Original article:

Factors associated with maternal anaemia among pregnant women in rural India

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Abstract:

Background: Anaemia in pregnancy is one of the most important and common public health problem not only in India but also in most of the South East Asian countries. Anaemia is the most common nutritional deficiency disorder in the world. There is predominance of iron deficiency anaemia (nutritional anaemia). In pregnancy, it is one of the leading causes responsible for maternal and perinatal morbidity and mortality. ***Objective***: To find out the risk factors associated with anaemia in pregnant women at MMIMSR during the study period with special reference to the severity of the disease. ***Methods:*** The study was conducted in Department of Obstetrics and Gynaecology, MMIMSR, Mullana, Ambala. The study was carried out between the period of october 2012 to September 2014.A total of 200 cases of moderate and severe anaemia were included in the study on the basis of simple random sampling method and 200 cases of non anaemic subjects were included to serve as controls for the anaemic group, during the study period. Hb gm/dl was taken as criteria for deciding anaemia cases and also to classify them according to the severity. Cases were classified according to WHO criteria. ***Results:*** Out of 200 cases of anaemia, 70% were moderately anaemic (Hb 7 – 9.9gm/dl) and 30% were severly anaemic (Hb < 7gm/dl). Microcytic hypochromic type of anaemia (82.5%) was more prevalent suggesting nutritional inadequacies as cause of anaemia. ***Conclusion****:* In the present study maternal illiteracy, low SES, inadequate antenatal care, close birth spacing, poor nutrition were all risk factors for anaemia in pregnancy Microcytic hypochromic type of anaemia (82.5%) was more prevalent suggesting nutritional inadequacies as cause of anaemia..

Keywords: Pregnancy; Microcytic hypochromic; iron deficiency; Anemia.

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Introduction

Pregnancy is special: let's make it safe

Pregnancy is a unique experience in every woman's life. The thought of a growing foetus in the mother's womb, indeed is nature's way of expressing the attributes of motherhood. Anaemia in pregnancy is one of the most important and common public health problems not only in India but also in most of the South East Asian countries. About 16% to 40% of maternal deaths occur due to anaemia. Anaemia also increases maternal morbidity significantly. Pregnancy increases the requirements of various nutrients especially iron and folate and therefore puts a stress which will either precipitate or aggravate anaemia in pregnancy. Haemodilution occuring in pregnancy is also a main factor to aggravate anaemia. Most of the pregnant patients presenting to outpatient department have iron deficiency anaemia. Most of the population in India lives in rural areas where proper health care services are not available to them. Along with physiological causes, social causes are also responsible for anaemia during pregnancy like early age at marriage, teenage pregnancy, ill spacing between two pregnancies and poor supplementation

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of iron, malnutrition, endemic diseases like malaria and worm infestations. Standards laid by WHO suggest haemoglobin below 11 gm/dl as anaemia. According to standards laid down, incidence of anaemia during pregnancy in India ranges from 65% to 75%.[1] The prevalence of anaemia all over the world is 51% and is as high as 87.5% amongst pregnant women in India.[2] Anaemia continues to take a heavy toll of maternal lives in India from direct as well as indirect deaths, from cardiac failure, haemorrhage, infections, pre-eclampsia, puerperal sepsis. According to the FOGSI – WHO study (1997), anaemia is responsible for 64.4% of maternal deaths in India.[3] The Indian Council Medical Research (ICMR)'s data also shows 84.2% anaemia prevalence in rural pregnant women, of which 13.1% were severely anaemic.[4] In India, the National Nutritional Anaemia prophylaxis programme was launched in 1972 and has been in operation since then. The programme has been reinforced for the last three decades, yet the prevalence of anaemia remains alarmingly high. Anaemia, the most preventable cause of maternal mortality, should be eradicated from the female population in the coming years that will ensure better maternal and perinatal health, happy family and a healthy nation. Multifaceted approach is needed to correct anaemia in pregnant women.

Aims and Objective

Aim

To find out the risk factors associated with anaemia in pregnant women with special reference to the severity of the disease.

Objective

Anaemia in pregnancy is one of the most important and common public health problem not only in India but also in most of the South East Asian countries. Anaemia is the most common nutritional deficiency disorder in the world. WHO has estimated that prevalence of anaemia in pregnant women is 14 per cent in developed and 51 per cent in developing countries and 65-75 percent in India.[1] About one third of the global population (over 2 billion) are anaemic.[2] India contributes to about 80 per cent of maternal deaths due to anaemia in South Asia. Low SES, inadequate antenatal care, close birth spacing, poor nutrition were all risk factors for anaemia in pregnancy. The high prevalence of anaemia is recognized to be contributory to maternal mortality, under nutrition of the foetus and infant mortality.

Material and Method

The present study was conducted in Department of Obstetrics and Gynaecology, MMIMSR, Mullana, Ambala. The study was carried out between the period of October 2012 to September 2014. The objectives of the study were to find out the risk factors associated with anaemia in pregnant women of at MMIMSR during the study period with special reference to the severity of the disease.

• A total of 200 cases of moderate and severe anaemia were included in the study on the basis of simple random sampling method and 200 cases of non anaemic subjects were included to serve as controls for the anaemic group, during the study period.

• Hbgm/dl was taken as criteria for deciding anaemia cases and also to classify them according to the severity.

Cases were classified according to WHO criteria[5]

Inclusion criteria

Haemoglobin levels to diagnose anaemia at sea level (gm/dl)

Population	Non Anaemia	Anaemia		
		Mild	Moderate	Severe
Children 6-59 months of age	11 or higher	10.0-10.9	7.0-9.9	Lower than 7.0
Children 5-11 years of age	11.5 or higher	11.0-11.4	8.0-10.9	Lower than 8.0
Children 12-14 years of age	12.0 or higher	11.0-11.9	8.0-10.9	Lower than 8.0
Non pregnant women (15 years of age and above)	12.0 or higher	11.0-11.9	8.0-10.9	Lower than 8.0
Pregnant Women	11.0 or higher	10.0-10.9	7.0-9.9	Lower than 7.0
Men (15 years of age and above)	13.0 or higher	11.0-12.9	8.0-10.9	Lower than 8.0

Antenatal women with moderate anaemia (Hb-7-9.9gm/dl)

Antenatal women with severe anaemia (Hb < 7gm/dl).

Antenatal women with moderate and severe anaemia otherwise having no other medical problem.

Exclusion criteria

Antenatal women with no anaemia (Hb ≥11gm/dl)

Antenatal women with mild anaemia (Hb-10-10.9 gm/dl)

Antenatal cases with other associated diseases were excluded.

Cases of bad obstetric history for any other reason.

Methods

All study subjects were studied in full details with reference to age, literacy, socio economic status, diet, detailed obstetric and menstrual history. Present pregnancy details regarding the number of antenatal visits, ill health, chronic infection or infestation any time during pregnancy were studied.

Women were investigated for:-

- Complete haemogram.
- Urine Routine Examination and Microscopy:
- Stool Routine Examination and Microscopy:

- Peripheral Blood Smear for evidence malarial parasite.
- Serum iron and serum total iron binding capacity to know the iron stores.
- Serum Iron/Folate/Haemoglobin Electrophoresis (when required)
- Any Other Investigations as and when required.

Only Hb was done in the control group.
All the study subjects were followed up till they were discharged from the hospital.
Present pregnancy details – parity, interval between conception, number of ANC visits, and any associated medical disorder were studied.

Statistical methods employed

1. The Mean and it is defined as the average of N values.

$$\text{Mean} = \frac{\sum N \text{ values}}{N}$$

where $\sum$ = summation of all N values

2. Chi-Square ($\chi 2$) Test

$$\chi 2 = \sum \frac{(Oi - Ei)^2}{Ei}$$

Where Oi is Observed frequency and Ei is Expected frequency with
n-1 degrees of freedom
The completed questionnaires of patients were compiled and enetered into Microsoft Excel which were then analysed using SPSS Version 2.1 or 21. Proportions were calculated for different parameters and $\chi 2$ test was then used to assess the association of these factors with anaemia in pregnant women.

3. Significant Figures

Highly Significant (HS) (p value: $p \leq 0.01$)
Significant (S) (p value: $0.01 < p < 0.05$)
Non Significant (NS) (p value: $p \geq 0.05$)

4. Contingency Coefficient, $CC = \sqrt{\frac{\chi 2}{N + \chi 2}}$

Where $\chi 2$ = Chi-Square and N= Number of patients

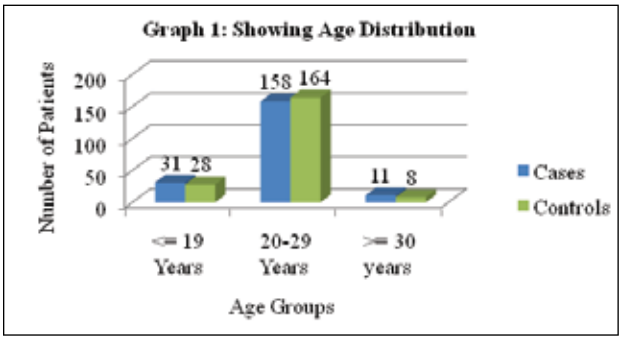
Results

The study subjects were divided into two groups.
200 cases of moderate and severe anaemia
200 non anaemic controls

Table-1: Distribution of study subjects according to age

Age (years)	Cases		Controls	
	N=200	%	N=200	%
≤ 19 Yrs.	31	15.5	28	14
20-29 Yrs.	158	79	164	82
≥ 30 Yrs.	11	5.5	8	4
Total	200	100	200	100

CC = 0.061, P = 0.691 (NS)



- Majority of study subjects belonged to the age group of 20-29 years – 79% in cases and 82% in controls.
- 15.5% of women in cases and 14% of women in controls were belonging to the teenage age group of ≤ 19 Years.
- 5.5% of cases and 4% of controls were elderly mothers with age ≥ 30 years.

Table – 2: Distribution of study subjects according to socio economic status

SES	Cases		Controls	
	N=200	%	N=200	%
Lower	138	69	36	18
Middle	59	29.5	130	65
Upper	3	1.5	34	17
Total	200	100	200	100

CC = 0.599; P < 0.001 (HS)

All the cases were categorized as per modified Kuppuswamy's socio economic classification.
69% of the cases as against only 18% of the controls belonged to low socio economic group, indicating that low socio economic status is a risk factor for anaemia in pregnancy.

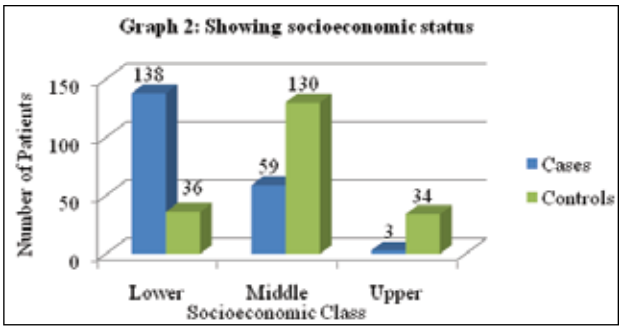
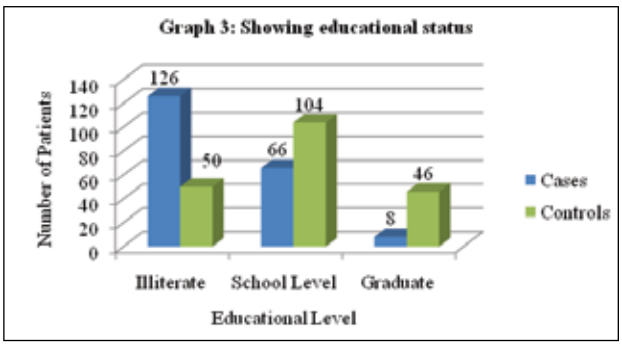


Table – 3: Distribution of study subjects as per educational status

Educational Status	Cases		Controls	
	N=200	%	N=200	%
Illiterate	126	63	50	25
School Level	66	33	104	52
Graduate	8	4	46	23
Total	200	100	200	100

CC = 0.504; P <0.001 (HS)

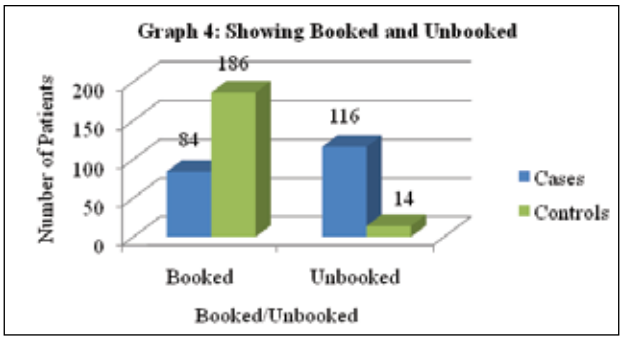


Majority of anaemic women were illiterate accounting to 63% as against only 25% in the control group. 52% in the controls and 33% in cases had school level education.

Table – 4: Distribution of study subjects as booked and unbooked

Category	Cases		Controls	
	N=200	%	N=200	%
Booked	84	42	186	93
Unbooked	116	58	14	7
Total	200	100	200	100

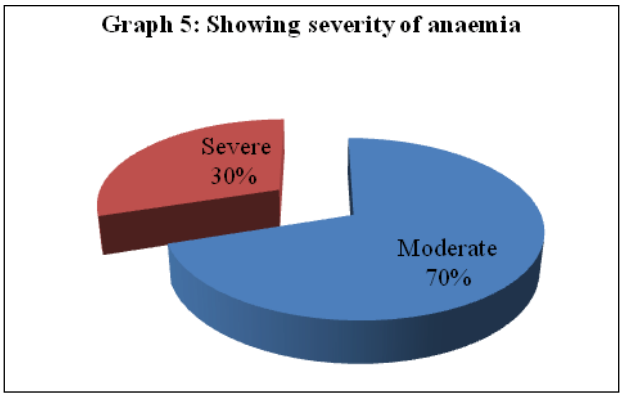
CC = 0.611; P <0.001 (HS)



It was observed that 58% of the anaemic patients were unbooked as against only 7% in the control group. Hence anaemia is more common in the unbooked cases.

Table – 5: Distribution of cases according to the severity of anaemia

Severity of anaemia	No. of cases (N=200)	%
Moderate	140	70
Severe	60	30
Total	200	100

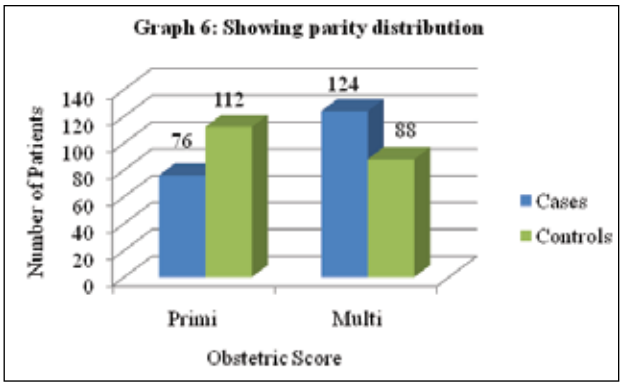


It is observed that out of 200 anaemia cases 70% were moderately anaemic and 30% were severely anaemic.

Table – 6: Distribution of study subjects according to parity

Parity	Cases				Controls	
	Moderate	Severe	N = 200	%	N=200	%
Primi	52	24	76	38	112	56
Multi	88	36	124	62	88	44
Total	140	60	200	100	200	100

CC = 0.247, P < 0.001 (HS)

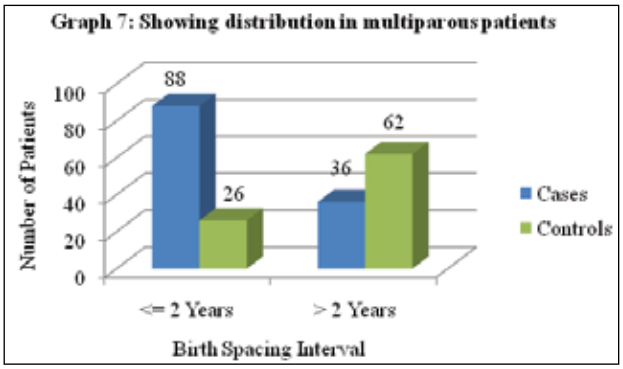


38% of anaemic patients were primigravida as against 56% in the controls. 62% of anaemic cases were multigravidae as against only 44% in the controls. Hence anaemia is more common in multigravidae probably because of decreased birth spacing and multiple pregnancies.

Table – 7:Birth spacing interval in multiparous patients

Birth Spacing Interval	Cases		Controls	
	N* = 124	%	N = 88	%
≤ 2 Yrs.	88	71	26	29.5
> 2 Yrs.	36	29	62	70.5
Total	124	100	88	100

CC = 0.472; P < 0.001 (HS)
N* - Total Number of Multigravidae Patients



71% of the cases had birth spacing interval of ≤ 2 years while it was only 29.5% in the control group.

70.5% of the patients in the control group had birth spacing interval of more than 2 years.

Thus, anaemia is more common in multigravidae with decreased birth spacing.

Table – 8: Symptom analysis of anaemic cases and control group

Symptoms	Cases		Controls	
	N = 200	%	N = 200	%
Asymptomatic	30	15	194	97
Weakness / Fatiguability	150	75	0	0
Dyspnoea / Palpitations	74	37	0	0
Pedal Edema	40	20	6	3
Loss of Appetite	56	28	0	0
Malaria	3	1.5	0	0
Visual black outs	3	1.5	0	0
Fever	3	1.5	0	0
UTI	3	1.5	0	0
TB	3	1.5	0	0

p<0.001 (HS)

85% of anaemic women had symptoms suggestive of anaemia. The common symptoms were weakness/ fatiguability in 75%, dyspnoea/ palpitations in 37% and pedal edema in 20% of anaemic cases.

97% of the control group were asymptomatic and only 3% had pedal edema due to associated gestational hypertension.

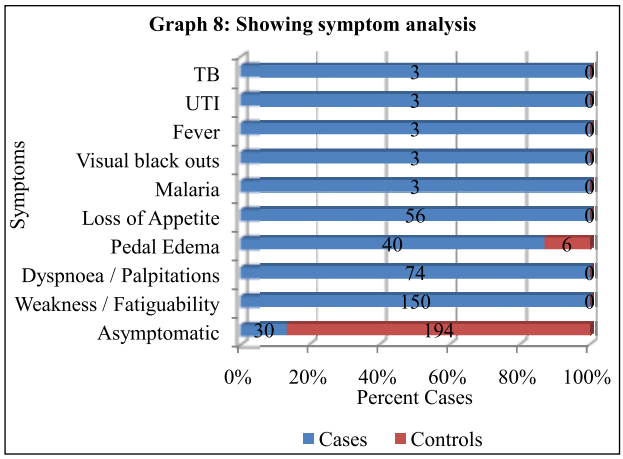
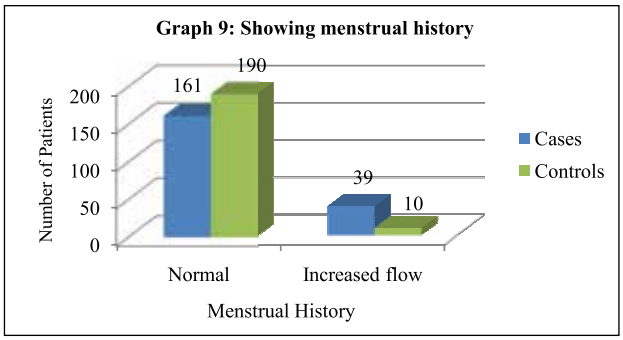


Table – 9: Distribution of study subjects according to menstrual history

Menstrual history	Cases		Controls	
	N = 200	%	N = 200	%
Normal	161	80.5	190	95
Increased flow	39	19.5	10	5
Total	200	100	200	100

CC = 0.299; P < 0.001 (HS)

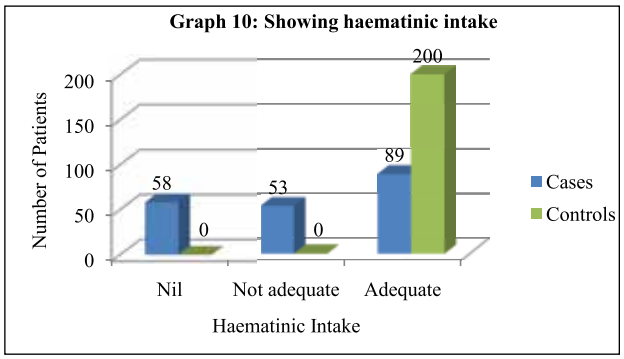


19.5% of anaemic cases had increased menstrual flow as compared to only 5% in the control group.

Table – 10: Haematinic intake in the study subjects in the present pregnancy

Haematinic intake	Cases		Controls	
	N = 200	%	N = 200	%
Nil	58	29	0	0
Not adequate	53	26.5	0	0
Adequate	89	44.5	200	100
Total	200	100	200	100

CC = 0.659; P < 0.001 (HS)

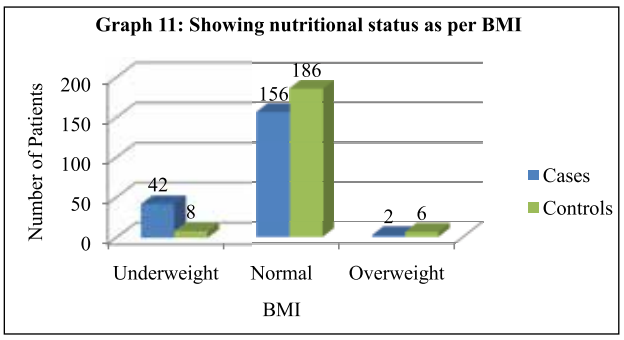


- Iron intake was considered to be adequate if the women had haematinic intake from the beginning of second trimester.
- 29% of anaemic cases had no haematinic intake and 26.5% had inadequate iron supplementation.
- Only 44.5 % of anaemic cases had adequate haematinic intake as against 100% in the control group.

Table – 11: Table showing nutritional status of study subjects as per BMI

BMI (Kg/m^2)	Cases		Controls	
	N = 200	%	N = 200	%
Underweight	42	21	8	4
Normal	156	78	186	93
Overweight	2	1	6	3
Total	200	100	200	100

CC = 0.349; P < 0.001 (HS)



The nutritional status was analysed on the basis of body mass index (BMI). BMI of the women was calculated by using the formula.

BMI (in kg/m^2) = Weight (in kg) / Height^2 (m)

Women were divided into 4 categories depending on the BMI.

≤ 19 Kg/m^2 = Underweight
20 – 24 Kg/m^2 = Normal
≥ 25 Kg/m^2 = Overweight

- 21% of the anaemic patients were underweight as against only 4% in the control group.
- 93% of the controls had normal BMI as against only 78% in the cases.

Table – 12: Relationship of grade of anaemia with different mean blood parameters

Blood parameters (Mean value)	Moderate (N = 140)	Severe (N = 60)
PCV (%)	27.0	19.2
MCV (fl)	76.0	61.8
MCH (pg)	22.37	17.91
MCHC (%)	27.4	25.1
S. Iron (mg/dl)	59.74	60.15
S. TIBC (mg/dl)	447.44	477.20

- This table shows that mean PCV was 27.0% in the moderate anaemic group and 19.2% in the severely anaemic group.
- The mean MCV was 76.0fl in the moderately anaemic and 61.8fl in the severely anaemic group.
- The mean MCH was 22.37pg in the moderately anaemic and 17.91pg in the severely anaemic group.
- The mean MCHC was 27.4% in the moderately

anaemic and 25.1% in the severely anaemic group.

- This shows that MCV, MCH and MCHC are all reduced in iron deficiency anaemia, which is the commonest type of anaemia in pregnancy.
- The mean S. Iron was 59.74 mg/dl in the moderately anaemic and 60.15 mg/dl in the severely anaemic group.
- The mean S. TIBC was 447.44 mg/dl in the moderately anaemic and 477.20 mg/dl in the severely anaemic group.

This shows that as the iron stores decrease in iron deficiency anaemia, serum total iron binding capacity increases.

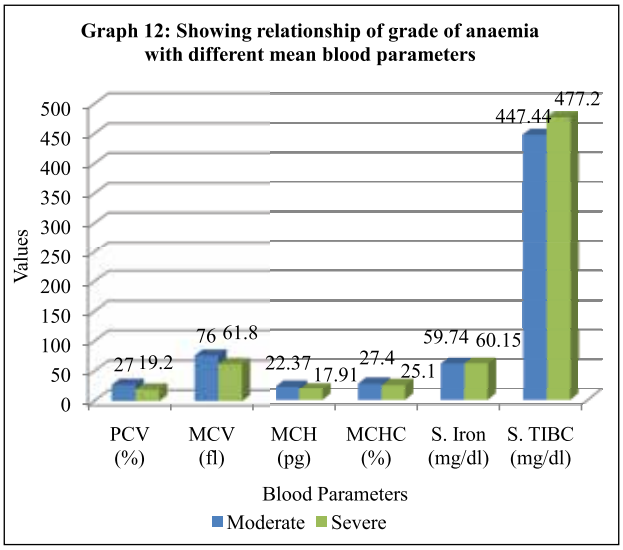


Table – 13: Type of anaemia in cases based on peripheral smear

Type of blood picture	Frequency	%
Microcytic hypochromic	165	82.5
Dimorphic	35	17.5
Total	200	100

- Maximum cases had microcytic hypochromic anaemia accounting for 82.5% of cases.
- Dimorphic anaemia was present in the balance 17.5% of the cases.

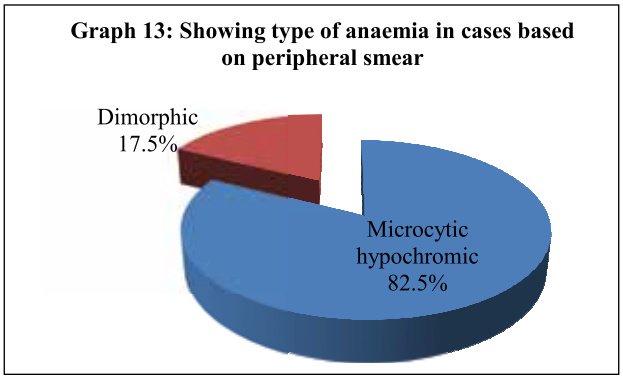
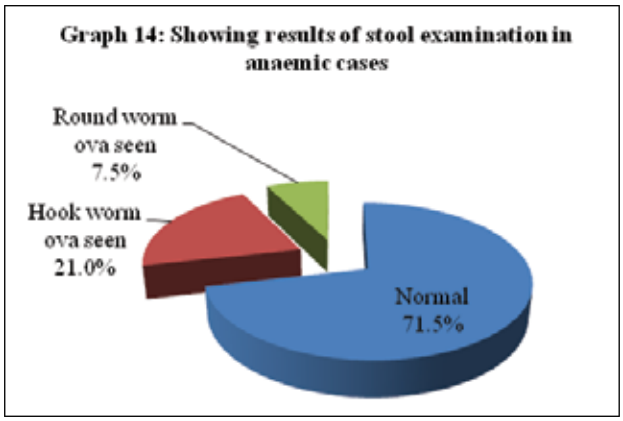


Table – 14: Table showing the results of stool examination in the anaemic cases

Stool examination	Frequency	%
Normal	143	71.5
Hook worm ova seen	42	21
Round worm ova seen	15	7.5
Total	200	100



Out of 200 cases of anaemia, 21% had positive stool examination for hook worm ova and 7.5% had positive stool examination for round worm ova.

Discussion

Majority of study subjects in the present study belonged to the age group of 20-29 years, 79% in cases and 82% in the controls group (table no-1). This is comparable to the study conducted by Khandait DW et al (2001)[23]; in which 70% of the cases belonged to 20-29 years age group. Some other studies also concluded similar results[7,9]. Low SES is a risk factor for anaemia, poor nutrition being the main cause. In the present study 69% of the anaemic women (table no-2) belonged to low SES. These findings are comparable with study conducted by Malhotra P et al (2004)[7], in which prevalence of anaemia in women from low socioeconomic status was 63.2% as compared to 38.5% in higher socio-economical status women. Studies conducted by Sanha H et al[9], Lokare PO et al[11], Judith A et al[18] and Hashim N et al[13], Ndukwu GU[14] also concluded that anaemia was more prevalent in women belonging to low socio economic class. This suggests a close relationship between low SES and pregnancy anaemia probably because of poor nutrition and inadequate health care. In the present study it was observed that anaemia is more common among the illiterate mothers, the prevalence being 63% as against 25% in the control group (table no-3). Only 33% of anaemic women

had school education as compared to 52% in the control group. This is comparable with studies done by Naz H et al[16] and Malhotra P et al[14] and Khandait WD[29]. Naz H et al concluded that 55.6% of anaemic women were illiterate. Malhotra P et al concluded that prevalence of anaemia was 51.3% amongst illiterate women as compared to 43.5% prevalence in educated women. Lokare PO et al[21], Hashim N et al[23] also found that illiteracy was significantly associated with high prevalence of anaemia during pregnancy. Regular antenatal checkups and adequate antenatal care is the cornerstone for safe motherhood. 58% of the cases in the present study were unbooked (table no-4) as against only 7% in the control group. This is comparable to study by Agarwal R [30] in which 51.82% were unbooked. Study by Naz H et al[16] also concluded that that 67% cases were unbooked in their study. In the present study 70% of subjects had moderate anaemia and 30% had severe anaemia (table no-5). This is comparable to the study conducted by Awasthi et al (2001)[32], in which 71.5% subjects had moderate anaemia and 28.5% had severe anaemia. In their study, Hyder SM et al[28] concluded that 80% of women had moderate anaemia. Rizwan F[28], Toteja GS[17] also concluded that majority of women in the study had moderate anaemia. Similar results were concluded by Gautam V et al[15].Anaemia in pregnancy is more common in women of high parity due to frequent pregnancy and inadequate spacing. In the present study, anaemia was more common in multigravidae accounting for 62% of cases (table no-6) compared to only 44% in the control group. These observations are comparable to the study conducted by Awasthi A et al[32], in which 65.5% subjects were multigravidae and 34.5% were primigravida. Study by Naz H et al[16] also concluded that 61.5% of multigravide women had anemia. Studies conducted by Judith A et al[18], Hashim N et al [13], Al-Farsi YM[23] also found that anaemia was more prevalent in miltigravidae. Close birth spacing had an impact on the haemoglobin status of women. 71% of women in the anaemic group had birth spacing ≤ 2 years (table no-7) as compared to only 29.5% in the control group. This is comparable to study conducted by Khandait WD et al[29], in which 55.9% subjects had birth spacing > 2 years. Sanha H et al[17] also found that anaemia was more prevalent in multigravidae with birth interval of less than 36 months. Kozuki N et al[34] studied that birth intervals shorter than 18 months are significantly associated with SGA, preterm birth and death in the first year of life. Lack of access to family planning interventions thus contributes to the burden of adverse birth outcomes and infant mortality. Okwu GN et al[22] examined pregnant women with birth spacing of less than one year and less than one and a half years had significantly lower mean Hb and higher prevalence of anemia. Similarly, Nwizu EN et al[12], Lazović N et al[33] also found that short intervals between pregnancies were significant predictors of anaemia in pregnancy. In the present study, 85% of anaemic women had symptoms suggestive of anaemia. The common symptoms were Weakness / Fatiguebility in 75%, Dyspnoea / Palpitations in 37%, Loss of Appetite in 28% and Pedal Edema in 20% cases. Malaria, fever, UTI, TB and visual blackouts were present in 1.5% cases. (table no-8). Sharma JB[12] studied that anaemic patients complain of weakness, exhaustion and lassitude, indigestion and loss of appetite. Palpitation, dyspnoea, giddiness, edema and rarely anasarca and even congestive cardiac failure can occur in severe cases. Amengor GM et al[24] studied that presence of malaria parasites in peripheral blood constituted a significant risk for low Hb. 29% of anaemic cases had no haematinic intake and 26.5% had inadequate iron supplementation. Only 44.5 % of anaemic cases had adequate haematinic intake (table no-10) as against 100% in the control group. Studies by Nik Rosmawati NH et al[25] and Ivan EA et al[26] concluded that inadequate haematinic was a significant risk factor for anaemia. 21% of the anaemic patients were underweight (table no-11) as against only 4% in the control group. Judith A et al[18] also concluded that low BMI contributed significantly to the higher prevalence of anaemia in pregnancy. Adam I et al[20] concluded that attention to maternal nutrition should be given to prevent maternal anaemia and for improvement of perinatal outcome. In the present study, (table no-12) the mean PCV, MCV, MCH, MCHC and S. Iron and S.TIBC are comparable that to that studied by Agarwal V.[31] In the present study mean PCV was 27% in moderate anaemia and 19.2% in severe anaemia. In the study conducted by Agarwal V, mean PCV was 21.6% in moderate and 14.9% in severe anaemia.

Blood parameters (Mean value)	Moderate (N = 140)	Severe (N = 60)
PCV (%)	27.0	19.2
MCV (fl)	76.0	61.8
MCH (pg)	22.37	17.91
MCHC (%)	27.4	25.1
S. Iron (mg/dl)	59.74	60.15
S. TIBC (mg/dl)	447.44	477.20

In the present study mean MCV was 76fl in moderate and 61.8fl in severe anaemia. Mean MCV was 83.5fl in moderate and 75.3fl in severe anaemia in study by Agarwal V. In the present study mean MCH was 22.37pg in moderate and 17.91pg in severe anaemia. Mean MCH was 26.2pg in moderate and 22.6 pg in severe anaemia in study conducted by Agarwal V. In the present study mean MCHC was 27.4% in moderate and 25.1% in severe anaemia. This is comparable to study by Agarwal V, in which mean MCHC was 26.4% in moderate and 24.4% in severe anaemia. In the present study mean S.Iron was 59.74 mg/dl in moderate and 60.15 mg/dl in severe anaemia. In the study conducted by Agarwal V, mean S.Iron was 54.2 mg/dl in moderate and 28.19 mg/dl in severe anaemia. In the present study, mean S.TIBC was 447.44 mg/dl in moderate and 477.20 mg/dl in severe anaemia (table no-12). In the study by Agarwal V, mean S.TIBC was 320.62 mg/dl in moderate and 419.34 mg/dl in severe anaemia. Thus, iron stores decrease in iron deficiency anaemia and serum total iron binding capacity increases. Peripheral smear examination tells us about the type of anaemia and is important in the management. The present study correlates with study conducted by Awasti et al.[32] In the present study majority, 82.5% of subjects had microcytic hypochromic anaemia (table no-13) as compared to 17.5% subjects having dimorphic anaemia.This is comparable to study conducted by Awasthi et al, in which 22% subjects had dimorphic anaemia and 66.57% had microcytic hypochromic anaemia. Awan MM et al[19] also found that 76% of the cases had microcytic hypochromic anaemia. Similarly, in the study conducted by Rao P Srinivasa et al[18], it was concluded that, anaemia in 1st trimester of pregnancy was endemic and microcytic, hypochromic anaemia is most common. Worms compete with maternal nutrition and are also responsible for loss of blood and thus can cause anaemia. In the present study, 21% of cases were positive for hookworm ova and 7.5% were positive for round worm in stool examination (table no-14). Thus, 28.5% cases were positive for worm infestations in the present study. Amengor GM et al[24] studied that hookworm infestation was strongly associated with low Hb. Getachew M et al[27] concluded from their study that, there was a significant correlation between increasing hookworm parasite load and decreasing haematocrit values. Thus Plasmodium malaria and soil transmitted helminth infections were significantly associated with anaemia. Thus, Antenatal care should promote de-worming and education on personal hygiene. In the present study maternal illiteracy, low SES, inadequate antenatal care, closes birth spacing, poor nutrition were all risk factors for anaemia in pregnancy.

Among various causes of anaemia, 90% were nutritional in origin.

Conclusion.

In the present study maternal illiteracy, low SES, inadequate antenatal care, close birth spacing, poor nutrition were all risk factors for anaemia in pregnancy .Microcytic hypochromic type of anaemia (82.5%) was more prevalent suggesting nutritional inadequacies as cause of anaemia

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