

Manuscript received February 26, 2024; revised March 16, 2024; accepted March 16, 2024; date of publication April 25, 2024

Digital Object Identifier (DOI): <https://doi.org/10.35882/ijahst.v4i2.218>

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How to cite: Jujuk Proboningsih, Endah Suprihatin, Anita Joeliantina, Aida Novita Sari, and Fathimath Shifaza, "Current Study on Antidepressant Activity of Chocolate Drink in Pregnant Woman in Jombang, Indonesia", International Journal of Advanced Health Science and Technology, vol. 4, no. 2, pp. 50–55, April. 2024.

Current Study on Antidepressant Activity of Chocolate Drink in Pregnant Woman in Jombang, Indonesia

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ABSTRACT Pregnancy is a natural and physiological process that occurs in every woman. But often pregnant women experience anxiety and worry during pregnancy, this is a normal thing to happen during pregnancy. Symptoms of anxiety during pregnancy vary including anxiety, worry, and anxiety that are difficult to control, irritability, irritability, difficulty concentrating, body muscles being painful and tense, lack of energy, disturbed sleep patterns, and disturbed rest patterns. Such anxiety can occur during pregnancy in both the I Trimester, II Trimester, and III Trimester. Although anxiety is normal in pregnancy, anxiety symptoms can occur on an ongoing basis if not addressed. The purpose of this study was to analyze the effectiveness of giving chocolate drinks as a complementary therapy to antidepressants in pregnancy. This type of research is quantitative analytics using a Quasi-Experimental research design with one group pre-post test design method using one treatment group. Free variables: Administration of chocolate drinks and bound variables: complementary therapy of antidepressants in pregnancy. The sample in this study was pregnant women who experienced anxiety in pregnancy both mild, moderate, severe, and even panic which matched the inclusion criteria of 124 people. Sampling using purposive sampling techniques. Instrument: HARS (Hamilton Anxiety Rating Scale) and Observation sheet. Data analysis using the Wilcoxon Test. The results showed that the anxiety of pregnant women before being given chocolate drinks was mostly 62.9% experienced mild anxiety, 35.5% experienced moderate anxiety and 1.6% experienced severe anxiety and after being given chocolate drink therapy more than half of the respondents namely 55.6% had no anxiety, 29% had mild anxiety, 15.4% had moderate anxiety and none of the respondents experienced severe anxiety and panic. This study concludes that giving chocolate drinks has activity as an antidepressant in pregnant women. It is hoped that all healthcare providers for pregnant women can recommend complementary therapies with herbal ingredients, especially chocolate as a therapy for reducing anxiety (antidepressants) during pregnancy. So that the benefits of this study can provide a solution for pregnant women who are depressed to use chocolate drinks as an alternative therapy to calm the depressive state.

INDEX TERMS Chocolate, Complementary Therapy, Antidepressants, Pregnancy

I. INTRODUCTION

Pregnancy is a natural and physiological process that occurs in every woman. But often pregnant women experience anxiety and worry during pregnancy, this is a normal thing to happen during pregnancy [1]. Symptoms of anxiety during pregnancy vary including anxiety, worry and anxiety that are difficult to control, irritability, irritability, difficulty concentrating, body muscles painful and tense, lack of energy, disturbed sleep patterns, disturbed rest patterns, feeling worthless, guilty, or failing to be a mother or future

mother [2]. In addition to the anxiety symptoms above, pregnant women can also feel the symptoms of Obsessive Compulsive Disorder (OCD) and panic attacks. Obsessive Compulsive Disorder can make pregnant women think about and perform an action repeatedly[3]. When a panic attack occurs, pregnant women can suddenly have difficulty breathing, feel that they are going crazy, and feel that something bad is happening. Such anxiety can occur during pregnancy in both the I Trimester, II Trimester, and III Trimester [4]. Although anxiety is normal in pregnancy,

anxiety symptoms can occur on an ongoing basis if not addressed. Pregnant women need to recognize the causes and symptoms of anxiety to anticipate and overcome them as early as possible [5].

Based on the results of research on anxiety in pregnancy states that 3-17% of women experience anxiety during their pregnancy. Anxiety disorders in pregnant women in developed countries reach 10% while in developing countries reach 25%, and in Indonesia, the anxiety rate in pregnancy is around 28.7%. The anxiety of pregnant women in early pregnancy was found to be lower when compared to the anxiety of pregnant women facing the delivery process [6].

Anxiety in pregnancy is generally caused by changes in hormone levels in the body. Changes in hormone levels during pregnancy can affect the levels of chemicals in the brain that play a role in regulating feelings. This is what causes pregnant women to be easily anxious, restless, and worried [7]. In addition, several risk factors can trigger anxiety in pregnancy including having a history of anxiety or depression, having a history of the premenstrual dysphoric disorder, having complications, having trauma in previous pregnancies, having conflicts in the household, experiencing traumatic events, being pregnant under the age of 20, being pregnant with twins, not getting social support, having three or more children, abusing drugs and having an unwanted pregnancy [8]. Anxiety in pregnancy if not resolved as soon as possible will have a negative impact on the mother and fetus. The impact on the mother triggers uterine contractions resulting in premature childbirth, miscarriage, and depression. As a result of this condition, it can increase blood pressure so that it can trigger preeclampsia and miscarriage [9]. Anxiety during pregnancy does not have a direct impact on death but anxiety in childbirth has a restless effect, and autonomic nervous activity in responding to unclear threats that individuals feel, thus hindering the delivery process. Anxiety in pregnancy can result in decreased uterine contractions so that childbirth will last longer, increased incidence of uterine atony, bleeding lacerations, infections, maternal fatigue, and shock, while in babies it can increase the risk of premature birth and BBLR [10].

Treatment that can be done for pregnant women who experience anxiety in pregnancy is to vent all the anxiety and worries experienced by the closest people, do meditation, consume healthy food, exercise regularly, and get enough sleep so that the health of pregnant women is maintained and fetal growth and development are more optimal [11]. Internal anxiety can also be overcome by applying self-healing during pregnancy.

Previous research stated that overcoming anxiety in pregnant women can be done with pregnant women's gymnastics, but the implementation of pregnant gymnastics is very limited because it is more advisable in the III trimester [12]. In addition, pharmacological treatment through antidepressant drugs in pregnant women is very difficult to administer because of the difficulty of balancing risks to the fetus and rejection by pregnant women [13].

Along with the development of science and technology that is currently being developed related to complementary therapies in overcoming anxiety in pregnancy, namely by giving chocolate as one of the nonpharmacological therapies that are easy to do and can be applied to pregnant women in the I, II, III trimester [14]. Chocolate has a function as an antidepressant, brown ethanol extract is reported to have a lower FST value in Wistar strains compared to turmeric ethanol extract preparations [15]. The compounds contained in chocolate contain flavonols which are rich in antioxidants and have the ability as relaxants and antidepressants. Indonesia is a country that is reported to have 26 types of brown genotypes with various bioactive compounds. Three of them have the highest flavan-3-ols content [16]. The compound flavan-3-ols has a relationship with the effects of antidepressants, namely by blocking the absorption of monoamine in the brain in a stressful state, besides that chocolate contains phenylethylamine which functions to regulate mood. Another content of chocolate is vitamin D2 which is distributed in the hypothalamus so it affects the control of depression [17]. Bioactive compounds in chocolate are influential on the mechanism of serotonin because it can function as a neuromodulator through effects on MAO and binding to benzodiazepine receptors. The chocolate powder has a serotonin level of 1.25 µg/g higher compared to cereal chocolate of 0.095 µg/g [18]. Based on the background above, researchers are interested in researching the significance of brown phytochemical tests as antidepressants in pregnant women. The purpose of this study was to analyze the effectiveness of giving chocolate drinks as a complementary therapy to antidepressants in pregnant women.

This research has contributed to the health sector as follows : (a) Knowing the activity of chocolate drinks as antidepressants in pregnant women, (b) Providing solutions to antidepressant problems in pregnant women, (c) Provide antidepressant alternatives for pregnant women with nonpharmacological ingredients, (d) Provide antidepressant therapy solutions that are easy and can be applied by all pregnant women in the I, II, and III trimesters.

II. METHOD

A. PHYTOCHEMICAL TEST PROCESS ON CHOCOLATE POWDER

1. TOOLS AND MATERIALS

The tools used in this study were Erlenmeyer, measuring cups, beakers, ovens, drip pipettes, test tubes, volume pipettes, ovens, evaporators, maceration containers, scales, stirring rods, scales, and evaporating cups. Ingredients needed pure brown powder, ethanol 96% and 70%, aqueous, FeCl₃, NaOH 20%, HCl 2N, reagent Dragendorff, Mayer reagent, Na₂S₂O₃ 0.01N, iod 0.01 N.

2. CHOCOLATE EXTRACTION

The chocolate powder used in this study was obtained from the brown village of Blitar. Chocolate powder is soaked with 70% ethanol for 5 days and stirred daily. After soaking, then filtered and then precipitated for 1-2 days. The pure extract obtained is put in a 40°C oven for 2 hours

and then poured into a sealed sterile bottle and stored in the refrigerator until a concentrated extract is obtained.

3. PHYTOCHEMICAL ASSAYS (FLAVONOIDS, TANNINS, ALKALOIDS).

Flavonoid test: a chocolate sample of 1 ml was put into a test tube, then a concentrated HCl of 2 drops was added to homogeneous and then Flavanoid Positive Magnesium powder was added with the presence of orange color and foam appeared. Flavonoid test with KLT (Thin Layer Chromatography) method with the procedure: each ethanol sample extract was inserted on a Thin Layer Chromatography plate of 25 μ L in a Thin Layer Chromatography test with a stationary phase of GF 254 Gel, CHCl₃ motion phase, acetone, formic acid and given stain appearance on a spectrophotometer with UV wavelengths of 366 nm and 254 nm. Alkaloid test: a sample of 0.3 grams of chocolate powder plus 2 ml of 96% ethanol was stirred until dissolved and then added 5 ml of HCl 2N heated on water handling for 2-3 minutes while stirring after cooling plus 0.3 grams of NaCl stirred and filtered, filtrate plus 5 ml of HCl. Filtrate plus concentrated NH₄OH until the solution becomes alkaline, then extracted with 5 ml of water-free chlorophyll in a test tube. The chlorosome phase was taken with a pipette, and tested by the KLT test with a spectrophotometer at wavelengths of 366 nm and 256 nm.

Tannin Test: a sample extract of 1 ml is put into a test tube, then 1% FeCl₃ is added by 2-3 drops. Positive samples contain tannins when they change color to blackish green.

4. CHOCOLATE DRINK MAKING PROCESS

Chocolate powder obtained from Blitar chocolate village. Chocolate drink is made using 100 mg of chocolate powder brewed with 50 ml of warm water and added 2 teaspoons of granulated sugar to reduce the bitter taste of chocolate.

B. RESEARCH PROCEDURE

This type of research is quantitative analytics using a Quasi-Experimental research design with one group pre-post test design method using one treatment group. Before being given an intervention, researchers will identify the respondent's anxiety level, then an intervention is carried out in the form of giving chocolate drinks for 7 days every morning after waking up and an evaluation will be carried out on day 8 by measuring the respondent's anxiety level. The population in this study was all pregnant women who experienced anxiety in pregnancy both mild, moderate, severe, and even panicked in the Midwife Independent Practice in the Jombang Regency area from September to November 2022 which amounted to 215 people. The sample in this study was some pregnant women who experienced anxiety in pregnancy both mild, moderate, severe, and even panic the inclusion criteria totaled 124 people. Sampling uses purposive sampling techniques. The instruments in this study are HARS (Hamilton Anxiety Rating Scale) and an Observation sheet. HARS is a measurement of anxiety based on the appearance of symptoms in individuals experiencing anxiety. The data collection process uses editing, coding, and tabulating. The

data analysis method used in this study is Univariate Analysis using percentages in each variable, Bivariate Analysis to find the effectiveness of giving chocolate drinks as antidepressants in pregnant women. Data was analyzed using SPSS software with Wilcoxon statistical tests on bivariate analysis.

III. RESULT

A. PHYTOCHEMICAL TEST RESULTS ON CHOCOLATE POWDER

Phytochemical test using concentrated extract of brown ethanol. The extraction principle is like dissolve-like, which is a polar solution will dissolve with polar solvents and nonpolar solutions will dissolve in nonpolar compounds, the active compounds in a plant will be easily dissolved or bound by solvents according to their polarity properties. So that polar ethanol solutions will be easier to extract flavonoid compounds in plant tissues. The phytochemical qualitative test aims to determine secondary metabolites so that biological activity is known [19]. Tetrahydro- β -carbolines (TH β Cs) brown isolate compounds have hydroxyl groups and can cause the formation of hydrogen bonds so that they are polar [18]. Chocolate gave a positive result in the tannin test marked by a blackish-green color caused by the FeCl₃ reaction forming a complex compound as presented in figure 1. Tannins are a group of phenols that can be distinguished from other phenols positive results characterized by a change in color to dark green as presented in figure 2. The results of phytochemical tests can be seen in table 1 below:

TABLE 1

Chocolate Seed Extract Phytochemical Screening Results			
Golongan Senyawa	Pereaksi	Hasil	Keterangan
Alkaloid	Pereaksi dragendorf	+	Endapan kuning
Flavanoid	Uap amonia	+	Kuning
Tanin	FeCl ₃	+	Hijau tua

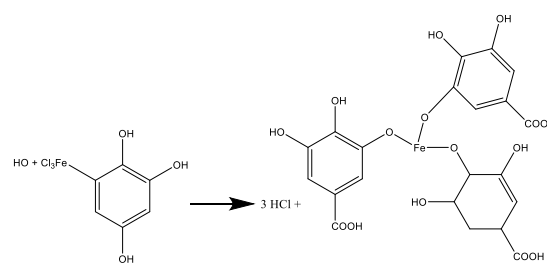


Figure 1 Reaction of Flavanoids with reagents

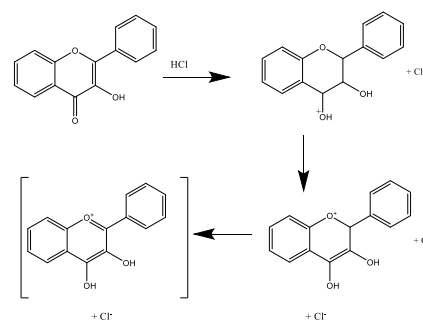


Figure 2 Tannin Reaction with FeCl3

Based on phytochemical tests on chocolate, it can be seen that the active compounds found in chocolate contain flavonoids, tannins, and alkaloids. The active compound has the potential to be an antidepressant.

C. RESULTS OF RESEARCH ON RESPONDENTS

TABLE 2
Frequency distribution characteristics of respondents based on the age

No	Age	f	%
1	<20	13	10,5
2	20 – 30	94	75,8
3	>35	17	13,7
Total		124	100

TABLE 2 shows that the characteristics of respondents based on the age of pregnant women are mostly aged 20-30 years, namely 94 respondents (75.8%).

TABLE 3
Frequency distribution characteristics of respondents based on parity

No	Parity	f	%
1	Primipara	65	52,4
2	Multipara	46	37,1
3	Grande Multipara	13	10,5
Total		124	100

TABLE 3 The characteristics of respondents based on parity in table 3 show that more than half of the respondents were 65 respondents (52.4%).

TABLE 4
Respondents anxiety before being given a chocolate drink

No	Anxiety	f	%
1	Not anxious	0	0
2	Mild Anxiety	78	62,9
3	Moderate anxiety	44	35,5
4	Severe Anxiety	2	1,6
5	Panic	0	0
Total		124	100

TABLE 5
Respondents anxiety after being given a chocolate drink

No	Anxiety	f	%
1	Not anxious	69	55,6
2	Mild Anxiety	36	29
3	Moderate anxiety	19	15,4
4	Severe Anxiety	0	0
5	Panic	0	0
Total		124	100

TABLE 6
Cross-tabulation of the effectiveness of giving chocolate drinks in reducing anxiety (antidepressants) in pregnant women

Giving chocolate drinks	Anxiety										Total	
	Not anxious		Mild anxiety		Moderate anxiety		Severe Anxiety		Panic		f	%
	f	%	f	%	f	%	f	%	f	%		
Before	0	0	78	62,9	44	35,5	2	1,6	0	0	124	100
After	6	55,6	36	29	19	15,4	0	0	0	0	124	100

Uji Wilcoxon : p-value : 0,0001 r : 0,011

TABLE 4 showed that the majority of respondents experienced mild anxiety as many as 78 respondents (62.9%). TABLE 5 showed that more than half of the responses were no longer anxiety, with 69 respondents (55.6%) and none of the respondents experiencing severe anxiety and panic (0%). TABLE 6 Based on table 6 shows that before being given brown drink therapy in pregnant women experience anxiety both mild anxiety, moderate anxiety and severe anxiety. Most of the respondents, 62.9% experienced mild anxiety, 35.5% experienced moderate anxiety and 1.6% experienced severe anxiety but no one experienced anxiety to the stage of panic. Meanwhile, after being given therapy for giving chocolate drinks, the anxiety level of pregnant women experienced a decrease, namely more than half of the respondents, namely 55.6% did not experience anxiety, 29% experienced mild anxiety, 15.4% experienced moderate anxiety and there were already pregnant women who experienced severe anxiety. Based on bivariate analysis using the Wilcoxon test, the effectiveness of giving chocolate drinks as a complementary therapy for antidepressants in pregnant women in the Independent Practice of Midwives in Jombang Regency obtained a p-value: 0.0001 where less than the p value ≤ 0.05 with a correlation coefficient value (r): 0.011 which shows that Ho is rejected which means that giving chocolate drinks is effective as an antidepressant in reducing anxiety in pregnancy.

IV. DISCUSSION

1. ANXIETY LEVEL OF PREGNANT WOMEN BEFORE BEING GIVEN CHOCOLATE DRINKS.

Based on the results of research that has been carried out by researchers, show that the anxiety of pregnant women before being given chocolate drinks is mostly 62.9% experience mild anxiety, 35.5% experience moderate anxiety, and 1.6% experience severe anxiety. Factors that influence the anxiety of pregnant women are age and parity. The first factor influencing anxiety in pregnancy is age. Based on table 4.1 the age of maternity mothers is mostly aged 20-35 years, namely 94 respondents (75.8%). According to researchers, the age of 20-35 years is the reproductive age and is also called adulthood. At this age the mindset is mature but it is natural that in pregnancy a woman experiences anxiety. This is due to the complaints and discomfort that are often experienced by pregnant women, anxiety also often occurs before delivery. The anxiety that occurs is anxiety that is still in a mild stage [20]. From the results of the study, there were 1.6% of pregnant women experienced severe anxiety, this is because

pregnant women are high-risk group mothers and have comorbidities or comorbidities so the level of anxiety about their pregnancy is much higher than that of normal pregnant women. The increase in a person's age will change the physical and psychological (mental) aspects [21]. In the psychological or mental aspect, the level of thinking is getting more mature and mature. The older a person gets older can also affect changes in a more mature and more mature mindset which will affect how to manage and overcome the problems they experience [22].

The second factor influencing anxiety in pregnancy is parity. Based on Table 4.2 shows that more than half of the respondents, namely 52.4% are primipara, 37.1% are multipara and 10.5% are grande-multipara. According to researchers, parity is an important factor that determines the level of anxiety that can occur in pregnant women. In pregnancy, this is a new thing that has never been felt by pregnant women before [23]. So that the existence of small disturbances in the form of complaints and also discomfort that normally occurs in pregnancy can cause excessive anxiety and worry [24]. Pregnant women have not had any previous pregnancy experience so this pregnancy is the first experience, being a mother-to-be is a new role that she will experience so anxiety often arises if there are complaints related to her pregnancy and also other things that can trigger anxiety [25].

In contrast to multipara and gendemultipara pregnant women, pregnant women who have previously had experience in previous pregnancies [26]. So mothers have been able to adjust to the conditions of their pregnancy which makes the anxiety and worry about her pregnancy reduced [27]. Complaints and discomforts that are commonly experienced by pregnant women, especially in the III trimester, are common and have also been experienced in previous pregnancies, so that pregnant women are more able to control their emotions and feelings to be calmer and not feel anxious [28].

2. THE LEVEL OF ANXIETY OF PREGNANT WOMEN AFTER BEING GIVEN A CHOCOLATE DRINK.

Based on the results of research that has been carried out by researchers, show that the anxiety of respondents after being given chocolate drinks more than half of the respondents, namely 55.6% have no anxiety, 29% have mild anxiety, 15.4% have moderate anxiety and none of the respondents experience severe anxiety and panic. From the results of the study above, respondents' anxiety levels decreased significantly after being given chocolate drink therapy. According to researchers, giving chocolate drinks has a variety of very good benefits for body health including heart health, reducing the risk of stroke, slowing down the aging process, lowering the risk of diabetes, increasing blood flow and lowering blood pressure, protecting the skin from the sun and improving mood (mood). Chocolate is a food that is loved by all groups from children, and teenagers to adults. Chocolate contains compounds that can make the mood good and can improve a person's mood as well as pregnant women's [29].

Dark chocolate contains a chemical compound called Phenylethylamine (PEA). Such compounds can have a positive effect on mood and cognitive health. This compound also stimulates the brain to release the hormone endorphin, so you will feel happier after eating chocolate [30].

3. THE EFFECTIVENESS OF GIVING CHOCOLATE DRINKS AS A COMPLEMENTARY ANTIDEPRESSANT THERAPY IN PREGNANCY.

Based on table 6 shows that the level of anxiety before being given chocolate drinks to pregnant women all respondents experienced anxiety which included mild anxiety 62.9%, moderate anxiety 35.5% and severe anxiety 1.6%. After being given chocolate drink therapy to pregnant women, the results showed that the level of anxiety in pregnant women decreased, namely 55.6% not anxious, 29% mild anxiety, 15.4% moderate anxiety and none of the respondents experienced severe anxiety or panic. Based on the presentation value above, it can be seen that there is a decrease in the anxiety rate in pregnant women.

Based on bivariate analysis using the Wilcoxon test, the effectiveness of giving chocolate drinks as a complementary therapy for antidepressants in pregnant women in the Midwife Independent Practice in Jombang Regency obtained a p-value: of 0.0001 where less than the p-value ≤ 0.05 with a correlation coefficient value (r): 0.011 which shows that H_0 is rejected which means that Chocolate drinks have activities as an effective antidepressant for pregnant women. According to researchers, giving chocolate drinks to pregnant women who experience anxiety is an innovation in providing herbal and complementary therapies, without any side effects, and can improve health in the pregnant woman's body [31]. The provision of chocolate drinks is an innovation to reduce anxiety in pregnant women to reduce the use of chemical drugs [32].

Chocolate is a food ingredient that can function as an antidepressant, based on research brown ethanol extract is reported to have a lower FST value in the Wistar strain than turmeric ethanol extract preparations. The compounds contained in chocolate contain flavonols which are rich in antioxidants, and have the ability as relaxants and antidepressants [33]. However, it is necessary to conduct further research related to complementary antidepressant therapy in pregnant women who experience allergies to chocolate, so that antidepressant treatment therapy will continue in pregnant women with various conditions.

V. CONCLUSION

After conducting a three-month study at the Midwife Independent Practice in Jombang Regency, it was found that after being given chocolate drinks it had decreased to no anxiety (55.6%), mild anxiety (29%), moderate anxiety (15.4%) and no one experienced severe anxiety or even panic. Thus, the conclusion is that chocolate drinks have activity as nonpharmacological antidepressants in pregnant women. In the future, it is hoped that chocolate drinks can

be used as antidepressant drinks for pregnant women and health workers can recommend to pregnant women who are depressed giving chocolate drinks as therapy in reducing anxiety (antidepressants) during pregnancy. Further studies are needed to combine chocolate with other ingredients containing flavanoid compounds, tannins, and alkaloids as complementary antidepressant therapy in pregnancy using herbal ingredients.

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