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The Relationship between Dietary Habits and Severity of Anemia in Pregnant Women Attending Primary Health Care Centers in Najaf, Iraq

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ABSTRACT

Background: One of the major public health concerns is anemia impacting pregnant women as iron deficiency is the primary cause of anemia in pregnant women. This study investigated the relationship between dietary habits and severity of anemia in pregnant women.

Methods: In a simple random sampling cross-sectional study, 150 anemic pregnant women receiving prenatal treatment at primary health care centerts in Najaf, Iraq from November 19, 2024 to March 10, 2025 were enrolled. The instrument's validity was assessed at 0.791.

Results: Totally, 92% and 8% of pregnant women reported moderate and good dietary habits, respectively. The mean consumption of fruits and leafy vegetables was 3.09 and 3.26, respectively. The mean intake of red meat, chicken, fish, dairy products, eggs, nuts and legumes was moderate (range: 2.46-2.95), while organ meat and caffeine intake was poor (mean: 1.21 and 1.42, respectively). High intake of canned foods, soft drinks, and fast food was demonstrated (mean: 3.87, 3.24 and 3.05, respectively). Sugar, salt, and pickles were consumed moderate to high levels (mean: 2.75, 2.91 and 2.63, respectively). Totally, 68.7%, 27.3% and 4% of women had mild, moderate, and severe anemia, respectively. A significant negative correlation was found between dietary habits and anemia severity.

Conclusion: Mild anemia was common in pregnant women as they had poor dietary habits and increased severe anemia. They consumed minimal meat, moderate amounts of proteins, and lots of fruits and vegetables, moderate amount of dairy and egg intake with excessive intake of soft drinks and fast foods.

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Introduction

Anemia is a pathophysiological state that involves a substantial reduction in hemoglobin concentrations in the blood, a decline in the amount of blood cells in the body, or impaired maturation of red blood cells (1). It impacts all populations; however, pregnant women and children exhibit greater susceptibility (2). Anemia in pregnant can have adverse effects in

both the mother and the fetus (3, 4). It is widespread nutritional a deficiency condition worldwide, impacting almost a quarter of the global population (5). World Health Organization (WHO) showed that anemia impacted 32.4 million pregnant women (38%) and 496 million non-pregnant women aged 15-49 years (29%) (6). Anemia was shown to affect up to 38% of pregnant women worldwide (7). It has predominantly happened in Asia and Africa with an estimate of 1% and 5% of pregnant women, while 60% and 52% of pregnant women, respectively suffer from anemia (8). It is prevalent among 43% to 56% of pregnant women in developing countries, in contrast to 9% to 18% in developed ones (9). The incidence of anemia among pregnant women in South Africa has been reported to range from 29.0% to 42.7% (10). In Erbil city, Iraq, a prevalence of 55.5% of anemia was demonstrated during pregnancy with 70% of individuals to be at risk (11).

The World Health Organization defines anemia in pregnant women as a hemoglobin (Hb) level of less than 11 g/dL. Anemia was divided into three distinct types based on severity including mild anemia (hemoglobin level from 9 to 10.9 g/dL), moderate anemia (hemoglobin level from 7 to 8.9 g/dL), and severe anemia (hemoglobin level less than 7 g/dL) (12, 13). From weeks 20 to 28 of pregnancy, hemoglobin level may be assessed as 2 g/dL lower than normal due to the serum plasma hemodilution (14). Iron deficiency anemia (IDA) is the primary cause of anemia during pregnancy. It is associated with an increase in the volume of the mother's blood and increased iron needs during fetal growth (15). The need for iron rises as pregnancy progresses, and numerous women may not consume adequate dietary iron to fulfil these demands. Moreover, physiological changes during gestation might influence iron absorption; therefore, raising the likelihood of development of IDA. As iron deficiency is the main contributory factor of anemia, other forms of anemia, such as folate-related anemia, a lack of vitamin B12 anemia, and anemia associated with an ongoing disease can also contribute to the total incidence of anemia (16-18).

The entire iron need for a pregnant woman weighing 55 kilograms is approximately 1040 mg (19). The majority of iron is required during the final trimester, with daily needs rising from the pre-pregnancy level of 1-1.5 mg/dL to approximately 6 mg/dL (19, 20). Meeting this requirement through dietary sources alone is difficult, especially in countries that are developing where food frequently contains insufficient iron content and accessibility is generally low or moderate due to excessive fiber in the diet and phytate consumption (19, 20). The management of anemia during pregnancy often includes dietary modifications, supplements, and, in severe cases, blood transfusions (21). Anemia is associated with a high mortality and morbidity in women and children, negative birth outcomes including premature delivery, low birth weight, and perinatal mortality, as well as minimized job performance in adults (22).

All humans require a balanced intake of nutrients to ensure proper body function. Nutrition is an essential component of human existence, health, and growth throughout the lifespan (23). Pregnancy increases a woman's energy and food requirements to sustain the development of fetus and maternal tissues. A nutritionally balanced diet is needed to supply enough energy for the development of the embryo; while protecting the mother's own tissues throughout pregnancy (24). Dietary habits describe the food options made by people or groups, crucial for sustaining a nutritious diet rich in fats, carbs, proteins, vitamins, and minerals. Nutritious food can avert difficulties during youth and other stages of life (25). Good dietary habits throughout pregnancy are crucial for both mothers and their babies. Pregnancy-related nutritional inadequacy is more common in poor nations, where women tend to restrict their food consumption because of cultural beliefs and concerns about potential consequences. Deficiencies in essential nutrients such as iron, protein, vitamin C, and vitamin A may result from this, raising the risk of low birth weights, anemia, stillbirths, and premature births. Having fewer than three meals a day, drinking too much tea or coffee, and not eating a variety of foods are all examples of poor dietary habits that lead to these deficiencies (26).

The inadequate nutrition of women, together with insufficient care can lead to death in mothers during pregnancy and delivery; therefore, jeopardizing the health as well as survival of the newborns and kids (27). Insufficient nutrition can also have detrimental effects on the embryo throughout gestation and in the early two years of life, with the consequences of health status such as cognitive development (28). The present research aimed to investigate the relationship between dietary habits and the severity of anemia in pregnant women attending primary health care centers in Najaf, Iraq.

Materials and Methods

A cross-sectional analytical study was used to evaluate the relationship between dietary habits and the severity of anemia among pregnant women in a particular community at a single point in time who attended antenatal care in primary health care

centers (PHCCs) in the city of Najaf, Iraq between November 19, 2024 and March 8, 2025. Through the use of a lottery system, six primary health care centers were chosen from a total of thirty primary health care centers. Three of these centers were chosen from the south health care sector and three were chosen from the north health care sector. A total of 150 pregnant women who were anemic were included in the research via a purposive sampling method. The Steven K Thompson equation was applied to calculate a sample size for the specified population, incorporating a permissible error of 5%, a prevalence based on similar research, and a 95% confidence interval (29). The sample size for each primary health care center was established according to their proportion within the targeted population. The research included pregnant women who visited primary health care centers and were diagnosed with anemia (hemoglobin level of <11 g/dL). A written signed consent form was provided from all participants. Exclusion criteria were individuals with chronic illnesses, those with dietary restrictions, and those who could not or did not provide informed consent.

The data gathering tool consisted of two components. The first part involved determining dietary habits through a food frequency questionnaire (FFQ), which included food types consumed over a week based on dietary routines (30). The second section addressed anemia level classified from normal to severe anemia based on hemoglobin concentration (12). The instrument was submitted to a committee of twelve nursing specialists to improve its validity. Twenty anemic pregnant women took part in pilot research at the Imam al-Jawad Health Care Center from December 1 to December 21, 2024. The reliability was evaluated at 0.791 using the alpha correlation coefficient. After receiving the pregnant women's agreement, the data gathering process consisted of interviews, with every interview lasting roughly ten to twelve minutes.

The data analysis was performed utilizing SPSS software (version 26.0, IBM SPSS Statistics, Chicago, IL, USA). The descriptive statistics included the use of frequency, percentage, mean, and standard deviation to evaluate variables associated with dietary habits and anemia in pregnant women. Inferential statistical tests, including Spearman's rank correlation were employed to examine the relationships between dietary habits and severity of anemia. The research was performed in compliance with the Declaration of Helsinki. Approval from the Institutional Review Board (code: UOK.CON.24.048) was secured on November 19, 2024. Before beginning data collection, the researcher made sure that the participants fully understood the study's goals by outlining the scientific rationale for the investigation as well as their responsibilities. All participants were informed of their voluntary participation and the freedom to pull out from the study at any time.

Table 1: Assessment of dietary habits among pregnant women (N=150).

Order	Dietary habits	M	SD	Assessment
1	How often should you eat chicken during pregnancy?	2.61	0.623	Moderate
2	How often do you eat red meat during pregnancy (such as beef, lamb)?	2.46	0.662	Moderate
3	How often do you eat organ meats during pregnancy (such as liver)?	1.21	0.509	Poor
4	How often do you eat eggs during pregnancy?	2.95	0.992	Moderate
5	How often do you consume milk and dairy products during pregnancy (such as cheese, cream, yogurt, etc.)	2.87	0.822	Moderate
6	How often do your meals include fruits and citrus fruits (such as bananas, oranges, lemons, etc.)?	3.09	0.655	Good
7	How often do your meals contain green leafy vegetables (such as spinach, lettuce, basil, etc.)	3.26	0.639	Good
8	How often do you consume nuts and legumes (such as almonds, walnuts, beans, lentils, chickpeas, etc.)	2.73	0.552	Moderate
9	Do you include fish regularly in your diet?	2.51	0.610	Moderate
10	Drinking beverages that contain caffeine (such as tea or coffee)	1.42	0.943	Poor*
11	Do you regularly consume soft drinks during pregnancy (such as Coca-Cola, Pepsi)?	3.24	0.994	Good*
12	Eating a lot of sugar (such as chocolate, sweetened juices, etc.)	2.75	1.049	Moderate*
13	How often do you eat canned foods (such as canned meat, sweetened condensed milk)?	3.87	0.422	Good*
14	Eating fatty foods or fast food (such as French fries, burgers, etc.)	3.05	0.975	Good*
15	Excessive use of salt during eating	2.91	.944	Moderate*
16	Frequent consumption of pickles during pregnancy	2.63	0.924	Moderate*

M: Mean, SD: Standard Deviation, *Reverse score. Poor=1–2, Moderate= 2.1–3, Good= 3.1–4. *: Statistically significant.

The researcher described the principal aim of the study and promised participants that their data would be kept entirely confidential. All participants submitted an informed consent document.

Results

Table 1 presents the dietary habits of pregnant women to vary in quality. The consumption of fruits (mean=3.09) and green leafy vegetables (mean=3.26) was considered to be well consumed and the intake of essential protein sources such as red meat (mean=2.46), chicken (mean=2.61), and fish (mean=2.51) was demonstrated to be moderate in use. The organ meat consumption, as a key source of iron and vitamin A, was illustrated to be poorly consumed (mean=1.21); while the intake of dairy products (mean=2.87), eggs (mean=2.95) and nuts/legumes (mean=2.73) was moderate. However, caffeine consumption was poor (M=1.42), while the intake of soft drinks (mean=3.24), canned foods (mean=3.87), and fast foods (mean=3.05) was relatively high. Additionally, moderate to high levels of sugar (mean=2.75), salt (mean=2.91), and pickles (mean=2.63) consumption indicated dietary habits to contribute to gestational health issues such as hypertension or gestational diabetes.

Table 2 represents that the majority of pregnant women to have moderate dietary habits (92%) with mean score of 43.57±3.572; while only 8% exhibited good level of dietary habits. It was shown that there was a significant relationship (moderate negative) between severity of anemia and dietary habits among pregnant women (n=150) as seen with significant reverse correlation (p=0.039, Spearman correlation of -0.169*) suggesting when the quality of dietary habits increased, the severity of anemia decreased. Totally, 68.7% of pregnant women had mild anemia (2.35±0.557); while 27.3% had moderate, and only 4% had severe anemia (Table 3).

Discussion

The findings of our study revealede that chicken, red meat, eggs, dairy products, nuts, legumes, and fish were moderately consumed. The dietary intake of fruits and green foliage vegetables was advantageous. However, pregnant women consumed less organ meats. This finding contrasts with that of previous research conducted before demonstrating that milk and yogurt, veggies, eggs, and fruits were consumed frequently on a daily basis. Poultry, dates, and nuts were moderately consumed weekly, while red meat, fish, liver, and some plants were consumed less (5). However, we observed similar trends in suboptimal nutritional behavior in India. Adolescents showed relatively better daily consumption of cereals/grains (38.5%), but the intake of fruits and vegetables (3.8%) and animal products (9.7%) was strikingly low. The frequent consumption of unhealthy items such as carbonated drinks (30%), pastries (28%), and energy drinks (23%) mirrors the pregnant women's high intake of soft drinks and processed foods (31).

We demonstrated that pregnant women had low consumption of caffeine-containing beverages and moderate use of salt during meals. These findings align with the research conducted in Basrah, Iraq, which reported a 39.7 percent reduction in coffee consumption and a 59.1 percent prevalence of iodized salt usage (32). The comprehensive assessment of dietary habits in our study revealed that ninety-two pregnant women reported moderate dietary habits, whilst only eight percent displayed an excellent variety of food intake. In contrast, a study carried out in Pakistan indicated that sixty-five percent of

Table 2: Overall assessment of dietary habits among pregnant women.

Dietary habits	F	%	M	SD	Assessment
Poor	0	0	43.57	3.572	Moderate
Moderate	138	92			
Good	12	8			
Total	150	100			

f: Frequency, %: Percentage, M: Mean for total score, SD: Standard Deviation for total score, Poor=16–32, Moderate=32.1–48, Good=48.1–64.

Table 3: Severity of anemia among pregnant women based on hemoglobin index.

Hemoglobin	F	%	M	SD	Assessment
Normal	0	0	2.35	0.557	Mild
Mild	103	68.7			
Moderate	41	27.3			
Severe	6	4			
Total	150	100			

f: Frequency, %: Percentage, M: Mean for total score, SD: Standard Deviation for total score.

women demonstrated exemplary practices related to nutrition during pregnancy (33). The factors contributing to these disparities may be linked to differences in socioeconomic status, cultural beliefs, and access to nutrition and healthcare services in the countries where the studies were conducted.

The present research indicated that mild anemia impacted sixty-eight percent of pregnant women, moderate anemia affected twenty-seven percent and severe anemia influenced four percent. This outcome opposes with a recent study conducted in Somaliland that showed thirty-three percent of pregnant women to be slightly anemic, while 54.9 percent were moderately anemic, and twelve percent were seriously anemic (34). A similar investigation conducted in Bangladesh denoted to a severe anemia prevalence of 3.40% in government hospitals (35). However, this finding aligns with the research conducted in Unguja Island, Tanzania, which reported a 80.8% prevalence of anemia. In the population of pregnant women, 68.64% demonstrated mild anemia, 11.24% were classified as moderate anemia, and 0.89% showed signs of severe anemia (36).

Our study revealed a moderate negative correlation between anemia severity and dietary habits in pregnant women, suggesting that improved dietary habits resulted in less severe anemia. This finding is in agreement with a similar research conducted in Pakistan, demonstrating that the dietary intake and habits of pregnant females directly contributed to the development of anemia (30). A notable correlation has been noticed between the intake of dark-colored leafy vegetables and those who were not vegetarian and was associated with an enhanced hemoglobin concentration during pregnancy (37). No significant relationship has also been observed between anaemia status and adherence to a vegetarian diet in two separate studies (38, 39).

Conclusion

The dietary habits of pregnant women can significantly vary from good intake of fruits and green leafy vegetables and moderate consumption of essential proteins like red meat and chicken to low organ meat consumption. Moderate intake of dairy, eggs, nuts/legumes, and low caffeine intake was visible in pregnant women too. Excessive consumption of soft drinks and fast food was also observed in this population. We showed that mild anemia was the most common cases revealing a moderate negative correlation between dietary habits and anemia severity.

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Authors' Contribution

All authors contributed equally to this work.

Conflict of Interest

The authors declare no conflict of interest.

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