Indonesian Journal of Global Health Research
Volume 8 Number 6, December 2026
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

EFFECTIVENESS OF MARC IN REDUCING STRESS AND ANXIETY IN PREGNANT WOMEN IN THE THIRD TRIMESTER

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ABSTRACT
The third trimester of pregnancy is a period that can increase stress and anxiety due to physical changes, pregnancy discomfort, and concerns about childbirth and the baby's condition. Safe and easy-to-implement non-pharmacological interventions are needed, one of which is MARC (Massage aromatherapy combination of Rosa oil and Cajapaut oil typical of Merauke). This study aims to determine the effectiveness of MARC in reducing stress and anxiety levels in pregnant women in the third trimester in Merauke Regency. The study used a randomized controlled trial design.This study used a quasi-experimental approach using a pretest-posttest control group design. The sampling technique used in this study was purposive sampling, a non-probability sampling method in which participants were selected based on predetermined inclusion criteria. Respondents were 34 pregnant women in their third trimester who met the research criteria. Stress and anxiety levels were measured before and after the intervention using the DASS-21 instrument. The DASS-21 instrument has demonstrated good construct validity and reliability in previous Indonesian research, with Cronbach's alpha coefficients of 0.84 for both the stress and anxiety subscales. Analysis was conducted to determine differences in stress and anxiety levels before and after MARC administration. The results showed that there were significant differences in stress levels (p value 0.003) and anxiety levels (p value 0.000) before and after MARC administration. The decrease in scores after the intervention indicated that MARC was effective in helping reduce stress and anxiety levels in pregnant women in their third trimester. MARC is effective in reducing stress and anxiety levels in pregnant women in their third trimester. MARC can be an alternative non-pharmacological intervention that supports maternal relaxation and comfort before labor.

Keywords: anxiety; MARC; pregnant women; stress; third trimester

How to cite (in APA style)
Ekawati, E. A., Tambaip, T., Hastuti, T., Suryaningsih, D., Putri, H. A., Supriyatin, S., & Pratami, Y. R. (2026). Effectiveness of Marc in Reducing Stress and Anxiety in Pregnant Women in the Third Trimester. *Indonesian Journal of Global Health Research*, *8*(6), 1073–1082. https://doi.org/10.37287/ijghr.v8i6.2644.

INTRODUCTION

During the third trimester of pregnancy, pregnant women experience various physical and psychological discomforts which can increase stress and anxiety levels.(Febriana & Zuhana, 2021). Based on data from the World Health Organization (WHO) in 2020, it was reported that around 8-10% of pregnant women experience anxiety during pregnancy, which increases to 12% approaching delivery in the third trimester.(R & Yuliastanti, 2020). Furthermore, based on the results of psychosocial research in several countries, it shows that 43.82% of pregnant women in the third trimester experience moderate to severe psychosocial stress, an increase compared to the previous trimester, due to concerns about the delivery process and the condition of the fetus.(Salsa Putri Kusumah & Setiawan, 2025).

In Indonesia, the prevalence of pregnancy anxiety reaches 28.7%, with a significant increase in the third trimester. Furthermore, basic health research data shows that the prevalence of depression and anxiety reaches 20% in the second and third trimesters, with psychological distress persisting into postpartum.(Nuswantoro et al., 2024). Based on the results of a 2025 study in South Papua, particularly in Merauke Regency, the prevalence of anxiety in pregnant women reached around

62.8% in the third trimester, with mild anxiety levels at 26%, moderate at 62%, and severe at 12%.(Suhartatik et al., 2025).

Stress and anxiety experienced by pregnant women in the third trimester is a common psychological problem but can have serious impacts on the health of the mother and fetus if not handled properly.(Simanjuntak et al., 2025). Research shows that anxiety before labor often increases sharply due to concerns about the birth process and the safety of the baby, which can trigger physiological responses such as increased stress hormones (cortisol hormone) that affect uterine blood flow and oxygen supply to the fetus, thereby increasing the risk of premature birth, low birth weight, and other obstetric complications such as maternal neonatal morbidity and mortality.(Dadi et al., 2025).

In addition to the threats to the mother and fetus' pregnancy, other research findings suggest that stress and anxiety in pregnant women in the third trimester can have a negative impact even after the mother gives birth, which can threaten the mental health and safety of the baby.(Widia Lilis Nur Indah Sari, Sholaikhah Sulistyoningtyas, 2025)Despite the high prevalence of complications from stress and anxiety in pregnant women, specific and effective interventions are still limited. Pregnant women often underestimate their psychological disorders and leave them untreated.(Dewi et al., 2025).

The lack of knowledge of mothers regarding the importance of maintaining mental health during pregnancy and mothers' concerns about the negative stigma that arises in society regarding the treatment of mental disorders are some of the reasons why pregnant women underestimate the stress and anxiety they experience.(Thi et al., 2024). In addition, some mothers said they were afraid of paying high prices for mental health services such as consultations with psychologists or psychiatrists.(Wurisastuti et al., 2025).

METHOD

This research is a quantitative research with a quasi-experimental design through a pretest-posttest control group design approach. The experimental group was given treatment in the form of the MARC method, while the control group was given massage using Coconut Oil. The research was conducted at the Sota Community Health Center, Merauke Regency, which will be implemented for 3 months, conducted from June 10, 2026 to August 20, 2026. The population in this study were all third-trimester pregnant women registered at the Sota Community Health Center, Merauke Regency during the research period. Samples were taken using a purposive sampling technique with inclusion criteria, namely third-trimester pregnant women who were willing to participate in the research, experiencing mild, moderate, and severe levels of stress and anxiety. Samples in the experimental group and the control group were 17 respondents each, resulting in a total of 34 respondents. The DASS-21 instrument has demonstrated good construct validity and reliability in previous Indonesian research, with Cronbach’s alpha coefficients of 0.84 for both the stress and anxiety subscales (Arjanto, 2022).

The MARC method is a method of administering drugs through the topical where there is a mixture of two oils, namely cajaput and rossa oil. Before applying through massage, it is necessary to evaluate the preparation. This study uses the DASS-21 measurement scale which is valid and reliable so that researchers do not need to conduct validity and reliability tests. This study has received approval from the ethics committee through the Bioethics Commission of the Health Polytechnic of the Ministry of Health Jakarta 1 with letter number: 092 / KEPK-PKJI / VI / 2026. The collected data will be analyzed using SPSS statistical software. Data analysis includes the homogeneity of variance test, data normality test (Kolmogorov Smirnov), Wilcoxon Signed Ranks Test and Paired Samples Test.

RESULT

Table 1.
Respondent Characteristics (n= 34)

Respondent Characteristics	Intervention Group (n=17)		Control Group (n=17)		P Value
	f	%	f	%	
Age					
<20 Years	3	17.6	4	23.5	0.485
20-35 Years	12	70.6	10	58.8	
>35 Years	2	11.8	3	17.6	
Education					
No school	1	5.9	0	0.0	0.857
Elementary School	2	11.8	4	23.5	
JUNIOR HIGH SCHOOL	5	29.4	5	29.4	
SENIOR HIGH SCHOOL	9	52.9	8	47.1	
Work					
housewife	13	76.5	14	82.4	0.413
Businessman	4	23.5	3	17.6	
Ethnic group					
OAP	11	64.7	10	58.8	0.508
Non-Indonesian Indigenous People	6	35.3	7	41.2	
Income					
<UMR	13	76.5	13	76.5	1,000
≥Minimum Wage	4	23.5	4	23.5	

P Value = Chi Square Test

Based on table 1, the characteristics of respondents were found that in the intervention group, most of the respondents were aged 20-35 years, namely 12 respondents (70.6%), most of the respondents had a high school education, namely 9 respondents (52.9%), most of the respondents were housewives, namely 13 respondents (76.5%), most of the respondents came from the OAP (Indigenous Papuans) tribe, namely 11 respondents (64.7%), and most of the respondents had income <UMR, namely 13 respondents (76.5%). In the control group, most of the respondents were aged 20-35 years, namely 10 respondents (58.8%), most of the respondents had a high school education, namely 8 respondents (47.1%), most of the respondents were housewives, namely 14 respondents (82.4%), most of the respondents came from the OAP tribe, namely 10 respondents (58.8%), and most of the respondents had income <UMR, namely 13 respondents (76.5%). Based on the results of the homogeneity test using Levene's Test, all variables have a significance value greater than 0.05. The age variable has a significance value of 0.485, education 0.857, occupation 0.413, ethnicity 0.508, and income 1.000. Thus, it can be concluded that all variables have homogeneous variance between the two groups because the significance value of each variable is > 0.05.

Table 2.
Stress and Anxiety Levels Pre-Test and Post-Test (Intervention Group and Control Group)

Treatment	Category	Intervention Group (n=17)		Control Group (n=17)	
		f	%	f	%
Stress Pre-Test	Light	12	70.6	11	64.7
	Normal	5	29.4	6	35.3
Stress Post Test	Light	3	17.6	9	52.9
	Normal	14	82.4	8	47.1
Pre-Test Anxiety	Very Serious	4	23.5	1	5.9
	Heavy	0	0.0	0	0.0
	Currently	10	58.8	9	52.9
	Light	3	17.6	7	41.2
	Normal	0	0.0	0	0.0
Post-Test Anxiety	Very Serious	0	0.0	0	0.0
	Heavy	0	0.0	1	5.9
	Currently	5	29.4	7	41.2
	Light	9	52.9	8	47.1
	Normal	3	17.6	1	5.9

Based on table 2, it was found that the stress level in the pre-test intervention group was that most respondents experienced stress in the mild category, namely 12 respondents (70.6%) and a small number of respondents experienced stress in the normal category, namely 5 respondents (29.4%). After the post-test, it was found that in the intervention group, most respondents experienced stress in the normal category, namely 14 respondents (82.4%) and a small number of respondents experienced stress in the mild category, namely 3 respondents (17.6%). In the pre-test control group, most respondents experienced stress in the mild category, namely 11 respondents (64.7%) and a small number of respondents experienced stress in the normal category, namely 6 respondents (35.3%). After the post-test, it was found that in the control group, most respondents experienced stress in the mild category, namely 9 respondents (52.9%) and a small number of respondents experienced stress in the normal category, namely 8 respondents (47.4%). The anxiety level in the pre-test intervention group was that most respondents experienced anxiety in the moderate category, namely 10 respondents (58.8%) and a small number of respondents experienced anxiety in the mild category, namely 3 respondents (17.6%). After the post-test was conducted, it was found that in the intervention group, most respondents experienced anxiety in the mild category, namely 9 respondents (52.9%) and a small number of respondents experienced anxiety in the normal category, namely 3 respondents (17.5%). In the pre-test control group, most respondents experienced anxiety in the moderate category, namely 9 respondents (52.9%) and a small number of respondents experienced anxiety in the very severe category, namely 1 respondent (5.9%). After the post-test was conducted, it was found that in the control group, most respondents experienced anxiety in the mild category, namely 8 respondents (47.1%) and a small number of respondents experienced anxiety in the severe and normal categories, namely 1 respondent (5.9%) each.

Table 3.
Normality Test of Stress and Anxiety Levels of the Intervention Group and the Control Group Based on Measurement Time

Variables	Group	Measurement Time	P Value	Information
Stress	Intervention	Pre-Test	0,000	Abnormal
		Post Test	0,000	Abnormal
	Control	Pre-Test	0,000	Abnormal
		Post Test	0,000	Abnormal
Anxiety	Intervention	Pre-Test	0,000	Abnormal
		Post Test	0.003	Abnormal
	Control	Pre-Test	0,000	Abnormal
		Post Test	0.010	Abnormal

P Value = Kolmogorov Smirnov

Based on the results of the Shapiro-Wilk normality test in Table 3, all stress and anxiety variables in both the control and intervention groups had significance values <0.05. Therefore, it can be concluded that the stress and anxiety data in both groups were not normally distributed.

Table 4.
Analysis of Differences in Stress and Anxiety Levels between Pre-Test and Post-Test

Variables	Ranks	N	Mean Rank	Sum of Rank	Z	P Value
Stress						
Post Test	Negative Ranks	2	8.00	16.00	-2,840	0.005
Pre-Test	Positive Ranks	13	8.00	104.00		
	Ties	19				
	Total	34				
Anxiety						
Post Test	Negative Ranks	5	12.50	62.50	-3,605	0,000
Pre-Test	Positive Ranks	24	15.52	372.50		
	Ties	5				
	Total	34				

P Value = Wilcoxon Signed Ranks Test

Based on the results of the Wilcoxon Signed Ranks Test in Table 4, the Z-value for the stress variable is -2.840 with a significance value of 0.005. For the anxiety variable, the Z-value is -3.605

with a significance value of 0.000. Since all significance values are <0.05, it can be concluded that there is a significant difference in stress and anxiety levels between the two measurements.

Table 5.
Analysis of the Effectiveness of MARC in Reducing Stress and Anxiety Levels

Variables	Mean	Standard Deviation	Std. Error Mean	95% CI of the Difference		t	df	P Value
				Lower	Upper			
Stress	-0.324	0.589	0.101	-0.529	-0.118	-3,204	33	0.003
Anxiety	-0.706	0.906	0.155	-1,022	-0.390	-4,545	33	0,000

P Value = Paired Samples Test

Based on table 5, the results of the Paired Samples Test analysis show that for the stress variable, the t value is -3.204, df = 33, and p value = 0.003. Because the significance value is <0.05, there is a significant difference between the stress scores before and after the intervention. The mean value of -0.324 indicates a change in the average stress score of 0.324 points. For the anxiety variable, the t value is -4.545, df = 33, and p value = 0.000. These results indicate a significant difference between the anxiety scores before and after the intervention. The mean value of -0.706 indicates a change in the average anxiety score of 0.706 points. Based on these test results, the stress and anxiety variables show a significant difference between before and after the intervention. Thus, statistically there is evidence that the intervention provides significant changes to the stress and anxiety levels of respondents.

DISCUSSION

Based on the research results in Table 1, it was found that the majority of respondents in the intervention and control groups were aged 20-35 years, the majority had a high school education, the majority were unemployed or housewives, and the majority had an income <UMR. The results of this study are in line with research conducted by Mariana (2020) which showed that the majority of respondents were in the low-risk age group, namely 67.3%.(Marina, 2020)Similar research by Linda and Pangestika (2023) showed that the majority of respondents were in the primary education group, namely 21 people (84%), and the majority of respondents were employed, namely 15 people (45.4%).(Linda Juwita & Pangestika, 2023)The results of this study are also in line with research conducted by Velga Yazia (2022) which shows that economic status/income level needs to be understood as part of the mother's social environment which can have an indirect influence on the mother's ability to face various demands during pregnancy.(Velga Yazia, 2022).

Researchers believe that respondent characteristics based on age, education, occupation, and income can influence the psychological well-being of pregnant women in the third trimester, but are not the sole determinants of stress and anxiety. Mothers aged 20–35 years and with a high school education generally have adequate adaptability and health literacy, but can still experience stress and anxiety due to concerns about childbirth and the baby's condition. Meanwhile, both housewives and working mothers have their own demands, and low income can be a factor that adds to anxiety. Therefore, the MARC intervention remains relevant to help improve the relaxation and psychological well-being of pregnant women in the third trimester.

Based on the research results in Table 2, several changes were found, namely a decrease in the frequency of stress and anxiety in the intervention group, while in the control group, although there was a change in the frequency of stress and anxiety, it was not that high.

The results of this study align with research conducted by Mesirngsih (2024), which also provides an overview of stress levels in pregnant women. The study, conducted on 37 pregnant women in their second and third trimesters in the Lemo Community Health Center, North Barito Regency, found that 70.3% of respondents experienced mild stress. These findings indicate that although most respondents experienced mild stress, stress remains a psychological condition that requires attention during pregnancy because it can be related to maternal health conditions.(Yunaningsih et al., 2024).

Similar research by Amalia Hanifa (2022) found that the group of pregnant women who received hypnoprenatal massage experienced a greater decrease in mental health scores than the control group. These findings suggest that massage-based interventions can benefit the psychological well-being of pregnant women in the third trimester.(Amalia Hanifa et al., 2022)This supports the distribution of MARC research results after the intervention because one of the expected mechanisms of massage is the creation of a state of relaxation so that mothers can reduce the tension and stress experienced during pregnancy.

Theoretically, anxiety in pregnant women in the third trimester can be understood as an emotional response to situations perceived as threatening or uncertain. As labor approaches, mothers begin to focus on the birth process, potential pain, the baby's safety, potential complications, and life changes after birth. The presence of anxiety in respondents can be understood as part of the mother's psychological response to the various demands and uncertainties that arise before labor.(Anggorodiputro et al., 2023).

Interventions that provide relaxation can help improve the psychological well-being of pregnant women. Massage and aromatherapy are aimed at creating a state of relaxation so that mothers can feel calmer after receiving the intervention. Interventions that provide relaxation can be a complementary approach to helping pregnant women manage their psychological well-being.(Aprilia, 2025). Aromatherapy components can also theoretically stimulate the sense of smell, which is associated with emotional responses and mood. A pleasant aroma can help create a comfortable atmosphere, thus supporting the relaxation process. Aromatherapy is a complementary therapy that can be used to help reduce anxiety in pregnant women in the third trimester. Aromatherapy can be a component of relaxation interventions.(Susilawati et al., 2024). Thus, the use of Rosa oil and Cajapaut oil in MARC has a basis as a complementary approach.

Researchers believe that the stress and anxiety levels before the intervention indicate a need for MARC intervention in third-trimester pregnant women. MARC, which combines massage with aromatherapy using Rosa oil and Cajapaut oil, a specialty of Merauke, can provide a relaxing effect through physical and sensory stimulation, thereby helping to reduce tension and provide a sense of comfort. The shift in stress and anxiety levels to a lower category after the intervention descriptively indicates an improvement in the respondents' psychological condition and supports the use of MARC as a complementary, non-pharmacological approach to help manage stress and anxiety in third-trimester pregnant women.

Based on the research results in table 4, it was found thatthat there is a significant difference in stress and anxiety levels between the two measurements (pre-test and post-test). This research aligns with Komang's (2021) study, which showed a link between pregnancy massage and the psychological state of pregnant women, including stress. Massage during pregnancy can be a method that provides mothers with the opportunity to rest, achieve physical comfort, and experience relaxation. Therefore, the reduction in stress scores can be understood as a result of the combined effects of therapeutic touch through massage and the relaxation experience provided during the intervention.(L. Komang S. Santi et al., 2021). Similar research by Liya and Kintan (2023) showed a decrease in the median level of anxiety after being given endorphin massage of 8.17, which means that endorphin massage has an effect on reducing anxiety in pregnant women in the third trimester.(Liya Lugita Sari & Kintan Anissa, 2023)These results support the MARC research because the main component of MARC, massage, also provides tactile stimulation that can create a sense of comfort and relaxation for mothers approaching labor.

In stress and relaxation theory, stress arises when an individual perceives demands that exceed their adaptive capacity. In the third trimester of pregnancy, these demands can stem from physical changes, bodily discomfort, anxiety about childbirth, changes in the mother's role, and concerns

about the fetus's condition. Interventions can help break this cycle of tension through a combination of massage and aromatherapy stimulation. Massage provides a physical relaxation experience, while the aromas received through the olfactory system can provide calming emotional stimulation. Thus, it can help enhance the relaxation response, thereby lowering the perception of stress. This theoretical basis aligns with research findings on relaxation massage and aromatherapy in pregnancy, which demonstrate benefits for stress and anxiety.(Vidal-García et al., 2024). Pregnancy massage is one approach that can be used to help overcome psychological problems during pregnancy. Changes in anxiety subscale scores before and after intervention can be used to describe changes in anxiety symptoms felt by pregnant women(LKS Santi et al., 2021).

Researchers believe that the significant differences in stress and anxiety levels between the pretest and posttest indicate that MARC administration resulted in changes in the psychological state of pregnant women in their third trimester. These changes are thought to occur because the combination of massage and aromatherapy with Rosa oil and Cajapaut oil, a specialty of Merauke, provides a relaxing effect, reduces physical tension, and increases feelings of comfort, thus helping to reduce stress and anxiety. Therefore, MARC has the potential to be a complementary non-pharmacological intervention to help manage stress and anxiety in pregnant women in their third trimester.

Based on the research results in table 5, it can be seen that the MARC method is effective in reducing stress levels with a p value of 0.003 and is also effective in reducing anxiety in pregnant women in the third trimester with a p value of 0.000. The results of this study are supported by an international study conducted by Hall (2021) on maternal mental health and partner-delivered massage. The study used the DASS-21 to measure symptoms of depression, anxiety, and stress in pregnant women. The results showed that scores on all DASS-21 subscales decreased over time in both the massage group and the self-management group. These findings support the possibility that massage and relaxation activities can help reduce stress symptoms during pregnancy.(Hall, H., Munk, N., Carr, B., 2021). In addition to massage, MARC's effectiveness can also be explained through its aromatherapy component.

A similar study by Wang (2025) found that aromatherapy overall resulted in a significant reduction in anxiety, with a p-value of 0.002. These results support the finding that aromatherapy components can contribute to reducing maternal anxiety.(Wang et al., 2025). Theories regarding the effects of aromatherapy on stress suggest that essential oils have the potential to reduce anxiety and explain that aroma stimulation may be linked to neurophysiological mechanisms involving the olfactory system and parts of the brain associated with emotion. Aromatic stimulation can influence a person's emotional state. The combination of aroma stimulation and massage creates a relaxing effect not only from touch but also from olfactory stimulation.(Tan et al., 2023)The effect of massage on anxiety may be linked to the body's neuroendocrine response. Gentle, regular touch can help reduce body tension and support the parasympathetic response associated with rest and relaxation. This is the opposite of the sympathetic response, which typically increases when someone experiences anxiety. Therefore, when pregnant women receive a massage in a comfortable setting, the body's response can shift toward a state of relaxation, thereby reducing the perception of threat or worry. Research on pregnancy massage and maternal mental health also supports the use of massage as a non-pharmacological approach to supporting psychological health during pregnancy.(Mueller & Grunwald, 2021).

Researchers believe that the reduction in stress and anxiety levels after MARC administration occurs because the combination of massage and aromatherapy provides a physical and psychological relaxation effect. Massage helps reduce body tension and provides a sense of comfort, while Rosa oil and Cajapaut oil, typical of Merauke, provide olfactory stimulation that supports emotional calm. This combination helps pregnant women feel more relaxed in the third

trimester, thus reducing stress and anxiety levels. MARC's uniqueness lies in the use of Rosa oil and Cajapaut oil aromatherapy, typical of Merauke, making it a potential non-pharmacological complementary intervention to help manage stress and anxiety in pregnant women.

CONCLUSION

Based on the results of research on the effectiveness of MARC (Massage combination of Rosa oil and Cajapaut oil aromatherapy typical of Merauke) in reducing stress and anxiety levels in pregnant women in the third trimester in Merauke Regency, it can be concluded that there are differences in stress and anxiety levels before and after MARC intervention, so MARC is effective in helping reduce stress and anxiety levels in pregnant women in the third trimester. The combination of massage techniques with Rosa oil and Cajapaut oil aromatherapy provides a relaxation approach that can help create a sense of comfort, reduce tension, and support the psychological condition of mothers during pregnancy. Thus, MARC can be considered as a complementary non-pharmacological intervention in an effort to help reduce stress and anxiety in pregnant women in the third trimester, especially in obstetric services in Merauke Regency.

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