Original Research Article

Association Between Hemoglobin Levels And Dietary Iron Consumption Among Pregnant Women In Bangladesh: A Cross-Sectional Study

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ABSTRACT

Background: It is thought that anemia ranks as the second most common primary cause of disability worldwide. An estimated 2 billion people worldwide are anemic, and iron deficiency in the diet is thought to be the root cause of 50% of cases, according to the WHO. This study looked at the relationship between pregnant women's hemoglobin levels and dietary iron intake.

Methods: It was a cross-sectional research carried out in Bangladesh's Chuadanga district. Participants in the research were females who tested positive for pregnancy, had their pregnancy confirmed by a mother child health card, and were registered at an antenatal clinic. It comprised 197 expectant women between the ages of 15 and 49 who were willing to voluntarily participate in the research and who regularly visited their prenatal clinic. To analyze nutritional consumption, a 24-hour recall was performed. Microsoft Excel was used to clean, modify, code, and validate the data for accuracy. Using Nutri-survey 2017 statistical software, the 24-hour recall data analysis was done to look for critical nutrient intake. Additionally, the fingertip's side was used to draw the blood sample since it allowed for the greatest blood flow and least discomfort. The link between the two variables was then examined using inferential statistics, and significance was acknowledged at a P-value of less than 0.05.

Result: The Pearson correlation findings showed a slight positive correlation (r=0.1036, 95% CI (0.002-0.20), p=0.04, r2=0.014) between maternal dietary iron consumption levels and hemoglobin levels for expectant women, with the iron levels explaining 1% of the variance in maternal iron concentration.

Conclusion: It is commonly accepted that maternal age and increased parity both contribute to anaemia during pregnancy. Older women are anticipated to be multigravida in addition to the overall body frailty associated with prolonged maternal age. This is due to the possibility that multigravida may cause anemia by lowering maternal iron stores throughout each pregnancy and resulting in blood loss during each birth.

Keywords: Dietary Iron consumption; Hemoglobin levels; Bangladesh

1. INTRODUCTION

Over 2 billion individuals worldwide are thought to be affected negatively by Iron Deficiency Anaemia (IDA) [1]. Additionally, according to research, anemia is a factor in 20% of all maternal fatalities [2]. A haemoglobin level less than 11 g/dl during pregnancy is considered anaemic. Severe anemia is defined as having less than 7.0 g/dl of hemoglobin, moderate anemia as having 7.0 to 9.9 g/dl of hemoglobin, and light anemia as having 10.0 to 10.9 g/dl of hemoglobin [1].

Over 40% of expectant women globally are thought to be anemic. It is expected that iron deficiency accounts for at least half of this anaemia burden [3]. To fulfill both their nutritional demands and those of the growing fetus, pregnant women need to take in more iron and folic acid. Iron and folic acid deficiencies during pregnancy have the potential to be harmful to the mother's health, the pregnancy, and the growth of the fetus. The use of iron and folic acid supplements has been linked to a lower incidence of anemia and iron deficiency in pregnant women, according to the evidence [3]. Iron is a crucial micronutrient that contributes to the catalytic activity of several enzymes as well as the transport of oxygen. It is essential for both brain development and the manufacture of hemoglobin in the fetus. Even in high-income countries, pregnant women with iron deficiency anemia often have this issue.

Further study revealed that anemia has significant negative consequences on human health, as well as social and economic development, in both emerging and developed nations [4]. Additionally, it is claimed that anemia is also to blame for around 1 million fatalities annually, with three-quarters of these deaths taking place in Africa and South-East Asia [5]. In impoverished countries, it affects more than 50% of preschoolers and expectant mothers, and at least 30% to 40% of those living in developed nations [6]. However, the frequency of anemia is around four times higher in developing nations than in wealthy nations [7]. Additionally, due to several socio-cultural issues including illiteracy, poverty, ignorance, cultural and religious taboos, poor dietary practices, and a high frequency of parasite infestations, there is still a significant public health concern among pregnant women. As a result, the majority of the population's dietary habits and variety deteriorate, with many families focusing more on cereals than other food categories and others cutting down on the number of meals eaten each day from the customary three to two [8].

Women used to follow a modified diet during pregnancy, which included limiting calorie intake throughout and after the first six months of pregnancy [9]. The community's food restrictions are thought to ensure smaller infants, making childbirth safer and requiring fewer medical interventions [9]. Additionally, women choose to repeat this pattern in future pregnancies since village elders and TBAs often impose this practice in the first trimester. However, different research conducted in Nigeria found that traditional views on what foods should be avoided during pregnancy were seen to be a significant influence in pregnant women's quality of nutritional intake [10]. The major justifications given for avoiding certain meals during pregnancy in Nigeria were taboo, stomach aches, nausea, and vomiting, as well as the impact on the baby's size due to concern that the chance of a caesarean section rose with the delivery of big newborns [11]. Even in the case of obstetric crises, a strong reluctance to surgical delivery is widespread in underdeveloped nations as a consequence of societal misconceptions, religious beliefs, and concerns about surgical complications and expense [10].

2. MATERIALS AND METHODS

Dietary evaluation is done retroactively using 24-hour dietary recall. A random sample of (384/2, n=197) people were purposefully chosen for the 24-hour recall interview based on their availability to return for the dietary assessment, in which they were required to recollect and provide specifics about the food and drinks they had eaten in the previous 24 hours. In order of consumption, the interview was conducted in person. The dietary recall was staged using the Multiple Pass Recall (MPR). While they were recalling, the research participants were not interrupted. After they finished, they were questioned about the amounts, ingredients, and technique of meal preparation while also going over everything they had previously remembered. The respondents were also asked to provide additional information for each food or beverage listed in the questionnaire, such as the time at which it was consumed and a detailed description of each item, including any combinations of foods or drinks, such as milk in tea. The next step was to ask the research participants to provide their eating frequency, or how often they had eaten or drank in the previous 24 hours. To enhance the food estimate data, the 24-hour recall and food frequency were integrated.

When their hemoglobin levels were assessed, the participants' skin, lips, and nails were examined for indications of anemia, which might include weakness, breathlessness, dizziness, and irregular heartbeats. The method for taking the blood sample was then explained to the research participants. Additionally, they were informed that the operation of taking their blood would be carried out by a trained laboratory worker, thus there was no reason for them to be concerned. For optimal blood flow and minimal discomfort, the side of the fingertip rather than the center of the fingertip was used to collect the sample. Then, a lancet was used to pierce the finger while applying gentle pressure to the fingertip. A lint-free wipe was used to remove the initial 2 or 3 droplets of blood. The fingertip was gently pressed once again till a fresh drop of blood emerged.

A capillary tube was used to collect around 4 millimeters of blood, which was then placed in a cuvette. A lint-free wipe was used to remove extra blood from the cuvette's exterior; if any air bubbles were found, a new cuvette was filled. After the Mission Plus HB machine was switched on, the cuvette was inserted into its holder, moved gently to its measuring position (photometer), and the measurements were read out after 15–60 seconds.

3. RESULTS

After controlling for age and education, there is a correlation between dietary iron consumption and hemoglobin levels in pregnant women. The link between maternal dietary iron intakes in mg/day and pregnancy hemoglobin levels in g/dL was initially investigated using Pearson's correlation based on the results. Multiple regression models that included adjustments for variables including age, educational attainment, and parity were then used. These were taken out of the model because of their age collinearity.

The regression model has a 5% threshold of statistical significance and 95% confidence intervals. It was shown that there was a strong correlation between maternal age and iron deficiency. It was shown that older pregnant women had a higher likelihood of becoming anemic than younger pregnant women.

The findings of the Pearson correlation showed a weakly positive correlation (r=0.1046, 95% CI (0.002-0.20), p=0.04, r2=0.015) between maternal dietary iron consumption levels and haemoglobin levels for expectant women, with the iron levels explaining 1% of the variance in maternal iron concentration. The sporadic correlation can be related to forced vomiting, which is regarded as a local custom.

There was remained a modest connection between the key exposures—maternal food intake and hemoglobin levels—after controlling for the confounding factors (mother's age and educational level; p=0.03). This suggested that, despite age and education level, only a very little part of the maternal hemoglobin levels may be explained by food consumption.

Table 1 : Dietary Iron Consumption and Haemoglobin Levels

Outcome	p-value* (95% CI)	r	r^2
Iron levels (mg/day)	0.042	0.1046	1.0742
Age	0.038		
Education	0.035		

**Pearson's Chi-square test*

4. DISCUSSION

In the current investigation, there was a strong positive correlation between maternal age increases and iron deficiency. These results were in line with earlier research, which revealed that a late pregnancy's risk of anemia development was dramatically enhanced [12].

5. CONCLUSION

It is commonly accepted that maternal age and increased parity both contribute to anaemia during pregnancy. Older women are anticipated to be multigravida in addition to the overall body frailty associated with prolonged maternal age. This is due to the possibility that multigravida may cause anemia by lowering maternal iron stores throughout each pregnancy and resulting in blood loss during each birth.

This result was in contrast to another study's findings, which stated that there were no significant relationships between food consumption and hemoglobin levels [13].

ETHICAL APPROVAL

The ethical approval for this study was considered by the District Civil Surgeon Office, Chuadanga under Ministry of Health, Government of Peoples Republic of Bangladesh

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