervous system will suppress parasympathetic activity and increase sympathetic activity, resulting in a marked increase in heart rate, respiratory rate, and systolic and diastolic blood pressure (Holzman and Bridgett, 2017). It is hoped that by using audio therapy, pregnant women can overcome or reduce the stress they experience due to nausea and vomiting.

Our results showed that after being given relaxation music treatment, most respondents in both groups showed an increase in meditation. This means that brainwaves decrease, and a relaxation and meditation state is achieved. According to the qualitative responses of most respondents, when listening to ATHP-HC, they felt relaxed and sleepy – and even fell asleep at the end of the session. Achieving relaxation and meditation after treatment causes a decrease in the severity of nausea and vomiting compared to conditions before treatment. The similar result between the two groups is likely caused by the same type of music provided in this study. Both of them were relaxation music in terms of rhythm, beat, melody, music notes and harmonization. The difference was intervention group used ATHP-HC, which contained a combination of Cirebon Gamelan music instruments “Gunung Sari” and brainwave instruments, while the control group used audio therapy with Cirebon Gamelan instruments “Kinanti” without combining brainwave instruments.

ATHP-HC treatment in both groups had the same effect on relaxation, so both groups showed significant differences before and after the treatment. Music therapy can provide a stimulus-response to a feeling of relaxation in the body (Primawati et al., 2018). Music therapy can be used to treat psychological problems, such as anxiety and stress. Music therapy can increase endorphin hormones, making pregnant women comfortable and more relaxed. Music therapy supports its recipients’ emotional, spiritual, and psychological needs by creating an environment that stimulates and maintains relaxation, wellbeing, and comfort to reduce or control stress (Chang et al., 2015). Audio therapy, especially relaxation music, is used to relax listeners and overcome anxiety, stress, and pain felt by respondents due to NVP.

In this study, indicators of the state of relaxation were the results of heart rate measurements taken before, during, and after treatment. Pregnant women experience various physical and psychological changes and are required to adapt to their pregnancy. In the first trimester, mothers generally experi-

ence nausea and vomiting (Liu et al., 2022). The therapeutic benefits of music have been well-expounded in the current research literature. It is widely proposed that listening to music helps to distract patients from focusing on negative thoughts of the impending surgery, a major source of anxiety. Listening to music provides a source of serenity and calmness, allowing patients to divert their attention and focus less on feelings of anxiety and fear (Tan et al., 2020).

The ATHP-HC musical instrument uses Cirebon Gamelan combined with brainwave therapy. Cirebon Gamelan is a type of Javanese music. Research results (Suryani et al., 2021) show that Javanese-style music can increase relaxation and change pain perception. This music has a soft rhythmic accompaniment to significantly reduce systolic blood pressure, foetal heart rate, respiration, and increased oxygen saturation. This music has a soft rhythmic accompaniment to significantly reduce systolic blood pressure, foetal heart rate, respiration, and increased oxygen saturation. Similar to this research, ATHP-HC in this study can also influence relaxation rate as seen from vital sign and oxygen saturation. So, after listening to this audio therapy regularly, the respondents felt more relaxed, i.e., their state of relaxation increased.

Music can stimulate the sympathetic and parasympathetic nerves, resulting in a relaxation response (Tan et al., 2020). Relaxing music can help overcome stress and anxiety, prevent disease, and relieve pain. The resulting relaxation response can include decreased heart rate, muscle relaxation, and sleep. ATHP-HC has a tempo of 63 beats, fulfilling the elements of relaxation music, namely a tempo of 60–80 beats/minute (Jacobsen et al., 2019). The ATHP-HC instrument lasts 30 minutes, the same as music therapy, which research has shown increases in psychological and physiological relaxation (Warth et al., 2014). Almost all types of music can be used as therapy, but the most recommended music therapy is music with a tempo of around 60 beats/minute, which is calming (Fancourt and Perkins, 2018). Music with a slow rhythm (between 55–70 beats/minute) causes the brain to become more relaxed, thus stimulating the release of endorphins which suppress the cortisol level (Suryani et al., 2021).

The study revealed significant differences in the quality of life of the intervention group and the control group after treatment. This could be because the audio therapy for both groups was relaxation music therapy. Previous studies have proven that music therapy can provide relaxation, reduce anxiety and psychosocial stress, depression, and pain, increase the bond between mother and foetus, improve sleep quality, and control foetal heart rate and blood pressure (Shimada et al., 2021). Music can stimulate behavior and emotional expression in individuals and encourage the ability to control homeostatic conditions physically and psychologically, which has an impact on physiology, behavior, cognition, emotions, and social interactions.

After routinely being given ATHP-HC every morning and being monitored for two weeks, most respondents in the intervention and control groups felt that their condition was much more relaxed, so their complaints of nausea and vomiting were reduced compared to before treatment. Some respondents no longer even felt nausea and vomiting. When respondents felt relaxed, complaints of nausea and vomiting reduced or disappeared. Based on this, respondents began to increase their food intake, their condition improved, fatigue decreased, sleep quality was better, energy increased, and they could carry out daily activities. All of this can continue to improve the quality of life of respondents.

Recent research results by Lorek et al. (2023) have proven the effect of music therapy on the listener's physiological, psychological, and social responses. Music therapy can reduce heart rate, blood pressure, breathing, pain intensity, anxiety, sleep disorders, and incidence of delirium, improve cognitive function and mood, and facilitate communication. Research results by Cao et al. (2016) prove that, as a complementary intervention, music can lower blood pressure and reduce anxiety and depression, thereby improving quality of life.

In general, after receiving the intervention, most respondents experienced an improvement in their quality of life. Before treatment, a few respondents experienced severe nausea and vomiting, felt discomfort, and their daily activities were disrupted. This condition illustrates that the quality of life is poor. After the ATHP-HC treatment was carried out, respondents experienced a gradual reduction in the severity of nausea and vomiting to a moderate level. According to Cao et al. (2016), music therapy can influence people's physiology and it can be measured objectively and subjectively from their quality of life. Music therapy can affect four domains of quality of life: physical health, psychology, social relationships, and environment. Physical health domain includes pain or sickness, medical therapy, energy, sleep, activity daily living, fulfilment and ability to work; environmental domain includes health conditions, access to health facilities; social domain covers financial, information, recreation, sociability, social relationship satisfaction, sexual, and support; psychological domain comprises life satisfaction, concentration, safety, body image, satisfaction with self (Mardiati et al., 2016). Music has great potential as a form of relaxation intervention, reducing anxiety levels and pain. The application of audio therapy in pregnancy can prevent negative impacts that may occur in pregnant women and fetuses due to mothers experiencing stress and anxiety (Wulff et al., 2017).

Biofeedback can be used to control several body functions, such as heart rate, breathing patterns, and muscle response. Changes in brainwaves are aimed at improving health because their frequency can be adjusted to the desired mental condition, such as a state of relaxation or wakefulness and sleep (Mayo Clinic Staff, 2023). Combining music therapy with brainwave therapy can reduce brainwaves and have a relaxing effect (Hinkle et al., 2016). Relaxation can create calm and relaxed conditions that slow down the brainwaves. Furthermore, it also decreases the stimulation of the nausea center and balance stimuli originating from hormones so that nausea and vomiting do not occur (Ropyanto et al., 2019). ATHP works by balancing hormones and improving the immune system of pregnant women through brainwave stimulation and special music (Putra, 2022). These brainwaves can increase relaxation. In this study, ATHP-HC has low alpha and theta frequencies (Wahyuni et al., 2022). The effect of music with alpha frequencies can reduce brainwaves and produce a relaxing effect. Alpha rhythms are generally dominant in the awake-rest state, both relaxed and comfortable (Kučikienė and Praninskienė, 2018).

Brainwave therapy can relax respondents more because the brainwaves used in ATHP-HC are lowered from alpha to theta. When the brainwave frequency decreases, the level of relaxation is deeper, so the brainwaves increase in meditation (Putra, 2022). The effects of relaxation and meditation can help respondents overcome nausea and vomiting. As gestational age increases and the process of adaptation to hormonal changes continues, this also reduces the severity of nausea and vomiting.

Pregnant women with persistent nausea have an increased risk of depressive symptoms at six weeks postpartum, regard-

less of their history of depression (Iliadis et al., 2018). Music therapy can relieve relaxation during pregnancy (Chang et al., 2008; Wulff et al., 2017). Music is an intervention to improve the psychological health of pregnant women, an effective method for dealing with pregnancy-related stress, provides comfort, has no side effects (or minimal side effects), and is cost-effective (Chang et al., 2015). Similar to this study, after ATHP-HC treatment for two weeks, there were changes in the severity of nausea and vomiting, relaxation response, quality of life, and brainwave states.

Limitations

Several limitations of this study related to a small amount of sample size. In addition, this NeuroSky MindWave Mobile II only describes the decrease in brainwaves from attention to meditation. However, it cannot yet measure brainwave frequency.

Conclusion

ATHP-HC treatment, in the form of relaxation music and meditation, can reduce the severity of nausea and vomiting, increase relaxation, reduce brainwaves, and improve the quality of life of women with NVP.

Recommendations

Nurses can provide relaxation using audio therapy as a complementary therapy to deal with physical and psychological problems in pregnant women. Nurses need to motivate pregnant women to listen to audio therapy regularly to increase relaxation and reduce discomfort caused by nausea and vomiting.

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Contributions

SW conceptualized and designed the study, and was responsible for manuscript preparation. *Badriah* and *Komarudin* contributed to the data input process on the statistical software. YC and TGS contributed to the critical revision of the manuscript. All authors approved the final manuscript and have participated sufficiently in the work to take public responsibility for appropriate portions of the content.

Ethical aspects and conflict of interest

This research was approved by The Ethics Commission Board, Mahardika Institute of Technology and Health number 091/KEPK.ITEKESMA/VI/2023. The authors have no conflicts of interest to declare.

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