

Role of Hemoglobin (Hb) Level in Pregnancy During the 1st, 2nd, 3rd Trimester

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This study was designed to find out the Hb level in women during pregnancy visiting the Pakistan Institute of Medical Sciences (PIMS), from January to June 2000. Maintenance of normal level hemoglobin (Hb) that is >11 gm/dl is very important in pregnant women as low Hb level <11 gm/dl leads to iron deficiency anemia, which is one of the major causes of deaths related to childbirth. During pregnancy there are many factors directly or indirectly related to anemia. This study has determined that how gestational age of pregnancy and nutrition is causing anemia and what is the prevalence of anemia with respect to these factors in pregnant women. The data are collected by asking questions from prepared questionnaire, and anemic conditions have been determined by measuring Hb level of blood of pregnant women. It was found that prevalence of anemia is 42.3 percent in pregnant women at third gestational stage and 80 percent in vegetarian pregnant women and 66.6 percent women having greater number of pregnancies.

Introduction

Anemia is defined as too few red blood cells or too little hemoglobin, mainly reducing the blood's oxygen-carrying capacity (David *et al.*, 1998). Maintenance of Hb level in all human beings is very important but its importance is more significant during pregnancy (Alexander and Walker, 1998) as during pregnancy mother has to fulfil the oxygen needs of herself as well as of the fetus (Tallib, 1998). Low Hb level of mother can lead to the death of the fetus or herself or both. It has been claimed that low level of Hb is responsible for upto

40% of half a million deaths associated with child birth each year (Alexander and Walker, 1998). Therefore pregnant women need a significantly high level of Hb in blood especially during the last trimester of pregnancy as Hb requirement of the fetus is maximum at this stage (Ledingham and Warell, 1996).

Anemia may be of various types depending upon the physiological state. Iron deficiency anemia is caused by a deficiency of iron (Stuart, 1996). A deficiency of folacin (folic acid) leads to the megaloblastic anemia which is caused by a reduced number of normal red blood cells and the presence of large nucleated cells (John, 1996). In pernicious anemia there is an inadequate availability of Vit. B12 that is needed for the red blood cells production. Aplastic anemia is due to the destruction of bone marrow which may be caused by the chemicals including benzene and arsenic (Stuart, 1996). Hemolytic anemia is characterized by an abnormally high rate of red blood cell destruction (John, 1996).

Hb level of human beings is specific in all age groups, but its level is more specific in pregnant women as compared to other groups of human beings. Normal level of Hb in pregnant women is >11 gm/dl and a pregnant woman having Hb level <11 gm/dl is considered to be anemic (Lee *et al.*, 1993). Anemia during pregnancy is due to iron deficiency in blood of mother because the main constituent of Hb is iron (William, 1969). For the maintenance of Hb a mother requires 1100mg of iron (Tallib *et al.*, 1998), showing that mother's Hb is spontaneously transferred to fetus indicates how important it is to maintain the Hb level of mother and how

dangerous an anemic condition of mother could be. Another important cause of anemia is related to gestational age of pregnancy (Meda *et al.*, 1999), and low socio-economic status (Rangon *et al.*, 1997). This study has determined the prevalence of anemia during pregnancy by using different parameters among pregnant women with reference to gestational age, number of pregnancies and combination of diet intake.

The objectives of this study are:

1. To determine the incidence of anemia in pregnant women.
2. To correlate it with age and number of pregnancies.
3. To investigate the possibilities of other factors such as diet, family history etc. with anemic pregnant women.
4. To determine whether previous history of disease is a predisposing condition.
5. Whether smoking cigarettes has an effect on Hb level of the pregnant women.

Materials and Methods

The data from about 300 patients was collected at maternal child health (MCH) department of Pakistan Institute of Medical Sciences (PIMS) by asking questions from a prepared questionnaire. Anemic condition of pregnant women was determined by measuring the Hb through complete picture (CP) of blood.

Detection

2 ml of blood per patient was mainly collected from the arm of the patient with the help of syringe. Then it was transferred to the bottle with EDTA, used as anti coagulant. After that an automatic machine (Sysmex K-1000) was used for detecting the Hb level of the patient.

Normal range of Hb level will be as follows:

Men	=	13-16 gm/100 ml
Women	=	12-14 gm/dl 100 ml
Pregnancy	=	11-12 gm/dl 100 ml
New born	=	17-19 gm/dl 100 ml
Children	=	14-17 gm/dl 100 ml

Other Tests

1. Primigravida
2. Multigravida

Statistical Analysis

Data was analyzed by descriptive statistics

Results and Discussion

During the study period, the pregnant women attending MCH centre at PIMS were tested for anemic condition. A total of 27.6% were at the first trimester of gestational stage. 30.0 percent were at second and 42.3 percent were at third trimester of gestational stage. (Fig. 1).

This study was carried out to assess the prevalence of anemia in pregnant females and to work out the effect of multi-pregnancies on hemoglobin (Hb) level.

Prevalence of anemia is less in non-anemic mother in the first trimester may be because of the fact that in first trimester there is not much transfer of Hb from mother to the fetus. During first trimester 12 percent of women are anemic and 88 percent are non-anemic (Fig. 2). According to the Lund and Donovan (1967), starting of decrease of Hb is by the sixteenth week of pregnancy. The percentage of anemic pregnant women in second trimester is 31% and the non-anemic is 69%. This is supported by the findings of Jackson *et al.*, 1991 that there is not too much transfer of Hb from the mother to the fetus during second trimester. In the case of third trimester 78 percent are anemic and 22 percent are non-anemic showing that there is a high percentage of anemic pregnant women in the third trimester of pregnancy as compared to first and second trimester, may be because of the reason that in third trimester there is a maximum demand of oxygen by the fetus. The normal range of Hb level is 12-14 gm/dl in women but in the first trimester mean Hb level in anemic women is 10.5 gm/dl and in non-pregnant women is 11.5 gm/dl. In second trimester mean Hb level in anemic women is 9.6 gm/dl and in non-anemic pregnant women is 11.0 gm/dl. While in third trimester mean Hb level in anemic mother is 8.0 gm/dl and in non-anemic mother it is 10.2 gm/dl (Fig. 3). Same results were shown by Ogbeide *et al.*, 1994 who admitted that out of one hundred and eight women attending University of Benin Teaching Hospital 28.4% were severely anemic with third trimester.

Prevalence of anemic and non-anemic pregnant mother is with respect to the different combinations of diet. When pregnant women are using vegetable, fruit and meat in combination as their food the percentage of anemic mother is 40 percent and non-anemic pregnant women are 60 percent. In the case when pregnant women

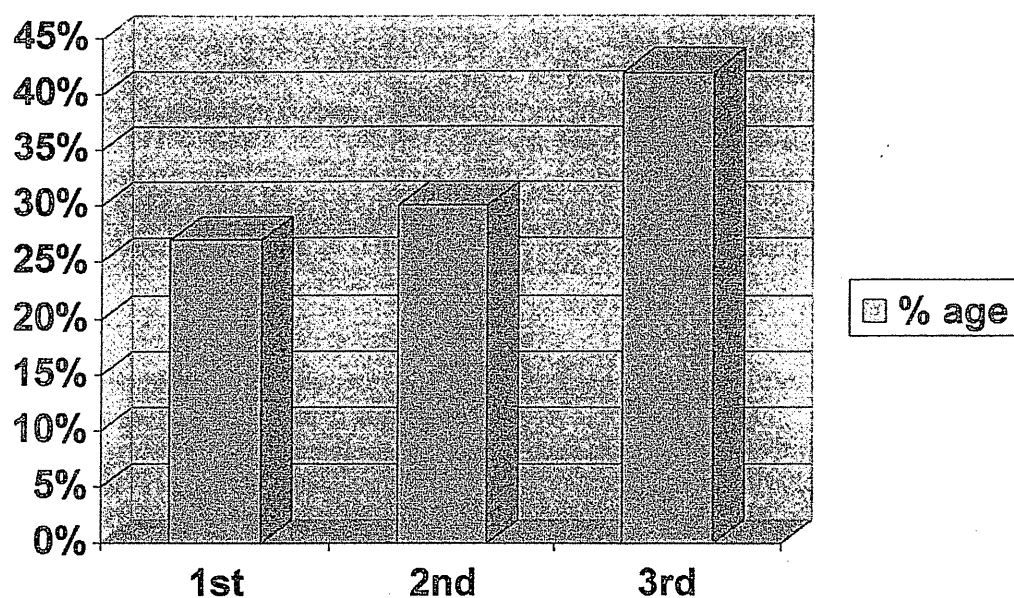


Fig. 1
Categorization on the basis of trimester.

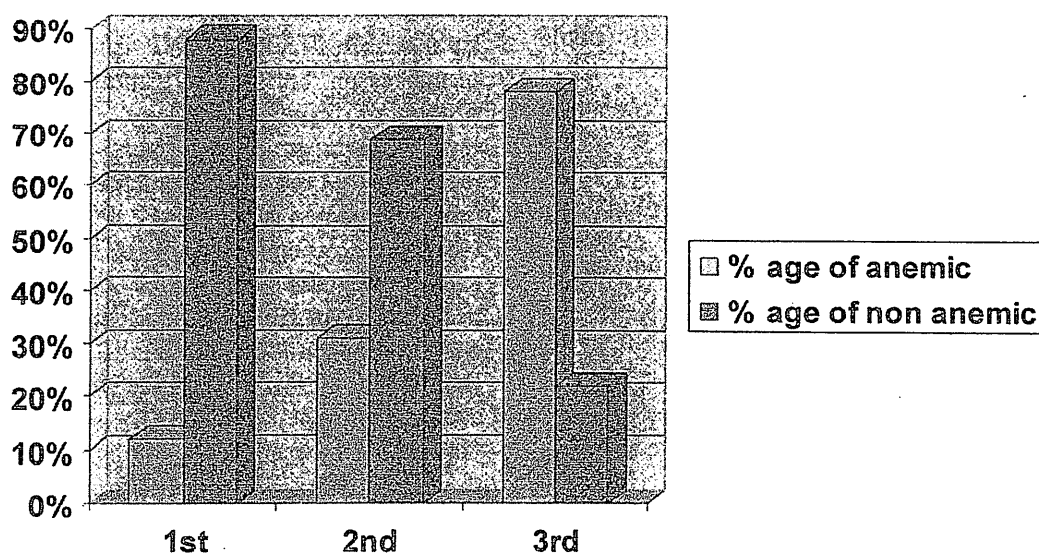


Fig. 2
% age of anemic and non-anemic pregnant women with respect to gestational stage.

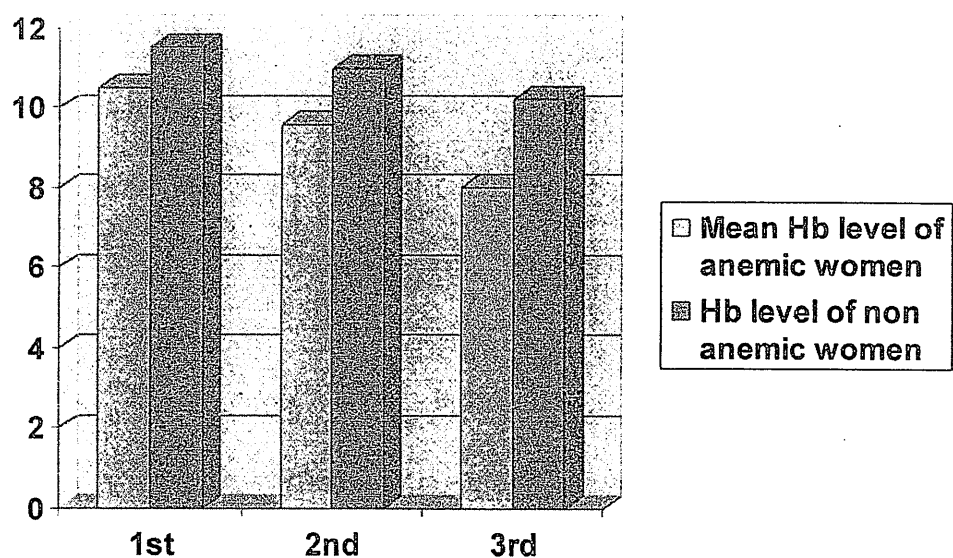


Fig. 3

Mean Hb level in anemic and non-anemic women with respect to gestational stage.

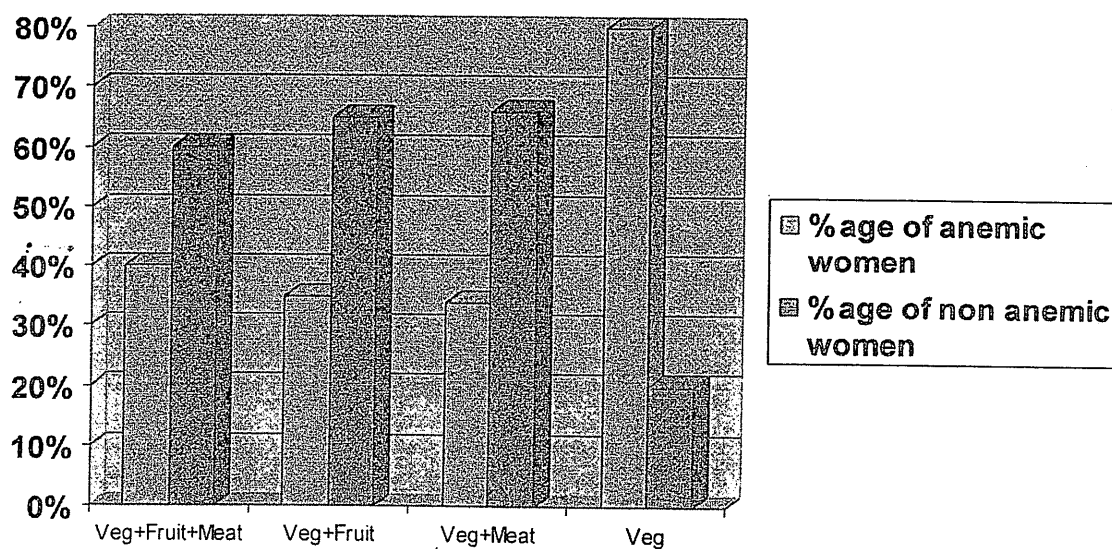


Fig. 4

% age of anemic and non-anemic pregnant women with respect to the diet.

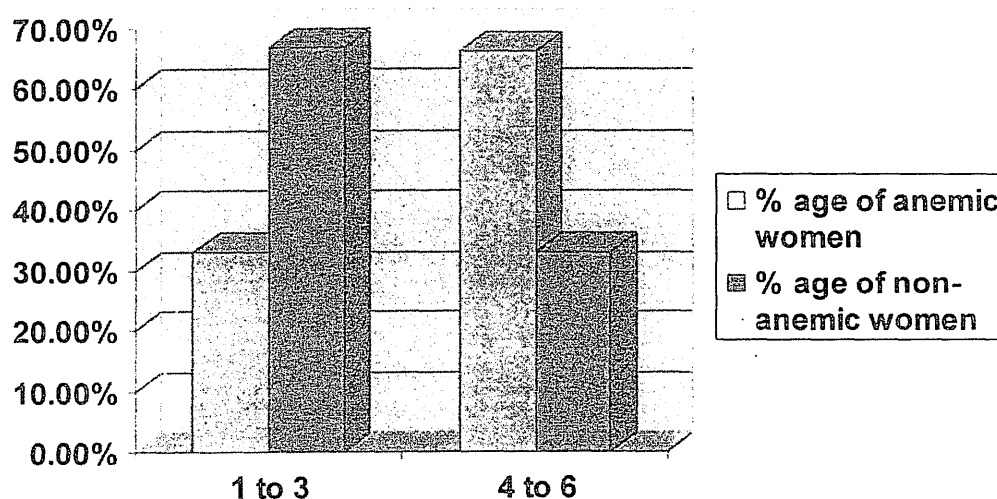


Fig. 5

% age of anemic and non-anemic women due to multi-pregnancies.

have combination of vegetable and fruit in their diet, there are 35 percent anemic and 65 percent non-anemic pregnant women. When pregnant women are using diet combinations of vegetable and meat, 34 percent women are anemic and 66 percent are non-anemic. When only vegetables are the source of food in pregnant women the prevalence of anemic mother is 80 percent and non-anemic mother is 20 percent including that prevalence of anemic as compared to non-anemic mother is higher in vegetarian mother (Fig. 4). Same results were presented by Wickramasinghe and Weatherall, 1982 that women whose diet is habitually high in iron, iron deficiency anemia does not occur during pregnancy, Gordon and Paul, 1996 said that if a vegetarian mother becomes pregnant she must carefully plan a diet that includes iron, as iron is poorly absorbed from most plant foods, therefore, iron supplement is probably necessary. Same studies were done by Sharma *et al.*, 1991 who conclude that severity of anemia was much greater in women of poor class and vegetarian families. Socio-economic status is also a cause of anemia because about 40 percent women are anemic due to their less awareness and low socio-economic status which effects the diet and as stated by Baumann and Rubin, 1973 that low socio-economic status leads to the poor diet intake resulting in iron deficiency anemia in pregnant women, (Rangon *et al.*, 1997). Prevalence of anemic condition is greater especially in the case of

multiple pregnancies. The percentage of anemic women having 1-3 pregnancies is 66.6% and non-anemic is 33.3% while on the other hand percentage of anemic women having 4-6 pregnancies is 33.3% and the non-anemic is 66.6% (Fig. 5).

Thus a better motivation and education programme is needed to highlight the importance of the health and proper nutrition. The media and NGOs can do a lot to improve the awareness in young females that healthy mother and the healthy infants will lead to a healthy nation.

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