Estimation of hemoglobin levels in pregnant and non-pregnant women in Rafhacity, Saudi Arabia

Abstract

Background: Anemia is a global health problem especially affecting pregnant and non-pregnant women. Among many different causes of anemia, iron deficiency anemia is the most common cause. Hemoglobin concentration measurement is among the most commonly performed blood tests, usually as part of a complete blood count.

Methods: A cross sectional study was conducted in Rafha Central Hospital and three associated health centers. Pregnant and none pregnant women (400) were included in the study. The data were collected by using questionnaire prepared by the investigator in Arabic language. Informed consents were taken prior to taking data from each participant.

Results: Out of the 400 women enrolled in this study, 235 were pregnant. Majority of the participants were married (86%), and 45% were university graduates. Most of the participants (77.25%) were in the anemic range. The prevalence of anemia was almost equally distributed among pregnant (75.31%) and non-pregnant (80%) women. The prevalence of anemia was significantly associated with the use of tea, coffee and soft drinks.

Discussion and conclusion: Our results show much higher prevalence of anemia than reported by many other studies done inside and outside of Saudi Arabia. We conclude that anemia prevalence in the region is quite large. People must adopt eating and drinking habits which positively affect the absorption of iron from the food and therefore, increase hemoglobin levels in the body.

Keywords: Prevalence, Anemia, Pregnancy, Risk Factors, Saudi Arabia,

1. Introduction:

Pregnancy and lactation are considered vulnerable periods for both the mother and the child worldwide. The maternal health and nutrition has an important role in the development of the fetus. Low birth weight as a result of nutritional deficiencies affects some 20 million newborns annually, mainly in the developing countries [1]. World health organization (WHO) defines anemia in pregnancy as a reduction in the oxygen-carrying capacity of the blood as a result of fewer circulating erythrocytes than normal or a decrease in the concentration of hemoglobin level below 11 g/dl. Different micronutrients like iron, vitamin B12, folate and others are needed for the production of hemoglobin and red blood cells. The lower intake of Iron (<20mg/day), folate (<70mg/day), and/orvitamin B12 concentration (<150pg/ml) can result in different types of anemia like microcytic and megaloblastic anemia [2].

Hemoglobin concentration measurement is among the most commonly performed blood tests, usually as a part of a complete blood count. Normal hemoglobin levels are: children aged 6 months to 6 years 11 g/dL, children aged 6-14 years 12 g/dL, adult males 13 g/dL, adult females none pregnant 12 g/dL and adult females pregnant 11 g/dL [3].

Anemia is an important health consideration as it results in poor growth and energy levels. It affects about two billion people throughout the world, mainly due to deficiency of iron. Anemia is associated with unfavorable pregnancy outcomes such as premature labor, low birth weight, maternal mortality, and perinatal mortality. In the developing world, more than 50% women are considered anemic. [4, 5].

Deficiency of iron is considered the most common cause of anemia in pregnant and non-pregnant women worldwide. Good nutrition in pregnancy is very important as if affects the health of the mother and the fetus. During pregnancy, plasma volume increases more than the red blood cell mass, resulting in low hemoglobin concentration which in turn lowers the blood viscosity. This phenomenon is important as it increases the placental perfusion, imparting an improved exchange of nutrients and gases between mother and fetus [6].

Anemia in pregnancy is very common. According to WHO estimates in 2011, 38% of the pregnant women between the age of 15 and 45 years are suffering from anemia worldwide [1]. Anemia in pregnancy is considered as a major health problem in almost all developing countries. In the middle east, anemia, especially iron deficiency anemia among pregnant women is an important public health problem. In Saudi Arabia, it is estimated that around 40% pregnant women are anemic [7, 8, 9]. The anemia prevalence is almost equally higher among non-pregnant women. Therefore, it is important to consider that most of the pregnant women with anemia were already anemic at the time of conception [10]. Among most common factors associated with anemia during pregnancy, lesser intake of juices and meat, menorrhagia, intake of antacids, and non-steroidal anti-inflammatory drugs have been reported [11]. Pica associated anemia was reported among 13.2% of women [12].

There have been limited studies describing Hb concentration during pregnancy in this region of Saudi Arabia. Our primary objective is to study the pattern of hemoglobin level and prevalence of anemia among pregnant and none pregnant women living in Rafha, Northern Border region and to evaluate effects of women's demographic and socioeconomic characteristics on hemoglobin level and the occurrence of anemia and assess the dietary food habits of pregnant and none pregnant women.

2. **Material and methods:**

This is a cross sectional study conducted in Rafha Central Hospital and three health centers in Rafha (Northern, Eastern and Western health centers) during a period of eight months from July 2017 to March 2018. A total of 400 pregnant and none pregnant women were included. The data were collected by using questionnaire prepared by the investigators in Arabic language. The questionnaire consisted of two parts; one concerning the socio-demographic characteristics of the participants such as age, educational level, employment, residence, and marital status; the second part was about the awareness about risks factors. For better quality of the data, the investigator of the study explained highlights of the questionnaire to the participants. Informed consent were taken from each participant.

The official permission was taken from the Hospital and health centers authorities before starting the project. The ethical clearance was taken from the local bioethics committee of the university and from the health department in Arar.

The haemoglobin levels were analysed in the diagnostic laboratory of the Rafha General Hospital by an expert lab technician as per routine protocol of the hospital and were recorded.

The data were organized and statistically analyzed to find out the required objectives. Softwares like SPSS and Microsoft excel were used for analyzing the data with the help of a professional statistician.

3. Results:

As stated earlier, a total of 400 women were enrolled in this study, out of which, 97.3% were Saudi. Most of the participants were married (86%) and pregnant (58.75%). Most of the participants were in the age group ranging15-24 years. A large number of the participants was anemic (77.3%) and did not have knowledge of iron rich foods (88.3%). The demographic data of the participants is given in the Table 1.

Table 1. The demographic data of the participants

	Parameter	Number	%age	Cumulative %age
Nationality	Saudi	389	97.3	97.3
	Non-Saudi	11	2.7	100
Educational levels	Illiterate	84	21.0	21
	School level	135	33.75	54.75
	University	181	45.3	100
Residential area	Rural	59	14.8	14.8
	Urban	341	85.3	100
Age groups (years)	15-24	274	68.5	68.5
	25-34	88	22.0	90.5
	35-44	32	8.0	98.5
	55-70	6	1.5	100.0
Hemoglobin levels	Lower than Expected	309	77.3	77.3
	Normal range	91	22.8	22.8
Marital status	Married	344	86	86
	Unmarried	56	14	100
Pregnancy status	Yes	235	58.75	58.75
	No	165	41.25	100
Low Hb level throughout life	Yes	240	60.0	60.2
	No	160	39.8	100
Knowledge of iron rich food	Yes	46	11.5	11.5
	No	353	88.3	100

As shown in Table 1, most of the participants (77.25%) were in the anemic range. While calculating each group separately, we found that anemia was equally prevalent among pregnant (75.31% (177/235)) and non-pregnant (80% (132/165)) women.

Regarding the participants' life style, we found that, most of the participants (86.5%) were drinking varying number of cups of tea at different times of the day, with or without eating food (Table 2). The number of cups of tea taken per day was significantly associated with anemia (p-value 0.001). Among those taking tea regularly, 79.7% (275/345) had their hemoglobin level less than the normal range.

Table (2): Relationship between tea intake and hemoglobin level

Parameters		HBGROUP		*p* value	Total
		Lower Hb Levels	Normal Hb Levels		
How many cups of tea you are drinking per day?	0	33	21	0.001	54
	1	107	37		144
	2-3	113	23		136
	4-5	30	1		31
	More than 5	25	9		34
Total		308	91		399

Majority of the participants were also taking coffee regularly (88.5%; 353/399) with different number of cups each day. The amount of coffee taken was significantly associated with low Hb levels among the participants (*p*-value = 0.010). Among regular coffee drinkers, 78.2% (276/353) were anemic (Table 3).

Table (3): Relationship between number of cups of coffee taken and hemoglobin level

Parameters		Hb GROUP		*p* value	Total
		Lower Hb Levels	Normal Hb Levels		
How many cups of coffee you are drinking per day?	0	32	14	0.010	46
	1	69	31		100
	2-3	105	26		131
	4-5	44	3		47
	More than 5	58	17		75
Total		308	91		399

Most of the participants (74.2%; 296/399) were also taking different amounts of soft drinks at different times of the day, out of which, 78.4% (232/296) had hemoglobin level less than the normal range (*p*-value = 0.019, Table 4).

Table (4): Relationship between amount of soft drink taken and hemoglobin level

Parameters		HBGROUP		*p* value	Total
		Lower Hb levels	Normal Hb levels		
How many bottles of soft drinks you are taking per day?	0	76	27	0.019	103
	1	146	34		180
	2-3	60	14		74
	4-5	9	2		11
	More than 5	17	14		31
Total		308	91		399

4.0 Discussion:

Anemia, which is the most prevalent nutritional problem worldwide, occurs more commonly in young children, pregnant women, and women of child bearing age. This is not a specific entity but an indication of an underlying pathologic process or disease. In the present study, the prevalence of anemia among pregnant women of Rafha city of Saudi Arabia was 75.31% in pregnant and 80% in none pregnant women. These results show much higher prevalence of anemia than reported by other studies done inside Saudi Arabia. In a study done among 134 male and female students of the Applied Medical Sciences, Jazan University, Gizan, Saudi Arabia, 5% male while 67.35% female students were found anemic [13]. In another study done in the same region where data was taken from different healthcare units, 58.9% of the pregnant women were found anemic [5]. In another study done on 6,539 pregnant women attending different healthcare units in the Asir region of Saudi Arabia, the prevalence was 31.9% [10]. In Jeddah, in a study done on the female students of the elementary school, 23% of the students were found anemic [14] whereas in another study done on pregnant women of the same region, 55.6% were reported anemic [15]. In Riyadh city, a study was done on 683 healthy females aged between 18 and 40 years, the prevalence of anemia was reported 41.6% [16]. Our reported prevalence of anemia is also much higher than that found by a previous study done among female Saudi university students of Taibah University, Al-Madinah Al-munawarah, which reported a prevalence of 64% [17]. In 2016, a study done on the female university students in Tabuk, it was reported that a 12.5% of the students were anemic [18]. Our study has reported a much higher prevalence of anemia among pregnant and non-pregnant women of Saudi Arabia. When discussing the anemia prevalence outside Saudi Arabia, in most of the reported studies, it was also less than our findings. For example, in a study conducted in 2018 in the Thatta district, Pakistan, 61.3% of the 150 non-pregnant women were anemic [19]. Among female student at a health institute in India, a 28.6% prevalence of anemia was reported [20]., while among pregnant women it was 68%, reported from a tertiary care hospital in Haryana, India [21]. In Bangladesh, 63.3% female students were reported anemic in Noakhali region [22].

In our study, we have also identified some risk factors associated with anemia. When looking for the participants' life style we found that, most of the participants (86.5%) were drinking tea with different amounts at different time of the day, with or without eating food (Table 2). We found that taking tea was statistically associated with the onset of anemia (p-value 0.001). The prevalence of anemia in current study was also associated with increasing consumption of coffee (p-value = 0.010). Tea and coffee contain polyphenolic compounds having antioxidant properties which help reduce inflammation and cancer but also bind elemental iron and reduce its absorption in the gut, resulting in iron deficiency anemia [23, 24, 25].

Studies have reported increased absorption of elemental iron with concomitant use of cola drinks [26]. The possible explanation of this increased absorption is the increased solubility of iron in the lower pH caused by cola drink. In current study, however, we found that the use of soft drinks was associated with decreased absorption of iron resulting in anemia (p = 0.019, Table 4). This may be explained by the fact that majority of the participants who were taking soft drinks were also taking large amounts of tea and coffee. The inhibitory effects of tea and coffee on the absorption of iron superseded the positive effects of the soft drinks.

5. Conclusion:

We conclude that anemia prevalence in Rafha area, Northern Border Region of Saudi Arabia is quite large. Participants had a variety of risk factors that can lead to anemia eventually especially taking larger amounts of tea and coffee. The concerned people in the ministry of health must educate people to adopt eating and drinking habits which positively affect the hemoglobin levels in the body.

Consent:

Informed written consents were obtained from all study subjects. Complete privacy, anonymous responding, voluntary participation and rights of participating subjects were all explained and applied to potential respondents.

Ethical Approval:

The authors have obtained all necessary ethical approval from involved institutions.

Competing Interests:

Authors have declared that no competing interests exist.

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