

Article

Literature Review: The Relationship Between Tea Drinking Habits and The Incident of Anemia in Prenant Women

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A B S T R A C T

Background: Pregnancy anemia is condition when the hemoglobin (Hb) less than 11 g/dL. Based on the Indonesian Healthy Survey in 2023, the prevalance of pregnancy anemia was 27,7%. One of the risk factors was excessive consumption of tea, because it contained tannins that inhibited iron absorption.

Purpose: The purpose of this study was to determine the relationship between tea drinking habits and the incidence of anemia in pregnant woman.

Methods: This type of research was a literature review with a scoping review method, conducted from March 2024 to March 2025. Data were collected through digital database sources, namely: Pubmed Central, Sciencedirect, Google Scholar, DOAJ, and Garuda, published from 2019-2024. Data were analyzed using thematic analysis.

Results: Relevant articles was selected based on inclusion and exclusion criteria, and processed usinh the PRISMA-ScR flow diagram. 21 articles were identified for analysis. 21 articles were analized by thematic analysis.

Conclusion: The study show, that the habit of drinking tea is associated with the incidence of anemia during pregnancy. The frequency of daily tea consumption with an amount of 1, 2, or 3 cups causes anemia and the timing of tea consumption before, after or with meals within a time span of up to 1 or 2 hours is also associated with pregnancy anemia.

I. INTRODUCTION

Anemia is a condition in which the amount of hemoglobin (Hb) in the body is lower than the normal amount based on gender and age. Hemoglobin (Hb) is needed to bind oxygen in the lungs and transport it to all body tissues. If the body has too little or insufficient hemoglobin (Hb), the blood's capacity to carry oxygen to all body tissues will decrease.¹ The World Health Organization (WHO) states that pregnant women are considered anemic if their hemoglobin (Hb) is less than 11 g/dL.²

The World Health Organization (WHO) states that nearly two billion people, or approximately 25% of the global population, suffer from anemia.³ According to the 2023 Indonesian Health Survey (SKI), the percentage of pregnant women with anemia in Indonesia is 27.7%. This data indicates that approximately 3 in 10 (27.7%) pregnant women in Indonesia suffer from anemia. The prevalence of anemia among pregnant women aged 15-24 years is 14.6%, 31.4% among those aged 25-34 years, 39.6% among those aged 35-44 years, and 2.4% among pregnant women aged 45-54 years.⁴

Anemia in pregnant women can lead to complications such as abortion, premature rupture of membranes (PROM), premature birth, postpartum hemorrhage, and even maternal death.⁵ Furthermore, pregnant women with anemia tend to have a higher risk of receiving blood transfusions during delivery, being admitted to the Intensive Care Unit (ICU), and experiencing postpartum depression.⁶

Anemia dapat disebabkan oleh faktor gizi dan non gizi. Faktor gizi dapat disebabkan oleh defisiensi konsumsi Protein, vitamins, and minerals. Non-nutritional factors can be caused by infectious diseases. Nutritional factors that cause anemia are closely related to iron.⁷ Iron plays a vital role in neurotransmitter function in cognition, hemoglobin (Hb) formation, and assists various enzymes by binding oxygen for the body's metabolic processes.⁸ Therefore, if iron intake is insufficient, the body will experience anemia.⁷

Iron in food consists of two types: heme iron and non-heme iron. Heme iron is found in abundance in meat, poultry, seafood, and fish, which have higher bioavailability and are an essential component of red blood cells, which transport oxygen throughout the body. Non-heme iron is found in plant-based foods, such as grains, nuts, vegetables, and fruits. Heme iron absorption from animal protein foods is generally around 25%, while non-heme iron absorption is influenced by various factors, such as individual iron status, the amount of available non-heme iron, and the balance between factors that promote and inhibit absorption. Supporting factors include protein, folate, vitamin C, and zinc, while factors that inhibit absorption include tannins, caffeine, oxalates, and phytates, which are found in tea, coffee, and soybeans, as well as calcium found in dairy products.^{7,9}

Tannin is a substance that can inhibit iron absorption and is found in large quantities in tea. The tea plant contains high levels of natural tannins. Excessive consumption of tea can inhibit the absorption of minerals such as iron.¹⁰ This also applies to pregnant women. Drinking tea with or after meals can cause anemia in pregnant women, because tea contains tannins. When consumed with or after meals, these tannins combine with iron in the body and cause anemia.¹¹

Based on the background description above, the author is interested in conducting a literature review regarding the relationship between tea drinking habits and the incidence of anemia in pregnant women.

II. METHODS

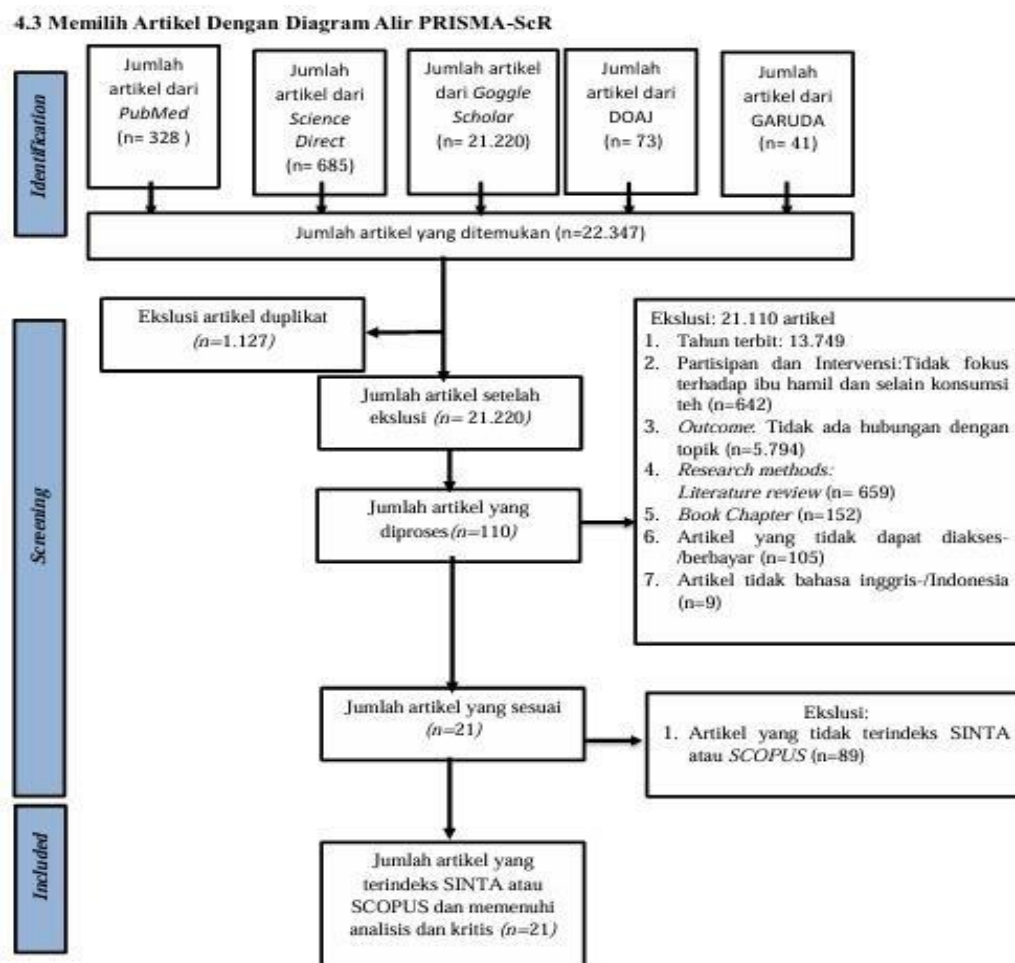
The methods section describes the rationale for the application of specific procedures or techniques used to identify, select, and analyze information applied to

understanding the research problem, thereby, allowing the reader to critically evaluate a study's overall validity and reliability. The methodology section of a research paper answers two main questions: How was the data collected or generated? And, how was it analyzed? The writing should be direct and precise and always written in the past tense. This research design is a literature review using a scoping review using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) method, which is used to identify the steps in developing a research protocol in a scoping review.

The research procedure was carried out by identifying the research question; identifying relevant articles; selecting relevant articles; mapping the data in tables; and compiling the results in a results matrix.

III. RESULT

The search results for articles based on keywords and research questions from each database yielded 22,347 articles. PubMed Central found 328 articles, ScienceDirect found 685 articles, Google Scholar found 21,220 articles, DOAJ found 73 articles, and Garuda found 41 articles. The following describes the filtering results, presented in the form of a PRISMA-ScR flowchart.



Gambar 4. 1 Diagram alir PRISMA-ScR hasil

IV. DISCUSSION

Tea is a popular beverage worldwide after water and comes from the tea plant (*Camellia sinensis*).³³ Tea contains several compounds such as tannins, flavonols, proteins, amino acids, volatile substances, enzymes, vitamins, minerals, and alkaloids.¹⁵ One of the substances contained in tea is tannin. Tannins are divided into two types: condensed tannins and hydrolyzed tannins. Condensed tannins have complex bonds that bind more strongly to proteins than hydrolyzed tannins. This strong interaction can interfere with protein digestion and the absorption of certain nutrients, such as iron.³⁴

According to Soehardi's theory, as cited by Chorunissa et al.¹⁴, iron absorption is significantly influenced by the combination of foods consumed at certain meals, particularly strong tea, which significantly inhibits iron absorption.¹⁴ The tannins in tea can reduce iron absorption by up to 80%, leading to iron deficiency. Consuming excessive amounts of tannins can suppress the activity of intestinal microbial enzymes. Furthermore, tannins form complex bonds with proteins and iron, causing repeated anti nutritional effects. According to research by Delimont in Andriyani et al.¹⁶, in experimental and clinical animal models, iron bioavailability has been reduced by repeated consumption of antinutrients, namely tannins.¹⁶ This is because tannins act as antinutritional compounds, allowing them to bind to proteins and iron, which are key components of hemoglobin formation, thereby reducing hemoglobin levels.³⁵

According to research by Afrini et al.,¹⁰, the results of the Chi-Square statistical test showed a p value of 0.023. With a 95% confidence level, H_0 is rejected and H_1 is accepted. This indicates a significant relationship between tea consumption patterns and the incidence of anemia in pregnant women. After further testing using the phi coefficient ($R\phi$), the $R\phi$ value was obtained as 0.380, indicating a very strong relationship between tea consumption patterns and the incidence of anemia. This is further supported by research by Shah et al.²⁷, which found that pregnant women who did not consume tea had an average hemoglobin level of 12.08 mg/dL with a standard deviation of 1.32 mg/dL, while pregnant women who did consume tea had an average hemoglobin level of 8.57 mg/dL with a standard deviation of 2.57 mg/dL. This indicates lower hemoglobin levels in pregnant women who had a habit of drinking tea compared to pregnant women who did not.

The most common cause of anemia in pregnancy is iron deficiency. Iron deficiency is also associated with increased risks of complications such as preterm birth, preeclampsia (PE), cesarean delivery, and perinatal death. Women with anemia are also more susceptible to perinatal blood transfusions, hospitalization in the intensive care unit (ICU), and postpartum depression.³⁶

According to research by Yakar et al.³⁰ and Thesome et al.¹⁶ in Adriyani, the type of tea most consumed by pregnant women is black tea. Based on the results of research by Chorunisa et al.¹⁴, pregnant women who consume tea prefer black tea bags over loose leaf or instant tea because of the practicality of preparation. Tea bags are tea brewed in

small pouches; once the water turns brown, the tea bag can be removed and discarded. Tea bags are widely chosen by pregnant women because they are practical, easy to make, and not difficult to prepare.

The study conducted by Andriyani et al.¹⁶ states that frequent tea consumption (4-7 times/week) can cause anemia in pregnant women, as the tannins in tea can inhibit iron absorption. Research conducted by Andriyani et al.¹⁶ states that frequent tea consumption (4- 7 times/week) can cause anemia in pregnant women, as the tannins in tea can inhibit the absorption of non-heme iron, which is only absorbed by 2-10% by the body. Research by Setiyarno in Rochmaedah et al.¹⁸ explains that consuming one cup of tea per day can reduce iron absorption by 49%, and consuming two cups of tea per day can reduce iron absorption by 67%, and The minimum daily tea consumption is 750 mg/day or 200 ml of tea.¹⁸ This is also supported by research by Lisisiana et al.¹⁷, which found that pregnant women who drank

≥ 1 cup (200 ml) of tea were associated with a higher incidence of anemia. According to research by Shah et al.²⁷ consuming three or more cups of tea daily during pregnancy was found to have a significant association with the occurrence of anemia in pregnant women.²⁷

Tea consumption among pregnant women occurs at three times: before, after, and during meals. According to research by Laraeni in Rochmaedah et al.¹⁸, tea consumed within 1 hour after eating can reduce the absorption of red blood cells of iron by 64%.¹⁸ Research by Septiawan in Chorunissa et al.¹⁴ explains that tea consumption 1 hour after eating can reduce hemoglobin absorption by up to 85%, thereby causing anemia. ¹⁴ According to

research by Quartz in Anggraeni et al.²⁹, tea consumption is associated with anemia in pregnant women because it is consumed during meals.²⁹ According to research by Saepul et al.²⁴, the habit of drinking tea > 2 cups/day is associated with the incidence of anemia in pregnant women and if tea is consumed together with iron tablets, it can reduce iron absorption by 79-94%.

Adjusting tea consumption patterns appropriately can increase the health benefits obtained, whether for the body, mind, or overall well-being. According to research by Rochmaedah et al.¹⁸, it is necessary to adjust tea consumption patterns in pregnant women, because this study, based on interviews conducted, found that people who did not experience anemia but drink tea, but they do so at the right time, namely more than two hours after eating, and the respondents often consume green vegetables, so their hemoglobin levels are not affected even though they frequently consume tea.

V. CONCLUSION

Tea consumption habits are associated with anemia in pregnant women because the tannins contained in tea can cause anemia as the tannins in tea can form bonds with proteins that are difficult or even insoluble before being absorbed by the intestines, causing the iron consumed to be excreted in the feces (not absorbed) by the body, thereby

reducing iron absorption that would be used for hemoglobin synthesis, leading to anemia.

The frequency of tea consumption in pregnant women according to various studies includes 1 cup (200ml), 2 cups, or 3 cups per day, which, when consumed regularly, can cause anemia in pregnant women because tea contains tannins that can inhibit the absorption of non-heme iron.

The timing of tea consumption in pregnant women, as indicated by various studies, such as before meals, after meals, or during meals, with a timeframe of up to 1 or 2 hours, has been proven to cause anemia in pregnant women.

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BIOGRAPHY

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