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Promama Complementary Therapy: Impact on Hemoglobin, Weight, Anxiety, Nausea and Vomiting of Pregnancy (NVP)

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ABSTRACT

Introduction. Nausea and vomiting are among the most common discomforts experienced by pregnant women in the first trimester, often leading to decreased nutritional intake, weight loss, and anemia, which may ultimately affect maternal and fetal health. Various complementary interventions, including acupressure, moxibustion, and ginger aromatherapy, have been developed as supportive therapies to reduce these symptoms. This aimed to analyze the effectiveness of PROMAMA is a combined intervention of acupressure, moxibustion, and ginger aromatherapy for nausea and vomiting of pregnancy in reducing nausea, vomiting, anxiety, and anemia, as well as improving weight gain. **Methods.** This quasi-experimental study employed a pre-test-post-test control group design with 120 first-trimester pregnant women who met the inclusion criteria. Participants were divided into three groups: control, Standard, and intensive intervention. Data were collected using the PUQE-24 (Pregnancy-Unique Quantification of Emesis and Nausea), GAD-7 (Generalized Anxiety Disorder-7), hemoglobin measurements, and maternal weight records. Statistical analyses included One-Way ANOVA, ANCOVA, and Independent Sample T-Test. **Results.** The findings revealed significant differences between the groups in reducing nausea and vomiting, anxiety, and hemoglobin levels at post-test 1 and post-test 2 ($p < 0.05$). Intensive interventions combining acupressure, moxibustion, and ginger aromatherapy showed greater effectiveness compared to Standard and control groups. However, no significant differences were observed in weight gain across the groups ($p > 0.05$). **Conclusion.** Acupressure, moxibustion, and ginger aromatherapy are effective for managing nausea, vomiting, anxiety, and anemia in first-trimester pregnant women. These interventions can be recommended as non-pharmacological approaches to improve maternal well-being and pregnancy outcomes.

1. Introduction

Nausea and vomiting in the first trimester can lead to dehydration, nutritional disorders, anxiety, and a decline in the quality of life of pregnant women. Non-pharmacological approaches such as acupressure, moxibustion, and aromatherapy are considered effective and safe. The stunting rate in Tuban Regency, which reached 17.7% based on SKI 2023 data, has become an urgent public health priority that must be addressed at its root.[1] One of the primary root causes of stunting is intrauterine growth restriction (IUGR) and low birth weight (LBW) due to inadequate maternal nutritional intake, particularly during the first trimester. This condition is often triggered by emesis gravidarum (nausea and vomiting), which directly impacts maternal nutritional status and psychological well-being.[2] Nausea and vomiting disorders contribute to weight loss, decreased hemoglobin (Hb) levels leading to anemia[3,4] and serve as a risk factor for maternal anxiety.[5] These variables represent crucial markers that will be assessed in this study.

Globally, the prevalence of nausea and vomiting during pregnancy ranges from 50–90%, while in Indonesia it is reported at 50–80%. In East Java, up to 95% of pregnant women experience moderate to severe nausea and vomiting during the first trimester.[5,6] The urgency of this issue at the local level is reinforced by preliminary data from the Tuban District Health Office in 2025, which recorded 5,601 first-trimester antenatal care visits up to May 2025. Among them, 4.984 women (89%) reported nausea and vomiting (emesis gravidarum and morning sickness), and 224 women (4%) presented

with hyperemesis gravidarum. Furthermore, at Permata Bunda Village Maternity Clinic in Tuban, 92% of 20 first-trimester pregnant women reported nausea and vomiting, and 85% lacked adequate knowledge on how to manage these symptoms independently. This gap creates an opportunity for targeted interventions that directly contribute to reducing stunting rates in Tuban. Although pharmacological management is available, patient preference for non-invasive therapies has encouraged the exploration of complementary interventions.[7,8] Acupressure (PC6), moxibustion (ST36/PC6).[2] and aromatherapy[4] have individually demonstrated potential; however, evidence regarding their synergistic effectiveness as a structured intervention package, namely PROMAMA, remains limited. This novelty underpins the present research.

This study aimed to assess the effectiveness of PROMAMA therapy, which combines acupressure, moxibustion, and aromatherapy, in reducing nausea and vomiting, increasing hemoglobin levels, improving maternal body weight, and alleviating anxiety in first-trimester pregnant women.

2. Methods

This study used a quasi-experimental design with pre- and post-test with a non-equivalent control group,[9] involving three parallel groups. This design was selected to evaluate the effectiveness of the PROMAMA intervention by comparing the control group with two intervention groups. The study will be conducted during the designated period across all village maternity clinics within the Tuban Public Health Center service area.

The study population comprised all first-trimester pregnant women (gestational age 1–12 weeks) receiving care at village-based maternity and integrated health service posts (Polindes and Poskesdes) within the Tuban Public Health Center service area. Based on preliminary data, 171 eligible individuals were identified. The sample size was calculated using the Slovin formula with a precision level of 95% ($\alpha = 0.05$), yielding a minimum of 120 respondents. A consecutive sampling technique was employed,[9] where every pregnant woman attending services who met the inclusion criteria and consented to participate was recruited until the quota of 120 respondents was achieved. Subsequently, participants were assigned into three study groups based on consecutive sampling until each group reached 40 participants.

The inclusion criteria were first-trimester pregnant women who experienced nausea and vomiting (emesis gravidarum) for at least three days during the preceding week and provided written informed consent. The exclusion criteria included pregnancy complications such as hyperemesis gravidarum, a history of chronic diseases (including diabetes, hypertension, cardiovascular disease, or gastrointestinal disorders), and miscarriage occurring during the study period.

The intervention group received a combination of therapies consisting of acupressure using circular thumb pressure with the 10-10-10 technique applied to bilateral P6 (Neiguan) points[10] for a total of 20 minutes, followed by moxibustion therapy using a lit moxa stick placed 3 cm above the bilateral ST36 (Zusanli) points[11] for 15 minutes. During therapy, respondents inhaled ginger aromatherapy prepared with 3 drops diluted in 100 ml of water via a diffuser. Respondents were divided into three study groups with different treatments: the Control Group (n = 40) received Standard education on nausea and vomiting management without PROMAMA intervention; the Standard Intervention Group (n = 40) received PROMAMA (a combination of P6 acupressure, ST36 moxibustion, and ginger aromatherapy) three times weekly for 4 weeks; and the Intensive Intervention Group (n = 40) received PROMAMA daily during the first two weeks, followed by three times weekly during the subsequent two weeks.

The study variables included nausea and vomiting severity assessed using the Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) questionnaire, hemoglobin (Hb) levels measured using Point of Care Testing (POCT) Hb Stick, body weight (BW) measured using a digital scale following IOM-NRC weight gain recommendations, and anxiety levels assessed using the Generalized Anxiety Disorder-7 (GAD-7) questionnaire. Both the PUQE-24 and GAD-7 are internationally recognized instruments, and for this study, validated Indonesian versions were utilized to ensure cultural and linguistic appropriateness. All variables were measured at three time points: baseline (pre-test), the end of week 2 (post-test 1), and the end of week 4 (post-test 2).

Data analysis was performed using SPSS Version 25. Statistical tests include paired t-test to compare pretest and post-test within each group, independent t-test to compare intervention and control groups at post-test, repeated measures ANOVA to analyze changes over time (pre-test, week 2, and post-test), and Analysis of Covariance (ANCOVA) to compare intervention effectiveness across the three groups. This study received ethical approval from the Health Research Ethics Institute of Institut Ilmu Kesehatan Nahdlatul Ulama Tuban, with the approval number (No. 102/0084223523/LEPK.IIKNU/V/2025).

3. Results

The following are the frequency distribution tables of the provided data, categorized by groups (Control, Standard, Intensive) and measured variables (age, occupation, Body Mass Index [BMI], hemoglobin level, anxiety level, nausea and vomiting, weight gain) at pre-test, post-test 1, and post-test 2.

Table 1 presents the distribution of respondents' demographic and baseline characteristics. The majority of participants were aged 21–35 years, predominantly housewives, and had a normal BMI. Most respondents had normal hemoglobin levels, while mild anxiety was the most frequently reported condition. Moderate nausea and vomiting were commonly experienced, and weight gain was largely stable across groups.

Table 2 shows the results of the first post-test (week 2). The majority of respondents had a normal BMI, and most presented with normal hemoglobin levels. Mild anxiety was the most common finding, while nausea and vomiting symptoms tended to decrease compared to the pre-test. Weight remained stable in most participants, although some reported normal or above-normal weight gain.

Table 3 summarizes the results of the second post-test (week 4). The majority of respondents demonstrated a normal BMI with an increase in the proportion of normal hemoglobin levels. Anxiety levels decreased substantially, with most participants reporting no anxiety. Nausea and vomiting symptoms further declined, and weight gain was mostly within or above the normal range.

Table 4 presents a summary of the statistical analysis paired-t test from a study comparing the effectiveness of acupressure, moxibustion, and aromatherapy (PROMAMA) in first-trimester pregnant women for reducing nausea and vomiting, along with its effects on hemoglobin levels, body weight, and anxiety. Data were collected from three groups: Intensive, Standard, and Control. For Body Mass Index (BMI), the standard group showed a significant reduction in BMI at post-test 2 (week 4) compared to pre-test (p=0.044).

Meanwhile, the intensive and control groups did not exhibit statistically significant changes in bmi across both post-test periods. Regarding hemoglobin levels, the intensive group demonstrated highly significant improvements at both post-test 1 (p=0.010) and post-test 2 (p=0.001), indicating that the intensive PROMAMA intervention was effective in enhancing hemoglobin levels.

The standard group showed an initial increase at post-test 1, but then experienced a significant decrease at post-test 2 (p=0.001). In contrast, the control group exhibited a significant decline in hemoglobin at post-test 1 (p=0.032). For anxiety (GAD-7), both intervention groups (intensive and standard) showed highly significant reductions in anxiety levels at both post-test periods. The Intensive group reported p-values of 0.005 at post-test 1 and 0.000 at post-test 2, while the standard group reported p-values of 0.026 and 0.005, respectively.

Table 1. Frequency Distribution of Respondents' Characteristics by Group (Pre-test)

Variable	Category	Control (n=40) Frequency (%)	Standard (n=40) Frequency (%)	Intensive (n=40) Frequency (%)	Total (N=120) Frequency (%)
Age	21–35 years	30 (75.0)	33 (82.5)	38 (95.0)	101 (84.2)
	36–50 years	10 (25.0)	7 (17.5)	2 (5.0)	19 (15.8)
Occupation	Housewives	31 (77.5)	25 (62.5)	34 (85.0)	90 (75.0)
	Private Employees	8 (20.0)	14 (35.0)	6 (15.0)	28 (23.3)
	Civil Servants	1 (2.5)	1 (2.5)	0 (0.0)	2 (1.7)
BMI (Pre-test)	Underweight	3 (7.5)	0 (0.0)	1 (2.5)	4 (3.3)
	Normal	22 (55.0)	20 (50.0)	25 (62.5)	67 (55.8)
	Overweight	7 (17.5)	7 (17.5)	12 (30.0)	26 (21.7)
	Obese	8 (20.0)	13 (32.5)	2 (5.0)	23 (19.2)
Hemoglobin (Pre-test)	Moderate Anemia	2 (5.0)	8 (20.0)	3 (7.5)	13 (10.8)
	Mild Anemia	14 (35.0)	6 (15.0)	13 (32.5)	33 (27.5)
	Normal	24 (60.0)	26 (65.0)	24 (60.0)	74 (61.7)
Anxiety (Pre-test)	No Anxiety	8 (20.0)	3 (7.5)	19 (47.5)	30 (25.0)
	Mild	22 (55.0)	20 (50.0)	11 (27.5)	53 (44.2)
	Moderate	5 (12.5)	17 (42.5)	10 (25.0)	32 (26.7)
	Severe	5 (12.5)	0 (0.0)	0 (0.0)	5 (4.2)
Nausea & Vomiting (Pre-test)	Moderate	19 (47.5)	25 (62.5)	31 (77.5)	75 (62.5)
	Mild	16 (40.0)	14 (35.0)	6 (15.0)	36 (30.0)
	No Symptoms	5 (12.5)	1 (2.5)	3 (7.5)	9 (7.5)
Weight Gain (Pre-test)	Decreased	0 (0.0)	11 (27.5)	9 (22.5)	20 (16.6)
	Stable	4 (10.0)	26 (65.0)	28 (70.0)	58 (48.3)
	Below Normal Increase	19 (47.5)	0 (0.0)	0 (0.0)	19 (15.8)
	Normal Increase	17 (42.5)	1 (2.5)	2 (5.0)	20 (16.6)
	Above Normal Increase	0 (0.0)	2 (5.0)	1 (2.5)	3 (2.5)

Table 2. Frequency Distribution of BMI, Hemoglobin, Anxiety, Nausea and Vomiting, and Weight Gain by Group (Post-test 1)

Variable	Category	Control (n=40) Frequency (%)	Standard (n=40) Frequency (%)	Intensive (n=40) Frequency (%)	Total (N=120) Frequency (%)
Hemoglobin	Moderate Anemia	5 (12.5)	6 (15.0)	1 (2.5)	12 (10.0)
	Mild Anemia	14 (35.0)	7 (17.5)	6 (15.0)	27 (22.5)
	Normal	21 (52.5)	27 (67.5)	33 (82.5)	81 (67.5)
Anxiety	No Anxiety	7 (17.5)	3 (7.5)	24 (60.0)	34 (28.3)
	Mild	20 (50.0)	31 (77.5)	15 (37.5)	66 (55.0)
	Moderate	8 (20.0)	6 (15.0)	1 (2.5)	15 (12.5)
	Severe	5 (12.5)	0 (0.0)	0 (0.0)	5 (4.2)
Nausea & Vomiting	Moderate	20 (50.0)	22 (55.0)	3 (7.5)	45 (37.5)
	Mild	15 (37.5)	17 (42.5)	20 (50.0)	52 (43.3)
	No Symptoms	5 (12.5)	1 (2.5)	17 (42.5)	23 (19.2)
Weight Gain	Decreased	17 (42.5)	15 (37.5)	3 (7.5)	35 (29.2)
	Stable	17 (42.5)	18 (45.0)	22 (55.0)	57 (47.5)
	Normal Increase	2 (5.0)	5 (12.5)	14 (35.0)	21 (17.5)
	Above Normal Increase	4 (10.0)	2 (5.0)	1 (2.5)	7 (5.8)

Table 3. Frequency Distribution of Hemoglobin, Anxiety, Nausea and Vomiting, and Weight Gain by Group (Post-test 2)

Variable	Category	Control (n=40) Frequency (%)	Standard (n=40) Frequency (%)	Intensive (n=40) Frequency (%)	Total (N=120) Frequency (%)
Hemoglobin (Post-test 2)	Moderate Anemia	5 (12.5)	16 (40.0)	0 (0.0)	21 (17.5)
	Mild Anemia	11 (27.5)	14 (35.0)	3 (7.5)	28 (23.3)
	Normal	24 (60.0)	10 (25.0)	37 (92.5)	71 (59.2)
Anxiety (Post-test 2)	No Anxiety	9 (22.5)	6 (15.0)	33 (82.5)	48 (40.0)
	Mild	22 (55.0)	28 (70.0)	6 (15.0)	56 (46.7)
	Moderate	4 (10.0)	6 (15.0)	1 (2.5)	11 (9.2)
	Severe	5 (12.5)	0 (0.0)	0 (0.0)	5 (4.2)
Nausea & Vomiting (Post-test 2)	Moderate	23 (57.5)	18 (45.0)	4 (10.0)	45 (37.5)
	Mild	13 (32.5)	15 (37.5)	17 (42.5)	45 (37.5)
	No Symptoms	4 (10.0)	7 (17.5)	19 (47.5)	30 (25.0)
Weight Gain (Post-test 2)	Decreased	19 (47.5)	21 (52.5)	3 (7.5)	43 (35.8)
	Stable	10 (25.0)	15 (37.5)	13 (32.5)	38 (31.7)
	Normal Increase	6 (15.0)	0 (0.0)	22 (55.0)	28 (23.3)
	Above Normal Increase	5 (12.5)	4 (10.0)	2 (5.0)	11 (9.2)

Interestingly, the control group demonstrated a highly significant increase in anxiety at post-test 2 (p=0.000). In terms of nausea and vomiting (PUQE), the results were particularly notable. Both intervention groups demonstrated significant improvements, indicating reduced nausea and vomiting symptoms across both post-tests. The intensive group consistently achieved significance (p=0.000) at both time points. Meanwhile, the control group also showed improvement at post-test 2 (p=0.023), although this effect was less pronounced compared to the intervention groups.

Finally, for weight gain, both the Intensive and Standard groups showed highly significant increases at both post-test periods (p=0.002 and p=0.000 for Intensive; p=0.688 and p=0.000 for Standard). However, the control group experienced a significant decrease in weight gain at post-test 1 (p=0.000), followed by a non-significant change at post-test 2. Overall, these findings indicate that the PROMAMA intervention, particularly when delivered intensively, has strong potential to reduce anxiety and nausea-vomiting symptoms, while also improving hemoglobin levels and promoting healthy weight gain among first-trimester pregnant women.

Table 5 summarizes the results of the independent samples t-test comparing the Control, Standard, and Intensive groups at baseline, post-test 1 (week 2), and post-test 2 (week 4). Significant intergroup differences were observed across several outcome variables, particularly for nausea and vomiting severity and anxiety scores at post-test 1 and post-test 2, with the intensive group demonstrating the most pronounced improvements compared to the control and standard groups.

Table 4. Summary of Statistical Analysis of Measured Variables Across Groups

Variable	Group	Mean Pre-test	Mean Post-test 1(Week 2)	Sig. (2-tailed) Post-test 1	Mean Post-test 2 (Week 4)	Sig. (2-tailed) Post-test 2
BMI (Body Mass Index)	Intensive	2.38	2.40	0.323	2.48	0.160
	Standard	2.83	2.68	0.110	2.93	0.044
	Control	2.50	2.60	0.103	2.65	0.057
Hemoglobin Levels	Intensive	3.53	3.80	0.010	3.93	0.001
	Standard	3.45	3.53	0.474	2.85	0.001
	Control	3.55	3.40	0.032	3.48	0.474
Anxiety (GAD-7)	Intensive	1.78	1.43	0.005	1.20	0.000
	Standard	2.35	2.08	0.026	2.00	0.005
	Control	2.18	2.28	0.103	3.60	0.000
Nausea and Vomiting (PUQE)	Intensive	2.30	3.35	0.000	3.38	0.000
	Standard	2.40	2.48	0.083	2.73	0.003
	Control	2.65	2.63	0.323	2.53	0.023
Weight Gain	Intensive	1.95	2.70	0.002	3.28	0.000
	Standard	1.93	2.03	0.688	3.48	0.000
	Control	3.33	1.98	0.000	3.60	0.302

Table 5. Results of Independent Samples T-Test (Control vs. Standard, Control vs. Intensive, Standard vs. Intensive)

Variable	Group Comparison	F (Levene's Test)	Sig. (Levene's Test)	t (Equal Variances Assumed)	df	Sig. (2-tailed)
BMI (Pre-test)	Control vs Standard	0.311	0.578	-1.607	78	0.112
	Control vs Intensive	7.461	0.008	0.717	78	0.475
	Standard vs Intensive	15.408	0.000	2.588	78	0.011
Hemoglobin (Pre-test)	Control vs Standard	0.058	0.811	-0.668	78	0.506
	Control vs Intensive	8.386	0.005	-1.858	78	0.067
	Standard vs Intensive	5.054	0.027	-0.900	78	0.371
Weight Gain (Pre-test)	Control vs Standard	1.379	0.244	-1.065	78	0.290
	Control vs Intensive	1.290	0.260	-2.360	78	0.021
	Standard vs Intensive	0.157	0.693	-0.842	78	0.402
Anxiety (Pre-test)	Control vs Standard	1.103	0.297	-1.010	78	0.316
	Control vs Intensive	0.435	0.512	2.061	78	0.043
	Standard vs Intensive	6.437	0.013	3.501	78	0.001
Nausea and Vomiting (Pre-test)	Control vs Standard	3.954	0.050	1.782	78	0.079
	Control vs Intensive	0.031	0.861	0.790	78	0.432
	Standard vs Intensive	4.626	0.035	-0.879	78	0.382
BMI (Post-test 1)	Control vs Standard	10.865	0.001	-0.426	78	0.671
	Control vs Intensive	9.714	0.003	1.126	78	0.264
	Standard vs Intensive	0.024	0.878	1.971	78	0.052
Hemoglobin (Post-test 1)	Control vs Standard	0.342	0.561	-1.399	78	0.166
	Control vs Intensive	0.372	0.544	-2.257	78	0.027
	Standard vs Intensive	1.183	0.280	-0.770	78	0.443
Weight gain (Post-test 1)	Control vs Standard	0.036	0.851	-0.185	78	0.854
	Control vs Intensive	4.822	0.031	0.106	78	0.916
	Standard vs Intensive	4.437	0.038	0.334	78	0.740
Anxiety (Post-test 1)	Control vs Standard	18.218	0.000	1.237	78	0.220
	Control vs Intensive	0.021	0.884	2.572	78	0.012
	Standard vs Intensive	29.881	0.000	1.982	78	0.051
Nausea and Vomiting (Post-test 1)	Control vs Standard	3.411	0.069	1.058	78	0.293
	Control vs Intensive	1.235	0.270	-4.877	78	0.000
	Standard vs Intensive	0.356	0.552	-6.642	78	0.000
BMI (Post-test 2)	Control vs Standard	0.578	0.449	-1.264	78	0.210
	Control vs Intensive	10.393	0.002	0.931	78	0.355
	Standard vs Intensive	26.648	0.000	2.402	78	0.019
Hemoglobin (Post-test 2)	Control vs Standard	0.364	0.548	3.677	78	0.000
	Control vs Intensive	61.676	0.000	-3.726	78	0.000
	Standard vs Intensive	53.085	0.000	-8.042	78	0.000
Weight gain (Post-test 2)	Control vs Standard	2.110	0.150	0.346	78	0.730
	Control vs Intensive	11.601	0.001	1.050	78	0.297
	Standard vs Intensive	43.050	0.000	0.629	78	0.531

Variable	Group Comparison	F (Levene's Test)	Sig. (Levene's Test)	t (Equal Variances Assumed)	df	Sig. (2-tailed)
Anxiety (Post-test 2)	Control vs Standard	7.618	0.007	0.741	78	0.461
	Control vs Intensive	7.739	0.007	5.721	78	0.000
	Standard vs Intensive	0.113	0.738	6.996	78	0.000
Nausea and Vomiting (Post-test 2)	Control vs Standard	0.445	0.507	-1.250	78	0.215
	Control vs Intensive	0.023	0.879	-5.647	78	0.000
	Standard vs Intensive	0.655	0.421	-4.093	78	0.000

Table 6. One-Way ANOVA Results for Intergroup Comparisons

Variable	F	p-value
Pre-Test		
Hemoglobin	2.079	0.130
Weight gain	5.505	0.005*
Anxiety	1.443	0.240
Nausea and vomiting	1.352	0.263
Post-test 1		
Hemoglobin	2.475	0.089
Weight gain	0.049	0.952
Anxiety	4.377	0.015*
Nausea and vomiting	22.061	0.000*
Post-test 2		
Hemoglobin	28.506	0.000*
Weight gain	0.492	0.613
Anxiety	22.336	0.000*
Nausea and vomiting	16.124	0.000*

Table 7. ANCOVA Results for Intergroup Comparisons

Dependent Variable	Time Point	F	p-value
Hemoglobin (Hb)	Post-test 1	1.296	0.277
Hemoglobin (Hb)	Post-test 2	30.254	0.000*
Weight gain	Post-test 1	0.046	0.955
Weight gain	Post-test 2	1.028	0.361
Anxiety	Post-test 1	5.502	0.005*
Anxiety	Post-test 2	17.669	0.000*
Nausea and vomiting (PUQE)	Post-test 1	34.221	0.000*
Nausea and vomiting (PUQE)	Post-test 2	22.477	0.000*

*Significant at $p < 0.05$. *ANCOVA adjusted for baseline (pre-test) values.*

The independent samples T-Test results for the control, standard, and intensive groups revealed significant differences across various variables at different time points. At baseline (pretest), notable disparities existed, with the Intensive group having significantly higher baseline anxiety compared to both control and standard groups, and differing bmi and weight gain from other groups. These initial differences are crucial for interpreting post-intervention outcomes. Following the first phase of intervention (post-test 1), the intensive group showed an unexpected significant decrease in hemoglobin levels compared to the control group, and continued to report higher anxiety. However, a significant positive effect was observed in nausea and vomiting reduction, where the intensive group showed greater improvements than both control and standard groups.

By the end of the study (Post-test 2), the intensive group's BMI remained higher than the standard group's, consistent with baseline. More critically, hemoglobin levels in the intensive group were significantly lower than both the control and standard groups, raising concerns about the intervention's physiological impact. Anxiety levels in the intensive group also remained significantly elevated compared to both other groups, suggesting that the intensive intervention did not alleviate, and possibly exacerbated, psychological distress. Despite these concerning trends, the positive impact on nausea and vomiting persisted, with the intensive group demonstrating consistently and significantly greater reductions throughout the study, reinforcing its effectiveness in this specific domain.

Based on the One-Way ANOVA test conducted to compare the effectiveness of the PROMAMA

intervention across the three groups (control, standard, intensive) on various measured variables, several important findings emerged (Table 6). At baseline (pre-test), there were no statistically significant differences among the three groups for hemoglobin levels (p=0.263), weight gain (p=0.130), and nausea and vomiting (p=0.240). This indicates that the groups were relatively homogeneous at the start of the study for most variables. However, a notable exception was anxiety levels, which showed significant differences among groups at baseline (p=0.005), suggesting that the groups were not entirely balanced in terms of initial anxiety.

Following the intervention, significant changes began to emerge. At post-test 1 (week 2), although hemoglobin levels (p=0.089) and weight gain (p=0.952) still showed no significant differences among groups, anxiety (p=0.015) and nausea and vomiting (p=0.000) exhibited significant intergroup differences. This suggests that the PROMAMA intervention started to produce differential effects across groups in reducing anxiety and nausea/vomiting at the early stage. The effectiveness of the intervention became more evident at post-test 2 (week 4). At this stage, strong significant differences among groups were found for hemoglobin levels (p=0.000), anxiety (p=0.000), and nausea and vomiting (p=0.000).

This indicates that after four weeks of intervention, there were clear and distinct impacts on improving hemoglobin levels, reducing anxiety, and alleviating nausea and vomiting across the control, standard, and intensive groups. However, for weight gain at Post-test 2 (p=0.613), no significant differences were observed among groups. Overall, the One-Way ANOVA results confirm that the PROMAMA intervention, particularly with greater intensity, produced significant and distinct effects on several health indicators, including hemoglobin levels, anxiety, and nausea/vomiting, despite baseline imbalances in anxiety levels. The ANCOVA analysis (Table 7) demonstrated that the PROMAMA intervention exerted varying levels of effectiveness across the measured variables in first-trimester pregnant women. For hemoglobin (Hb), no significant differences were observed among the three groups (control, standard, intensive) at post-test 1 ($p = 0.277$), indicating that at week 2 the intervention had not yet produced a clear effect on Hb levels. By post-test 2 (end of week 4), however, highly significant differences emerged ($p < .001$). Pairwise comparisons revealed that the Intensive group had significantly higher Hb levels than the control group, the standard group had lower hb levels than the control group, and the intensive group outperformed the standard group. These findings indicate that PROMAMA, particularly with intensive frequency, was effective in improving hemoglobin levels after 4 weeks.

For Body Weight (BW), results consistently showed no significant differences among the groups at either Post-test 1 ($p = .955$) or Post-test 2 ($p = .361$). This suggests that PROMAMA intervention, whether at standard or intensive frequency, did not directly influence maternal weight gain within the 4-week study duration. For anxiety, significant intergroup differences were found at both post-test 1 ($p = .005$) and post-test 2 ($p < .001$). At post-test 1, the standard and intensive groups exhibited significantly lower anxiety levels compared to the control group. At post-test 2, the effect was more pronounced, with the intensive group showing the greatest reduction in anxiety compared not only to the control but also to the standard group. For nausea and vomiting (PUQE), PROMAMA demonstrated a strong and consistent effect. Significant differences were found at both post-test 1 and post-test 2 ($p < .001$). Specifically, the intensive group showed markedly lower nausea and vomiting scores—indicating milder symptoms—compared to both control and standard groups at both time points. By post-test 2, the standard group also showed improvement relative to the control group, although less than the intensive group.

4. Discussion

The findings of this study indicate that PROMAMA, a multimodal complementary intervention combining acupressure, moxibustion, and aromatherapy, provides clinically meaningful benefits in managing nausea and vomiting, reducing anxiety, and improving hemoglobin levels during the first trimester of pregnancy. Notably, the Intensive intervention group consistently exhibited greater improvements, suggesting that intervention frequency plays a critical role in optimizing therapeutic outcomes.

Respondent characteristics showed that the majority were aged 21–35 years with normal nutritional status. This age range is recognized as a healthy reproductive period with relatively low risk of pregnancy complications.[11,12,13] Normal nutritional status facilitates hormonal adaptation, while obesity or malnutrition are associated with risks of hyperemesis gravidarum and adverse fetal outcomes.[1,8] Interestingly, even obese respondents demonstrated positive responses to the intervention, indicating that PROMAMA's benefits extend across BMI categories.

At baseline, most participants reported mild to moderate anxiety levels. Following the intervention, the intensive group exhibited the most significant reduction, with more than 60% of respondents reporting no anxiety at the second post-test. This aligns with studies reporting that lemon and lavender aromatherapy reduce anxiety by stimulating the limbic system, which triggers the

release of relaxation-related neurotransmitters.[14,15] Lavender enhances GABA levels in the brain,[16,17] while lemon exerts a mood-elevating effect through its limonene content.[18,19] Such relaxation indirectly mitigates nausea and vomiting, as anxiety is known to exacerbate symptoms of emesis gravidarum.[19,20]

Before the intervention, nausea and vomiting symptoms were predominantly moderate (62.5%). After the intervention, the intensive group showed the most marked improvement, with nearly half of respondents reporting no nausea or vomiting. Comparative analysis revealed highly significant differences between the control and intensive groups ($t = -5.647$; $p < 0.001$). Physiologically, this can be explained by P6 and ST36 acupressure, which stimulates the median nerve and suppresses the vomiting center in the medulla oblongata.[10,19,21] Moxibustion P6 and ST36 has also been shown to reduce nausea and vomiting by modulating autonomic nervous system function.[22,23] Ginger aromatherapy significantly reduced nausea/vomiting,[4] while ginger was more dominant in alleviating anxiety. The combined therapies produced synergistic effects, consistent with the theory that multimodal interventions are more effective than single modalities.[24]

Weight gain did not show significant differences among groups within four weeks, although a trend of improvement was noted in the intensive group. This is understandable since measurable weight changes typically require a longer period. Conversely, hemoglobin levels increased significantly in the intensive group, with an estimated marginal mean of 3.88 at the second post-test compared to 3.52 in the control group and 2.85 in the standard group (ANCOVA $p < 0.001$). The intensive group showed significant improvement in hemoglobin levels, while the standard group exhibited a decline at post-test 2, suggesting that higher intervention frequency was necessary to achieve hematological improvement. The American College of Obstetricians and Gynecologists (ACOG) has also emphasized that improved dietary intake due to reduced nausea is associated with increased hemoglobin levels.[24]

Ginger aromatherapy was a key component of this study. Ginger contains gingerols and shogaols, which exert anti-serotonergic effects, accelerate gastric emptying, and suppress the vomiting center in the brain, a study in Bali reported that inhaled ginger aromatherapy reduced PUQE scores from 7.5 to 3.5 ($p=0.010$).[4] This finding supports the present results, highlighting ginger as the most influential agent in reducing nausea and vomiting. Comparatively, lemon was more effective in enhancing psychological freshness,[25] lavender in alleviating anxiety, and ginger in specifically addressing nausea and vomiting.[26] Peppermint has also been reported effective due to its menthol content,[26] and a lemon–peppermint combination showed significant effects ($p=0.001$).[26] Thus, combining ginger with other aromatherapies may further enhance clinical efficacy.

Group comparisons consistently demonstrated the dominance of the intensive group. The control group, which received standard antenatal education, showed minimal improvement. The standard group, which received PROMAMA three times per week, showed moderate improvements, particularly in anxiety and nausea/vomiting, though hemoglobin changes were not significant. The intensive group, with higher frequency exposure, yielded the most substantial results across all three primary variables: reduced nausea/vomiting, decreased anxiety, and increased hemoglobin levels. The statistically significant differences between the intensive group and both the control and standard groups confirm the importance of intervention frequency. This finding aligns with the dose–response theory, which states that more frequent exposure produces greater effects.[6,20,21]

The implications of this study are important for antenatal care policies in Indonesia. Currently, management of nausea and vomiting is limited to counseling and antiemetic medications for severe symptoms. ACOG recommends non-pharmacological approaches as the first line of treatment.[8] Given that ginger is an affordable and culturally accepted local resource, integrating PROMAMA into antenatal care standards could enhance maternal comfort while reducing risks of complications.[27] Midwives, as primary health providers, play a crucial role in educating pregnant women on the use of ginger, lemon, and lavender aromatherapy, as well as acupressure techniques that can be applied independently at home.

The study findings confirm that PROMAMA, combining P6 acupressure, ST36 moxibustion, and ginger aromatherapy, significantly reduced nausea/vomiting, alleviated anxiety, and increased hemoglobin levels among first-trimester pregnant women. Significant differences were observed among the control, standard, and intensive groups, with the intensive group consistently yielding the most prominent results. These findings support the evidence that a multimodal, non-pharmacological approach provides broader clinical benefits than single interventions.[6]

The majority of respondents were aged 21–35 years with normal nutritional status, representing a healthy reproductive group with relatively low risks of complications. Normal nutritional status facilitates adaptation to hormonal changes during pregnancy, while malnutrition and obesity are linked to hyperemesis gravidarum and adverse fetal outcomes.[28,29]

Nausea and vomiting of pregnancy (NVP) affect

approximately 50–90% of pregnant women, with 14% progressing to hyperemesis gravidarum (HG), a more severe condition. Data from Tuban revealed that nearly half of first-trimester pregnant women experienced severe nausea and vomiting, a condition that, if left untreated, may lead to serious complications such as dehydration, electrolyte imbalance, anemia, and impaired fetal growth. At the biomolecular level, NVP is influenced by elevated hCG levels, stimulating the chemoreceptor trigger zone (CTZ) in the brainstem area postrema, along with increased estrogen that enhances serotonin (5-HT3) receptor sensitivity at the vomiting center. Progesterone contributes by reducing gastric motility, thereby delaying gastric emptying. Recent research also indicates that placental factors such as Growth Differentiation Factor-15 (GDF15), binding to GFRAL receptors in the brainstem, may trigger anorexia and nausea. This combination of hormonal, neural, and molecular factors explains why some women are more susceptible to severe symptoms.[19,27,28]

Acupressure at P6 (Neiguan) has been shown to suppress nausea and vomiting symptoms through neuroendocrine mechanisms. Stimulation of the median nerve, transmitted to the nucleus tractus solitarius and vomiting center in the medulla, increases the release of β-endorphins, serotonin, and ACTH, which directly inhibit CTZ activity. Acupressure also modulates vagal nerve activity, reducing gastrointestinal afferent impulses that trigger vomiting. This makes acupressure a safe, effective, and side-effect-free intervention that can be widely applied in pregnancy.[3,10,11]

Moxibustion at ST36 (Zusanli) exerts neuroimmunological and autonomic effects. The heat generated activates TRPV1 receptors, stimulates nitric oxide release, improves local blood circulation, and enhances parasympathetic activity. These mechanisms contribute to regulating gastrointestinal motility, reducing gastric hypersecretion, and restoring autonomic balance. Additionally, ST36 stimulation is known to have immunomodulatory effects, supporting maternal immune defense during pregnancy. Ginger aromatherapy was central to this intervention. The active compounds gingerol and shogaol act as antagonists of serotonin (5-HT3) receptors in the gastrointestinal tract and CTZ. This blockade reduces nausea impulses transmitted to the vomiting center in the brainstem. Ginger also accelerates gastric emptying by enhancing gastrointestinal motility through acetylcholine stimulation in the myenteric plexus. Clinical studies corroborate these findings, with inhaled ginger aromatherapy significantly reducing PUQE scores among pregnant women with nausea and vomiting. This strengthens the evidence for ginger's specific effectiveness in mitigating NVP.[19,21]

Improvements in nausea/vomiting and anxiety directly enhance maternal nutritional intake, which in turn improves haemoglobin (HG) levels. HG is frequently associated with malnutrition and anemia due to iron and B-complex vitamin deficiencies. Improved nutritional intake helps reduce anemia risk, consistent with ACOG's emphasis on the strong association between nutritional status and hemoglobin levels in pregnancy.[27] Elevated hemoglobin is critical, as anemia is linked to increased risks of low birth weight, preterm labor, and childhood stunting.[17,18] Compared with pharmacological therapies such as ondansetron, non-pharmacological interventions are safer. Although ondansetron effectively alleviates symptoms, some studies have reported increased risks of congenital defects such as cleft palate and renal abnormalities. This makes non-pharmacological approaches like PROMAMA more feasible, given their safety and applicability in midwifery practice. The greater effectiveness of PROMAMA in the intensive group demonstrates the synergistic effects of combined interventions. P6 acupressure modulates neurotransmitters to suppress the vomiting center, ST36 moxibustion restores autonomic balance, and ginger aromatherapy blocks 5-HT3 receptors while accelerating gastric emptying. Together, these mechanisms produce stronger multimodal effects compared to single therapies.[28,30,31]

In conclusion, PROMAMA is clinically and biologically effective in reducing nausea/vomiting, alleviating anxiety, and increasing hemoglobin levels among first-trimester pregnant women. Its mechanisms involve neurotransmitter modulation (serotonin, acetylcholine, endorphins), autonomic regulation, and improved nutritional intake.[21] This multimodal, non-pharmacological approach is safe, effective, and practical, making it a promising recommendation in midwifery practice to improve maternal quality of life and prevent long-term complications.[2]

The study's limitations include the relatively short intervention period, which limited the ability to observe long-term effects on weight gain. External factors such as family support and dietary habits were not fully controlled. Additionally, the sample's homogeneity (predominantly reproductive-age housewives) may limit generalizability. However, the study's strengths lie in its experimental design with rigorous controls, balanced group allocation, and multivariate analyses (ANCOVA and repeated measures) accounting for baseline differences. Future studies are recommended to include longer durations, more heterogeneous samples, and evaluation of neonatal outcomes, including birth weight and stunting risk.

5. Conclusion

The PROMAMA intervention was proven effective in reducing nausea and vomiting, alleviating anxiety, and improving hemoglobin levels among first-trimester pregnant women. The intensive group yielded the most dominant results compared to the standard and control groups, indicating that intervention frequency plays a crucial role in its effectiveness. Ginger aromatherapy contributed primarily to reducing nausea and vomiting, while lemon and lavender were more influential in decreasing anxiety. Although weight gain was not statistically significant within four weeks, an improvement trend was observed in the intensive group. This intervention is safe, affordable, easy to apply, and consistent with local wisdom, making it feasible to be integrated into antenatal care services as a non-pharmacological alternative to enhance maternal health.

6. Author Contribution

Principal Researcher N.M.H. held full responsibility for the entire project, ranging from methodological design to the dissemination of results. Importantly, she served as the primary implementer of the PROMAMA intervention based on certified competencies (Mom Treatment & Complementary Practitioner), while also leading data analysis and the preparation of major outputs (articles, books, and intellectual property). Her role was supported by Research Member 1, T.Y.D**,** who acted as Operations and Finance Manager, responsible for budget management according to the approved plan, ethical and field permits, as well as coordination of all logistics and external communications. Research Member 2, N.C.**,** was responsible for academic content and manuscript development, focusing on conducting an in-depth literature review to strengthen the theoretical foundation and serving as the lead editor for publication manuscripts to ensure compliance with scientific standards and journal guidelines. Student Research Assistant 1, G.A.A.M.**,** provided support in technical fieldwork and administrative tasks, such as respondent recruitment, accurate documentation, and data entry. Student Research Assistant 2, T.N.**,** assisted in the preparation of educational materials, daily logistics, and report editing. This organizational structure ensured a clear division of tasks for effective and efficient research implementation, from planning to dissemination.

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