

Prevalence of Anemia in Second trimester – The rural Lucknow experience

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Abstract

Anaemia is defined as deficiency of Haemoglobin in the blood which can be caused by either too few RBC or too little Haemoglobin in the cells¹. (Number of RBC <4million /micron or content of Haemoglobin < 12 gm/dl or both) This study deals with the prevalence of anemia in the second trimester of pregnancy.

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Introduction

Physiologically, anaemia can be defined as condition in which the oxygen-carrying capacity of the blood is decreased. Anaemia in pregnancy can be defined as a haemoglobin level less than 10.5% gram /dl or a haematocrit less than 30%. The normal female haemoglobin reference range changes from 13 – 15 g /dl, in non pregnant state to 10.5 – 12 g /dl with pregnancy².

In pregnant women, anaemia is defined as Hb concentration of less than 11g/dl in the first and third trimesters, and less than 10.5 g/dl in the second trimester³. Iron transfer from mother to fetus occurs against the concentration gradient. As Maternal iron is the only source of fetal iron; thus iron status of neonates will be affected if mother is deficient in iron during pregnancy.⁴

Aims & Objective

The present study is undertaken to –

1. To study the prevalence of anemia in the second trimester of pregnancy in a Tertiary Health Care institute of Lucknow.
2. To investigate the prevalence of anemia in pregnant women receiving Ante Natal Care (ANC) in a tertiary care hospital.

Material and Methods

A cross- sectional study of pregnant women who presented at the OPD of dept of Obstetrics & Gynecology IIMS&R Hospital, was conducted during 2013-14. The women were inhabitants of the rural area from in & around IIMS&R that lie within 20 Km radius of the Institute A single blood sample for biochemical

analyses was obtained from each subject who visited the antenatal clinic during 2013-14. A haematocrit was obtained for each subject at the time of her visit to the antenatal clinic. Informed consents were obtained for each subject at the time of her describing the study, and its requirement were given to them in Hindi. At the time of drawing the blood sample, information regarding gravidum. Parity, education, and use of supplements by the subjects was recorded. Gestational age was estimated by both using data of the last menstrual period and measuring fundal height.

Study design: The present study is a single cross-sectional study, held between Dec 2013 to Feb 2014. The target population of this study was pregnant women in their second trimester.

The Sample size was 92 pregnant women in their second trimester. It is calculated as *Sample size calculation for a single cross-sectional survey*

To estimate a sample size for a proportion in a single cross-sectional survey, two numbers are needed:

1. Estimate of the expected proportion (p)
2. Desired level of absolute precision (d)

The sample size formula is:

$$n = \frac{1.96^2 p(1-p)}{d^2}$$

(Gorstein J, Sullivan KM, Parvanta I, Begin F. *Indicators and methods for cross-sectional surveys of vitamin and mineral status of populations*. Micronutrient Initiative (Ottawa) and Centers for Disease Control and Prevention (Atlanta), May 2007, pg 29).

If the expected proportion p for an indicator is not known, usually the value of 0.5 (or 50%) is used because it produces the largest sample size (for a given values of d). Grouping of the subjects on the basis of education level were done in accordance with census of India 1991.

Inclusion criteria:

Pregnant women who are in their equal to or more than 12th week and less than 24 week of gestation were

registered for screening. The study was limited to healthy normotensive pregnant women with no history of hypertension, proteinuria, or other complications of pregnancy.

Exclusion criteria:

Exclusion criteria includes those having chronic medical condition, like Diabetes mellitus, hypertension, Heart disease, thyroid disorder and Tuberculosis or those who have tested positive for HBS Ag/HIV/ Syphilis were excluded. Women treated for infertility were also excluded. Women with pre- eclampsia (systolic blood pressure < 140 mm Hg or diastolic blood pressure < 90 mm Hg) were excluded from the study.

Anthropometric measurements:

Age in years was self – reported & recorded. Weight was measured using a manually operated weighing scale accurate to 0.5 kg and height was measured to within 0.25 cm using a portable stadiometer

Biochemical analyses:

Blood was obtained by venipuncture and collected into trace metal-free vacutainer tubes containing EDTA. Hb% and complete blood count values were measured on automated coulter counter [Cellenium19Tm, Triviron health care] after determining the haematocrit (packed cell volume) and Hb% readings were noted down.

Results

This was a study focusing on anaemia levels among women of rural area near Lucknow. The population size

from which the sample was drawn was estimated to be 4000, based on the estimated pregnancy rate (5.2%) and anaemia prevalence among pregnant women in India (60%). The sample size was computed using the formula used by Leslie¹⁵; 60% was used for prevalence of anaemia, as adopted from the UDHS 20066. The sample size of 92 was calculated.

A total of 97 consecutive pregnant women in the second trimester were studied. The mean age was 22.34 years (SD 1/4 2.92). As it is well known that literacy may affect the prevalence of anaemia in pregnant women it was taken as main comparative parameter for this study. The pregnant ladies in their second trimester were subdivided into 6 group according to the level of their literacy. The groups are:-

- Group 0 - Illiterate
- Group I - Studied up to V standard
- Group II - Studied upto VIII standard
- Group III - Studied upto X standard
- Group IV - Studied upto XII standard
- Group V - Graduates and above
(Census India – 1991)⁵

Group O

In the present investigation, seven out of ninety seven ladies were found to be illiterate. All the parameters related to the haemoglobin were taken (Table 1). Age of this group was between 23 and 30 years. There was also not much difference in height and weight. Haemoglobin level, however, was below the normal in all the ladies except one. RBC and HCT values were also considered to see if there exists any relation of these to the haemoglobin level.

Table 1: The physical parameters of 7 pregnant ladies in group O (illiterate)

| S. No. | Age | Height | Weight | Obs Hist | Hb gm/dl | RBC (millions) | HCT |
|--------|-----|--------|--------|----------|----------|----------------|--------|
| 1 | 22 | 157cm | 50Kg | G2P111 | 10.60% | 4.32 | 31.76% |
| 2 | 30 | 154 | 42 | G3P212 | 9.70% | 4.65 | 28.65% |
| 3 | 30 | 156 | 56 | G4P3L3 | 8.60% | 3.56 | 30.52% |
| 4 | 23 | 152 | 48 | G3P2L2 | 8.40% | 3.37 | 23.90% |
| 5 | 23 | 153 | 48 | G4P0L0 | 8.04% | 4.45 | 29.63% |
| 6 | 25 | 153 | 52 | G3P2I2 | 8.02% | 4.47 | 28.64% |
| 7 | 24 | 153 | 52 | G3P2L1+1 | 8.01% | 4.15 | 28.05% |

Comparison of haemoglobin level showed only one lady to have mild anaemia. Five out of seven showed moderate anaemia (Fig 1).

Group I

Ten pregnant ladies, who studied up to class Vth, were included in this Group. The average age of this group was ~26 yrs. The average height was 153cm and average weight was ~53kg. The range of haemoglobin level was from 8.3 to 13.2.

Table 2: The physical parameters of 10 pregnant ladies in group I (Literacy up to standard V)

| S. No. | Age | Height | Weight | Obs Hist | Hb gm/dl | RBC (millions) | HCT |
|--------|-----|--------|--------|----------|----------|----------------|--------|
| 1 | 18 | 148cm | 48kg | G1POL0 | 12.4% | 4.28 | 33.90% |
| 2 | 24 | 153cm | 54kg | G2P1L1 | 13.0% | 4.36 | 34.99 |
| 3 | 25 | 154cm | 50kg | G2P1L1+0 | 13.20% | 4.26 | 34.89% |
| 4 | 22 | 155cm | 56kg | G3P2+0L1 | 12.30% | 3.48 | 31.60% |
| 5 | 22 | 153cm | 51kg | G2P1L1 | 12.10% | 3.78 | 36.15% |
| 6 | 26 | 155cm | 55Kg | G5POL0 | 9.50% | 3.74 | 28.23% |
| 7 | 35 | 154CM | 48kg | G3P2L2 | 9.20% | 3.03 | 26.37% |
| 8 | 35 | 154cm | 48kg | G4P3L3 | 9.80% | 3.68 | 27.52% |
| 9 | 27 | 153cm | 66kg | G2P1+0L1 | 9.70% | 3.45 | 25.90% |
| 10 | 25 | 154cm | 48kg | G2P1L1 | 8.6% | 4.19 | 31.41% |

Haemoglobin level in this group showed a variance, five out of ten showed normal level of haemoglobin, four had mild and one had moderate anaemia.

Group II

Fifteen pregnant ladies, who studied up to class VIIIth, were included in this Group. The average height was ~153cm and average weight was ~49kg. The average age of this group was ~26 yrs. The range of haemoglobin level was from ~8.6 to ~11.4. The average income per month was Rs ~7000/-.

Table 3: The physical parameters of 15 pregnant ladies in group II (Literacy up to standard V)

| S. No. | Age | Height | Weight | Obs Hist | Hb gm/dl | RBC (millions) | HCT |
|--------|-----|--------|--------|----------|----------|----------------|--------|
| 1 | 24 | 145cm | 44kg | G2P1L1 | 11.40% | 4.27 | 34.99% |
| 2 | 26 | 155cm | 43kg | G2P1L1 | 11.30% | 3.99 | 34.65% |
| 3 | 23 | 154cm | 35kg | G1POL0 | 13.20% | 4.58 | 35.98% |
| 4 | 24 | 162cm | 51kg | G3P3L2 | 12.10% | 3.83 | 32.37% |
| 5 | 25 | 156cm | 49kg | G3P2L1+1 | 11.10% | 2.9 | 28.13% |
| 6 | 23 | 156cm | 54kg | G2P1L1 | 11.40% | 3.28 | 27.65% |
| 7 | 18 | 148cm | 48kg | G1POL0 | 10.40% | 4.28 | 33.90% |
| 8 | 35 | 154cm | 51kg | G4P3L3 | 9.50% | 3.32 | 27.03% |
| 9 | 27 | 151cm | 48kg | G3P1L1 | 10.40% | 4.24 | 31.67% |
| 10 | 25 | 160cm | 53kg | G1POL0 | 9.80% | 4.46 | 30.14% |
| 11 | 20 | 151cm | 48kg | G2P1L1 | 9.00% | 4.15 | 28.65% |
| 12 | 35 | 154cm | 48kg | G4P3L3 | 9.80% | 3.68 | 27.52% |
| 13 | 35 | 151cm | 41kg | G3P2L2 | 9.40% | 4.43 | 30.12% |
| 14 | 20 | 158cm | 52kg | G1POL0 | 8.70% | 4.02 | 26.80% |
| 15 | 30 | 152cm | 54kg | G4P3L3 | 8.60% | 4.54 | 28.56% |

In this group, six had normal level of hemoglobin while seven had mild and two had moderate anaemia.

Group III

Twenty Six pregnant ladies, who studied up to class Xth, were included in this Group. The average height of the subjects was ~153cm and average weight was ~49kg. The average age of this group was ~24 yrs. The range of haemoglobin level was from ~8.6 to ~11.4. The average income per month was Rs ~6650/-, which is above the poverty level. Out of these 26 ladies of total 97, 7 were found to have normal haemoglobin level while 11 had mild & 8 had moderate anemia

Group IV

Twenty five pregnant ladies, who studied up to class XIIth, were included in this Group. The average height was ~153cm and average weight was ~49kg. The average age of this group was ~23 yrs. The range of haemoglobin level was from ~8.6 to ~11.4. The average income per month was Rs ~7000/-, which is above the poverty level.

In Group IV, total 25 ladies were examined, Out of these, 9 had a normal haemoglobin level while 13 had mild anemia & 3 had moderate anemia.

Group V

Fourteen pregnant ladies, who studied up to class XIIth, were included in this Group. The average height was ~153cm and average weight was ~49kg. The average age of this group was ~25 yrs. The range of haemoglobin level was from ~10.10 to ~14.00gm% The average income per month was Rs ~8000/-, which is above the poverty level.

Table 4: Distribution chart for anaemic and normal.

| Group | Anaemic N (%) | | Normal N (%) | Test statistic |
|--------------------------|---------------|----------|--------------|-------------------|
| | Moderate | Mild | | |
| 0(illiterate) | 5(71.4) | 1(14.3) | 1(14.3) | p= <0.05 df=10 |
| I(fifth pass) | 1(10) | 4(40) | 5(50) | |
| II(eighth pass) | 2(13.3) | 7(46.7) | 6(40) | |
| III(tenth pass) | 8(30.8) | 11(42.3) | 7(26.9) | |
| IV(twelfth pass) | 3(12) | 13(52) | 9(36) | |
| V(graduation and beyond) | 0(0) | 3(21.4) | 11(78.6) | |

Table No. 4 shows the distribution of subjects according to anaemic and normal. The test statistic X^2 (chi-square) shows there is a significant $p < 0.05$ association between groups and the distribution of subjects.

So it is observed that among 97 pregnant ladies in their second trimester, 19 (19.6%) were moderately anaemic, 39(40.2%) were mildly anaemic and 39 (40.2%) were normal.

Discussion

In the present study, 97 pregnant females coming for Ante Natal Check-up in the OPD of Department of Obstetrics and Gynaecology, in IIMS&R were taken and grouped into O-V groups on the basis of education level, as per 1991 census of India. In each group subjects were divided into mild and moderate anaemic and normal ie. Those having no anaemia. The study covered the population size from which the sample was drawn was estimated to be 4000, based on the estimated pregnancy rate (5.2%) in the study area during the data collection.

The definition of anaemia has been much debated. WHO criteria for pregnant women define anaemia as Hb below 110g/l, and severe anaemia as Hb under 70 g/l. The women in the second trimester with Hb of 105- 110 g/l were misclassified as (moderately) anaemic. In our sample, the women with Hb <70 g/l were not found.

Out of total 97 subjects 19(19.6%) are moderately anaemic, 39(40.2%) are mildly anaemic and 39(40.2%) are normal. As per UNICEF, in India 58% pregnant females are anaemic.⁶ Our study also shows the similar trend. 74.8% of pregnant females were found to be anaemic in a study done by Nadeem et al in 2010.⁷ The lower percentage of anaemia among pregnant females in our study could be attributed to small sample size and also due to limited duration of the study.

Similarly a study done by Bhargavi et al.⁷ in 2014 found that 52.73%, 40.97%, and 6.28% of pregnant females were having mild, moderate and severe anaemia. In our study 40.2% of subjects were having mild anaemia and 19.6% were having moderate anaemia, and no subject were having severe anaemia. The low percentage can again be attributed to small sample size in our study.

Higher prevalence of anaemia has been reported in first trimester of pregnancy as compared to second and third trimesters. (Bhargavi Vet al 2014). All the subjects included in our study were in second trimester of

pregnancy, and this could also be the reason for contrast in our and previous reported studies.⁷

Careful analysis of data in our present study reveals that in group IV /V (education level class XII, graduation and beyond), shows that 32.76% (19/58) were having anemia (mild and moderate) while 51.30% (20/39) were non anemic. In group 0/I/II/III (illiterate to class X), 67.24% ie 39/58 were having mild to moderate anemia. In the same group 48.70 % (19/39) were having Hb levels within normal range.

It must be emphasized that the subjects included in our study are those in second trimester of pregnancy. Earlier studies have reported varying results. Bhargavi V. etal, have reported higher prevalence of anemia in first trimester while other studies have reported higher prevalence of anemia in third trimester of pregnancy (Amany Mokhtar A etal, 2012)⁸. Moreover our study is not a follow up study.

Conflict of Interest: None

Sources of support: None

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