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Research Article

Prevalence of Anemia in the First Trimester of Pregnancy in Rural Population of Krishna District in Andhra Pradesh

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Abstract: Anaemia in pregnancy is an important health problem in India. Anaemia among pregnant women includes increased risk of low birth weight, maternal mortality and morbidity. The objective of this study was to estimate the prevalence of anaemia which helps in planning our maternal health programme. A hospital based, cross-sectional study was conducted among 104 pregnant women, in their first trimester to assess the prevalence of anaemia in rural Krishna. The study was carried out at Dr PSIMS & RF Hospital , Chinnavutapalli. Only those who visited the hospital were enrolled in the study. Lablife H3D Premier automated haematology analyser was used for estimation of haemoglobin, MCV and MCH. Anaemia was classified as per the World Health Organization (WHO) grading criteria as mild 10 -11 gms%, moderate 7 to 9.9 gms % and severe below 7 gms %.. The present study revealed that 93.26 % of pregnant women were anaemic and their mean Hb was 10.37 ± 0.94 g/dl, mean MCV was 72.65 ± 6.53 fl and their mean MCH was 26.75 ± 2.75 pg. Among them, 73.07% had mild anaemia, 20.19 % had moderate anaemic & none had severe anaemia. In Mild anaemia, the mean Hb was 10.78 ± 0.5 g/dl while in moderate anaemia, the mean Hb was 8.94± 0.625g/dl . Anaemia in 1st trimester of pregnancy was endemic and microcytic, hypochromic anaemia is most common in this region.
Keywords: Anaemia; Pregnancy; Mean Corpuscular Volume (MCV); Mean Corpuscular Haemoglobin (MCH).

INTRODUCTION:

WHO estimated that the prevalence of anaemia in developed and developing countries in pregnant women is 14 per cent in developed and 51 per cent in developing countries and 65-75 per cent in India [1]. Anaemia is a major factor which decides the outcome of pregnancy. Anaemia among pregnant women includes increased risk of low birth-weight or prematurity, perinatal and neonatal mortality, increased risk of maternal morbidity and mortality. The Indian subcontinent alone contains nearly half of the world's anaemic women [2].

WHO has suggested that anaemia is of moderate public health importance, when its prevalence is between 20% to 39.9% and severe if it occurs in 40% or more of the population [3] . In developing countries it is a cause of serious concern as, besides many other adverse effects on the mother and the foetus, it contributes significantly to high maternal mortality. According to United Nation declaration 1997, anaemia is a major public health problem that needs total elimination. It is estimated that globally two billion people suffer from anaemia or iron deficiency [4]. Maternal anaemia contributes to intergenerational cycles of poor growth in the offspring. Early detection and effective management of anaemia in pregnancy can lead to substantial reduction in under nutrition in childhood, adolescence and improvement in adult height [5].

Prevalence & Causes of Anaemia in Pregnancy: In India, National Family Health Survey - 2 in 1998 to 99 showed that 54% of women in rural and 46% women in urban areas are anaemic [6] . According to WHO, haemoglobin level below 11gm/dl in pregnant women constitutes anaemia and haemoglobin below 8 gm/dl is severe anaemia [7] .The Centre for Disease Control and Prevention defines anaemia as less than 11gm/dl in the first and third trimester and less than 10.5gm/dl in second trimester. Serum Ferritin of 15 micro gm/L is associated with iron deficiency anaemia [8].

Erythropoiesis in Pregnancy: The various factors required for erythropoiesis are proteins (erythropoietin), minerals (iron), trace elements (including zinc, cobalt and copper), vitamins [particularly folic acid, vitamin B_{12} (cyanocobalamine), vitamin C, pyridoxine; and riboflavin], and hormones (androgens and thyroxine). In addition to the common deficiencies of iron and folate, vitamin A (important for cell growth and differentiation, maintenance of epithelial integrity and normal immune function) and Zinc (important in protein synthesis and nucleic acid metabolism) were also implicated as major cause in nutritional anaemia's [9], [10] .

Types of Anaemia : Physiological Anaemia - During pregnancy there is a disproportionate increase in

plasma volume, RBC volume and haemoglobin mass. As plasma volume increase more than the RBC mass haemodilution occur . Criteria are: RBC 3.2 million/cumm, Haemoglobin 10 gm%, RBC morphology on peripheral smear is normal i.e. normocytic, normochromic, PCV 30%.

Iron Deficiency Anaemia - About 1000 mg of iron is required during pregnancy. 500-600 mg for RBC expansion & 300 mg for foetus and placenta and the rest for the growing uterus. As a result of amenorrhea there is a saving of about 150 mg of iron. As such 850 mg of extra iron is required during pregnancy [11]. Diet alone can not provide the extra iron and the stores which have around 500 mg of iron get depleted. But if iron stores are already deficient, iron deficiency anaemia manifests. Iron deficiency anaemia (IDA) is the commonest type of anaemia in pregnancy[12] . Iron absorption is 15-30% of Haem iron. Its absorption is usually not affected by inhibitors. The non Haem iron pool is made of all other sources of iron such as cereals, seeds, vegetables, milk and eggs. Its absorption can be increased by enhancers (Haem, proteins, ascorbic acid and fermentation) and decreased by inhibitors (phytic acid, fibres, calcium, tannins, tea, coffee, chocolate and herbal drinks)[13] .

Worm infestation: Prevalence of amoebiasis and giardiasis is around 40%. Increased iron loss due to hookworm infestations, schistosomiasis, chronic malaria, excessive sweating and blood loss from the gut due to haemorrhoids are important causes of anaemia in pregnancy [14] . Multiple pregnancies: Most women enter pregnancy with little or no iron reserve, which is further compounded by repeated and closely spaced pregnancies and prolonged periods of lactation.

Prevention of iron deficiency: Prophylaxis of non-pregnant women - As most women start their pregnancy with anaemia or low iron stores, so prevention should start even before pregnancy. As a public health approach, prolonged oral supplementation beginning before the woman becomes pregnant may be a better strategy to benefit the majority of the population.

Food fortification: Iron fortification of foods is a preventive measure that aims at improving and sustaining iron nutrition on a permanent basis. Even common salt, which is often fortified successfully with iodine in deficient areas, can be fortified with iron as has been successfully done in various South -East Asian and Latin American countries. Production of iron' fortified salt on a commercial scale has been approved by the Government of India and is in the process of Manufacture [15]. Iron supplementation during pregnancy - If there is a poor compliance for oral iron 100mg/ day , two injections of iron dextran (250 mg each) given intramuscularly at 4 week intervals along with tetanus toxoid injection have been recommended for better compliance and adequate results[16] . Ferrous ascorbate is the most favourable iron for Indian Diet which have high content of inhibitor for iron absorption [17] .Treatment of hookworm infestation - As worm infestation is very common and given the safety of the deworming drugs, oral antihelminthic treatment can also be given to pregnant and lactating women. Single albendazole (400 mg) or mebendazole (100 mg) doses twice daily for 3 days with iron supplementation should be given to all anaemic pregnant women in the second and third trimesters . Improvement of dietary habits and improving the bioavailability of food rich in iron should be advocated [19] .

Megaloblastic Anaemia in Pregnancy: The low incidence of megaloblastic anaemia during pregnancy is because of the abundance of both folic acid and vitamin B_{12} (Cyanocobalamine) in the vegetarian and non vegetarian diet. In the developing world the incidence is considerably higher approximately 25% of women with anaemia during pregnancy. In Megaloblastic anaemia, DNA replication is affected .There is derangement of red cell maturation with production of abnormal precursors known as megaloblasts which can due to deficiency of Folate or Vit B_{12} [20] . This occurs more commonly in multiple pregnancies, develops late in pregnancy around 20-28 weeks, develops immediately postpartum or up to fifth month, in Oral Contraceptive pill users or in anti-epileptic drug users. The cause of megaloblastic anaemia in pregnancy is always due to nutritional deficiency which leads to folate deficiency and wasting. Vitamin B_{12} deficiency takes years to develop anaemia and its deficiency causes infertility so megaloblastic anaemia due to B_{12} deficiency is very rare in pregnancy. Neurological features are more pronounced and if any autoimmune disease exists in the body with anaemia then suspicion of B_{12} megaloblastic anaemia arises. Dimorphic Anaemia: This is due to deficiency of both iron and folate. Folate deficiency anaemia: Effects on pregnancy - There is increased incidence of abortion, growth retardation, abruption placentae and pre-eclampsia in folate deficiency in some studies [21]. Folate supplements during pregnancy have resulted in increased birth weight in cases of malnutrition. Effects on fetus: Neural tube defects can be prevented in most cases by peri conceptional folic acid in dosage of 0.4 mg/day in low-risk cases and 5 mg/day in high-risk women. Incidence of neural tube defects is very high in India and peri conceptional folate supplementation is strongly recommended in all cases. There is some evidence that the incidence of abortion, premature babies, small-for date babies and folate deficiency in the neonates is higher in babies born to mothers with folate deficiency [22].

Vitamin B_{12} Deficiency: Pernicious anaemia caused by lack of intrinsic factor resulting in lack of absorption of vitamin B_{12} is rare during pregnancy as it usually causes infertility. Acquired vitamin B12 deficiency causing megaloblastic anaemia is also

uncommon, as the daily requirement of vitamin B_{12} is only 3.0 µg during pregnancy which is easily met with a normal diet [23] . Only vegans who do not eat any animal-derived substance may have a deficiency of vitamin B_{12} and they should have their diet supplemented during pregnancy.

Effects of Anaemia on Pregnancy: Mild, anaemia may not have any effect on pregnancy and labour except that the mother will have low iron stores and may become moderately to severely anaemic in subsequent pregnancies. Moderate anaemia may cause increased weakness, lack of energy, fatigue and poor work performance. Severe anaemia, however, is associated with poor outcome. The woman may have palpitations, tachycardia, breathlessness, increased cardiac output leading on to cardiac stress which can cause de-compensation and cardiac failure which may be fatal. Increased incidence of pre-term labour (28.2%), pre-eclampsia (31.2%) and sepsis have been associated with anaemia [24] .

Anaemia during pregnancy is associated with adverse infant outcomes, including low birth weight, preterm delivery and perinatal mortality, and it may also be associated with childhood intellectual disability [25]. Women with even mild anaemia may experience fatigue and they may have a reduced work capacity. Severe anaemia is associated with maternal and child mortality [26] which continues to be a major issue in Independent India.

MATERIALS AND METHODS:

A hospital based, cross-sectional study was conducted among 104 pregnant women, in their first trimester to assess the prevalence of anaemia in rural Krishna. The study was carried out at Dr PSIMS & RF Hospital , Chinnavutapalli. Only those who visited the hospital were enrolled in the study. Anaemia was classified as per the World Health Organization (WHO) grading criteria. Degree of Anaemia - mild (9-11 gm %), moderate (7-9 gms %), severe (4-7 gm %) and very severe (< 4gm %). It is also classified according to Hematocrit (PCV) %. The study was approved by Institutional Ethical Committee.

RESULTS

The present study revealed that 93.26 % of pregnant women were anaemic and their mean Hb was 10.37 ± 0.94 g/dl, mean MCV was 72.65 ± 6.53 fl and their mean MCH was 26.75 ± 2.75 pg. Among them, 73.07% had mild anaemia, 20.19 % had moderate anaemia & none had severe anaemia. In Mild anaemia, the mean Hb was 10.78 ± 0.5 g/dl while in moderate anaemia, the mean Hb was 8.94 ± 0.625 g/dl.

Table 1. Mean Hemoglobin , Mean Corpuscular Volume & Mean Corpuscular Hemoglobin in pregnant women .

	% of subjects	Haemoglobin g% Mean ± SD	MCV in fL Mean ± SD	MCH in pg Mean ± SD
Normal	6.74	12.33 ± 0.52	73.17±6.78	26.57±2.9
Mild anaemia	73.07	10.78 ± 0.51	73.28±4.76	27.08±2.32
Moderate anaemia	17.31	8.94 ± 0.625	70.504 ± 10.49	25.804 ± 3.81

DISCUSSION

Prevalence of anaemia in the present study was very high i.e. 93.26% as compared with the studies of Umesh Kapil et al [26] (78.8%) in Delhi slum area and Toteja GS et al [27] (84.9%) in 16 districts of India . Priyali Pathak et al [28] also found less percentage (85.4%) of anaemia among pregnant women of Delhi slums and observed that the prevalence of anaemia (Hb < 11 g/dl) among pregnant women was 69.3 % . Of the pregnant women, 3.4% were severely anaemic, 35.4% moderately anaemic and 30.2% mildly anaemic. The prevalence of mild anaemia in the study of Umesh Kapil et al [(26)] and Priyali Pathak et al [28] was 29.4% and 30.4% respectively which was lower than the present study (73.07%). But the prevalence of moderate anaemia observed by Umesh Kapil et al (47.8%) and Priyali Pathak et al (53.2%) was higher to present study (20.19 %). None of the pregnant women in the present study were severely anemic which is lower than the findings observed by Umesh Kapil et al (1.6%) and Priyali Pathak et al (1.5%) and Toteja GS et al [27] (13.1 %) . The baseline data of Operations Research, a UNICEF project in Tamilnadu documented a 95% prevalence of anaemia in Dindigul and 48% in Tirupur among the urban poor [29]. High prevalence of anaemia observed in our study was also in accordance with the study of Mondal B, Maiti S et al [30]. Viveki RG, Halappanavar A B [31] et al studied about the prevalence of anaemia and its epidemiological determinants in pregnant women. They observed a high prevalence (82.9%) of anaemia (Haemoglobin - < 11.0gm/dl) among pregnant women. Majority (50.4%) had moderate degree of anaemia (Haemoglobin - 7.0 to 10.0 gm/dl) and 7.0% had severe anaemia (Haemoglobin - < 7.0 gm/dl). Also, they observed that the anaemia prevalence was significantly higher among those subjects from below Class IV socioeconomic status, those with less than two years of spacing between previous and index pregnancies. Diminished intake and increased demands of iron, disturbed metabolism, pre pregnant health status and excess iron demands as in multiple pregnancies, women with rapidly recurring pregnancies, blood loss during labour, heavy menstrual blood flow, inflammation and infectious diseases are important factors which lead to development of anaemia during pregnancy. In India, anaemia is directly or indirectly responsible for 40 per

cent of maternal deaths and also 8 to 10 fold increase in Maternal Mortality Rate when the Hb falls below 5 g/dl [32] .

CONCLUSION

Very high prevalence of anaemia (93.26%) indicates that the anaemia continues to be a major public health problem in rural area's in India even though nationwide programmes for tackling anaemia in women have been functioning for a long time. The main operational constraints identified were: inefficient and irregular supply of supplements; procurement and distribution of supplements; low accessibility and utilization of antenatal care by pregnant women; inadequate training and motivation of frontline health workers; inadequate counselling of mothers and low compliance by the intended beneficiaries with the supplementation regimen. Poverty, ignorance, non availability and/or failure to utilize available medical facilities also play an important role in maternal anaemia. Strategic efforts are needed to broaden the coverage of Iron and Folic acid. Health & nutritional education in adolescent and paediatric clinics should be expanded particularly in the rural areas. Serum folate level and serum iron profile were not done due to financial constraints.

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