



Food Intake, Behavior Control and Anemia in Breastfeeding Mothers in Bogor, Indonesia

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Abstract

Anemia during breastfeeding mother affects the welfare of mothers and babies and is a public health problem. One factor that contributes to the incidence of anemia is the food intake and behavioral control of breastfeeding mothers. This study aims to investigate the correlation between daily food intake, behavioral control, and the incidence of anemia in breastfeeding mothers. This research employs a survey with data collection through structured questionnaires, examination of hemoglobin levels, and interviews. The research sample consists of breastfeeding mothers with babies under 12 months of age. Statistical analysis was performed using regression to assess the relationship between food intake variables, behavioral control, and anemia severity. The results of the study showed that the habit of consuming vegetables was correlated with the incidence of anemia in breastfeeding mothers. In contrast, food intake variables (iron adequacy, protein adequacy, vitamin B12 adequacy, and folic acid adequacy) were not correlated with anemia. Behavioral control (knowledge, mother's attitude towards portion sizes, and self-efficacy) was unrelated to anemia. This research provides important insights for developing public health interventions on anemia prevention and treatment through food intake improvement and behavioral control of breastfeeding mothers.

Keywords: Anemia, breastfeeding mother, food intake, behavior

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1. Introduction

Anemia is a significant health problem for breastfeeding mothers as it negatively affects the mother's well-being and the breastfed baby development [1]. Anemia is when the body lacks red blood cells or hemoglobin, which play vital roles in transporting oxygen throughout the body [2]. During breastfeeding, anemia can seriously affect the mother's breast milk production and its nutritional quality [3]. Mothers who experience anemia tend to experience fatigue, decreased endurance, and disruption of the menstrual cycle, all of which can affect the nutritional balance and health of breastfeeding mothers [4]. Nutrition and particularly iron deficiency in the breastmilk results in growth and development impairment and development of the baby as the baby experiences anemia as the result of the difficulty of

forming the hemoglobin [5]. Thus, it leads baby to be more susceptible to infection and diseases, which negatively influences their general health [6]. Continuous and prolonged iron deficiency in babies leads to cognitive and mental deprivation, which affects intelligence, motor skills, and cognitive function in the long term [7]. WHO data shows that around 38% of pregnant and breastfeeding women worldwide experience anemia. This institution also emphasizes the importance of iron, vitamins, and other minerals intake to prevent and treat anemia in breastfeeding mothers [8]. Data from UNICEF shows that the level of anemia in breastfeeding mothers directly affects the success rate of breastfeeding [9]. Anemia can reduce breast milk production and the quality of

nutrition that babies receive through breast milk, resulting in the risk of impaired growth and development in babies [10].

Imbalanced nutritional intake, unhealthy eating patterns, and lack of awareness of the importance of adequate nutrition in breastfeeding mothers are several issues [11]. These factors are risk factors that can worsen anemia in breastfeeding mothers [12]. A balanced and iron-rich diet is critical to preventing and overcoming anemia in breastfeeding mothers [13]. Adequate nutrition, especially iron, is necessary to meet the body's needs and support optimal hemoglobin production [14]. Control behaviors, such as consumption patterns and behavior, play an important role in managing anemia in breastfeeding mothers [15]. Hence, understanding these control behaviors can provide insight into the factors that influence breastfeeding mothers' dietary intake, as well as how behavior change can help improve health and prevent anemia [2].

Several previous studies have investigated the relationship between dietary intake, control behaviors, and anemia in breastfeeding mothers. A previous study highlighted the importance of iron consumption and analyzed its impact on anemia rates [2]. Another study examined the relationship between diet and anemia rates among breastfeeding mothers in a particular region [16]. However, there are knowledge gaps that need to be filled. Only a few studies have comprehensively investigated the relationship between dietary intake, control behaviors, and anemia rates in breastfeeding mothers. Therefore, further research is needed to deeply understand these factors' dynamics and identify more effective intervention strategies.

2. Materials and methods

This study used a cross-sectional approach to examine what factors correlate with the incidence of anemia in breastfeeding mothers. The research location was chosen because of the high rate of anemia in Bogor Regency compared to other observed areas surrounding Bogor Regency. The population in this study were breastfeeding mothers with the criteria of available data of mothers who have babies under 12 months old. After calculation using a random sampling technique, the sample obtained was 224 breastfeeding mothers. This study utilizes primary data obtained directly by researchers. Independent and dependent variables were collected using a questionnaire previously tested for feasibility. Anemia measurement was carried out using the Hb Hematology Analyzer. The variables studied were dietary intake (iron sufficiency, vitamin b12 sufficiency, protein sufficiency, folic acid sufficiency), behavioral control (knowledge, attitude, self-efficacy, vegetable consumption behavior), and anemia of breastfeeding mothers.

Data analysis was undertaken using SPSS. Univariate analysis using frequency and bivariate analysis using the chi-square test was performed to examine the relationship between independent and dependent variables. A multivariate analysis to assess the most dominant predictors was further employed by using the logistic regression test. Data were presented in tabular format as well as narrative explanations to provide a concrete picture of the data obtained in this study.

3. Results and Discussions

The results in Table 1 illustrate that most breastfeeding mothers had a high education (66.5%) compared to 33.5% of mothers who had a low education. Most breastfeeding mothers were employed (88.4%), compared to only 11.6% as housewives. Breastfeeding mothers were mostly multiparous (81.3%) compared to 18.8% who were primiparous (18.8%). The number of experienced breastfeeding mothers was slightly higher (52.2%) compared to 47.8% with low experience (47.8%). 18.8% of the breastfeeding mothers were at risk based on their age (age equal or over 35 years). The results of Table 2 illustrate that iron sufficiency has a value of 0.164, which means there is no correlation with anemia in breastfeeding mothers. Still, breastfeeding mothers provide breast milk to their babies that contains iron. Over time, the baby's iron needs can affect the mother's iron availability. Breastfeeding mothers can experience iron loss in a variety of ways, including menstruation (if it has returned), blood loss during labor, and iron loss through the breast milk given to the baby [17]. An imbalance between iron needs and intake might cause iron deficiency and, ultimately, subsequent anemia, particularly during breastfeeding or if the mother experiences significant blood loss [18]. An imbalance between iron requirement and intake can decrease the production of sufficient red blood cells or hemoglobin, thus causing anemia in breastfeeding mothers. [19]. Therefore, it is crucial to ensure adequate iron intake through food or supplements to maintain the health of both mother and baby [20].

The results illustrate that vitamin B12 sufficiency is 0.908, which does not correlate with anemia in breastfeeding mothers. Still, breastfeeding mothers provide vitamin B12 to their babies through breast milk. If the mother's vitamin B12 intake is insufficient, this may affect the availability of vitamin B12 for the baby [14]. Several conditions, such as impaired absorption in the gut, strict vegetarianism, or certain metabolic disorders, may increase the risk of vitamin B12 deficiency in nursing mothers [21]. Vitamin B12 insufficiency in nursing mothers can result in megaloblastic anemia, characterized by the formation of larger red blood cells and their impaired function [22]. Therefore, breastfeeding mothers must ensure adequate vitamin B12 intake through food or supplements, especially in the presence of risk factors that may inhibit vitamin B12 absorption or intake [23].

Based on the analysis, protein adequacy has a value of 0.211, which shows no correlation with anemia in breastfeeding mothers. Protein adequacy provides the availability of amino acids needed for various biological processes, including the formation of red blood cells [24]. Adequate energy can help ensure the body can carry out biological processes efficiently, including red blood cell formation [12]. Anemia can occur due to malnutrition, and protein is one of the main components in the nutrient intake needed to prevent malnutrition [9]. Adequate protein intake helps ensure that the body gets the essential nutrients, including iron and vitamin B12, needed in order to avoid anemia [15]. Analysis of the variable of folic acid sufficiency has a value of 1,000, which means it does not correlate with anemia in breastfeeding mothers. Still, folic acid deficiency can cause disturbances in DNA synthesis, forming larger and abnormal red blood cells, known as megaloblastic anemia [7].

Table 1: The Characteristics of Breastfeeding Mother

Characteristics		
	Frequency	Percentage
Mother Education		
Low	75	33.5
High	149	66.5
Mother Employment		
Working	198	88.4
Housewife	26	11.6
Parity		
Multiparous	182	81.3
Primiparous	42	18.8
Breastfeeding Experience		
Inexperienced	107	47.8
Highly Experienced	117	52.2
Mothers Age		
at-risk	42	18.8
Safe	182	81.3

Table 2: Correlation between Food Intake, Behavior Control and Anemia on Breastfeeding Mother

Variable	OR	95% CI	P-Value
Iron sufficiency	0.639	0.360-1.132	0.164*
Vitamin B12 Sufficiency	0.806	0.270-2.408	0.908
Protein Sufficiency	1.721	0.813-3.644	0.211*
Folic acid Sufficiency	0.595	0.061-5.816	1.000
Vegetable consumption	2.085	1.056-4.114	0.049*
Knowledge	0.773	0.446-1.338	0.435
Mother's attitude on intake ratio	1.630	0.937-2.837	0,111*
Self-Efficacy	1.419	0.815-2.469	0.271*

Table 3: Dominant factor of Anemia in Breastfeeding mother

Independent Variable	B	p-value	OR	95% CI
Iron Sufficiency	-0.537	0.077	0.584	0.322-1.060
Vegetable consumption	0.982	0.007	2.669	1.300-5.481
Mother's attitude on intake ratio	0.594	0.045	1.811	1.014-3.236

Megaloblastic anemia can lead to red blood cells that are inefficient and prone to damage, resulting in decreased red blood cell count and potential anemia [25]. The need for folic acid increases during pregnancy and lactation. Folic acid helps prevent neural tube defects in the fetus during pregnancy, and after delivery, folic acid is still required to support the production of sufficient red blood cells [26]. Breastfeeding mothers provide folic acid to their babies through breast milk. Sufficient folic acid in breast milk helps support the normal development of red blood cells and prevents anemia in infants [25]. Folic acid can help prevent anemia caused by iron deficiency. By supporting normal red blood cell production, folic acid contributes to the prevention of anemia related to iron deficiency [27]. Vegetable

Mothers' knowledge has a value of 0.435, which means there is no correlation with anemia in breastfeeding mothers. However, the knowledge of breastfeeding mothers can affect the incidence of anemia through various mechanisms because a good understanding of nutrition, a balanced diet, and preventive measures can help prevent or overcome nutritional deficiencies that can cause anemia. Breastfeeding mothers' knowledge of balanced nutrition is of importance [30]. Understanding the food composition of iron, folic acid, vitamin B12, and other essential nutrients can help prevent deficiencies that can lead to anemia [31]. Knowledge of the risks of nutrient deficiencies in breastfeeding mothers, especially after childbirth and during the nursing period, can motivate mothers to increase their consumption of essential nutrients to avoid anemia [32]. Maternal attitudes towards food portions had a value of 0.111, which means there is no correlation with anemia in breastfeeding mothers. S, attitudes that support balanced food portions can help prevent iron deficiency and other nutrients that contribute to the incidence of anemia. Maternal attitudes towards portion size and types of food consumed can also be influenced by culture, community habits, and general views on diet and eating patterns [33]. Indifferent attitudes on daily diet, such as skipping meals or lacking a variety of foods, can lead a nursing mother to experience deficiencies in iron and other nutrients needed to prevent anemia [32]. Adequate meal portions ensure breastfeeding mothers have sufficient energy and stamina to care for themselves and breastfeed their babies. If a breastfeeding mother experiences fatigue or lack of energy due to inadequate meal portions, this can affect general health and trigger anemia [31]. By adopting a positive attitude towards a balanced and nutritious diet, breastfeeding mothers can help prevent anemia and maintain their health while providing optimal nutrition to their babies through breast milk [30]. Self-efficacy has a value of 0.271, which means it has no correlation with anemia in breastfeeding mothers. Nevertheless, a high level of self-efficacy can increase the ability of breastfeeding mothers to choose and prepare foods rich in iron, folic acid, and other essential nutrients that can help prevent or overcome anemia [34]. Breastfeeding mothers who feel confident managing a healthy diet are more likely to meet their nutritional needs. Furthermore, high self-efficacy can improve the psychological well-being of breastfeeding mothers, reducing levels of stress or anxiety that can affect diet and general health. Self-efficacy can play an essential role in shaping the health behaviors of breastfeeding mothers, including efforts to prevent or overcome anemia [33]. Social support and positive self-efficacy building also play an essential factor in

consumption habits have a value of 0.049, which means there is a correlation between vegetable consumption and anemia in breastfeeding mothers. Some vegetables contain non-heme iron, which is a type of iron derived from plants. Although absorption is lower than heme iron (from animal sources), vegetable consumption can still contribute to iron sufficiency [10]. Vegetables generally contain fiber, affecting iron absorption [28]. Fiber can inhibit the absorption of non-heme iron, so it is essential to pay attention to variety in the diet so that iron needs are still met [29]. Breastfeeding mothers need to diversify their vegetable consumption to get the different types of nutrients required to prevent anemia. Including a variety of colorful vegetables can provide a broader spectrum of nutrients, including essential vitamins and minerals [28]. Improving self-efficacy and, consequently, improving the nutritional health of breastfeeding mothers [28].

The results in Table 3 illustrate that the outcome of regression analysis of the most dominant independent variable is the habit of vegetable consumption, which has a p-value of 0.007. This result shows a correlation between anemia in breastfeeding mothers and vegetable consumption habits. A breastfeeding mother with a habit of lacking vegetable consumption has a chance of 2.669 times the occurrence of anemia. Adequate vegetable consumption, especially vegetables rich in iron and other nutrients, can prevent or reduce the risk of anemia in breastfeeding mothers. Dark green vegetables, such as spinach and kale, contain non-heme iron [22]. Although non-heme iron is absorbed at a lower rate than heme iron (present in meat), consumption of vegetables can provide an additional iron boost. Several vegetables contain vitamin C, which can increase the absorption of non-heme iron [19]. Therefore, simultaneous consumption of vegetables and vitamin C sources, such as fruits, can help improve the efficiency of iron absorption from food [35]. Adequate vegetable consumption habits can help prevent nutritional deficiencies that may contribute to anemia. Iron, vitamin B12, or folic acid deficiency can cause anemia, and vegetables can be a good source of these nutrients [22]. Therefore, breastfeeding mothers need to pay attention to their diet and ensure that adequate consumption of vegetables is included in their daily diet [35]. However, it is also important to remember that other factors, such as chronic diseases, a history of gastrointestinal diseases, or nutrient absorption problems, can also play a role in the anemia [26].

4. Conclusions

There is a significant correlation between vegetable consumption habits and the incidence of anemia in breastfeeding mothers. The results of the data analysis showed that breastfeeding mothers with better vegetable consumption habits tend to have a lower risk of anemia. Public health intervention strategies involving nutrition education, promoting a balanced diet, and empowering breastfeeding mothers can be implemented to raise awareness about the correlation between vegetable consumption and blood health. The results of this study provide a basis for developing anemia prevention programs in breastfeeding mothers by promoting a healthy and diverse diet. By understanding the positive relationship between vegetable consumption and the health of breastfeeding mothers, prevention efforts can be better targeted and potentially provide significant health benefits in this population.

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