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Comparison of Nutrients Intake among Pregnant Anemic & Non-Anemic Women

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ABSTRACT

Background: Anemia, interpreted as a low blood hemoglobin values, was considered as a major health complication in the world. However, anemia in pregnancy is a global public health problem in the developing countries, posing high risk of adverse results for expecting mothers as well as their fetus. The aim of study was to compare nutrients' intake among pregnant anemic & non-anemic women. **Methods**: A comparative cross-sectional study was conducted at Sir Ganga Ram Hospital, Lahore over a period of 4 months. The data were collected from 150 pregnant women, including 75 anemic and 75 non-anemic women, through pre-tested questionnaire using non-probability convenient sampling method. Data were tabulated and analyzed with help of SPSS version 21.0. **Results**: Analysis revealed that 34% of women had carbohydrate intake between 0-150 g/day, 44% had protein intake less than 50 g daily, and 36% had daily fat intake between 0-100 g/day. Moreover, 46.7% of the pregnant women were vitamins deficient, 51% were minerals deficient, 52% were iron deficient, 54.7% consumed tea with their meals, 44% had vitamin B_3 intake less than 10 mg, 48% had vitamin C intake less than 50 mg, 48% had vitamin A intake between 0-500 RAE, 42% had calcium intake between 0-500 mg, and 31% had iron intake between 0-10 mg. **Conclusion:** The findings showed that nutrient intake of anemic pregnant women was not sufficient in the protein rich diet; they had high consumption of tea with their meals. Their overall energy intake and micronutrients were less than the required as per recommended dietary allowance in pregnancy.

Key words: *Nutrients intake; Pregnant anemic women; Low protein diet; Tea; recommended dietary allowance*

Introduction

Anemia, interpreted as a low blood hemoglobin values, has been considered as a major health complication with critical outcomes in the developed and developing countries and additionally unfavorable effects on social and financial conditions (Stevens *et al.*, 2013). Three mechanisms mainly lead to anemia: blood loss, when body is unable to produce enough red blood cells (erythropoiesis), and when red blood cells die (hemolysis). Genetic disorders and deficiency of certain nutrients are other contributors of anemia (Kassebaum, 2016). The most widely recognized reason of anemia is Iron deficiency, which is estimated to cause half of all instances of

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anemia. Because of their certain roles in synthesis of red blood cells and hemoglobin, deficiencies of vitamins A, riboflavin (B2), pyridoxine (B6), cobalamin (B12), C, D, E, folate, and copper can also lead to anemia (Balarajan *et al.*, 2011).

People more susceptible to anemia include infants, children under five years, adolescents, females of reproductive age (both pregnant and non-pregnant), and elderly. For various reasons women are at a higher risk of having anemia: blood wastage every month with menstruation causes high iron losses and hence iron demand, during adolescence (high development and growth phase), and pregnancy incur additional requirements for iron (for their own growth and the growing fetus) (Torheim *et al.*, 2010). It was estimated that about 1.3 billion people all over the world suffer from anemia, making it a standout amongst the most critical health problems globally. Many investigations showed the relationship of anemia with maternal diseases and death. Worldwide anemia adds to 20% of all maternal deaths, leading to premature deliveries, low birth weight, infant mortality, and mental impairment (Obai *et al.*, 2016).

Anemia was also found prevalent (49%) among women in Pakistan according to the National Nutrition Survey (NNS) of 2011 (Bhutta *et al.*, 2011). High prevalence of anemia was also reported among married women in urban (26%) and rural (47%) areas of Pakistan (Baig-Ansari *et al.*, 2008). The prevalence of anemia among pregnant women living in urban areas is similar, ranging from 29% to 50% among pregnant women attending antenatal clinics in a large private, tertiary hospital in Karachi (Aziz-Karim *et al.*, 1990). In the new born children, anemia was found to cause cognitive and behavioral dysfunction, low iron stores, and iron deficiency anemia (Lozoff *et al.*, 2006). Lone FW revealed that infants of anemic mothers had 1.8 times higher chance of having low Appearance, Pulse, Grimace, Activity and Respiration (APGAR) score at the time of birth (Lone *et al.*, 2004).

Rich dietary sources of iron include meat especially offal (organ meat), fish, eggs, poultry, and meat extracts. However, bread and flour, breakfast cereals, dark green vegetables, pulses, nuts, dried fruits like prunes, figs, and apricots are good sources of iron (Webster-Gandy *et al.*, 2020). Dietary factors such as inadequate amount of iron rich foods, vitamin C rich foods (iron absorption enhancers), high amounts of iron inhibitors (e.g. tea, coffee, calcium rich foods) in the diet particularly at the time of meals lead to low bio-availability of dietary iron (Rasheed *et al.*, 2008).

During pregnancy, an expanded danger of maternal and perinatal mortality and low size or weight at birth can be related with low hemoglobin values. Maternal and neonatal passing are a noteworthy reason for mortality in creating nations and cause deaths around the world (Abdelhafez and El-Soadaa, 2012, Zhang *et al.*, 2009). In pregnancy, maternal anemia is viewed as a hazard factor for unfavorable outcomes. In developing countries, anemia is in charge of 40-60% of maternal passing. Directly or indirectly, anemia contributes to premature delivery, pre-eclampsia, infection, cardiac failure, and hemorrhage (Padmanabhan and Chandrakar, 2018).

The research was aimed to find out the nutrient intake causing anemia among pregnant females. Given the low level of knowledge regarding dietary practices, awareness should be increased through health education and regarding behaviors modification. In the case that these practices and behaviors are not addressed on time, consequences of anemia on babies will increase, such as low body weight, malnutrition, delayed development, and still births. The purpose of this study was to compare the nutrient intake among pregnant females with and without anemia in order to highlight the effect of inappropriate dietary pattern and insufficient nutrients intake among pregnant anemic females.

Materials and Methods

Study design and participants: A comparative cross-sectional study design was used. Data were collected from females visiting the indoor and

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outdoor units of Gynae and Obstetrics department and vaccination center of Preventive Pediatrics department at Sir Ganga Ram Hospital, Lahore for a duration of 4 months in December 2018-March 2019. As a result, 150 pregnant women were enrolled in the study using non-probability convenient sampling technique. Pregnant females visiting the respective departments were selected for the follow-up routine checkup having biochemical profile. Later, the participants were categorized as anemic and non-anemic if they had Hb 8 g/dl or less and Hb above 8 g/dl, respectively.

Measurements: Data were collected via self-structured questionnaire regarding their demographics, medical history, food frequency questionnaire (FFQ) (Willett, 1998), and 24-hour recall. After receiving the written informed consent forms, data were collected by interview.

Ethical considerations: Ethical approval was taken from the Institutional Review Board (IRB) of the University of Lahore. All the rules and standards set by the committee were respected. Patients were pre-informed regarding the benefits of study, they were allowed to leave the study any time during interview. Their identities were kept anonyms. Prior written informed consents were taken from all the participating females.

Data analysis: The quantitative variables were assessed using mean ± SD and the qualitative variables were reported using frequencies and percentages. To analyze the data, SPSS version 21.0 was used. Nutrients from 24-hr dietary recall were derived with reference to the standard serving sizes using MS excel.

Results

The comparison of demographic profile showed insignificant association of patient's age (P = 0.88) and significant association of age at the time of marriage (P = 0.02) between anemic and non-anemic females. Education (P = 0.001) and socio economic status (P = 0.001) also showed significant association with anemia. However, employment status showed insignificant association with anemia (P = 0.16) as shown in **Table 1**.

Nutrient intakes of the pregnant women were estimated through 24-hour recall data. Mean value of energy intake in a day was 1429.7 ± 734 kcal for the anemic women and 1504.27 ± 736.4 kcal for non-anemic women; whereas, RDA of energy during pregnancy was 2200 Kcal. Mean value of daily carbohydrate intake of anemic women during 24 hours was 141.1 ± 80.4 g and non-anemic women intake was 135.4 ± 69.4 g; whereas, 175 g is considered as the RDA. The major reasons behind anemia among pregnant females included lower intake of protein (36.1 ± 20.0 g/day), which is approximately half of the RDA since protein is the building block of the cells and Hb; inadequate iron intake (8.9 ± 4.1 mg), which is highly lower than the RDA (as iron is the basic oxygen carrying unit of blood) and RDA (371.2 ± 173.8 mg); and intake of calcium, which helps oxygen carrying and iron absorption in blood.

Intake of other micronutrients was also not adequate, mean of vitamin A intake among anemic women was 605.1± 88.8 µg, while its RDA during pregnancy is 750-770 µg. Mean of Vitamin C intake was 20.0 ± 18.8 mg, whereas RDA is 80-85 mg. B_1 and B_2 intake means were 0.7 ± 0.3 mg and 0.5 ± 0.2 mg, respectively and their RDA during pregnancy is 1.4 mg. Mean intake of Niacin (B_3) was 6.5 ± 5.2 mg and its RDA was 18 mg during the pregnancy (**Table 2**).

Dietary intake of the participants was recorded through FFQ. Findings showed that among the anemic group, only 23 females had the knowledge regarding balanced diet during pregnancy and 48 of them were taking iron supplements. However, among the basic reasons towards anemia, 64 anemic females were taking tea or coffee on daily basis, 59 were taking tea after meal, and 46 were having craving for pica (**Figure 1**).

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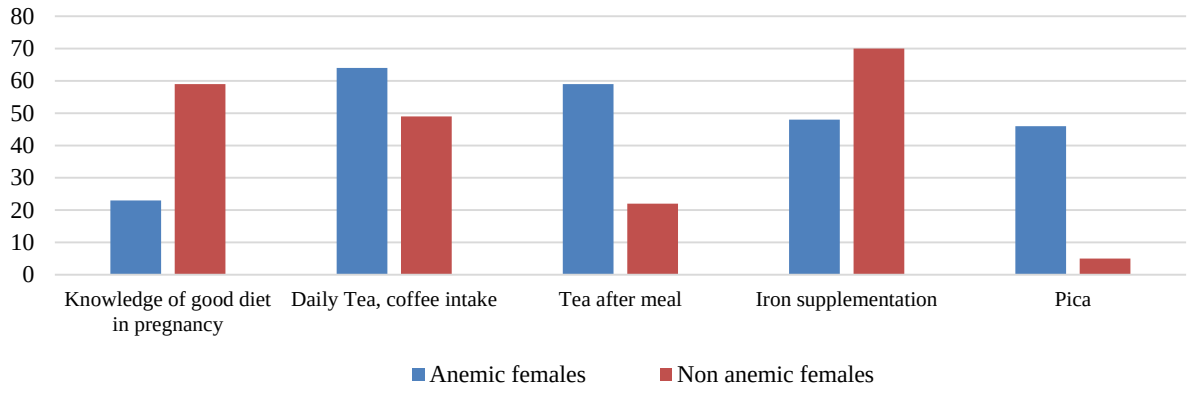


Figure 1. Comparison of dietary habits among anemic and non-anemic females

Table 1. Distribution of Age, age at the time of marriage, education, employment status, and socio-economic status of participants

Variables	Anemic	Non anemic	P-value[a]
Age (y)	28.07 ± 4.34	28.17 ± 3.72	0.88
Age at the time of marriage (y)	22.47 ± 4.12	23.84 ± 3.06	0.02
Education			
Illiterate	5 (7.4)	0 (0.0)	0.001
Middle school	16 (23.5)	4 (4.9)	
Matriculation	15 (22.1)	8 (9.8)	
Intermediate	14 (20.6)	13 (15.9)	
Graduation and above	18 (26.5)	57 (69.5)	
Socio economic status			
Lower class	41 (60.3)	20 (24.4)	0.001
Middle class	18 (26.5)	31 (37.8)	
Upper class	9 (13.2)	31 (37.8)	
Employment status			
House work	61 (89.7)	67 (81.7)	0.16
Working women	7 (10.3)	15 (18.3)	

[a]: *Chi-square test*

Table 2. Comparison of nutrient intake among pregnant females

Nutrients	Anemic	Non anemic	Recommended daily alowance	P-value[a]
Energy (kcal)	1429.7 ± 734.0	1504.27 ± 736.4	2200	0.53
Carbohydrates (g)	141.1 ± 80.4	135.4 ± 69.4	175	0.64
Proteins (g)	36.1 ± 20.0	53.94 ± 33.2	71	<0.001
Fats (g)	80.2 ± 40.7	87.4 ± 50.3	65	0.34
Iron (mg)	8.9 ± 4.1	10.8 ± 6.9	27	0.04
Calcium (mg)	371.2 ± 173.8	430.0 ± 298.5	1000-1300	0.13
Vitamin A (µg)	605.1 ± 88.8	742.5 ± 919.4	750-770	0.22
Vitamin C (mg)	20.0 ± 18.8	26.0 ± 40.4	80-85	0.26
Thiamin (mg)	0.7 ± 0.3	0.7 ± 0.9	1.4	0.90
Riboflavin (mg)	0.5 ± 0.2	0.8 ± 1.0	1.4	0.01
Niacin (mg)	6.5 ± 5.2	7.4 ± 7.2	18	0.37

[a]: *Chi-square test*

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Discussion

Based on the findings, anemic females had significantly higher daily consumption of tea and coffee and majority of them were taking their tea serving with breakfast meal. Similar results were reported in previous study by Rai (Rai, 2018). On the contrary, Rai revealed that anemia was more common among women who consumed tea two or more than two times a day. The current study showed that 44.7% of the anemic patients had no knowledge regarding balance diet. Rai S also conducted a study and informed that not having enough knowledge of balance diet was a risk factor of developing anemia (Alzaheb and Al-Amer, 2017). A strong association between anemia and low consumption of beef, mutton, poultry, fish, and eggs was found. Findings revealed poor protein intake and nutritional status among the anemic expecting females as one of the major causative factors of anemia. Parallel results were found in studies by Alzaheb RA and Alaofè H *(Alaofè et al., 2017, Alzaheb and Al-Amer, 2017),* indicating diet deficiency in iron rich foods among pregnant females (Alaofè *et al.*, 2017). Nik Rosmawati NH *et al*. carried out a research in 2009 in city of Terengganu, Malaysia and reported 57.4% prevalence of anemia with poor dietary and nutritional status(Nik Rosmawati *et al.*, 2012). Parallel results were found in a number of previous studies (Alaofè *et al.*, 2017, Nik Rosmawati *et al.*, 2012). Current research showed that overall females had very low consumption of vitamin C rich foods in their diet, which is another risk factor of developing anemia, since vitamin C enhances the absorption of iron in body.

Conclusions

Findings showed that anemic females had higher tea consumption right after meals along with fewer intakes of protein, iron, and vitamin C as compared to the non-anemic females and RDA. Lack of education, lower literacy rate, less knowledge regarding balance diet, and improper iron supplementation among anemic females promoted higher prevalence of anemia in pregnancy.

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Authors' contributions

Humayun N conducted the study and collected the data. Bashir S supervised and designed the study, critical review of the manuscript and Khalid S literature search and manuscript write-up. All authors approved the final version of manuscript.

Conflict of interest

There is no conflict of interest to reveal.

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