# PREVALENCE OF ANAEMIA AMONG PREGNANT MOTHERS IN A RURAL SOUTH INDIAN POPULATION

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## SUMMARY

Iron deficiency anaemia is a worldwide phenomena. It is particularly severe in developing countries. Pregnant women are at a higher risk due to their increased physiological needs. Around 80 % of the pregnant women suffer from anaemia in India. This is due to the fact that diet in India is predominantly cereal based and iron absorption is very poor because of its non-heme nature and also due to the presence of iron inhibitors.

The purpose of the present study was to indentify the prevalence of anaemia among pregnant mothers In a rural area of South India. It was observed from the study that 76 percent of the pregnant women were suffering from anaemia as per WHO criteria (< 11gm/dl).

The prevalence of anaemia in K.V.Kuppam block is found to in the same range as the national figures. In view of the high prevalence of anaemia among pregnant mothers there is a need to find ways for effective implementation of iron and folic acid supplementation programme.

## INTRODUCTION :

Anaemia is found to be by far the most widely prevalent nutritional disorder in the world (Sood S.K. 1975). It is particularly severe in developing countries affecting half of its population. Pregnant women were found to be the most vulnerable group. The prevalence of anaemia was highest among them. It ranged from 21 to 80 percent in different countries and India had the highest prevalence with 80 per cent of them suffering from it according to W.H.O. quarterly statistics 1982.

Several studies have reported association of anaemia with maternal and fetal morbidity (Bakers J 1979) and De Maeyer as well as prematurity and still birth. (Achari and Rani 1971) Likewise studies have also reported on the high incidence of low birth weight babies delivered by anaemic mothers (Rozkowski et al : 1966, Verma and Dhar 1976, Kaltreider and Gohnson 1976 and Tyagi N.K. et al 1985).

Iron deficiency was found to be the most common cause of anaemia though deficiency of folate and vitamin B12 were also associated with it (Bothwell T.H. 1972). The physiological changes that take place during pregnancy impose an additional demand of iron on the mother to cater to expanding blood volume and foetus.

(Fenton V et al 1977, Taylor and Lind 1979, Theodore and Arias 1979). The inability to meet this additional demand of iron through dietary source and the consequent exhaustion of iron stores leads to anaemia. Most women in developing countries start their pregnancy with absent iron stores (Puolakka g etal 1980). This would possibly explain the high prevalence of anaemia in developing countries. In India it is aggravated by the fact that they depend mainly on cereal and vegetable foods which are poor in iron content and as well as it is non-heme based. Besides this there is also the presence of phytates and phosphates and these are known to inhibit iron absorption (Narasingha Rao et al 1983).

Several other factors like age, gravidity and gestational age are also known to influence anaemia. Young primigravida tend to have lower haemoglobin levels (Hussain et al 1984). Likewise primigravida and multigravida were found to have lower haemoglobin concentration (Isah H.S. et al 1985). Gestational age was found to be inversely correlated with haemoglobin concentration wherein haemoglobin concentration was observed to decrease with increasing gestational age. (Shukla M.L. etal 1982). Another causative factor for anaemia was hookworm infestation. Hookworm infestation causes gastro-intestinal blood loss and this leads to iron deficiency. However it has been reported that only a load of above 2000 egg/gram of faeces is known to cause anaemia (Layrisse M et al 1964).

The major aim of the present study is to determine the prevalence of anaemia and also to see its association with age, gravidity, gestational age, symptoms of anemia and hookworm infestation.

## MATERIALS AND METHODS :

This study was carried out in K.V.Kuppam block in North Arcot Ambedkar District of Tamil Nadu which is the programme area of RUHSA Department of Christian Medical College and Hospital, Vellore, at its RUHSA Campus. It has a population of over 1,10,000. This block is drought prone and people largely depend on agriculture. The diet is predominantly cereal based and the major crops grown in this block are groundnut, rice, sugarcane, maize, millets, banana and local vegetables. The present survey was carried out in 1990 to measure the prevalence of anaemia. A total of 315 pregnant mothers were surveyed, of which 167 were selected from antenatal clinics of RUHSA and the remaining 148 were selected from the community by making home visits.

Blood was collected from all subjects to measure the haemoglobin concentration and haematocrit. Haemoglobin concentration was estimated by the cyanmethaemoglobin method using a photo-electric colorimeter which was calibrated at regular intervals against a standard cyanmethaemoglobin solution. Haematocrit values were measured using the microhaematocrit method. Measurements were done on capillary blood samples within seven hours after collection. For every 10th subject a double sample was taken. Compliance of women was 100 percent. Stool specimens were collected from 130 subjects and were examined microscopically for infestation with hookworm (Ankylostoma duodenale) after dissolving it in a saturated salt solution within six hours after collection. Using an interview schedule data on age, age at first pregnancy, gestational age and gravidity was collected. Clinical manifestations of anaemia such as pallor and oedema was also observed. The tint of the lower conjuctiva was examined to detect pallor. Oedema was determined as pitting oedema of the ankle.

Statistical analysis was carried out by using the SPSS/PC + Program for student's t-test and Pearson's correlation coefficient. Basica epistat was used for analysing odds ratio and MantelHaenzal odds ratio.

## RESULTS :

The characteristics of the subjects are given in Table 1. The mean age of the subjects was $22.6 \pm 3.7$ years and while the age of first

## TABLE - I

### Characteristics of the subjects *

| | | |
|---|---|---|
| Age (y) | $22.6 \pm 3.7$ | 13 - 34 (range) |
| Age at 1st pregnancy (y) | $19.8 \pm 2.9$ | 11 - 34 |
| Gravidity | $2.3 \pm 1.4$ | 1 - 11 |
| Gestational age (wks) | $27.6 \pm 7.9$ | 5.0 - 41.7 |

* n = 315

pregnancy was $18.9 \pm 2.9$. Then mean gravidity of the subjects was $2.3 \pm 1.4$ and the mean gestational age at the time of interview was $27.6 \pm 7.9$ weeks.

In Table 2, the results of haematological measurements are presented. Anaemia (Hb < 11g/dl) was found in 240 out of 315 subjects which gives us a prevalence rate of 76 percent.

## TABLE - II

### Haematological measurements of the subjects

| | | |
|---|---|---|
| Haemoglobin concentration (g / dl) | $9.82 \pm 1.54$ | 4.0 - 13.2 (range) |
| Haematocrit (l/l) | $0.33 \pm 0.04$ | 0.16 - 0.43 |
| Mean corpus- haemoglobin concentration (MCHC) g/dl) | $29.29 \pm 3.33$ | 19.75 - 46.96 g/dl |

Severe anaemia (Hb < 8g/dl) was observed in 11 percent of the subjects. The mean haemoglobin concentration of 315 subjects was estimated as $9.82 \pm 1.54$ g/dl (range 4.0 - 33 $\pm$ 0.041/1 (range

0.16 - 0.431/1). The mean corpuscular haemoglobin concentration ((MCHC) was 29.9 $\pm$ 3.6 (range 19.75 - 46.96 g/dl). The correlation coefficient of haemoglobin and haematocrit was 0.67 (P < 0.001).

The mean haemoglobin concentration was analysed with respect to age, age at first pregnancy and gravidity (Table 3). The mean heamoglobin concentration was $9.75 \pm 1.66$ among women who were below twenty years of

## TABLE - III

### Haemoglobin concentration as observed with age, age at first pregnancy and gravidity

| Age (y) | g/dl |
|---|---|
| < 20 | $9.75 \pm 1.66$ |
| 20 - 24 | $9.71 \pm 1.55$ |
| > 24 | $9.49 \pm 1.73$ |
| Age (y)   at first pregnancy | |
| < 20 | $9.46 \pm 1.77$ |
| > 20 | $9.89 \pm 1.41$ |
| Gravidity (G) | |
| G1 | $9.65 \pm 1.61$ |
| G2 | $9.85 \pm 1.29$ |
| G3 | $9.70 \pm 1.78$ |
| > G4 | $9.24 \pm 1.88$ |

age. This was higher when compared to the figures of $9.71 \pm 1.55$ g/dl in mothers was were between twenty and twenty four years and 9.49 $\pm$ 1.73 g/dl in women who were above twenty four years of age. The odds ratio (OR) for anaemia was 0.72 for the younger group but it is not significant. After adjusting for gravidity the Mantel-Haenzal odds ratio was even lower (0.66).

The mean haemoglobin concentration of

women who had their first pregnancy before the age of twenty was 9.46 ± 1.77 and it was 9.89 ± 1.41 among women who had their first pregnancy later than the age of twenty. This was not associated with frequency of anaemia, the odds ratio being 1.01 and after adjustment for pregnancies the odds ratio became 1.05.

The mean haemoglobin concentration was lowest (9.24 ± 1.88 g/dl) among women with four pregnancies. Similarly the mean haemoglobin concentration was lower among women with one pregnancy (9.65 ± 1.61 g/dl) when compared to women with two (9.85 ± 1.29 g/dl) and three (9.7 ± 1.78 g/dl) pregnancies respectively. The frequency of haemoglobin concentration of below 8.0 g/dl was found to be high among women with four pregnancies (24 percent) than women with one pregnancy (11 percent). The odds ratio was 2.17 (ns).

Prevalence of hookworm infestation was 62 percent. This was calculated for 130 subjects who had complied for this test. The mean haemoglobin level was 9.74 ± 1.53 g/dl among the infested women while it was 10.06 ± 1.22 g/dl among the noninfested women. No association of haemoglobin concentration was observed with tiredness, dizzyness and oedema. However Pallor was significantly correlated with haemoglobin concentration (- 0.34 P < 0.001). Women with Pallor had a mean haemoglobin of 8.99 ± 1.72 g/dl and those without had a mean haemoglobin concentration of 10.16 ± 1.32 g/dl.

## DISCUSSION:

The findings of a high prevalence of anaemia among pregnant mothers in this study is similar to those observed in other studies (Sood etal 1975.) Sood et al 1975 had reported a prevalence of 87 percent among pregnant mothers. In this study prevalence of 76 percent was obtained. However it should be noted that the previous study was done in the year 1975. Low MCHC (29.29 g/dl) in this study group indicates iron deficiency which is the commonest cause of anaemia in most parts of the world (Baker & De Maeyer 1979.) Though the mean haemoglobin concentration was highest in the first trimester, even among them 63 percent were suffering from anaemia. This indicates that iron deficiency in Indian women might have been there even before the start of pregnancy.

No correlation was found between haemoglobin concentration and age. The mean haemoglobin was found to be high in young women (< 20 years). Mean haemoglobin concentration of women who had their first pregnancy before the age of 20 years was low 9.46 ± 1.77 g/dl) when compared to women who married after the age of 20 years. Similar finding was reported by Hussain et al (1984) where the mean haemoglobin level was observed to be low among young primigravida. No significant correlation was found between haemoglobin and gravidity, however the mean haemoglobin concentration tended to be low among multigravida. The mean haemoglobin concentration of primigravida was lower when compared to second and third gravida. This is supported by the findings of Isah et al 1985 who had observed increased frequency of anaemia among primigravida.

The prevalence of hookworm infestation in the study area was found to be 62 percent. Hookworm infestation is generally considered to be associated with anaemia by causing gastro intestinal blood loss. There was no significant correlation between haemoglobin concentration and hookworm infestation, though a 0.4 g/dl lower haemoglobin concentration was observed in women with hookworm infestation. Other studies also reported negative correlations with haemoglobin concentration. However it should be noted that below 2000 eggs per gram are usually not associated with anaemia. Among the symptoms of anaemia only Pallor showed a statistically significant correlation with haemoglobin concentration (- 0.34 P < 0.001).

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