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Evaluation of Abnormal Red Blood Cells in Anemic Patient

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Abstract: A total of 100 blood samples were collected and blood smears were prepared immediately after collection of blood. In these patients, who were found to be anemic, smear studies were conducted for abnormal RBCs. Many of people comes majority in the age group of 20-30 (42%), 34% were from 30-40 and 24% were from 40-50. In normal pregnant women, the RBC parameters such as level of Hb, hematocrit, packed cell volume, red blood cell count, mean cell volume (MCV), mean cell hemoglobin (MCH) and mean cell hemoglobin concentration (MCHC) remain normal. The same was noted in non-pregnant women and men whereas the pregnant women who were anemic had decreased levels of Hb, PCV, RBC, MCV, MCH, and MCHC. Another difference noted in anemic pregnant women was that mild microcytes were seen in blood smear taken from a few weeks of pregnancy and marked microcytes were seen in blood smear taken from more than 4 months of pregnancy. Where as in men, microcytic and hypochromic cells were seen. Among 100 slides, only 25 slides were taken from anemic patients and 15 slides were found abnormal RBC cells. 75 slides of peripheral blood smear taken from normal subjects.

Keywords: hypochromic, morphology, microcytic, red blood cells

I. INTRODUCTION

Anemia is estimated to affect about 200 million people mostly in the developing countries (Viteri, 1998). Anemia in pregnancy is defined by the World health organization (WHO) as a hemoglobin concentration below 11 g/dL (WHO, 1993). It is continues to be a major health problem in many developing countries and is associated with increased rates of maternal and perinatal mortality, premature delivery, low birth weight and other adverse outcomes (Mohamed, 2000; Nyuke and Letsky, 2000).

In India, anemia is estimated in 50% of the population (Seshadri, 1998). Numerous studies (Chaturvedi and Kapil, 1996; Seshadri, 1997; Aggarwal, 1998; Vasanthi and Pawashe, 1994; Sivakumar *et al.*, 2001; Gawarikar *et al.*, 2002) among adolescent girls have shown the prevalence of anemia that ranges from 22.0-96.50% in India. Review of the literature on anemia in men, pregnant and non-pregnant women shows the morphological changes of red blood corpuscles. It was felt worthwhile in the present study to evaluate the morphological changes in RBC size as size, shape and structure of RBC and also to know the changes in RBC parameters seen in anemic pregnant, non-pregnant women and men. The objectives are as follows: To study the blood smears of healthy and anemic men and women within the age group of 20-50 for abnormal red blood cells;

- A. To evaluate the subjects in order to find out anemic or normal by various Hematological parameters such as hemoglobin, hematocrit, RBC count and red cell indices;
- B. To determine the distribution of blood smears based on interpretation;
- C. To evaluate the smears in relation to age and
- D. To interpret the findings in relation to age.

II. MATERIALS AND METHODS

A total of 100 blood samples were collected from Government hospitals in Tambaram, Tamil Nadu, India. The blood smears were prepared immediately after collection of blood. Inclusion criteria were a hemoglobin value less than 11.5g/dL in female and less than 13.0g/dL in male. In these patients, who were found to be anemic, smear studies were conducted for abnormal RBCs.

In the present study diagnosis of anemia is made by measuring concentration of Hemoglobin, Red Blood Cell count, Packed cell volume and Red cell indices like MCV, MCH and MCHC were measured for pregnant women, non-pregnant women and men with anemia in which, pregnant women reflect rate of anemia is more than the other populations. High rate of anemia in pregnant population irrespective of age groups clearly denote the lack of medical care given to them. Low rate of anemia in non-pregnant women may be attributed to the nature of dietary intake, quality of food and lifestyle practices. Morphologic features of RBCs were also examined in peripheral blood smears.

III. RESULTS

A total of 100 slides were prepared during this investigation. Many of people come majority in the age group of 20-30 (42%), 34% were from 30-40 and 24% were from 40-50 (Table 1.1). In normal pregnant women, the RBC parameters such as the level of hemoglobin (Hb), hematocrit (HCT) or packed cell volume (PCV), red blood cell count (RBC), mean cell volume (MCV), mean cell hemoglobin (MCH) and mean cell hemoglobin concentration (MCHC) remain normal whereas the pregnant women who were anemic had decreased levels of Hb, PCV, RBC, MCV, MCH, MCHC (Table1). The same was noted in non-pregnant women and men. Another difference noted in anemic pregnant women was that mild microcytic were seen in blood smear taken from a few weeks of pregnancy and marked microcytic were seen in blood smear taken from more than 4 months of pregnancy where as in men, microcytic and hypochromic cells are seen. The lowest level of hemoglobin level was 4 g/dL and the highest level was 16.8 g/dL.

Many of them showed abnormal cells in the peripheral blood smear. The slides which showed changes in the RBC alone were included in this table. Patients belonged to different age groups. The youngest was 20 year old woman and the eldest was 50 year old woman. Among these 100 slides, only 25 slides were taken from anemic patients and 15 slides were found abnormal. 75 slides of peripheral blood smear taken from normal subjects. Abnormal blood cells noted were shown in the smear report of the subjects.

Table 1: Red Cell Parameters

Red Cell Parameters	Men		Pregnant Women		Non-Pregnant Women	
	Normal mean \pm SD	Anemic mean \pm SD	Normal mean \pm SD	Anemic mean \pm SD	Normal mean \pm SD	Anemic mean \pm SD
HB	14.21 \pm 1.07	7.27 \pm 0.71	12.88 \pm 0.49	6.76 \pm 1.75	13.0 \pm 0.64	8.31 \pm 0.95
PCV	42.10 \pm 2.65	30.80 \pm 3.48	41.00 \pm 2.19	28.68 \pm 3.36	40.11 \pm 1.90	27.31 \pm 2.35
RBC	5.22 \pm 0.28	4.04 \pm 0.24	4.71 \pm 0.39	3.87 \pm 0.30	4.75 \pm 0.42	3.83 \pm 0.27
MCV	80.72 \pm 6.70	76.34 \pm 8.62	86.93 \pm 7.94	74.24 \pm 9.15	84.96 \pm 8.09	71.46 \pm 6.66
MCH	27.28 \pm 2.34	18.10 \pm 2.55	27.73 \pm 2.93	17.29 \pm 3.91	27.28 \pm 2.53	21.81 \pm 3.26
MCHC	33.86 \pm 3.11	23.76 \pm 2.97	31.83 \pm 1.51	23.43 \pm 5.03	32.17 \pm 2.09	30.63 \pm 4.70

- 1) Smear taken from 28 year women
Smear report - Stomatocytes cells picture (Plate 1)
- 2) Smear taken from 26 year old women
Smear report - Hypochromic picture (Plate 1)
- 3) Smear taken from 25 year old women
Smear report - Tear drop cells are seen (Plate 1)
- 4) Smear taken from 22 year old women
Smear report - Stomatocytes cells are seen (Plate 1)
- 5) Smear taken from 28 year old women
Smear report - Marked Microcytic, hypochromic picture (Plate1)
- 6) Smear taken from 50 year old women
Smear report - Microcytic, hypochromic picture (Plate 1)
- 7) Smear taken from 45 year old women
Smear report - Target cells are seen (Plate 1)

Table 1.1: Total number of subjects

State of pregnancy	Age groups			Total
	20 – 30	30 - 40	40 - 50	
Pregnant normal	11	6	0	17
Pregnant anemic	9	7	0	16
Non-pregnant normal	10	5	5	20
Non-pregnant anemic	5	2	2	9
Men normal	4	10	14	28
Men anemic	3	4	3	10
Total	42	34	24	100

- 1) Smear taken from 20 year old women
Smear report - Mild Microcytic, hypochromic picture (Plate 1)
- 2) Smear taken from 43 year old men
Smear report - Hypochromic picture (Plate 1)
- 3) Smear taken from 20 year women
Smear report - Microcytic, hypochromic picture (Plate 2)
- 4) Smear taken from 20 year old women
Smear report - Microcytic, hypochromic picture (Plate 2)
- 5) Smear taken from 45 year old women
Smear report - Microcytic, hypochromic picture (Plate 2)
- 6) Smear taken from 35 year old men
Smear report - Hypochromic picture (Plate 2)
- 7) Smear taken from 22 year old female
Smear report - Hypochromic picture (Plate 2)
- 8) Smear taken from 48 year old women
Smear report - Hypochromic picture (Plate 3.4)

IV. DISCUSSION

The relative contribution of blood smear review to the diagnosis of various types of anemia remains controversial (Fairbanks, 1971; Jen *et al.*, 1983). . The present study was originally initiated based on an experimental observation that microcytic, hypochromic conditions were recorded in the blood smear from patients with anemia. Only one quantitative morphologic anemic study comprising the morphological features of RBCs, RBC indices and serum iron studies in iron deficiency anemia was published (Rodgers *et al.*, 1999). However, a detailed analysis of their blood parameters during pregnancy in the present study indicates the need of greater awareness in India with reference to the intensity of medical care, treatment and management. In the present study, the blood parameters such as Hb, HCT, MCV, MCH and MCHC between three groups do not follow the same pattern. On the base of result, the prevalence of anemia in pregnant women is more than the non-pregnant. Although high demand of nutrients or iron is more than the non-pregnant but high iron supplement intakes to recover this gap between two groups. Yasaii and Kimiagar (1989), Nestel *et al* (1999), Stevens (2000) and Sedeghipour *et al* (2001) in their study found similar results.

Mean hematological indices such as MCV, MCH and MCHC among pregnant women were less than non-pregnant women. These results were similar as reported earlier by Bartels *et al* (1989). In the present investigation of anemia in pregnant women, the mean hemoglobin concentration was less than 6.7 g/dl. Thirty three smears were collected from pregnant women of whom 16 smears collected from pregnant women were found to be anemic. Among those sixteen peripheral blood smears collected from anemic pregnant women, seven of them showed their hemoglobin concentration in range of 4.0-6.76g/dL. Other nine anemic pregnant women showed their hemoglobin concentration in the range of 9.0g/dl. RBC count was less than the normal value (4.2 million/cu.mm) in all the sixteen pregnant women with anemia, MCHC was found to be less than 27% in all sixteen pregnant women with anemia. MCV was found to be in the range of 60 femtolitres in seven of them. The other nine showed their MCV to be in the range of 70 fl. PCV was found to be in the range of 24% in nine of them.

And another seven of them showed PCV value to be in the range of 24%. According to Hb value, the rate of anemia in pregnant women is less than non-pregnant women (Veghari, 2007) which was similar with the present study.

A well balanced diet is recommended to prevent anemia in pregnancy and also the iron and folate deficiency. Iron supplements preferably ferrous sulphate tablets (300 mg) should be given to anemic pregnant women. These supplements should not be taken more than twice daily to avoid side effects of iron.

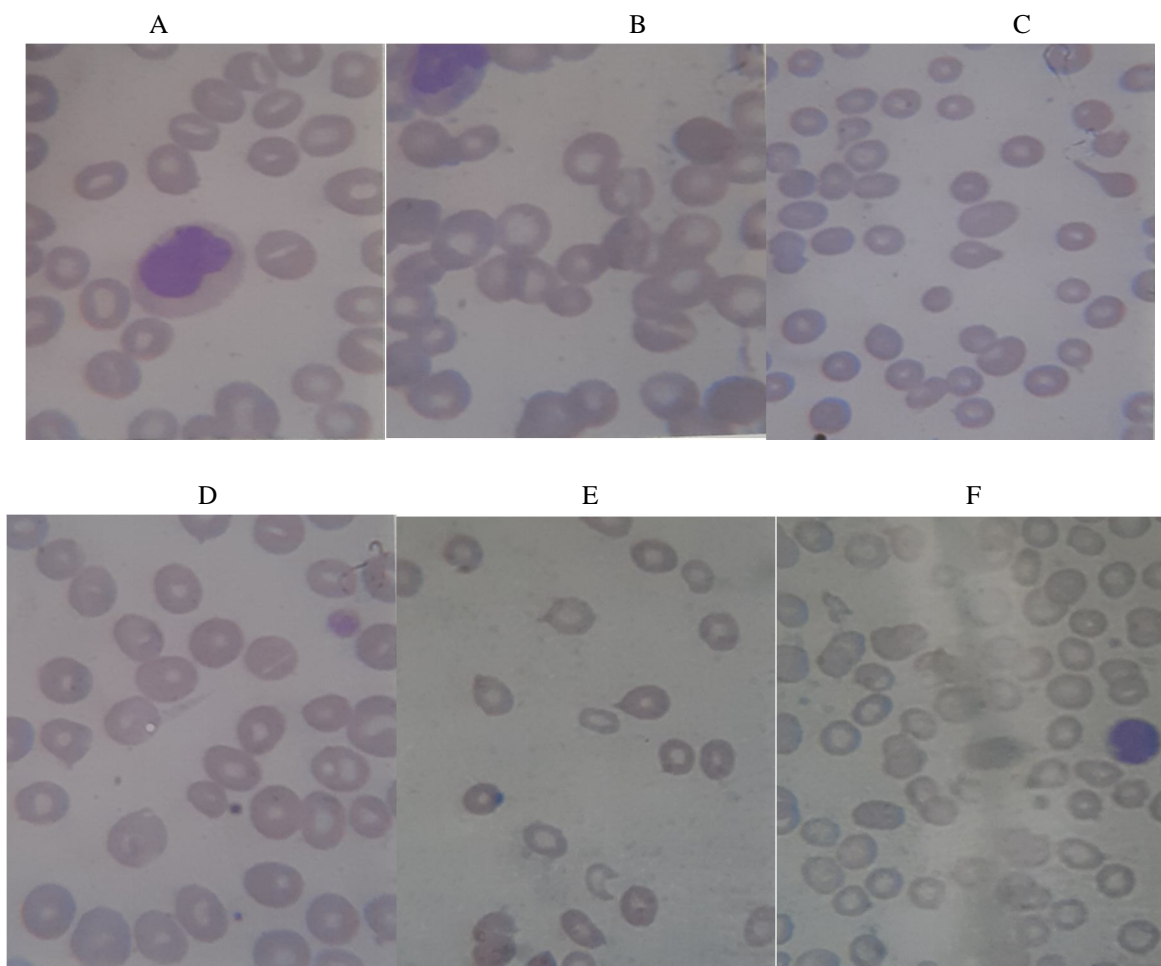
V. CONCLUSION

This finding suggests that anemia is one of the most vital nutritional problems among pregnant women; this disorder among pregnant women is more than non-pregnant women. According to iron deficiency disorders in gestational period, the present study recommends that pregnant women suffering from anemia should have food intake with iron supplement may have a greater influence on the metabolism and physiology of active state population.

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Plate: 1



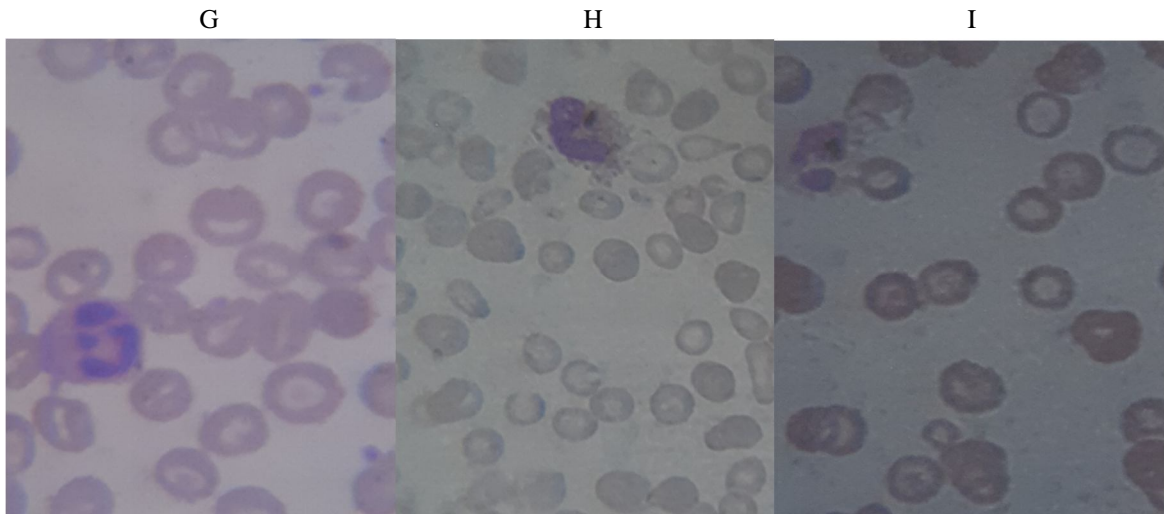
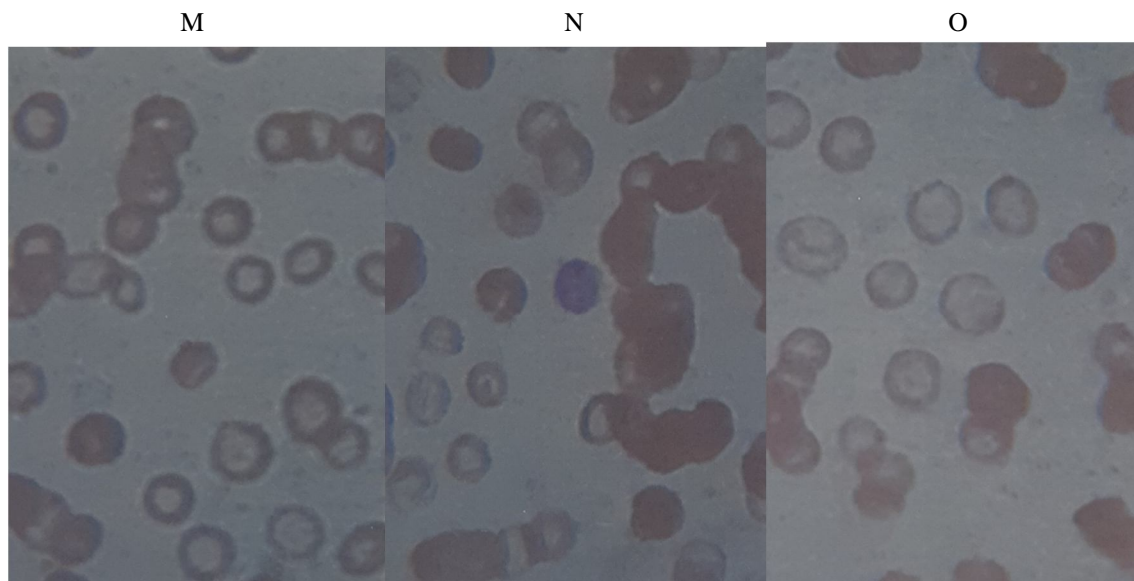
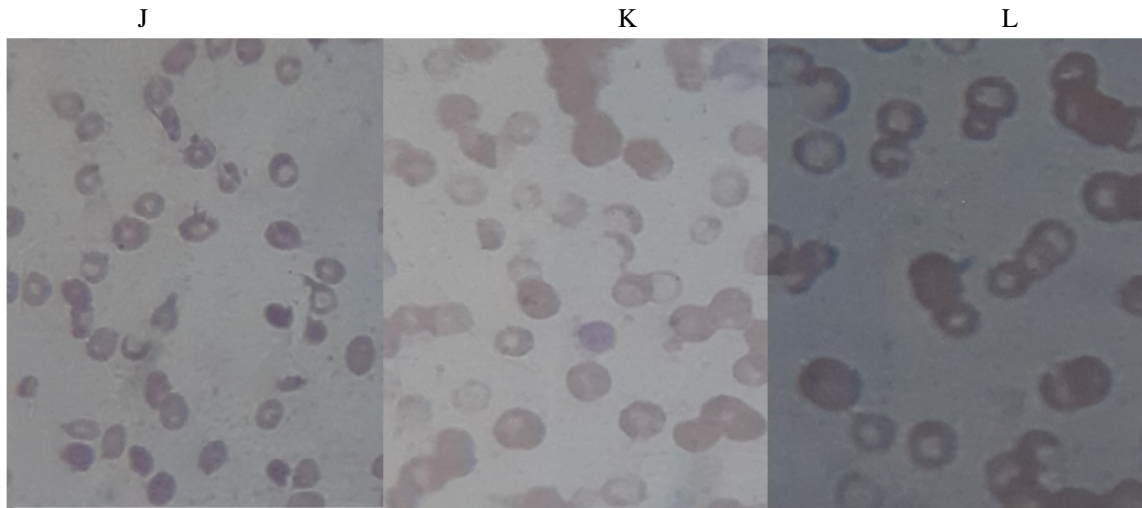


Plate: 2





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