To study the prevalence of anemia in pregnant women of different age group and trimester in Ropar District, Punjab

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Abstract

India being a developing country, the issue of food security and malnutrition has always been bothering the nutritionists as well as the government of the country. Triple burden of malnutrition nowadays is a major cause of concern, where iron deficiency anemia is leading the board. 64% of pregnant women in Ropar district were found to be anemic, the reason for which varied from age to number of pregnancies and poor dietary intakes. Although, to eradicate this high prevalence of anemia the Government of India have made many interventions as free iron and folic acid supplementations and free or cheap antenatal health checkups in government hospitals and dispensaries, yet the prevalence is high enough. The most convincing cause of this is lack of education and awareness among the population. Second factor might be the inefficiency of these schemes at ground level. Moreover, the consumption of iron and folic acid tablets during pregnancy alone would not be enough to cope up with the high demands of iron during pregnancy, it is important to maintain the nutritional stores before conceiving. So, the diet and nutritional status from menarche to the time a woman is planning to conceive affects greatly the outcomes of pregnancy.

Keywords: Anemia, Iron, Nutrition, Pregnancy, Punjab

Introduction

India was known to have great prevalence of Dual burden of malnutrition until 2018 but recently the Government of India has recognized the triple burden of Malnutrition in the country i.e.; the co-existence of overweight, underweight and micronutrient deficiency. Out of all micronutrient deficiencies, iron deficiency is the most prevalent one, affecting majority of pregnant women and children all over the country.

Iron deficiency being main cause of Anemia, it has been seen that Majority of the women in India are anemic. Despite numerous interventions by the Government of India like Pradhan Mantri Surakshit Matritva Abhiyan, Janani Suraksha Yojna, Integrated Childhood Development Services, Anemia Mukat Bharat and the fortification of staples namely, wheat flour, rice and edible oil with essential nutrients like iron, folic acid and vitamin B12, the prevalence of Anemia in India is still very high. In fact NFHS data shows that the percentage of mothers who consumed iron folic acid for 100 days or more when they were pregnant has been improved from NFHS-4 to NFHS-5 by 12.8% (55.4% to 42.6% respectively).As per NFHS data, the percentage of anemic pregnant women has increased from 50.4% to 52.2% in NFHS-4 (2015-16) and NFHS-5 (2019-21) respectively [2] even though there is an increase in percentage of mother who consumed Iron and Folic Acid during pregnancy from 14.4% (NFHS-4) to 26% (NFHS-5).

Red blood cells (RBCs) are essential for delivering oxygen throughout the body; therefore, anemia is a shortage of functioning RBCs, producing unusual problems. The bone marrow is where these RBCs are made. The lifecycle of an average RBC cell is about 120 days. For erythropoiesis (production of RBCs), the body requires folic acid, vitamin B12, and iron, among other things. Anemia develops if one or more of these components are deficient or if there is excessive loss of RBCs from the body. Anemia can be classified into iron deficiency anemia, folic acid deficiency anemia, B12 deficiency anemia, protein deficiency anemia. [1].

Pregnancy is a crucial period for women as well as child's health. Iron being essential element for maintenance of Physiochemical process, its demands increase during pregnancy and the deficiency can cause maternal mortality and morbidity. It not only affects the health of the mother but also affects the foetus. Iron deficiency anemia during pregnancy may lead to poor reproductive outcomes such as pre-tern delivery low-term birth weight infants which is evident from the 24.9% neo-natal mortality rate, 35.2% infant mortality rate and 41.9% under five mortality rate in the period of 2019-21 (NFSH-5) also every year 20-40% of maternal deaths are due to anemia.

According, to WHO in 2021, 29.9% of women aged 15-49 years all over the world were anemic, as in 2019, 36.5% of pregnant women anemic globally [3]. The Hb count of less than 11gm/dl to 11.5gm/dl in the initial stages of the pregnancy may be considered as anemia. The major reason behind this is the dilution of blood, a natural process, which starts at the eighth week of the gestational period and continues until the 32nd to 34th week of pregnancy.

Many researches have been conducted in the different districts of Punjab to know the situation of anemia in pregnant women. In this study a survey has been conducted to study the prevalence of anemia in pregnancy and to compare the prevalence among different age group and trimester.

Material and Method

The Pregnant women aged (18-45 years) in their first (1-3 months), second (4-6 months) and third (6-9 months) trimester (total - 100, 30 in first, 42 in second and 28 in third trimester), who came for follow up in hospitals in District Ropar, Punjab, were consider for the study. The hospitals were visited for two consecutive days and data was collected with the help of the duty staff for the month of august 2023.

The Information was collected from the records of the gynecology Department. From the records, the data collected for the study included, the age, weight, trimester, occupation, blood pressure, number of pregnancies, family members, family type and the blood test report for blood groups, RBS, serum iron, TSH and Hb levels. Along with these the number of pregnant women taking iron and folic acid supplements were also concluded.

From the data collected, several categories were formed, based on Hb levels (mild anemic- 10.0-10.9, moderate anemic- 8.1-9.9, and severe anemic- <8.00) and based on age groups i.e.; <20 years, 20-24 years 25-29 years and >30 years old women.

Result

In this study total 100 pregnant women were considered, the results of Hemoglobin levels in pregnant women showed that 64% of women were anemic. As of NFHS-5 data the prevalence of anemia in pregnant women aged 15-49 years is 51.7% [2]. Whereas, in a study conducted in 2017 the prevalence of anemic pregnant women in Punjab came out to be 87%, where the sample size of the study was 200 pregnant women in central Punjab [4]. Yet another study conducted in 2006 in 16 districts of India concluded the average prevalence of anemia among pregnant women to be 84.9% [5].

Out of 100 pregnant women, 3% were teenagers (below 20 years of age) whereas 33% subjects were above 30 years of age. Majority of the women i.e., 64%, were aged 20-29 years (Fig. 1.1). It was

observed that out of 100 subjects', maximum subjects i.e., 43% were having blood group B+ where as only 2% of the subjects belonged to blood group AB- and B-, as of other blood groups 17% were having A+, 15% had AB+ and 23% of the pregnant women had O+ blood group.

The average of number of pregnancies per women came out to be 3, however majority of the women (34%) were expecting their 2nd child, there were a few women, 7% and 2 %, who were going to have their 4th and 5th child, respectively. Whereas, the percentage of women expecting their 1st and 3rd child were 29% and 28%, respectively.

It has also been observed that 51% of the women belonged to nuclear type of family with average 3 family members, whereas 49% women came from joint families with average number of members being 12. (Table 1).

Age (Years)	Number of subjects
>20	3
20-24	19
25-29	45
≥30	33
Blood Group	
A+	17
B+	43
AB+	15
O+	23
AB-	1
B-	1
Number. of pregnancy	
1	29
2	34
3	28
4	7
5	2
Family Type	
Joint	49
Nuclear	51

Table 1: Demographic measures of pregnant women

Table 2 shows the prevalence of anemia among different age groups. Out of 64 anemic subjects 76% were above 30 years of age, followed by 74% falling in the category of 20-24 years age, whereas 67% of teenagers were anemic i.e., 2 out of 3. The most convincing reason for this high prevalence of anemia in teenage pregnancy was mentioned in a review, by Chakole *et.al.*, as the poor dietary pattern during adolescence and lack of prenatal care which increases the risk of preterm births, LBW, and stillbirths, and pose a threat of life in young mothers [6]. 51% of the women aged 25-29 years were found to be anemic, in contrary, 85.7% of this age group was suffering by anemia, according to a study by Lokare *et.al.* [7].

Age	Participants	Non-Anaemic	Anemic Subjects	Percentage of Anemic subjects
<20	3	1	2	67
20-24	19	5	14	74
25-29	45	22	23	51

>30	33	8	25	76
Total	100	36	64	

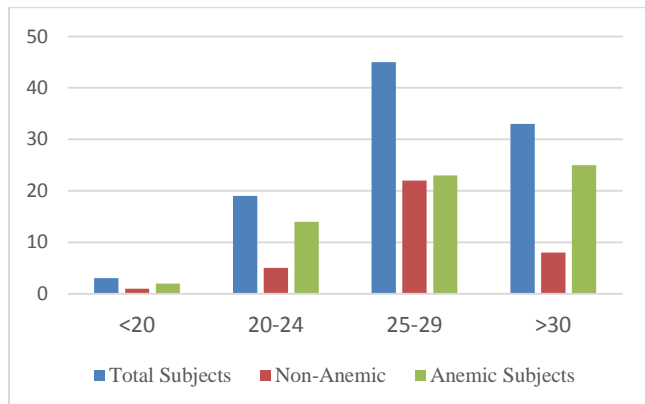Table 2: Prevalence of anemia among different age groups

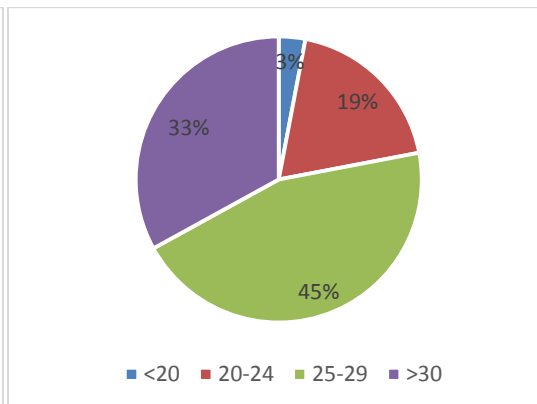Figure 1: Prevalence of anemia among different age groups

Figure 1.1: Total subjects according to age group

The prevalence of anemia among pregnant women with different blood groups is depicted in table 3. Total 64 women were found to be anemic out of which 100% of the subjects with blood groups Rh- (AB- and B-) were anemic. However, the correlation of blood group with anemia is not evident. whereas the women with blood group A+, B+ and AB+ were found to be almost equally affected i.e., 65%, 67%, 60%, respectively. It has been observed that O+ blood group was least affected with 57% of the pregnant women being anemic(fig.2). Among the blood groups O, A, B, AB the high prevalence of anemia among blood group B might be due to the highest number of participants with blood group B (43). The trend of prevalence of anemia among different blood groups in this study is found to be B>A>AB>O but in a study by Khaliq *et.al.* (2009) [8], this trend was different as O>B>A>AB, which however was similar to another study in 2012[9]

Blood group	Participants	Non-Anaemic	Anaemic	Percentage of anaemic subjects
A+	17	6	11	65
B+	43	14	29	67
AB+	15	6	9	60
O+	23	10	13	57
AB-	1	0	1	100
B-	1	0	1	100
Total	100	36	64	

Table 3: Prevalence of anemia among pregnant women with different blood groups
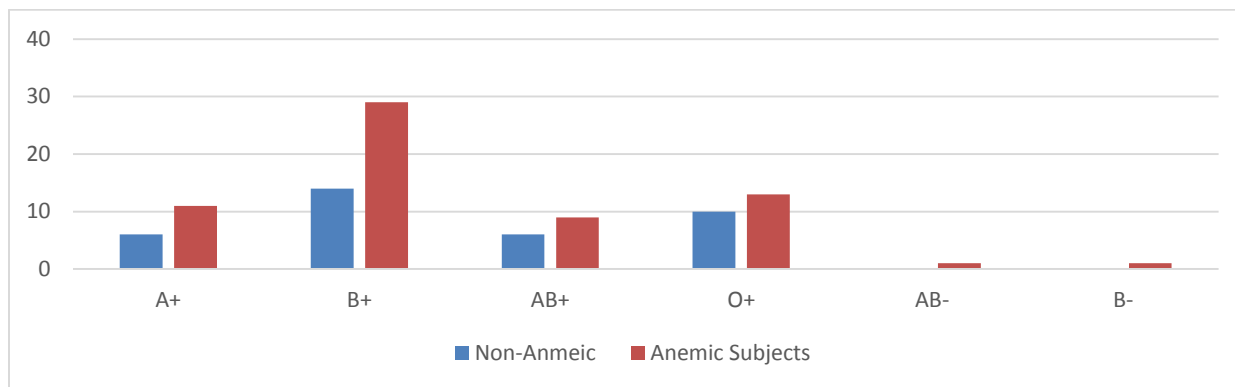
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Figure 2: Prevalence of anemia among pregnant women with different blood groups

While measuring the number of pregnancies of the subjects, it was observed that after 3 children the risk of anemia increased with subsequent pregnancies. 100% of the women expecting their 5th child were found to be anemic, followed by 86% women with 4th pregnancy, who were anemic. This high prevalence of anemia in fifth and forth pregnancy might be since most of the mothers are unable to recover from the postpartum anemia due to the previous pregnancy, the increased demands of the next gestation worsen the situation [10]. However, this trend was reversed from 1st child to 3rd i.e., the risk of anemia decreased gradually from 1st child (69%) to second child (65%) and reduced to 50% by the 3rd pregnancy. Young age pregnancies are one of the most relevant reasons for the high incidence of anemia during first and second pregnancy.

Number of pregnancy	Participants	Non-Anaemic	Anaemic	Percentage anaemic subjects
1	29	9	20	69
2	34	12	22	65
3	28	14	14	50
4	7	1	6	86
5	2	0	2	100
Total	100	36	64	

Table 4: Prevalence of anemia with respect to number of pregnancies.

Out of the total participants, almost half of the participants were in their 2nd trimester (42%) followed by 1st trimester (30%) and rest were in their third trimester (28%). Table 5 shows the prevalence of anemia during different trimesters, which is being led by 1st trimester with 70% of women being anemic, closely followed by 2nd trimester i.e., 69% and 50% of women in their third trimester were recorded to be anemic. However, a different outcome was observed in a study conducted in Pakistan where the prevalence of anemia was highest in 2nd trimester, followed by 3rd and 1st trimesters, respectively [11]. Another study showed the similar results where maximum number of pregnant women in their second trimester found to be anemic [12]. As of this study, the high prevalence of anemia in first trimester shows the lack of awareness about the replenishment of nutrient stores before planning to conceive as 58.8% of non-pregnant aged 15-49 in Punjab are already anemic, where the requirement of blood and iron increases during pregnancy. This might cause loss of fetus in initial stages of pregnancy, and increase the complications in pregnancy. Also, from NFHS-5 data, it is evident that all over Punjab only 68.5% women had an antenatal checkup in their first trimester [2].

Trimester	Participants	Non-Anaemic	Anaemic	Percentage of anaemic subjects
1	30	9	21	70

2	42	13	29	69
3	28	14	14	50
total	100	36	64	

Table 5: Prevalence of anemia in pregnant women during different trimesters.

Iron deficiency being main cause of Anemia, it has been seen that Majority of the women in India are anemic. During pregnancy the iron requirement increases to cope up with the demands of fetoplacental unit, the expansion of maternal erythrocyte mass and to compensate the iron loss during delivery [13]. As shown in table 6, out of 14 subjects with serum iron levels <40 mcg/dl ,100% were anemic including 5 severely anemic and 9 moderately anemic. It can be observed from the table that as the serum iron levels increases from 40-70 mcg/dl to 70-100 mcg/dl and finally >100 mcg/dl, the prevalence of anemia among the subjects is decreasing gradually as 67%, 51% and 25% respectively. Out of 64 anemic women, 33 were mildly anemic with Hb levels 10.0-10.9 g/dl, 26 were moderately anemic (Hb-8.1-9.9 g/dl) and 5 subjects were severely anemic with Hb <8 g/dl and serum iron <40 mcg/dl(fig.3). The iron requirement is however not equal throughout the pregnancy, it decreases in first trimester due to absence of menstruation but eventually increases in second and third trimester, similarly the absorption of iron is decreased in first trimester and increases gradually in second and third trimester [14]. Hence, it is important for pregnant women to have iron and folic acid supplementation during their gestation period to meet the increasing demands of iron, but in 2019-2021 survey by NFHS 55.4% women had iron and folic acid supplementation for 100 days or more during their pregnancy, whereas only 40.5% of pregnant women had the supplementation for 180 days or more [2]. This supports that fact that majority of pregnant women in the area are suffering with anemia.

Serum Iron (mcg/dl)	Participants	Normal (Hb>11 g/dl)	Mild Anaemic (Hb 10-10.9 g/dl)	Moderate Anaemic 8.1-9.9 g/dl	Severely Anaemic (<8 g/dl)	Percentage Anaemic
<40	14	0	0	9	5	100
40-70	45	15	16	14	0	67
70-100	37	18	16	3	0	51
>100	4	3	1	0	0	25
Total	100	36	33	26	5	

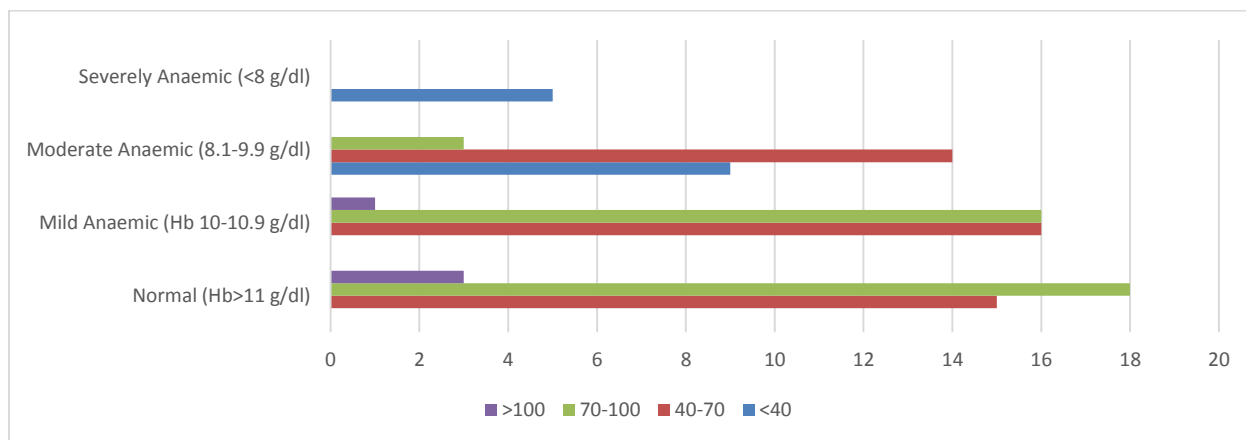Table 6: Relationship of serum iron with Hb levels and anemia

Figure 3: Relationship of serum iron with Hb levels and anemia

Many studies have shown the relation of TSH with the incidence of anemia. In the current study, it is evident from table 7 that 88% of the participants with elevated (>5.50) TSH levels were anemic whereas out of 84 participants with normal TSH levels 56% were anemic. Many studies have supported the fact that hypothyroidism is the leading cause of Iron deficiency anemia, as thyroid hormone plays an important role in the regulation of ferritin expression, which results in less ferritin synthesis. Low levels of ferritin decrease the iron stored in the body, as ferritin is an iron storage protein. Also, hypothyroidism is known to decrease the absorption of iron in the body, being another reason for iron deficiency anemia [15].

TSH level	Participants	Non-anaemic	Anaemic	Percentage
0.35-5.50(normal)	84	30	50	56
>5.50 (elevated)	16	6	14	88
Total	100	36	64	

Table 7: Relationship of serum TSH and anemia in pregnant women

Conclusion

From this study it has been concluded that there is high prevalence of anemia in Punjab. The age, nutritional status, number of pregnancies, trimester etc. can affect the outcomes of pregnancy to an extent. However, no previous studies were found to support the fact that number of pregnancies per woman can affect the iron profile of the woman and might become the risk factor of anemia during pregnancy. Not only during pregnancy, the nutritional status of a woman before pregnancy poses a major influence on the pregnancy outcome. The untreated anemia can increase the risk complications in pregnancy giving rise to preterm delivery, low birth weight, still birth, and increases the mortality and morbidity in mothers as well as the child. Being able to impose such serious consequences this issue needs urgent steps to be taken on ground level, to reduce the incidence of anemia during pregnancy. Not only during pregnancy, it is important to take care of the nutritional and biochemical status of women and adolescent girls.

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