Original Research Paper

Study of Coagulation Profile in Iron Deficiency Anaemia in Antenatal Patients and Effect of Oral Iron Therapy

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Abstract

Background: Iron deficiency anaemia (IDA) is a quite common factor during pregnancy in under developed countries. It impairs the coagulation factors of the blood and leads to frequency of pre-term labour and low birth weight infants

Method: 150 pregnant women having Hb% (gm/dl) less than 10% were compared with 100 normal (controlled) groups. The haematological and coagulation profile in both patients were studied and compared.

Results: The haematological parameters Hb%, TLC, DLC, MCV,(fl)MCH (pg) MCHC had significant p value ($p<0.001$) in both groups comparison. In the study of coagulation profile of both groups comparison except BT (bleeding time) all values were highly significant.

Conclusion: The present study will be a tool for physician, gynaecologist to treat such patient efficiently to present morbidity and mortality of mother and infant as well.

Keywords: Haematological, Coagulation profile, Hb%, ferritin, antenatal

Introduction

AS per WHO (world health organisation) anaemia affects approximately 1.5 billion people in the world. The prevalence is very high in Africa, Asia, India, China, Bangladesh however it is also high in developed countries [(1)(2)].

Anaemia caused by blood loss is because of excessive bleeding in ante partum and in the postpartum period or a problem with blood clotting mechanism. Anaemia can also results from heavy menstrual disorders in adolescent girls and women. Any of these factors will also increase the body's need for iron because it is needed to make a newRBCs, It takes at least three months to replenish the RBCs, supply back to normal levels, the length of this time is extended with pre-existing iron and other nutrient deficiencies.

During pregnancy Iron balance must be adequate for the production of haemoglobinand myoglobin[(3)]. IDA during pregnancy associated with increased frequency of pre-term labour and low birth weight infants.

Coagulation results from interaction of blood vessel,plateletscoagulationfactors,coagulationsystem

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undergosignificant changes in pregnancy. Decline in platelet count may results in pre-eclampsia which may lead to morbidity and mortality to both mother and infant by damaging vital organs like liver and kidney. IDA leads to thrombocytopenia in pregnancy associated with decrease in APTT values, which may cause risk of blood clot [4]. Hence coagulation profileand haematological parameters were evaluated andcompared in both groups. These variations will help the clinician to treat such patients efficientlyto avoid morbidity and mortality.

Material and Method

150 pregnant women aged between 19 to 35 years regularly visited to ACPM Medical college hospital Dhule, Maharashtra-424001 were studied.

Inclusive Criteria: Hb% (gm/dl) less than 10 gm% for iron deficiency in second trimester pregnancy were selected for study.

Exclusion Criteria: Third trimester pregnancy, patients already on iron supplementation therapy, immune compromisedpatients were excluded from study.

Method: 150 Iron deficiency patients were compared with 100 normal (controlled) pregnant women.

Every antenatal pregnant patients having less than 10 (gm/dl) were studied and compared in both group. CBC, Hb%, PT, INR, APTT, BT, CT, serum ferritin, test were conducted in every patients.

Duration of study was January-2021 to June-2022

Statistical analysis: Haematological parameters and coagulation profile of both groups were compared by t test and significant results were noted. The statistical analysis was carried out bySPSS software.

Observation and Results

Table-1: Comparison of haematological parameters in both groups

- Hb% (gm/dl) 9.062(±1.26) in Iron deficiency group, (ID group), 12.14 (± 0.96) in controlled group, t test was 21.8 and p<0.001
- TLC – 9358.20 (± 1.26) in IDgroup, 8678.20 (± 24.4) in controlled group, t test was 208.1 and p<0.001
- DLC – 1766916.5 (± 578) in ID group, 708626.2 (± 147) in controlled group, t test was 150.4 and p<0.001
- MCV (fl)– 79.30 (± 10.55) in ID group, 87.12 (±12.42) in controlled group, t test was 5.17 and p<0.001
- MCH (pg) – 22.12 (± 4.50) in ID group, 29.18 (± 2.96) in controlled group, t test was 14.9 and p<0.001
- MCHC (g/dl)– 28.10 (± 1.90) in ID group, 32.72 (± 2.20) in controlled group, t test was 17.1 and p<0.001

Table-2: Comparison of coagulation profile in both groups

- PT - 10.6(± 2.46) in ID group, 13.50 (± 2.10) in controlled group, t test was 9.98 and p<0.001
- INR –0.68(± 0.15) in ID group, 0.98 (± 0.16) in controlled group, t test was 14.8 and p<0.001
- APTT – 29.08(± 3.05) in ID group, 33.35 (± 4.05) in controlled group, t test was 9.42and p<0.001
- BT - 3.26 (± 1.84) in ID group, 3.38 (± 1.72) in controlled group, t test was 0.52 and p>0.61 (Insignificant p value)
- CT – 7.82 (± 1.92) in ID group,10.05 (± 3.18) in controlled group, t test was 6.29 and p<0.001
- Ferritin - 7.68 (± 11.7) in ID group, 98.12 (± 52.8) in controlled group, t test was 16.8 and p<0.001

Table 1: Comparison of haematological parameters in both groups

Parameters	Mean value (with ±SD) in Iron deficiency (150)	Mean value (with ±SD) controlled group (100)	t test	p value
Hb% (gm/dl)	9.062 (± 1.26)	12.140 (±0.96)	21.8	P<0.001
Total leukocyte count (TLC)	9358.20 (± 26.62)	8678.12 (± 24.40)	208.1	P<0.001

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Differential leukocyte count (DLC)	1766916.5 (± 578)	708626.2 (±147)	150.4	P<0.001
MCV (f1) (Mean Capsular volume)	79.30 (± 10.55)	87.12 (± 12.42)	5.17	P<0.001
MCH (pg) (Mean Capsular Haemoglobin)	22.12 (± 4.50)	29.18 (± 2.96)	14.9	P<0.001
MCHC (g/dl) (Mean Cell Haemoglobin Concentration)	28.10 (± 1.90)	32.72 (± 2.20)	17.1	P<0.001

P<0.001 = p value is highly significant

Table 2: Comparison of coagulation profile both groups

Parameters	**Mean value with SD in Iron deficiency (150)**	**Mean value controlled group (100)**	**t test**	**p value**
PT (Prothrombin time)	10.6 (± 2.46)	13.50 (± 2.10)	9.98	p<0.001
INR (International Normalized Ratio)	0.68 (± 0.15)	0.98 (± 0.16)	14.8	p<0.001
APTT (Activated partial Pro-thromboPlastintime)	29.08 (± 4.05)	33.56 (± 4.05)	9.42	P<0.001
BT (Bleeding time)	3.26 (± 1.84)	3.38 (± 1.72)	0.50	p>0.60 Insignificant
CT (Clotting time)	7.82 (± 1.92)	10.05 (± 3.18)	6.24	P<0.001
Ferritin	7.68 (± 11.76)	98.12 (± 52.84)	16.8	P<0.001

Except (Bleeding time) study all parameters have highly significant p value (p<0.001)

Discussion

Present study of coagulation profilein Iron deficiency anaemia in antenatal patients and effect of oral Iron therapy in Maharashtra population. The Iron deficiency patients were compared with controlled group with haematological parameters viz Hb%, TLC, DLC, MCV (fl), MCH (pg), MCHC (g/dl) and p value was highly significant (p<0.001) (Table-1).The comparative studies of coagulation profile in both groups. The parameters were PT, INR, APTT, BT, CT, Ferritin. Except BT parameters all studies were highly significant (p<0.001) (Table-2). These findings are more or less in agreement with previous studies [5][6][7].

The major signs and symptoms of Iron deficiency anaemia (IDA) in pregnancy can be summarized as fatigue, low physical and mental capacity, headache, vertigo, leg cramps, pagophasia, cold intolerance, koilonychias, mucosal paleness and angular stomatatis. IDAduring pregnancy poses number of maternal and foetal problems, including premature birth, Intra-uterine developmental retardation, placental problems, and decrease in new born iron storage, the risk of decrease in maternal blood reserves

during birth and need for transfusion in cases heavy blood loss, cardiac stress. Sickle cell crisis, ruptured uterus, trophoblastic disease (chorio-carcinoma), hypovolemic shock, blood transfusion, amniotic fluid embolism, intra uterine death, prolonged hospital stay, decreased maternal breast milk production and maternal depletion of Iron stores during and after the post partum period [8][9].

IDA may cause injury to endothelial cells exposing the underlying collagen to the plasma and coagulation factors. This may be initiate factor which lead to eclampsia or preeclampsia and sepsis [10].

Anaemia occurs for different reasons these include increased destruction (break down) of RBCS, excess blood loss, (i.e., haemorrhage), inadequate production of RBCS by bone morrow[11]. In some case anaemia results from inherited disorder and other causes may include environment such as nutritional problem,malaria infection or exposure to drug or toxin. It frequently occurs during pregnancy. Delivery will have significant risk of further blood loss [12].

It is established fact that 80% pregnant women in developing countries have IDA; severe IDA is dangerous for mother and her baby. IDA could be due topoverty and illiteracy also.

Summary and Conclusion

The present study illustratesmany haematological problems develop during pregnancy due to IDA, can lead to multiple emergencies, which ultimately lead to morbidity and mortality of both mother and foetus. But this study demands further embryological, genetic, nutritional,patho-physiological studies because exact mechanism of coagulation in IDA is still unclear.

Limitation of study: Owing to tertiary location of research hospital, less number of patients, lack of latest technique we have limited research results.

This research paper was approved by Ethical committee of ACPM Medical College, Dhule Maharashtra-424001

Conflict of Interest: No

Funding: Self

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