**Apakah Anemia Berhubungan Dengan Tingkat Risiko Depresi Pada Kehamilan Trimester Tiga?**

**Lyla Fitrania Primada1, Natalia Dewi Wardani2, M. Besari Adi Pramono3**

**1Resident Psychiatry, Medical Faculty of Diponegoro University**

**Jl. Prof. Sudarto SH, Tembalang, Semarang, Jawa Tengah 50275, Indonesia**

**\*Correspondence : E-mail: lyla.fp@gmail.com**

**2Psychiatrist, Medical Faculty of Diponegoro University**

**Jl. Prof. Sudarto SH, Tembalang, Semarang, Jawa Tengah 50275, Indonesia**

**3Obstetrician and Gynecologist, Medical Faculty of Diponegoro University**

**Jl. Prof. Sudarto SH, Tembalang, Semarang, Jawa Tengah 50275, Indonesia**

**ABSTRAK**

**Latar belakang**: Anemia menjadi masalah kesehatan di seluruh dunia. Anemia kehamilan dapat menyebabkan komplikasi pada ibu dan janin. Pada ibu hamil dapat menyebabkan depresi. Dari data penelitian di Indonesia depresi kehamilan mencapai 22,3-50%. Depresi kehamilan dapat mengganggu pertumbuhan dan perkembangan janin, risiko perdarahan pada kehamilan, risiko aborsi, kelahiran prematur, dan berat badan lahir bayi rendah. Selain itu berisiko terjadi depresi postpartum. Saat ini belum didapatkan data mengenai dampak anemia terhadap depresi pada kehamilan trimester tiga.

**Metode**: jenis penelitian ini adalah observasional analitik dengan desain *cross sectional*. Jumlah sampel 75 responden yang melakukan pemeriksaan kehamilan, dapat membaca dan menulis, dan bersedia menjadi responden. Pengambilan sampel dilakukan dengan metode *purposive sampling*. Pengumpulan data menggunakan kuesioner EPDS yang telah divalidasi dengan nilai CVI 1,00 dan reliabilitas 0,706. Data dianalisis dengan *Mann Whitney* dan *Kruskal Wallis*.

**Hasil**: dari 75 responden didapatkan 38 responden dengan anemia dan 37 responden tanpa anemia. Responden anemia yang memiliki risiko depresi sebanyak 12 orang (31,6%) dan responden tanpa anemia yang memiliki risiko depresi sebanyak 13 orang (35,1%).

**Diskusi**: dari hasil analisis data didapatkan hasil P > 0,05 sehingga tidak didapatkan hubungan yang signifikan antara anemia dengan tingkat risiko depresi pada kehamilan trimester tiga. Hal tersebut dapat disebabkan oleh kadar hormone estrogen dan progesteron yang tinggi saat hamil serta adanya faktor sosial yang mempengaruhi responden.

**Kesimpulan**: tidak didapatkan hubungan yang signifikan antara anemia dengan tingkat risiko depresi pada kehamilan trimester tiga.

Kata kunci: anemia, risiko depresi, EPDS, kehamilan trimester tiga

**Is Anemia Associated With The Risk Level Of Depression In The Third Trimester Of Pregnancy?**

**Lyla Fitrania Primada1, Natalia Dewi Wardani2, M. Besari Adi Pramono3**

**1Resident Psychiatry, Medical Faculty of Diponegoro University**

**Jl. Prof. Sudarto SH, Tembalang, Semarang, Jawa Tengah 50275, Indonesia**

**\*Correspondence: E-mail: lyla.fp@gmail.com**

**2Psychiatrist, Medical Faculty of Diponegoro University**

**Jl. Prof. Sudarto SH, Tembalang, Semarang, Jawa Tengah 50275, Indonesia**

**3Obstetrician and Gynecologist, Medical Faculty of Diponegoro University**

**Jl. Prof. Sudarto SH, Tembalang, Semarang, Jawa Tengah 50275, Indonesia**

**ABSTRACT**

**Background**: Anemia is a health problem worldwide. Anemia in pregnancy can cause complications in the mother and fetus. In pregnant women can cause depression. From research data in Indonesia, antenatal depression reaches 22.3-50%. Antenatal depression can interfere with the growth and development of the fetus, the risk of bleeding in pregnancy, the risk of abortion, premature birth, and low birth weight babies. In addition, there is a risk of postpartum depression. Currently there is no data regarding the impact of anemia on depression in the third trimester of pregnancy.

**Method**: this type of research is analytic observational with cross sectional design. The number of samples is 75 respondents who carry out pregnancy checks, can read and write, and are willing to be respondents. Sampling was done by purposive sampling method. Data collection used the validated EPDS questionnaire with a CVI value of 1.00 and a reliability of 0.706. Data were analyzed by Mann Whitney and Kruskal Wallis.

**Results**: from 75 respondents, 38 respondents were found with anemia and 37 respondents without anemia. There were 12 respondents (31.6%) with anemia who had a risk of depression and 13 respondents (35.1%) without anemia who had a risk of depression.

**Discussion**: from the results of data analysis, it was found that P> 0.05, so there was no significant relationship between anemia and the risk level of depression in the third trimester of pregnancy. This can be caused by high levels of estrogen and progesterone during pregnancy and the existence of social factors that affect respondents.

**Conclusion**: there was no significant relationship between anemia and the level of risk of depression in the third trimester of pregnancy.

Keywords: anemia, risk of depression, EPDS, third trimester of pregnancy

1. **BACKGROUND**

Anemia is a health problem that occurs throughout the world. Anemia is characterized by a decrease in hemoglobin levels in the blood. Anemia in pregnancy is mainly caused by iron deficiency which occurs due to lack of nutritional intake during pregnancy. Anemia in pregnancy can cause complications for both the mother and the fetus. In pregnant women can cause depression during pregnancy and are at risk for postpartum depression.1

Depression is a mental health problem that often occurs in women during pregnancy. It is estimated that 15% of women in the world experience depression throughout their lives, especially during pregnancy. The prevalence of depression during pregnancy varies between low, medium and high income countries. Countries with higher incomes have lower depression rates when compared to countries with lower incomes.2 Research conducted in Jakarta found that pregnant women in the third trimester experienced mild depression at 26.4% and moderate depression at 6.9%.3

Depression in pregnancy can have a negative impact on the health of the mother, fetus and family during pregnancy and after birth. Among the effects of depression are disrupting the growth and development of the fetus, the risk of bleeding during pregnancy, the risk of abortion, premature birth, and low birth weight babies.3

Pregnancy, giving birth, and becoming a mother are a physiological condition of a woman. These events can give a different meaning to each woman. In some women there are those who experience stress caused by physical and psychological changes from the time of conception to after delivery, so they have the potential to experience depression during pregnancy.4 However, most women will feel that this event is a positive thing and becomes a pleasant transition process to the next stage in their life journey.5

In the third trimester of pregnancy there are significant changes, both physically and psychologically. Physically, pregnant women will begin to experience difficulties in their activities and psychologically, mothers will begin to feel worried about the birth process that will be undertaken later. Thus allowing the emergence of depression in pregnant women.6 High levels of estrogen are known to play a role in neurotransmitters that affect mood, cognitive function, sleep, and eating.7

1. **MATERIAL AND METHODS**

This is an analytic observational study with a design cross sectional whichemphasizes the process of taking data on independent and dependent variables which is only done once at the same time using a measuring instrument. Sampling was carried out using the non*-*probabilitysampling methodthrough purposive sampling*,* namely by selecting samples from among the population based on thedesired criteria according to the inclusion and exclusion criteria as well as the research objectives.

This research was conducted at Diponegoro National Hospital, Amino Gondohutomo Psychiatric Hospital, Halmahera Health Center, and Ngesrep Health Center in Semarang city, Central Java Province. Research and data collection began from January to March 2022 using the Edinburgh Postnatal Depression Scale(EPDS) questionnaire.

Total sample 106

31 excluded:

* 10 respondent with difficult labor history
* 12 respondent uncomplited quessionaire
* 1 respondent with pregnancy problem
* 4 respondent with abortion history
* 3 respondent with age of pregnancy < 27 weeks
* 1 respondent with alcohol abuse history

Sample 75

Anemia 38

Non Anemia 37

* 26 no risk of depression
* 12 risk of depression
* 24 no risk of depression
* 13 risk of depression

Figure 1. Sampling flowchart

1. **RESULTS**

Table 1 shows the characteristics of the respondents where most are aged 20-35 years (93.3%), with lower secondary education (54.7%), not working (83.1%), income below the minimum wage (57.3%), pregnancy when there was more than one study (58.7%), anemia (50.7%), and no risk of depression (66.7%).

Table 1. Basic Characteristics of Respondents

|  |  |  |
| --- | --- | --- |
| **Variable** | **Frequency** | **%** |
| Age |  |  |
| <20 | 2 | 2,7 |
| 20 – 35 | 70 | 93,3 |
| > 35 | 3 | 4.0 |
| Education |  |  |
| Low | 21 | 28.0 |
| Intermediate | 41 | 54,7 |
| Tall | 13 | 17,3 |
| Profession |  |  |
| Doesn't work | 61 | 81.3 |
| Work | 14 | 18,7 |
| Income |  |  |
| <UMR | 43 | 57,3 |
| ≥ UMR | 32 | 42,7 |
| Parity |  |  |
| Primigravida | 31 | 41,3 |
| Multigravida | 44 | 58,7 |
| Anemia |  |  |
| Yes | 38 | 50,7 |
| Not | 37 | 49,3 |
| Depression |  |  |
| No risk | 50 | 66,7 |
| Possibility of depression | 14 | 18,7 |
| High risk | 8 | 10,7 |
| Depression | 3 | 4.0 |

Bivariate analysis was carried out to analyze the relationship of each characteristic with the level of risk of depression and the relationship of anemia with the level of risk of depression in the third trimester of pregnancy (table 2). With the Mann Whitney and Kruskal Wallis tests it was found that age, education, occupation, income, parity and anemia did not have a significant relationship with the level of risk of depression.

Table 2. Relationship of various characteristic variables to the level of risk of depression based on the Edinburgh Postnatal Depression Scale

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Depression** | | | | **p.s** |
| **No risk** | **Possible depression** | **High risk** | **Depression** |
| Age |  |  |  |  |  |
| <20 | 1 (50) | 0 (0) | 0 (0) | 1 (50) | 0.299 § |
| 20 – 35 | 48 (68.6) | 13 (18,6) | 7 (10) | 2 (2,9) |  |
| > 35 | 1 (33.3) | 1 (33.3) | 1 (33.3) | 0 (0) |  |
| Education |  |  |  |  |  |
| Low | 14 (66.7) | 4 (19) | 2 (9.5) | 1(4,8) | 0.666 § |
| Intermediate | 29 (70.7) | 6 (14,6) | 4 (9,8) | 2 (4,9) |  |
| Tall | 7 (53.8) | 4 (30.8) | 2 (15.4) | 0 (0) |  |
| Profession |  |  |  |  |  |
| Doesn't work | 41 (67.2) | 10 (16,4) | 7 (11.5) | 3 (4,9) | 0.948 ‡ |
| Work | 9 (64.3) | 4 (28.6) | 1 (7,1) | 0 (0) |  |
| Income |  |  |  |  |  |
| <UMR | 26 (60.5) | 11 (25.6) | 5 (11,6) | 1(2,3) | 0.317 ‡ |
| ≥ UMR | 24 (75) | 3 (9,4) | 3 (9,4) | 2 (6,3) |  |
| Parity |  |  |  |  |  |
| Primigravida | 21 (67.7) | 5 (16,1) | 3 (9,7) | 2 (6,5) | 0.985 ‡ |
| Multigravida | 29 (65.9) | 9 (20.5) | 5 (11,4) | 1(2,3) |  |
| Anemia |  |  |  |  |  |
| Yes | 26 (68.4) | 9 (23.7) | 3 (7,9) | 0 (0) | 0.461 ‡ |
| Not | 24 (64.9) | 5 (13.5) | 5 (13.5) | 3 (8,1) |  |

1. **DISCUSSION**

Respondents are generally aged between 20-35 years which is a fairly good age for a pregnant mother.8 Depression is more common between the ages of 20-40 years, so that the age of the respondents in this study is at an age that is at risk of experiencing depression.9 However, the results of this study indicate that there is no significant relationship between age and the level of risk of depression which is possible because the respondent's age is at a safe age for pregnancy so that the risk of depression is lower.

The results showed that a higher level of education had a higher risk level of 46.2% compared to secondary education which was 29.3% and lower education which was 33.3%. The results of this study are similar to studies conducted in Jembrana and Thailand which showed a higher risk of depression in respondents with a higher education level.10 , 11 In this study, there were no significant results between education level and risk of depression caused by sufficient education so that they can accept and process the problems they face so that the risk of depression becomes higher.12

In this study it was found that multigravida pregnancies have a greater risk of depression compared to primigravidas. The research conducted in Jembrana showed the same results, namely the risk of depression was more experienced by multigravida pregnancies.10 The results of this study, parity was not significantly related to the level of risk of depression.

The results in this study found that there was no significant relationship between marital status and the level of risk of depression caused by the possibility of a lack of husband and family support for respondents even though marital status was married.

In this study, there was no significant relationship between economic and occupational level with the risk of depression in respondents which could be caused because each work condition has different risks for each individual.

Based on the results of the study, it was found that the number of respondents who had anemia was 38 respondents (50.7%) and those who did not have anemia were 37 respondents (49.3%). Data from WHO states that 41.8% of pregnant women worldwide experience anemia.13 Research in India states that around 48.4% of pregnant women suffer from anemia.14 Research conducted in Baturaja found that around 42.6% of pregnant women had anemia.13 Data from the Ministry of Health shows that 48.9% of pregnant women experience anemia.15

In the third trimester of pregnancy is the peak of the increase in blood plasma which is used for the growth of the placenta, fetal development, and meeting the needs of additional blood volume in the mother. So if the third trimester pregnant women do not get enough nutrition to produce erythrocytes, anemia will occur.16

Based on the results of the study, it was found that 50 respondents (66.7%) were not at risk of depression and 25 respondents (33.3%) were at risk of depression. In research conducted in South Africa showed that 11.7% of respondents were at risk of experiencing depression.17 Meanwhile, research conducted in Ethiopia showed that 16.6% of pregnant women were at risk of experiencing depression.18 Research conducted in Purwokerto showed that 58.8% of pregnant women experienced depression.4 In line with the results of research conducted in Banyuwangi also showed as many as 50% of pregnant women are at risk of experiencing depression.19

Depression in pregnancy can be caused by maladaptive behavior patterns, poor coping mechanisms, problems in relationships with others, difficulties experienced and negative events, and lack of social support.20

From the results of data analysis, it was found that age, education, occupation, income, parity and anemia did not have a significant relationship with the level of risk of depression in the third trimester of pregnancy. These results are not like the results obtained from other studies conducted in Turkey which showed a significant relationship between anemia and the risk of depression in the third trimester of pregnancy. In that study, it was stated that there were differences in EPDS scores between the anemic and non-anemic groups in which the anemic group obtained higher EPDS scores than those in the non-anemic group. Another difference in this study included a history of previous depression as a predictor factor, whereas in this study a history of previous depression was included in the exclusion criteria.21

In this study, genetic factors have been excluded through initial screening, so that genetic factors as a risk factor for depression in this study can be excluded. Other factors such as psychosocial and biological in this study cannot be ruled out so that the risk of depression in the respondents of this study may still be caused by these two factors.

In this study, psychosocial factors such as anxiety about the delivery process, support from the family, especially husbands, physical discomfort due to a growing belly, and concerns about the condition of the baby who will be born later which can affect the mood of pregnant women are not excluded.22 Other psychosocial factors besides the patient's pregnancy problems such as relationships with other family members, relationships with the surrounding environment and co-workers can also affect the mood of pregnant women who have not been ruled out.9 As the results of research conducted in Greece and Nigeria which states that psychosocial factors such as satisfaction in marriage and social support are significantly associated with depression in pregnancy.23 , 24

Anemia as one of the biological factors related to depression includes affecting the production of monoamine neurotransmitters, especially norepinephrine and serotonin.9 Anemia is expected to reduce the production of monoamines which will cause depression. However, reproductive hormones such as estrogen and progesterone also have a role in the regulation of mood and cognition. Ovarian hormones are known to exert an effect on modulating synaptic transmission by altering postsynaptic receptor response or presynaptic neurotransmitter release. These mechanisms affect neurochemical systems in the control of emotion and cognition such as dopamine, serotonin, glutamate, and GABA.25

In conditions of pregnancy, high levels of estrogen as well as serotonin levels are synthesized by the placenta. Estrogen increases the activation of 5-HT2 which then increases the concentration of 5-HT.26 Progesterone amplifies the effects of estrogen in increasing serotonin activity at synapses. Progesterone will also increase dopamine release in the striatum and decrease dopamine release in the prefrontal cortex. So that these hormones can be things that affect the stability of the mood in pregnant women.27

The limitations in this study include the first, sampling using a purposive sampling techniquewhich allows pregnant women who also meet the criteria but are not present to be not represented. Second, there were two respondents in their teens who were included in this study. Third, uniformity in parity is not differentiated.

1. **CONCLUSIONS AND RECOMMENDATIONS**

The results showed that there was no significant relationship between anemia and the level of risk of depression in the third trimester of pregnancy. However, based on the results of this study, cases of pregnant women with a high risk of depression were found, so it is better to screen the risk of depression in pregnant women.

**REFFERENCES**

1. Yuliani E. Relationship History of Anemia during Pregnancy with the Incidence of Postpartum Anemia in Postpartum Mothers The Relationship History of Anemia During Pregnancy with Incidence of Postpartum Anemia in the Postpartum Mother. 2020;12(Nov):102-107.

2. Sheeba B, Nath A, Metgud CS, et al. Prenatal Depression and Its Associated Risk Factors Among Pregnant Women in Bangalore : A Hospital Based Prevalence Study. 2019;7(May):1-9. doi:10.3389/fpubh.2019.00108

3. Baiturrahim JA. Characteristics of mothers who experience depression in pregnancy. 2019;8(1):99-106.

4. Tyas, DI, Ma'rifah, AR, Triana NY. Differences in depression in pregnant women and postpartum mothers on the readiness for the role of motherhood at RSIA Bunda Arif Purwokerto. 2015;08:10-22.

5. Kusuma PD. Characteristics of the causes of postpartum depression in primiparas and multiparas. 2017;V(1):36-45.

6. Elvina L, Za RN, Rosdiana E. Factors Related to the Psychological Readiness of Pregnant Trimester III Mothers in Facing Labor. 2018;4(2):176-184.

7. Harsaya I. Pathobiology and management of premenstrual dysphoric disorder. Published online 2019.

8. Amanupunnyo NA, Shaluhiyah Z, Margawati A. Analysis of Factors Causing Anemia in Pregnant Women at the Kairatu Health Center in West Seram. *J Aisyah J Health Sciences* . 2018;3(2):173-181. doi:10.30604/if.v3i2.134

9. Amir N. *Depression: Neurobiological Aspects, Diagnosis, and Management* . Second edition. FK UI issuing body; 2016.

10. Medika E, April VOLNO, Country P, et al. INCIDENCE OF DEPRESSION IN PREGNANT WOMEN IN THE WORKING AREA Medical Education Study Program, Faculty of Medicine, Udayana University Community Medical Sciences / Preventive Medicine (IKK / IKP), Faculty of Medicine, Udayana University ISSN: 2303-13. 2020;8(4).

11. Tuksanawes P, Kaewkiattikun K, Kerdcharoen N. Prevalence and Associated Factors of Antenatal Depressive Symptoms in Pregnant Women Living in an Urban Area of Thailand. Published online 2020.

12. Asih I. Relationship between Age, Education, and Mother's Parity with Knowledge of Mental Health of Pregnant Women in Surakarta City. Published online 2020.

13. Astriana W. The incidence of anemia in pregnant women in terms of parity and age. Published online 2017:283.

14. Rawat K, Rawat N, Mathur N, et al. Prevalence and pattern of anemia in the second and third trimester of pregnancy in Western Rajasthan. 2016;4(11):4797-4799.

15. -. The main results of the 2018 RISKESDAS. The main results of the 2018 *riskesdas* . Published online 2018.

16. Aryanto E, Sugiarto AD, Darmawan PH, Pande NPYA. Overview of Anemia in Trimester III Pregnancy in the Obstetrics and Gynecology Department of Waikabubak Hospital, East Nusa Tenggara for the 2019-2020 period. *Digest of Medical Science* . 2021;12 No 2:463-467.

17. Govender D, Naidoo S, Taylor M. Antenatal and Postpartum Depression : Prevalence and Associated Risk Factors among Adolescents' in KwaZulu-Natal , South Africa. 2020;2020.

18. Town J. Antenatal Depression and Associated Factors among Pregnant Women Attending Antenatal Care Service in Kochi Health Center,. 2021;2021.

19. Of D, Depression P. J Community Med Pub Health Res Vol. 1 No. 1, June 2020 Putra et al Determinants Of Perinatal Depression. 2020;1(1).

20. Sunnqvist C. Depressive symptoms during pregnancy and postpartum in women and use of antidepressant treatment – a longitudinal cohort study. Published online 2019:109-117.

21. Yilmaz E, Cakmak B, Gultekin IB, Hospital T. Relationship between anemia and depressive mood in the last trimester of pregnancy. 2016;(May). doi:10.1080/14767058.2016.1194389

22. Kurniawan ES, Ratep N, Westa W, Denpasar S. FACTORS LEAD TO DEPRESSION DURING ANTENATAL CARE EVERY TRIMESTER OF PREGNANT MOTHER. Published online 2000:1-13.

23. Kleanthi G. iMedPub Journals Psychosocial Risk Factors of Depression in Pregnancy : A Survey Study Sample and data collection procedures. Published online 2015:1-6.

24. Ayamolowo SJ, Olajubu AO, Akintola E, Officer N. Perceived social support and depression among pregnant and child-rearing teenagers in Ile-Ife , Southwest Nigeria. 2019;13(October 2018):1-9.

25. Sacher J. Sex hormones affect neurotransmitters and shape the adult female brain during hormonal transition periods. 2015;9(February):1-20. doi:10.3389/fnins.2015.00037

26. Thibeault H, Sanderson JT, Vaillancourt C. Serotonin-estrogen interactions: What can we learn from pregnancy? 2019;161:88-108. doi:10.1016/j.biochi.2019.03.023

27. McOsker K. Hormonal Balance and the Female Brain: A Review. 2018;(National Women's Health Week).