

Haemoglobin Level of Pregnant Women on First Appointment to Antenatal Care Clinic and Their Awareness on Anemia During Pregnancy

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ABSTRACT

Background & Objective: Anemia in Pregnancy (AIP) causes many obstetric complications. Pregnant women's awareness and knowledge play a pivotal role in management and prevention of AIP.

Methods: The study was conducted at Lakshmi Madhavan Hospital-Tirunelveli, India, between August 2020 and December 2020. The questionnaire survey was conducted among 138 first trimester pregnant women visiting the obstetrics and gynaecology department for antenatal care on their first appointment. The diagnosed participants' knowledge, awareness and management potential about AIP was assessed.

Results: The mean age was 26.9 and 24.2 years in AIP and non-anemia in pregnancy NAIP groups, respectively. First appointment was scheduled for the antenatal care in the early weeks of first trimester i.e, between five to nine weeks gestation was 38.3% and 37.6% of the AIP and the NIAP group, respectively. AIP compared to parity ($\chi^2 = 3.0739$) and gestation age ($\chi^2 = 0.8435$) was not significant at P-value<0.05. According to WHO definition, AIP was reported in 49.2% of the study population involving 30.4% of urban and 18.8% of rural population. The knowledge and awareness of pregnant women towards anemia in pregnancy was not significant with eleven predictor's odds ratio. However, both of the groups, 60.3% of the AIP and 46.2% of the NAIP cases were aware of the anemia-related complications during pregnancy.

Conclusions: First trimester anemia in pregnancy was a prominent health burden in spite of available resources and awareness programmes. There was a sensitization lacunae to rule out the misconception and the belief. A healthy state of mind and practice among women shall be instrumental in bringing about an improved perception of AIP and its prevention.

Keywords: Antenatal care, Anemia in pregnancy, Deworm, First trimester anemia, Iron deficiency Anemia



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Introduction

Anemia in pregnancy (AIP) is a major health burden to the global health. It causes 20% of perinatal mortality and 10% of maternal mortality in India (1). Nutrition and micro-nutrition have a big role in the pregnancy outcomes. Iron deficiency in pregnancy has affected more than 50% of pregnant women, globally (2).

Based on the estimated level of blood hemoglobin (Hb) (g/dL), a decline in the HB level from 11.0 g/dL in the first trimester and 10.5 g/dL in the second trimester was considered as AIP, according to the WHO definition (3, 4). AIP was categorized as mild, moderate and severe with respective Hb levels of 10.0 -10.9 g/dL, 7.0 - 9.9 g/dL and less than 7.0g/dL (5).

The prevalence of AIP varies across the developed, developing and underdeveloped countries. The latter is adversely affected due to its low income and hindrance in meeting out the health care requirement (6, 7, 8). Women (particularly pregnant women) are more vulnerable since they are adversely affected by anemia. According to the National Family Health Survey (NFHS-4), held between 2015 and 2016, India, 30 million pregnant women (50.3%), 27 million post-partum women (58%) and 17 million of women in their child bearing age group (53%) suffered from anemia (9).

Several factors including knowledge, awareness about AIP and its risks, treatment affordability,

compliance of anemia prophylaxis, socio economic, socio demographic, nutritional habit, etc. determines the status of anemia (10).

In spite of resource availability and public health awareness measures taken by Health authorities, the incidence of AIP keeps raising, and the disease's burden category is severe public health problem (11).

Adverse effects were witnessed extensively as consequences of the AIP. Undeniably, there were lacunae to compete the situation in spite of many government schemes to tackle anemia in women and there were also few studies exploring the trend and shift of the disease (12).

This study aimed to assess anemia at antenatal care initiation and the regarding awareness and knowledge as determinants, among pregnant women in a tertiary care hospital.

Materials and Methods

All pregnant women visiting the antenatal care (ANC) Clinic for their first appointment during their first trimester i.e. the day of pregnancy confirmation, were approached for study participation. A cross-sectional survey was conducted in the department of obstetrics and gynaecology in Lakshmi Madhavan Hospital, a tertiary hospital, in Tirunelveli, India. The study was conducted between August 2020 and December 2020 with the Institutional Ethics Committee's approval and all the study participants had signed informed consent for study participation

A structured questionnaire was designed for the purpose of study. Awareness and knowledge on anemia during pregnancy was evaluated through a survey questionnaire. Pregnant women on their first appointment for ANC care were offered to participate in the survey. A trained personnel explained the questionnaire. The information in the questionnaire was administered to the pregnant women, and the reply was recorded. Other data was collected from their medical records.

The questionnaire survey was conducted soon after the confirmation report was received and before the participant received other services including dietician counselling, ANC mother counselling, etc. They were individually explained about the study and its purpose and the study questionnaire survey.

The ANC women were interviewed in their vernacular language, Tamil; in which the participants were conversant and comfortable. The questionnaire was designed to include details like demography, socio-economics, medical history to comprise obstetrics and gynaecological history including anemia

history. Their responses to the survey were collected and analysed with descriptive statistics.

The Questionnaire was developed to include specific questions evaluating potential knowledge and awareness regarding anemia during pregnancy and the soundness in dealing with the condition, if they were diagnosed with AIP.

The study inclusion criteria were, woman visiting the obstetrics and gynaecology department for the first time, first trimester, first appointment for antenatal care and pregnant women confirmed through HCG-titre (urine or serum), irrespective of the parity.

The study exclusion criteria were, pregnant women who had already consulted with obstetrics and gynaecologist or had their ANC first appointment elsewhere, women with nutritional deficiencies (iron and folic acid) identified and treated before conception, pregnant women who were treated for subfertility (through IVF or assisted reproductive techniques), receivers of blood in the last three months from the conception date, women attending ANC with completed 1st trimester, i.e. in their 2nd and 3rd Trimester, and women who suffered from anemia other than nutritional anemia including β -thalassemia.

A total number of 205 pregnant women were initially assessed who were reported for their first ANC visit in the Department of OG, from 1st October 2020 to 31st December 2020. The pregnant women satisfying the study selection criteria were included in the study. A number of 67 participants satisfying any of the exclusion criteria were exempted from the study leaving 138 patients.

The study data was extracted from the completed questionnaires and the medical records. Medical history related to obstetrics and gynaecology history including parity, gravida, deworming status, Hb level on the conception confirmed day, and blood transfusion history. The Hb value on their very first ANC appointment was evaluated using routine blood investigations. The haematology sample was drawn through venous blood.

Results

Anemia was the main outcome in qualitative status as anemic in pregnancy and Non anemic in pregnancy. Independent variables such as socio-demographic and socio-economic details of 138 respondents were analysed. The mean age of pregnant women in the anemic and non-anemic groups were 26.9 and 24.2 years, respectively. The majority of the mothers were aged 21-25 years in AIP and NAIP groups with 51% and 46%, respectively, [Table 1](#).

Table 1. Socio-demography of antenatal care pregnant women.

S No.	Variable	Anaemia in Pregnancy: n = 68 (%)	Not Anaemic in Pregnancy n = 70 (%)	
1	Age (years):	a. < 20	03 (4.4%)	02 (2.8%)
		b. 21-25	35 (51.4%)	32 (45.7%)
		c. 26-30	22 (32.3%)	28 (40.0%)
		d. 31-35	07 (10.2%)	07 (10.0%)
		e. >35	01 (1.4%)	01 (1.4%)
2	Religion:	a. Hindu	45 (66.1%)	41 (58.5%)
		b. Muslim	20 (29.4%)	19 (27.1%)
		c. Christian	03 (4.4%)	09 (12.8%)
3	Education:	a. Illiterate	00 (%)	01 (1.4%)
		b. Class 1-5	02 (2.9%)	3 (4.2%)
		c. Class 6-12	18 (26.4%)	15 (21.4%)
		d. Graduate	33 (48.5%)	37 (52.8%)
		e. PG & above	15 (22.05%)	14 (20%)
4	Occupation:	a. Home maker	56 (82.3%)	59 (84.2%)
		b. employed	11 (16.1%)	10 (14.2%)
		c. self employed	01 (1.4%)	01 (1.4%)
5	Nature of Job:	a. Static job	41 (60.2%)	45 (64.2%)
		b. moderate movement	26 (38.2%)	22 (31.4%)
		c. frequent movement	01 (1.4%)	03 (4.2%)
6	Family Monthly income (in thousands):	a. < 10k	20 (29.4%)	16 (22.8%)
		b. 11k -20k	22 (32.3%)	24 (34.2%)
		c. 21k -30k	13 (19.1%)	15 (21.4%)
		d. >31k	13 (19.1%)	15 (21.4%)
7	Source of Income	1. Cottage work	02 (2.9%)	02 (2.8%)
		2. Salary	47 (69.1%)	46 (65.7%)
		3. Trade	03 (4.4%)	04 (5.7%)
		4. Agriculture	03 (4.4%)	04 (5.7%)
		5. Professional	10 (14.7%)	12 (17.1%)
		6. Business	03 (4.4%)	02 (2.8%)
8	House:	a. Owned	42 (61.7%)	51 (72.8%)
		b. Rental	26 (38.2%)	19 (27.1%)
9	Where do you come from:	a. Rural	27 (39.7%)	24 (34.2%)
		b. Urban	41 (60.2%)	46 (65.7%)
10	Food habit	a. Vegetarian	09 (13.2%)	06 (8.5%)
		b. Non- Vegetarian	12 (17.6%)	07 (10.0%)
		c. Mixed diet	47 (69.1%)	57 (81.4%)

First appointment with the ANC clinic in the early weeks (five to nine weeks) of the first trimester was seen in 75.9% of the total population, with 38.3% and 37.6% of the AIP and the NIAP group, respectively.

The relationship of parity status with AIP and gestation age with AIP was not significant at P-value<0.05, with chi-square relation for parity ($\chi^2=3.0739$, $P<0.3803$) and gestation age ($\chi^2=0.8435$, $P<0.8390$). The primigravida mothers (27.53%) and gestation weeks (5-9 weeks) first trimester (18.11%) were anemic in pregnancy.

The routine blood investigations at the first ANC visit were done in all of the 138 pregnant women. AIP was found in 68 (49.2%) pregnant women with the mean Hb level being 10.9 g/dL and a range of 8.5g/dL to 13.7 g/dL. According to the WHO guideline, Hb levels less than 11.0 g/dL in the first trimester were indicative of AIP. Its prevalence was 49.2% involving urban (30.4%) and rural (18.8%) populations. The intensity of severity of anemia was measured as mild in 60.2%, moderate in 32.3%, and severe in 7.3% of the patients ([Table 2](#)).

Table 2. Pregnant Women's Characteristics.

Variable (n = 138)	Anemia in Pregnancy (n = 68)	Non-Anemic in Pregnancy (n = 70)
	Frequency (%)	Frequency (%)
Gravida		
Primi	38 (55.8)	37 (52.8)
Second	19 (27.9)	26 (37.1)
Multi (2-5)	10 (14.7)	05 (7.1)
Grand multi (>5)	01 (1.4)	02 (2.8)
Gestation Age		
1-5 wk	25 (36.7)	23 (32.8)
6-9 wk	28 (41.1)	29 (41.4)
10-12wk	12 (17.6)	16 (22.8)
>13 wk	03 (4.4)	02 (2.8)
Last Child birth Interval		
For Primi	38 (55.8)	37 (52.8)
<1 year	11 (16.1)	15 (21.4)
1-2 years	13 (19.1)	13 (18.5)
>3 years	06 (8.8)	05 (7.1)

The predictors association with anemia in pregnancy was performed. These 11 factors were then pulled into binary logistic regression and odds ratio estimated. Mixed diet was the food habit among 75.3% respondents from both of the groups and as individual,

it was 69.1% and 81.4 % in AIP and NAIP groups, respectively. Among both AIP and NAIP groups, 6.5% and 4.3% were vegetarians and 8.6% & 5.07% were non-vegetarians ([Table 3](#)).

Table 3. Knowledge and Awareness of the respondents.

Ques.	Characteristic	Comparison	Anaemia in Pregnancy	Non-Anaemia in Pregnancy	Unadjusted OR (95%CI)	P-value
			n (%) N=68	n (%) N=70		
1	Were you anemic ever before?	Yes	09 (13.2%)	08 (11.4%)	1.1822	0.7470
		No	59 (86.7%)	62 (88.5%)		
2	What is the last Hb value you remember?	Remember	33 (48.5%)	35 (50.0%)	0.9429	0.8628
		Not Remember	35 (51.4%)	35 (50.0%)		
3	A Normal Hb value:	Knowing	51 (75.0%)	49 (70.0%)	1.2857	0.5114
		Not Knowing	17 (25.0%)	21 (30.0%)		
4	Have you ever been prescribed and consumed haematinics:	Yes	27 (39.7%)	21 (30.0%)	1.5366	0.2325
		No	41 (60.2%)	49 (70.0%)		
5	Are you interested in improving you hemoglobin level?	Yes	57 (83.8%)	62 (88.5%)	0.6686	0.4204
		No	11 (16.1%)	08 (11.4%)		
6	Are you a diet conscious in improving the Hb:	Yes	60 (88.2%)	62 (88.5%)	0.9677	0.9508
		No	08 (11.7%)	08 (11.4%)		
7	Tick all the dietary foods that can improve your Hb: (All six options were iron rich diet)	Ticked > 3	56 (82.3%)	57 (81.4%)	1.0643	0.8879
		Ticked < 3	12 (17.6%)	13 (18.5%)		

Ques.	Characteristic	Comparison	Anaemia in Pregnancy n (%) N=68	Non-Anaemia in Pregnancy n (%) N=70	Unadjusted OR (95%CI)	P-value
8	De worming status: Have you ever consumed drug to de-worm:	Yes	09 (13.2%)	09 (12.8%)	1.0339	0.9474
		No	59 (86.7%)	61 (87.1%)		
9	Do you think that there are complications due to anemia in pregnancy?	Yes	41 (60.2%)	32 (45.7%)	1.8032	0.0874
		No	27 (39.7%)	38 (54.2%)		
10	Are you willing to take medicine for anemia?	Yes	44 (64.7%)	45 (64.2%)	1.0185	0.9589
		No	24 (35.2%)	25 (35.7%)		
11	Choose the best option you think to increase hemoglobin during pregnancy? Chosen both Pharmacological and non-pharmacological	Chosen both	38 (55.8%)	34 (48.5%)	1.3412	0.3905

NAIP group (81.4%), had chosen both green leafy vegetable such as spinach and liver as rich sources of iron out of six dietary iron sources, having vegetarian and Nonvegetarian source, three options each. Green leafy vegetable as a rich source of iron was common among vegetarians and it was the primary choice for all respondents to improve blood Hb level.

The pregnant mothers in both the groups, 60.3% of AIP and 46.2% of NAIP were aware of anemia-related complications during pregnancy.

A near equal proportion of the pregnant mothers in both the groups, AIP and NAIP (65% and 64%) had willingness to accept therapeutic or prophylaxis of haematinics if diagnosed with AIP.

A combined task of pharmacological and non-pharmacological sources in managing anemia in pregnancy was accepted by 56% of AIP and 49 % of NAIP patients.

Discussion

With a fast growing economy, India and the sub-continent’s maternal health poses threat as perinatal and neonatal problems are becoming more eventful with high mortality and morbidity rates (1). AIP shall demand frequent hospitalization for hematinic infusion and blood transfusion, increased follow-up and more haematological investigations than regular antenatal care.

In this study, the majority of the pregnant mothers were between the age group of 21-25 years (49%). This is comparable to the study conducted by Rajaratnam *et al.*, in Vellore, India, during 1996 which reported that almost half of the study population (46.7%) were 20-24 years (13). The preventive anemia management

among teenage women, preconception prophylaxis among mother to be, deworming awareness and anthelmintic prophylaxis are prone to AIP (14).

Frequent pregnancies had not been a major determinant in causing AIP. In contrast to the earlier study, a study carried out by Al-Farsi YM. *et al.* in Muscat in 2004, found that AIP was associated with high parity pregnancies (41.6%) more, compared to low parity pregnancies (14.3%) (15). Reduced child birth interval was not found to cause AIP, in contrast to Lazović N. *et al.* findings (16). The relationship of parity level and child birth interval could not be established as more than half of the total study population (54.34%) were primigravida.

Nearly 60% of anemic cases belonged to urban population while 40% came from rural areas. Even though the urban population was highly educated (graduation and post-graduation), 35% of the graduated housewife mothers were anemic. Balarajan Y. *et al.* inferred that high literacy reported lower incidence of anemia (17).

When distributed according to education levels, anemia was found to be more prevalent in graduate and post-graduate mothers (34.7%). Prevalence of anemia was seen in 49.2% of the total study population, and 61.7 % of AIP mothers were having a monthly income of less than 20,000 rupees. The financial limitations may restrict them to spend on their well-being and nutritious food (18).

AIP was ominously more among homemakers (40.57%). The housewives may spend more time on family care and may spare no time for enough self-care due to forgetfulness, skipping diet, missing prophylaxis, unbalanced diet or untimely diet habits, which may attribute to anemia in pregnancy (19).

Their awareness about anemia-related complication in pregnancy, knowledge on iron sources or diet consciousness, had not extended a helping hand to leap optimal hemoglobin border (20). Pregnant mothers lacking awareness on the risks in AIP had to presume that lower hemoglobin in pregnancy was normal (21). It is a concern when it comes to notice the role of other family members particularly the men, having authority as the decision maker of the family. Their perception was also essential to determine the anemia status among pregnant women (22, 23).

The study was conducted in Tirunelveli town of Tamilnadu, India and the community wise distribution of pregnant women as seen, Hindus consisted 66% and 59 %, Muslim consisted 29% and 27%; Christians consisted 4% and 13 % of the anemic and non-anemic groups, respectively.

Anemia was more prevalent among the pregnant women with primigravida status as the first time pregnant mothers constituted 54.3% of the total study population. Out of second gravida mothers, 18.8% were non-anemic compared to 13.7% AIP cases. AIP was diagnosed in the first trimester of pregnancy, and a non-anemic pregnant woman may go anemic in her second trimester. Anemia correction from first trimester to early third trimester shall reduce anemia-related adverse events in pregnancy (24, 25, 26). The oxidative stress deterioration rate is higher during the first trimester (27) and a pre-existing anemia in an ANC mother shall aggravate in pregnancy due to the increased requirement and additional utilization of micronutrients (4, 5).

Multi gravida was classified as gravida from two to five pregnancies, reported to have 7.2% and 3.6%, of anemic and non-anemic mothers. The significance of gravida status and birthing interval could not be analysed as more than half of the total population were pregnant for the first time.

All predictive factors were not statistically associated with AIP. Although a statistical significance of the prediction with AIP could not be established. The noteworthy point in the study is that awareness or knowledge does not necessarily lead to a desirable outcome. The general issues faced by the non-compliance of the pregnant women were forgetfulness, exasperation, affordability, and worrying about the side effects (28). An attitude of applying the learned information into their routine life, and a conscious to do persistently, shall bring in the eradication of AIP. A mass sensitization and screening for anemia is quite essential in all platforms of the community including post-partum women (29). An inappropriate diet schedule may skip the micronutrients from being absorbed in to the blood stream.

Conclusion

First trimester AIP was very common and irrespective of literacy and education standard. Regardless of awareness level, there were intrinsic factors with a role in determining the anemic status in pregnancy. The preventable nutritional deficiency anemia still prevail and could be deterred by bringing a healthy state of mind and practice among women of all age groups. More robust screenings and interventions are required to be implemented to prevent AIP.

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Conflict of Interest

The author declared no conflict of interest.

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