# A DEEP STUDY OF MATERNAL CHANGES DURING PREGNANCY

[1]Anand Kumar *, [2]Dr. Rakhee Kelaskar

*[1]Research Scholar, [2]Supervisor*

*[1-2]Department of Public Health, OPJS University, Churu, Rajasthan, India*

**Accepted**: 23.08.2022 **Published**: 01.09.2022

**Keywords**: Morbidity, Chromosomal, Obstetric, Hematologic.

## Abstract

*Maternal anaemia has been recognised as the most prevalent hematologic issue in pregnant mothers. This condition arises commonly as a consequence of low consumption of metal and biotin during birth. It is stated that anaemia develops around 85-100 percent pregnant ladies with inadequate supplementation of metal during pregnancy. Both rate and degree of maternal anaemia has considerable heterogeneity in the various geographic and socioeconomic distributions. Though many ladies in rich nations start delivery with decreased iron levels, this is significantly more dangerous in underdeveloped countries. Maternal anaemia in the prenatal period might be associated to obstetric difficulties including such maternal morbidity and mortality, surgical delivery and chromosomal abnormalities.*

**Paper Identification**

*Corresponding Author

## Introduction

While pregnant, there is now a significant increase including both erythrocytes and blood viscosity as a result of the increased demands of the expanding uterus and baby. The amount of circulatory plasma rises in a predictable manner until it reaches a peak in the eighth or ninth trimester. It is estimated that the increase is around 1000 mL, which equates to 45 percent of the total volume in circulatory circulation in ou pas. After birth, the volume declines fast, but it returns to pre-pregnancy levels by 3 peripartum weeks, when the woman is no longer pregnant. Although the total rbcs rises, the plasma size increases as much as the rbcs, causing the amount of methemoglobin to decline, despite the fact that the entire number of white blood cells grows. This fall in haemoglobin content lowers the viscosity of the blood, which it is hypothesised would improve placental perfusion, resulting in improved gas and nutrition exchange between the mother and the foetus.

The physiological hemodilution that occurs during pregnancy, as well as the haemoglobin levels at which mothers and newborns might benefit with iron supplementation. According to some research, the normal reduction in haemoglobin is related with better results for the infant throughout the pregnancy. In the corpus of an older woman, there seems to be around 2,000 g for iron, 60–70 percent of which would be found in red cells and the remaining portion glycogen in the hepatic, spleen, and stem cells. That whenever a woman gets pregnant, her body's need for iron rises dramatically. More specifically, around 1,000 mm more is necessary, with 300 mg being allocated to the foetus and brain, 500 mg being allocated to high maternal haemoglobin, and gramme being allocated to compensate for urine. Accordingly, an extra 50 percent of the iron that would be required in the quasi condition should be consumed throughout the time of pregnancy.

**Iron Deficiency Anemia during Pregnancy**

Iron deficiency anaemia (IDA) is perhaps the most frequent cause of severe anaemia, accounting for around 80% of cases. When a person's diet contains high levels of phytates including phenolic chemicals, which inhibit absorption, they or she will develop anaemia. It is characterised by a deficit in haemoglobin production, which results in erythrocytes that are unusually tiny (microcytic) and often have a low concentration of haemoglobin (hypochromic). As a result, the ability of both the oxygen - carrying to the skin's tissue is diminished. Iron is required by every cell in the body. In addition to its roles in mitochondrial respiration and epigenetic modification, iron also plays a role in cell development and differentiation, oxygenation binding and transit, muscle oxygen usage and storage, chemical reactions, synapse production, and biogenesis, among other things. For a gestation to be successful, about 1190 mg or iron is necessary every day from fertilization through birth. It is necessary to consume more iron while pregnancy, which increases steadily during the course of the pregnancy, with 0.8 mg/day throughout the first phase to 7.5 mg/day there in second trimester. It is estimated that an average if 4.4 milligrammes per week is required for the whole gestational period. In pregnancy, the needed iron is utilised to increase the woman's hemoglobin mass, meet the iron needs of the baby, and adjust for hysteresis loss (i.e. blood wastage) during delivery. The amount of iron in a patient's body is influenced by their low birthweight to either a significant degree. Low fertility weight (about 2,500 g) newborns have a concentration of around 200 mg, while "average" birth weight (approximately 3,500 g) newborns have an iron level of approximately 270 mg. The risk of newborn death and morbidity rises when a mother has an iron deficit during pregnant. If the haemoglobin level is far less that 8 grammes per deciliter, the rate of death before delivery rises by a factor of two to three times. Further, if the haemoglobin level falls below 5 new gm, the chance of mortality rises by an 8-10 times, according to research. When the mother's haemoglobin numbers are low, she is more susceptible to have a preterm childbirth and a premature birth for her child.

Iron in pregnancy is classified according to its severity. Anemia may be categorized into two kinds: hemolytic and nonhemolytic.

(A) Pathological anaemia in the course of a pregnancy

(B) Anemia due to physiological causes in pregnancy

(A) Anemia due to a pathological condition: It is also subdivided into the following categories:

1. A deficiency of resources Anemia may be caused by a variety of factors, including: iron insufficiency, folate deficit, B12 deficiency, and protein shortage. 2. Hemorrhagic: a kind of haemorrhage Acute hemorrhagic shock (APH) is characterised by bleeding in the first trimester of life or APH. Chronic hemorrhagic conditions include hookworm infection and digestive (gastrointestinal) haemorrhage. Thalassemias and haemolobinopathies are hereditary diseases. This is because of the following reasons:

Iron is under high demand during pregnancy, which results in an iron deficiency status.

**Physiological Anemia**: During gestation, there seems to be a dramatic rise in plasma levels, which may reach 50%, RBC amount, which can reach 33%, and haemoglobin mass, which can reach 18-20%. Additionally, there's also a significant requirement for additional iron throughout pregnancy, particularly during the later part of the infertility. As a result, physiological anaemia is caused by the combined effects of hemodilution and a poor iron equilibrium in the blood.

Physiologic Anemia is defined by the following criteria: haemoglobin concentration of less than 10 gm/dL,

- R.B.C. 3.5 ,000,000 per millimetre of water

- P.C.V. – 30%, - P.C.V. – 20%

PCB-PBF morphology is normal, with just a central pale face.

The clinical manifestations of anaemia are highly dependent on the severity of the anaemia.

Anemia indicators include lassitude, tiredness, weakness, anorexia, dyspepsia, palpitation, and swelling of the legs and ankles. Pallor, glossitis, Ulcerations, edoema of the legs, and a faint rhythmic murmur in the mitral region are all indicators of anaemia. In order to determine the severity of anaemia, as well as what caused it, investigations are carried out in a laboratory. To determine the severity of anaemia, one must examine the Hb percent, the Erythrocyte count, and the Pct (Packed Cell Volume). Light anaemia is defined as Hb 8-10 gram percent; moderate anaemia is defined as less that 7-8 gram percent; and severe anaemia is defined as 2 - 7 gm percent. PBF (Nerves Blood Flow) and haematological indices such as MCV, Haematocrit, MCHC, and others must be examined in order to define the kind of anaemia.

The following are the values of the walls of blood vessels in a common iron deficient anaemia:

- Hb just under 10 gm percent (high blood pressure).
- RBC – fewer than 4 million per millilitre of water
- PCV is less that 30% of the total.
- MCHC – Only about 30% of the population
- MCV – only about 75% of micro volt m3 is present (meter cube)
- MCH- fewer than 25 pages in length The concentration of iron in serum is typically less than 30 micrograms per 100 millilitres.
  - The total high binding capacity rises to 400 micrograms per 100 millilitres of solution. Serum decreases below 15 pico gm/L
  - If a physician wants to determine the source of anaemia, he or she must follow appropriate the fundamental guidelines.
  - Researching the past,
  - Examining the physical condition,
  - Examination of faeces on a regular basis to identify helminthes or latent blood, Urine is tested for protein, lactose, and snot cells, among other things.
  - Chest X-rays in suspected instances of pulmonary TB; however, if the disease does not response to treatment, a myeloid examination should be performed.
  - Testing of blood both PBF and malarial protozoa
  - Kidney following inclusion criteria such as BUN and creatinine are performed etc.

**Mild anemia**

Women who have moderate anaemia during pregnancy have a lower proclivity to work. Because physical labour is involved in the job, they would have been unable to support themselves. Women who have chronic moderate anaemia may be able to do it through labor and birth without experiencing any negative repercussions since they are adequately compensated.

**Moderate anemia**

Women who suffer from moderate anaemia have a significant decline in their job capacity but may fail to keep up with domestic tasks and free childcare responsibilities. They seem to be more susceptible to illnesses, and the recovery phase after an ailment may be longer. Infant deaths are more prevalent in women who have mild anaemia, according to research. They give birth to kids that are smaller in size at term, and the risk of prenatal death is increased in these newborns. Their ability to tolerate blood loss before to and after the childbirth may be impaired, making them more susceptible to infection. Mothers experiencing moderate anaemia account for a disproportionately high number of maternal fatalities owing to antenatal care and uterine rupture, pregnancy-induced pressure, and sepsis, among other causes.

**Severe anemia**

There are three separate phases of severe anaemia that've been identified: compensated, metabolic acidosis, and that which is connected with cardiovascular failure. Cardiovascular decompensation generally happens when haemoglobin (Hb) decreases below the normal range (5.0 g/dl). Even when the patient is at rest, his vital capacity is enhanced, the blood volume is higher, and indeed the heartbeat is elevated. These alterations are accompanied by palpitations and difficulty breathing, even while at rest. Insufficient compensatory methods have emerged to cope with the drop in haemoglobin levels. Because of a lack of oxygen, anaerobic glycolysis takes place, resulting in lactate buildup. Eventually, cardiac failure develops, limiting the amount of labour that may be done. If left untreated, it may result in pulmonary edoema and mortality. When haemoglobin (Hb) is less than 5 g/dl and compacted contains substantial (PCV) is less than 14. Just a little haemorrhage of 200 mL there in third step might result in crisis and mortality in these patients. Even today, females in India's outlying rural regions sometimes arrive to the doctor only after they are in just this advanced state of decompensation. According to the available data form India, parental suicide rate are higher among females with haemoglobin levels less 8.0 d e. Whenever maternal haemoglobin levels fall beyond 5.0 g/dl, the incidence of maternal death increases dramatically.

**Pregnancy Maternal effects of Anemia**

With differing degrees of adolescent pregnancy, distinct forms of breakdown are seen in the unborn, indicating that diverse types of disintegration occur. An increase in maternal haemoglobin below 9.5 g/d1 has been shown to be related with a substantial increase in the postnatal death rate there in majority of studies18, 19, 23, 25. As pregnant haemoglobin levels fall beneath 8.0 g/dl, overall risk of perinatal death increases by 2 to 3 times, and the risk increases by 8-10 times when pregnant haemoglobin levels fall under 5.0 g/dl, according to the American Journal of Medicine. Increased preterm rate and foetal short stature have been linked to a considerable decrease in gestational age when paternal haemoglobin levels are less than 8.0 g/d1, according to the literature2. Mild anaemia may have little impact on labor or childbirth other than the fact that the family will have inadequate iron levels and would become moderately to highly anaemic in future pregnancies if the condition persists. Moderate anaemia may result in greater weakness, an exhaustion, exhaustion, and poor job performance, to name a few consequences. Anemia is connected with a bad prognosis in severe cases, on the other hand. The lady may well have beats, tachycardia, shortness of breath, and heart rate and cardiac pulse, which may result in cardiac distress, which can develop to possible to identify and heart failure, but can be life-threatening. Anemia has been linked to an increased risk of well before labour (28.2 percent), or before (31.2 percent), and sepsis (blood poisoning). Regardless of the presence or absence of adequate iron reserves, the foetus still acquires iron through maternal fibrin, which is locked in the uterus but which, in effect, removes continuously actively delivers iron to the foetus during pregnancy. Progressively, however, such foetuses likely to have lower iron storage as a result of the depletion of daily iron reserves. It has been noted that neonates born to anaemic women have a poor perinatal result, with well before and comparatively tiny newborns being born, as well as higher perinatal death rates. Providing iron here to fetus during pregnancy has been shown to enhance the neonatal outcome. Children in the broilers fed gained considerably more weight, scored higher on the Infant scale, and had a higher hba1c 3 months later than others in the versus placebo.

**Clinical Signs and Symptoms**

Pregnancy anaemia may be nonspecific, and it is often discovered through normal prenatal screening. Throughout most cases, there are no distinct indications or symptoms, with fatigue is now the most prevalent. Women could also experience weakness, migraines, palpitations, dizziness, breathlessness, and male pattern baldness, among other symptoms. Even in the face of a low haemoglobin level, signs of anaemia might manifest themselves.

**Diagnosis**

The ability to recognise distinct haemoglobin cutoff values during pregnant in order to distinguish both hydraemia and genuine anaemia is critical in the first stages of the evaluation. When it comes to the first final trimesters, the lower haemoglobin cut off would be 11.0 g/dL, so it is 10.5 g/dL like in third pregnancy. As a result, any haemoglobin level than 10.5 g/dL must be considered anaemic and must be investigated further. The next stage is making a differential diagnostic for the presence of anaemia. Despite the fact that anaemia is the most common cause of anaemia during pregnancy, additional factors such as illness, atypical haemoglobin, renal illness, or insects (malaria, parasites) should always be cleared out before treatment may begin to ensure the best possible therapeutic outcome. A trial using oral iron treatment may be used as a diagnostic tool as well as a therapeutic tool. If the presence or absence of hemaglobinopathy is uncertain, it is appropriate to start orally administered treatment while screening is being performed. A trial given oral iron would show an increase in haemoglobin (Hb) before 2 to 3 days after starting the treatment. It is confirmed that an individual has iron insufficiency if the level of ferritin rises. Even if there's no increase, more testing will need to be performed. The serum ferritin level should be examined first in individuals who have a documented hemaglobinopathy. Lactoferrin levels less than 30 micrograms per litre of blood should urge therapy, while values less than 15 micrograms per litre of blood are characteristic of persistent iron insufficiency. Traditional treatment options for hemolytic anemia in pregnancy included the prescription of oral medications or, in extreme instances, the delivery of blood transfusions, according to medical convention. While oral metal has limited potency in treatment of serious iron deficiency anemia based on a variety of factors including adverse reactions, nonadherence, and the realisation that this also limits intestinal biodistribution, blood transfusions must be overlooked due to given the significant huge risks associated with transfusions, including infection, the hazard of incorrect stem cell transplant, transfusion public reaction, and just an adverse effect upon that innate immunity, among others. In addition, the percentage of patients whose refuse blood transfusions is growing every year.

**Laboratory Parameters**

The value of laboratory markers in the diagnosing of anaemia, however addition to medical examination, should not be underestimated. Upwards of a century ago, the earliest tests included a smears, with red blood cells serving as gold test for assessing iron status. But in other situations, such as core infections, ferro is not useful since it responds as an immediate hypersensitivity reactant and produces misleading normal readings, as is the case for example during pregnancy and after delivery. When it comes to pregnancy complications, ferritin has only modest associations with other iron indicators but then the extent of anaemia; consequently, further testing are beneficial.

**REVIEW OF LITERATURE:-**

According to the World Health Organization (2005), anemia in adults causes tiredness and impaired work capacity, and it has the potential to disrupt fertility. Pregnancy outcomes are known to be negatively affected by maternal iron insufficiency, which is thought to be caused by poor haemoglobin oxygen supply to the uterus, placenta, and baby. The data on this negative effect, on the other hand, is not uniformly consistent across studies, and there is still a great deal of data that is contradictory, not least even though only extremely randomized trial specimens can aspire to control for all conceivable variations that really can impact pregnancy outcome. Anemia in pregnancy is often connected with low socioeconomic position, multiple pregnancies, mother age and smoking at extremes, all of which may contribute to poor pregnancy outcomes on their own or in combination with one another (Scholl and Hediger, 1994).

Because the majority of studies do not account for it and other variables that may influence birth weight and immaturity, it is difficult to determine if anaemia and haemoglobin have a direct impact on the outcome of the pregnancy. The more cynical point of view would be that, given how prevalent either anaemia and anaemia throughout pregnancy are, the negative consequences of the first and the good benefits of such should be more clearly distinguishable from one another (walker et al.1996).

Hemorrhage, multiple births, uterine and placental abnormalities, parental size and heredity, and serious congenital malfonnations are all examples of non-nutritional reasons of foetal stunted growth. These factors may account for up to 50% of the variation in birth weight in both ndustrialised and poor nations, respectively (Villar and Belizan 1982).

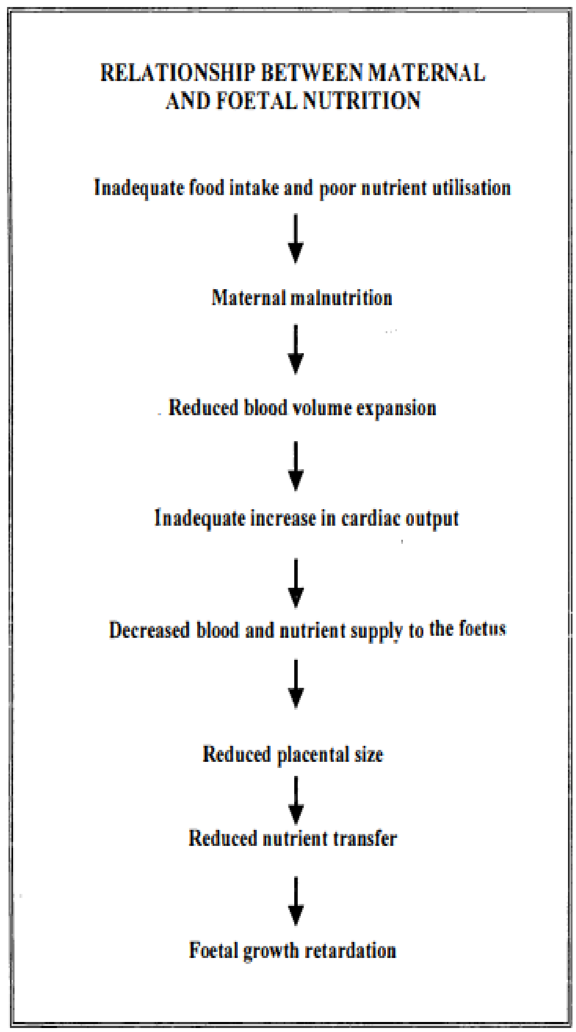


**Fig 1: Schematic diagram of Relationship between Maternal and Foetal Nutrition. (Srilakshmi, 2003)**

Poor maternal starting weight (due to inadequate nutrition throughout the mother's growth), low maternal weight gain (which is determined by food intake during pregnancy), and maternal illness are all factors that contribute to increased IUGR in impoverished nations. Inferior foetal development and intrauterine growth restriction (IUGR) are associated with low mother weight at birth and low weight increase throughout pregnancy, respectively. Low maternal height, in addition to having a low body mass index, has been shown to have an effect (Allen. 2000)

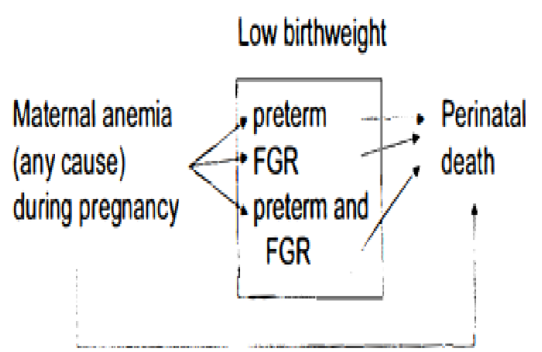


**Fig 2: .Maternal anaemia and outcome of pregnancy (Rasmussen, 2001)**

Iron supplementation is often suggested throughout pregnancy to ensure that the iron requirements of both the mother and the baby are met. Pregnancy-related anaemia (IDA) is linked with a greater than two-times enhanced danger of preterm birth when discovered occur during pregnancy. A higher risk of premature delivery is connected with maternal anaemia, particularly if it is identified before the middle of pregnancy (Scholl, 2005)

| Components | Weight g |
|---|---|
| Foetus | 3000 |
| Placenta and amniotic acid | 1500 |
| Maternal tissues and blood | 7000 |
| Total | 11500 |

**Table 1: Components of weight gain during pregnancy- 28 - 40 weeks (Arafa et al.. 1998).**

Poor maternal nourishment may also result in low infant survival rates, which can result in an increase in total fertility. Hookworm infestation, recurring pregnancy intercurrent infection, ante- and post-partum haemorrhages, chronic vomiting and spontaneous miscarriage, pre-term labour and low birth weight infants are some of the additional reasons of anemia in pregnant that may occur. Premature deliveries, puerperal sepsis, thromboembolic phenomena, and a high rate of perinatal death have all been linked to anemic in pregnancy (Mahajan and Gupta, 1995; Mahajanand Gupta, 1996). (Park, 2000).

| Weight category Based on BMI | Total weight gain (Kg) |
|---|---|
| Underweight (BMI<19.8) | 12.5- 18 |
| Normal weight (19.8-26) | 11.5- 16 |
| Overweight BMI> 26-29 | 7-11.5 |
| Obese>29 | 6.0 |

**Table 2: Recommended weight gains for pregnant women based on body mass Index (Fowles, 2004)**

High demand for iron, poor absorption of iron, and many pregnancies that are closely spaced deplete the iron reserves of pregnant women on a continual basis, depleting their iron storage. The increased iron need during pregnancy often outstrips the available supply of iron, resulting in low levels of hemoglobin and haematocrit levels, which in turn result in lower oxygenation transporting capacity and impairment in foetal development. As a result, undernutrition during delivery may be a significant predictor related to the high prevalence of birthweight in children (Baron et al., 2005).

Iron deficiency is affects an estimated 3.5 billion people in poor countries and therefore more of about 320 million indian women, the with largest concentration between women and kids (40 to 80 percent of pregnant women, 60 to 70 percent of children, and 50 percent of adolescent girls ), and the lowest prevalence among men.

Nutritional deficiencies are the most prevalent cause of disease in pregnancy in impoverished nations. Regarding parental dietary patterns and fertility levels, there is an indirect inverse link of the sort shown in the graph. Generally speaking, fertility rates are low in communities where ladies are well nourished, while fertility rates are high in civilizations where females aren't very well fed (Park 2000). The nutritional content of a pregnant woman's food is most likely the single most important aspect that will have a direct impact on the outcome of the pregnancy (Devadas, 2001). (Zhou et al., 2005).

Pregnancies that are closely spaced are more likely to result in anaemia than other types of pregnancies. A woman's iron reserves are depleted during her previous pregnancy, and she does not have time to replenish them before giving birth to a new developing foetus with iron. During pregnancy, their bodies produce red blood cells at a higher rate than usual (King, 2003). In many underdeveloped nations, parasite infection is often implicated in the pathogenesis of iron deficiency anaemia, which may be fatal (UNICEF, 2006).

**CONCLUSION: -** Instability and dispute persist over the relationship between the mum's nutrition and the health of the unborn baby. The diet of the mother has an impact on the kid, maybe even before development and definitely during childbirth. The mother's preconception size and nutritional requirements, as well as her weight increase throughout pregnancy, have an impact on the development of the foetus, the weight of the baby at delivery, and indeed the outcome of the infertility. Poor nutrition, though in the absence of an acceptable amount of female weight issues, may have an impact on the prevalence underlying congenital abnormalities and the rate of increase in the child. Observational studies report inconsistent and ambiguous conclusions because their findings generally reflect far too many characteristics of pregnant women's lives that fluctuate along nutrition and health, and as a consequence, their findings are difficult to interpret. However, it has been seen that dietary limitations might result in a significant reduction in gestational age.

## RÉFÉRENCIAS


1 *Allen, L.H. And Ahluwalia, N. (1997) "Improving iron status through diet. The application of knowledge concerning dietary iron bioavailability in human populations. OMNI Opportunities for micronutri.ent Interventions." Washington, DC, John Snow lnc./OMNI Project, United States Agency for International Development (USAID).*

2 *Allen L H., (2000), "Anaemia and iron deficiency: effects on pregnancy outcome" American journal of Clinical Nutrition 71 (suppl) l 280s-4s De.*

3 *American Family Physician (2000) Normocytic Anemia (American Family Physician November 15, 2000,*

*http://www.aafp.org/afp/20001115/2255.html "How to Diagnose Cobalamin (B-12) Deficiency," Nexo, Ebba, et al., Scandinavian Journal of Clinical and Laboratory Investigation, 1994; 54(Supple. 219): 61-76.*

4 *Amine, E.K., and Al-A wadi Nutritional status survey of preschool children FA (1996) in Kuwait. Eastern Mediterranean health journal, 2:386-95.*

5 *Amy, L., Mary, E.C, Laura, K., Julie, C .W, and Ramakrishnan,U. (2000) "Iron deficiency anemia: higher prevalence in Mexican American than in non-Hispanic white females in the third National Health and Nutrition Examination Survey, 1988- 1994"Am. J. Clinical Nutrition 72: 963-968*

6 *Anand, K, (2000) "A Study of Factors Affecting lbw" Indian journal of community medicine April-June.*

7 *Andraca I, CastiHo M, Walter T. (1997) "Psychomotor development and behavior in iron-deficient anemic infants." Nutr Rev; 55:125-132.*

8 *Andres, E., Loukili, N. H., Noel, E., Kaltenbach, G., Abdelgheni, M. B., Perrin, A. E., Noblet-Dick, M., Maloisel, F., Schlienger, J. - L., Dlicklc, J.-F. (2004). "Vitamin B 12 ( cobalamin) deficiency in elderly patients". Can Med Assoc J 171: 251-259.*

9 *Andrews NC. (1999) "Medical progress: disorders of iron metabolism." N Engl J Med.; 341: 1986-1995.*

10 *Antia,F.P (2002) " Clinical Dietitics and Nutrition";Bombay; Nutrition";Bombay; Oxford University Press; P,53.*

11 *Arafa, M., Abou-Zied H., Attia, A.F, and Y oussof, M. (1998) "Maternal haemoglobin and premature child delivery" Eastern Mediterranean Health Journal Volume 4, Issue 3, Page 480-486.*

12 *Singla, P.N, TyagiM,KumarA,Dash D, and Shankar R., (1997), "Fetal growth in maternal anaemia" Journal of Tropical Pediatrics.*

13 *Smith ,G.C.J,PellJP,Dobbie R. (2003), lnterpregnancy interval and risk of preterm birth and neonatal death: retrospective cohort study. BMJ 327:313.*

14 *Sood, S.K. ( 1988), "Epidemiology of Iron deficiency anaemia" New Mediwave .Vol 1, No.3:12.*

15 *Srilakshmi,B. (2003), "Nutritional Anaemia" Dietetics new age International publishers ppl 38"155.*

16 *SRS-RGI. (2000), Registrar General, India, SRS Bulletin, New Delhi, April.*