Research Article　　　　　　　　　　　　　　　　　　　　**Open Access**

Anemia Among Pregnant Women in the Sidi Bel Abbes Region (West Algeria) : An Epidemiologic Study

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Abstract

Background and Objectives: Anaemia in pregnancy is a major public health problem in developing countries. It is associated with an increased risk of maternal and perinatal morbidity and mortality. The aim of this present work is to study of prevalence and effect of some socio-biological factors on anemia of pregnancy in a mother-and-child health center (MCH) in area of Sidi Bel Abbes.

Subjects and Methods: Across sectional study was conducted during three months (march to may 2010), on a representative sample of 242 pregnant women attending MCH center in sidi bel abbés region, west of Algeria for the assessment of their hémoglobine level. Most of the women did not have a follow-up at the MHC and they had not taken iron or vitamin supplement during pregnancy. Maternal venous fasting blood samples were collected with EDTA and haemoglobin concentration (Hb); Hematocrit (Htc), Mean cell haemoglobin concentration (MCHC), Mean cell volume (MCV) were determined by an electronic counter.

Results: The overall prevalence of anemia (H<11g/dl) was found to be 40.08 %. Classified in each trimester, the prevalence was 17.3%, 23.8% and 50.0% in the first, second and third trimester, respectively. According to severity of anemia 36.08% having mild 49.48% moderate and 14.43% severe anemia. The study shows that 46.39% of the subject had MCV values less than standard value of 75fl suggesting microcytic anemia.

No correlations were found between the hemoglobin and the maternal obstetric characteristics, in particular not between hemoglobine concentration and parity (p=0.40), betwwen Hb and number of abortion (r=0.005, p=0.30). Our study shows that age and parity were not a risk factor for anemia.

Conclusions: Iron deficiency is quite frequent during third trimester of pregnancy in our study population. A comprehensive research in our country is needed on how to improve existing iron supplementation programs and the overall health care and nutritional status of women before they enter their reproductive years.

Keywords: Iron; Deficiency; Anaemia; Pregnancy; Supplementation

Introduction

Iron deficiency anemia is the most common nutritional deficiency in the world; estimates suggest that 2 billion persons worldwide are iron deficient [1]. Because of the increased iron requirements of pregnancy and growth, pregnant women and infants are recognized as the groups most vulnerable to iron deficiency anemia.

Symptomatic iron deficiency during pregnancy has deleterious effects on maternal and perinatal health [2]. Iron deficiency anemia during pregnancy is associated with higher rates of premature birth and low birth weight [3,4] Severe maternal anemia increases the risk of reproduction-related mortality at delivery and during the perinatal period [5]. Iron deficiency in infants may also adversely influence cognitive development [6,7] and may have long-term consequences. Severe iron deficiency anemia in infants has been associated with impaired psychomotor development and developmental delays >10 y after the treatment of iron deficiency during infancy [8].

The total iron requirements over pregnancy in a 55-kg woman are ≈1040 mg [9]. Most of this iron is required during the third trimester, at which time daily iron needs increase from prepregnancy requirements of ≈1–1.5 mg/d to ≤6 mg/d [5,9]. The magnitude of this demand is difficult to meet from dietary sources alone, especially in developing countries where the diets are often limited in iron content and bioavailability is generally low or moderate as the result of high intakes of dietary fiber and phytates.

The aim of this present work is to study of prevalence and effect of some socio-biological factors on anemia of pregnancy in a mother-and-child health center (MCH) in area of Sidi Bel Abbes.

Subjects and Methods

The current study aimed to estimate the prevalence of iron deficiency anemia (IDA) among pregnant women who attend MCH center in SBA. The study was conducted during the period march - may 2010 and the sample consisted of 242 pregnant women in the age group (18-42) years. No patients had clinical infections or chronic inflammatory diseases.

Blood samples were collected from each pregnant woman and a questionnaire was completed at the time of blood collection, including basic socio-demographic, biological, and reproductive data (age, parity, profession, level of instruction and gestational age), (see appendiece).

Complete blood count (CBC) was conducted for all pregnant women. Maternal venous fasting blood samples were collected with EDTA and haemoglobin concentration (Hb); Hematocrit (Htc), Mean

cell haemoglobin concentration(MCHC), Mean cell volume (MCV) were determined by an electronic counter (ABX micros 60-OT). A hemoglobin value of less than 11.0 g/dL was considered to be anemia in pregnancy. The degrees of anemia studied were mild anemia (9.0–10.9 g/dL), moderate anemia (7.0–8.9 g/dL), and severe anemia (less than 7.0 g/dL) [10]. Based on hemoglobin level, all samples with a value less than 10.5 g/dL (second trimester) and less than 11 g/dL (first and third trimester) were considered to be at risk [11]. Microcytosis was defined as mean corpuscular volume (MCV) lesser than 75fL and macrocytosis was considered when MCV was greater than 85fL.

Data of the questionnaire and results of blood tests were analyzed using software program stat -vieux (1998). Frequencies and percentages were calculated. chi-square test and ANOVA test were performed to investigate the significance in the association of the different variables and the prevalence of IDA. Correlations were considered significant with the observed significance level (P-value was <0.05).

Results

From march 1, 2010 to may31 2010 there were 2892 pregnant women attended the MCH center in SBA. 242 pregnant women were recruited. The number of pregnant women who first attended the MCH center during the first, second and third trimester were 22(9.09%), 13(5.37%) and 207(85.53%) cases, respectively (Figure1a).

The mean age was 29.73 ± 6.74 years (range 20-46 years) (Figure1b). One hundred six (43.80%) of the study population were nulliparous and 136 cases (56.19%) had one child or more (Figure1c). Out of the sample there were 226 (93.38%) pregnant women without profession and 14 (5.78%) employee of the public sector. (Figure 1d).

The mean haemoglobin at the first antenatal visit was (10.9 ± 1.9 g/dl), (range 5-14). Using the WHO criterion of haemoglobin less than 11.0 g/dl as indicative of anaemia, 97 mothers (40.08%) were anaemic (Figure 2), according to the severity was 36.08% mild, 49.48% moderate and 14.43% severe anemia (Figure 3). Categorized by trimester, the prevalence of anemia was shown in Table 1. Classified in each trimester, the prevalence was 4.54%, 23.07% and 44.92% in the first, second and third trimester, respectively.

The mean age of the women was 29 ± 6.74 years with a range of 18-42 years. 4.1 percent of them were less than 22 years (Figure 4a). Fourteen percent of the women low level of education (illiterate, read and write), (Figure 4b). The relationship of anaemia to age of mother, parity, gestational age of pregnancy are shown in Table 2. The age of the mother is no significantly associated with anaemia, with the majority of mothers (38.14%) who are less than 26 years old being anaemic at the first anatenatal visit (p=0.13). By parity, 45.28 of nullipara, 38.23% of the primigravida, 33.33% of the multigravida and 50% of the grandmultipara were anaemic. Again, parity is shown to be no significantly associated
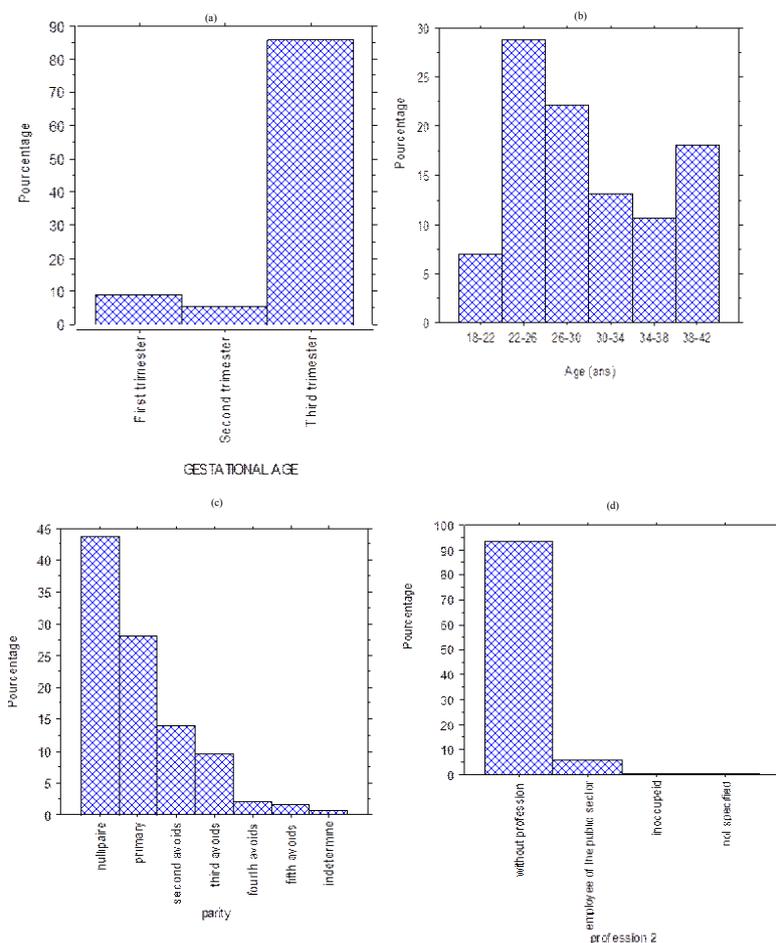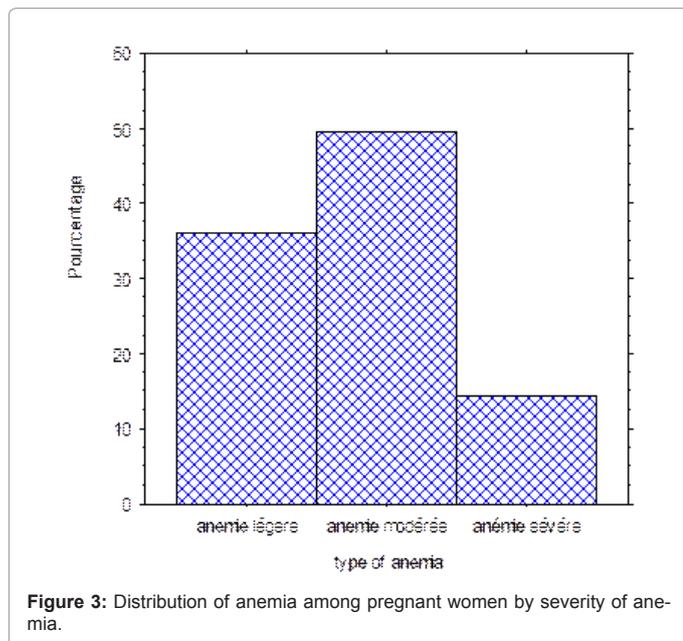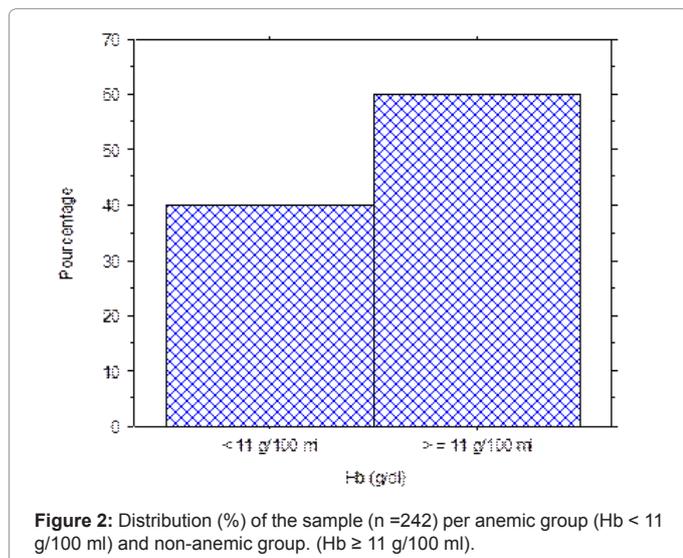

Figure 1: Distribution of the whole sample (n=242) according to gestational age (a), age (b), parity (c), profession (d).

Figure 2: Distribution (%) of the sample (n =242) per anemic group (Hb < 11 g/100 ml) and non-anemic group. (Hb ≥ 11 g/100 ml).

Figure 3: Distribution of anemia among pregnant women by severity of anemia.

trimester	No anemic women	Anemic women	total
first	21(95.45%)	1(4.54%)	22(100%)
second	10(76.92%)	3(23.07%)	13(100%)
third	114(55.07%)	93(44.92%)	207(100%)
total	145(59.91%)	97(40.08%)	242(100%)

Table 1: Prevalence of anemia by trimester.

Variable	<11g/dl (%)	>11g/dl (%)	Total (100%)	p
Age : >26 26-34 >34	37 (42.52) 42 (48.83) 18 (26.08)	50 (57.47) 44 (51.16) 51 (7391)	87 86 69	0.13 NS
Parity : nullipaire primary multiparous Grand multiparous	48 (45.28) 26 (38.23) 22 (33.33) 1 (50)	58 (54.71) 42 (61.76) 44 (66.66) 1 (50)	106 68 66 2	0.40 NS
Level of instruction analphabete -primary education -means -secondary -academic	14 (87.50) 15 (45.45) 31 (40.78) 23 (33.82) 14 (28.57)	2 (12.50) 18 (54.54) 45 (59.20) 45 (66.17) 35 (71.42)	16 33 76 68 49	040 NS
Profession Without profession -employee of the public sector Inoccupeid Not specified	91 (40.26) 6 (42.85) 0 (0.00) 0 (0.00)	135 (59.73) 8(57.14) 1(100) 1 (100)	226 14 01 01	0.95 NS
Gestational age first trimester -second trimester -third trimester	1(4.54%) 3(23.07%) 93(44.92%)	21(95.45%) 10(76.92%) 114(55.07%)	22 13 207	<0.05 S

Table 2: Factors affecting anaemia in pregnancy among pregnant women.

dl), while in the control group no anemic (n=145) it was (12.23±0.79g/dl), (p = 0.0001).

46.39% of the subjects had MCV values less than standard value of 75fl suggesting microcytic anemia. For the remaining 25.77% their MCV were above > 85 (fl) suggesting megaloblastic anemia (Figure 5a). There was a not significant correlation between the Hb level and the MCV level (r = 0.06). The MCHC values of about 7.21% of the subjects were found to be below < 30 (g/dl), for the remaining 92.78% their MCHC were above > 30(g/dl) (considered to be normal), (Figure 5b).

The mean of MCHC (±SD) in the anemic group (n=97) was (33.75±2.79 g/100ml), while in the control group no anemic (n=145) it was (33.20±2.47 g/100ml), (p = 0.11).

On the other hand, the mean of PCV (%), (±SD) in the anemic group (n=97) was (27.00±5.39%), while in the control group no anemic (n=145) it was (36.94±3.37%), (p=0.001). Finally, the mean of WHITE GLOBULE (±SD) in the anemic group (n=97) was (6.78±2.12 103/mm3), while in the control group no anemic (n=145) it was (6.74±1.78 103/mm3), (p= 0.88).

Table 4 shows relation between maternal age and mean Hb distribution. The age of the mother is no significantly associated with anaemia. The majority of mothers (38.14%) who are less than 26 years old being anaemic at the first anatenatal visit. We found no correlation between the Hb level and maternal age (r = 0.17, p=0,67).

Table 5 shows relation between the maternal parity and mean hemoglobine distribution, most were nullipara (49.48%) while 26.80% para1 ,10.3% para2 and the remaining 13.4% para 3 and above. The mean hemoglobin among the difference parity groups showed no statistically significant difference (p=0.40).

The results shows that the profession and mean hemoglobin distribution, most were without profession (93.81%). The mean hemoglobine among the difference groups showed no statistically significant difference (p=0.32), (Table 6).

with anaemia (p=0.40). The gestational age of pregnancy during the first visit also show an association with anaemia in pregnancy. The result shows a significant difference between first trimester / second trimester (p=0.48), between first trimester / third trimester (p=0.001) and between second trimester / third trimester (p=0.004).

The results of the measurements of the various variables in maternal blood during the gestation in women with and without anemia are sumamarized in Table 3.

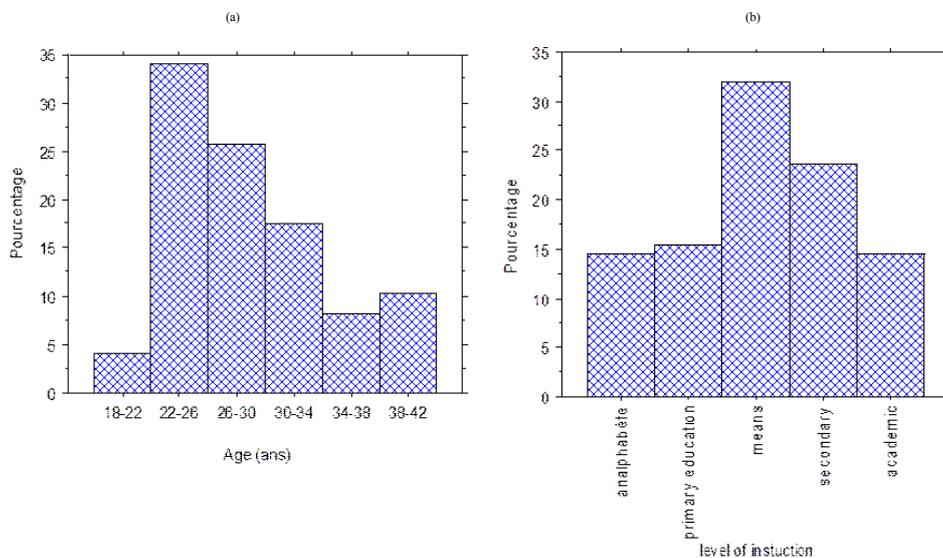The mean of Hb (±SD) in the anemic group (n=97) was (9±1.57g/

Figure 4: Distribution of the anemic women (n=97) according to age (a) and level of instruction (b).
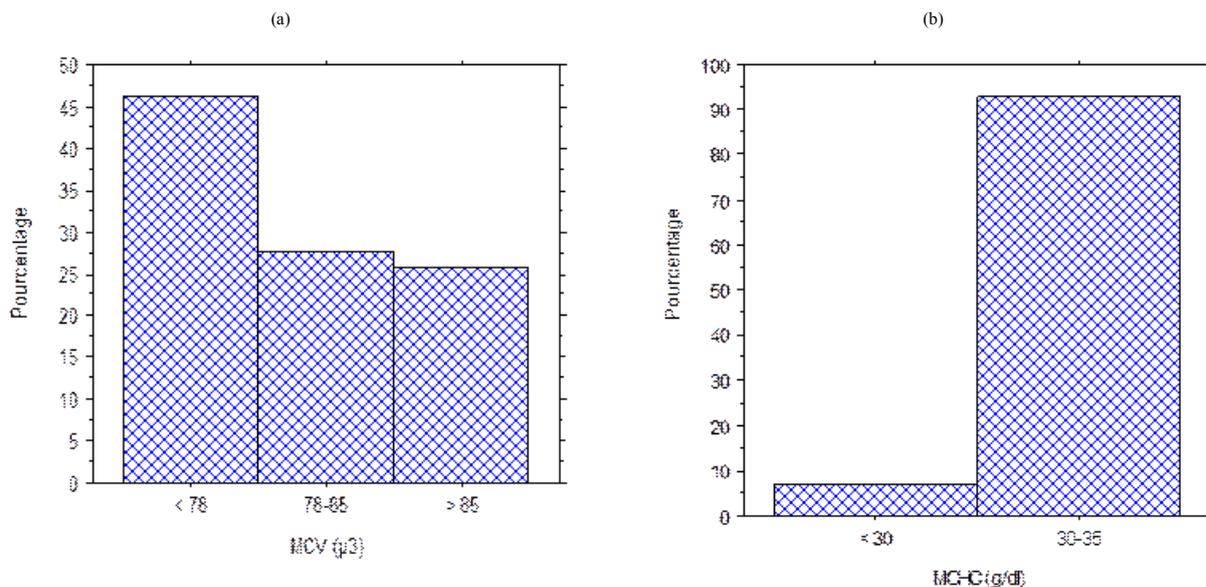

Figure 5: Distribution of the whole sample (n=97) according to MCV (fl) level (a) and MCHC(g/dl) level (b).

The level of instruction and mean hémoglobine distribution are summarized in (Table 7). The mean hemoglobine among the difference level of instruction groups showed statisticaly significant difference (p=0.009). In particular between Analphabete / means (p=0.02), Analphabete / academic (p= 0.003), primary education / means (p=0.02) and primary education / academic (p=0.004). However, we found a correlation between Hb and Htc (r =0.98), (Figure 6).

Discussion

Anemia associated with pregnancy is a public health problem. The world health organisation report gives anemia prevalence picture at global level at 55.9% among the expectant mothers [12] .

The prevalence of anemia in pregrancy in these study, 40.08% is similar than the 37-56% given bu the world health organisation [13]. Using the critirion of hemoglobin concentration <11g/dl to define anemia. However, given the fact that is now generally accepted that the maternal iron status can not be assessed simply from hemoglobine concentration [14], care needs to be taken in interpreting this finding. Hemoglobin concentration taken along with mean corpuscular volume is a better indication for anemia or lack of it [14].

The mean hemoglobin concentration in this study of 10.9 ±1.9 g/ dl is similar to findings in other studies though the exact figures are not usually available for developing countries, the published rates are applicable to selected urban group of women [15,16].

Most of the anemic women (49.48%) in this study were of the

	Hb(g/dl) Mean ± SD	PCV (%) Mean ± SD	MCV(fl) Mean ± SD	MCHC (g/100ml) Mean ±SD	White globule 10³/mm³ Mean ± SD
Anemic women (n=97)	9.00± 1.57	27.00±5.39	75.70±10.48	33.75±2.79	6.78±2.12
No anemic women (n= 145)	12.23±0.78	36.94±3.37	84.65±4.24	33.20±2.47	6.74±1.78
WHO VALUE	>11	>33	75-85	30-35	4-10
P	0.13 NS	0.001 S	0.001 S	0.11 NS	0.88 NS

S: significatif (p<0.05)
NS: no significatif (p>0.05)

Tables 3: Parameters hematologic statute (average ± SD, manpower) of the whole of the sample and comparison enters the anemic group and non anemic group.

Age	Number	Percentage%	Mean Hb ±SD
18-22	4	4.12	8.64 ± 2.29
22-26	33	34.02	8.91 ±1.68
26-30	25	25.77	8.69 ±1.57
30-34	17	17.52	9.35 ±1.28
34-38	8	8.24	9.51 ±1.34
38-42	10	10.30	9.24 ±1.61
total	97	100	9.05 ±1.62

Table 4: Relation between maternal age and mean Hb.

parity	Number	Percentage%	Mean Hb ±SD
0	48	49.48	8.85 ±1.71
1	26	26.80	9.08 ±1.31
2	10	10.3	9.56 ±1.45
3-5	12	12.37	9.83 ± 0.48
6 §above	1	1.03	6.25 ±0.00

Table 5: Relation between parity and mean Hb.

profession	Number	Percentage%	mean Hb ±SD
Without profession	91	93.81	8.96 ±1.57
Employee of the public sector	6	6.18	9.62 ±1.42
total	97	100	9.29 ±1.49

Table 6: Relation between profession and mean Hb.

Level of instruction	Number	Percentage %	Mean Hb ±SD
analphabéte	14	14.43	8.19 ±1.52
Primary education	15	15.46	8.26 ±1.51
means	31	31.95	9.33 ±1.50
secondary	23	23.71	9.00 ±1.71
academic	14	14.43	9.89 ±0.85
total	97	100	8.93 ±1.41

Table 7 : Relation between level of instruction and mean Hb.

Figure 6: Correlation between PCV and Hb.

moderate variety, 36.08% were mild anemic and 14.43% were severly anemic. Compared with other recent studies from southh eastern Nigeria and Ibadan [17,18], Western Nigeria , no cases of sever anemia was noted [19], unlike in Shagamu, western nigeria were 0.7% of the anemic pregnant women were severly anemic [20]. Also in southern malawi, 3.6% of anemic pregnant women were of the sever variety (Hb<7g/dl).

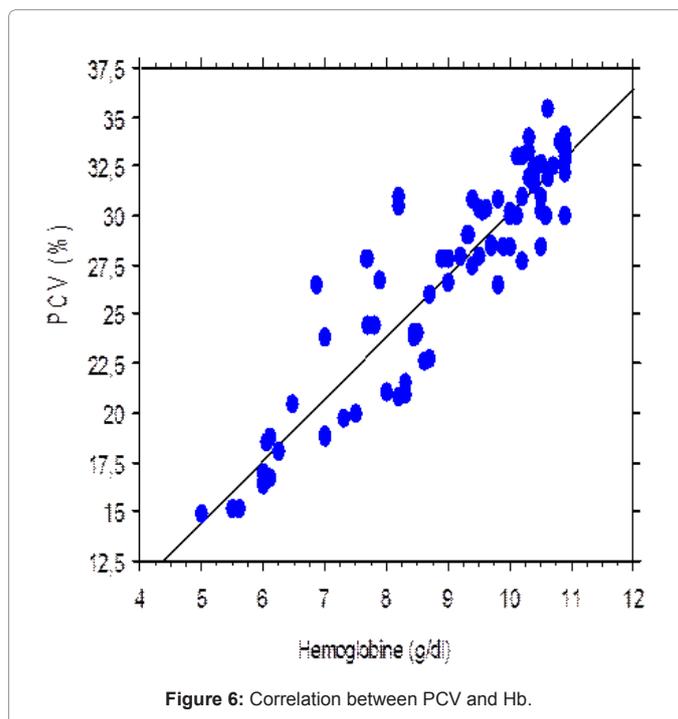In our study, 46.39% had MCV values less than standard value of 75fl suggesting microcytic anemia. Also, the determination of PCV has shown that about 55% of the subjects had hypochromic type of anemia. This suggests that the cells were lacking iron. This observation is similar to that made by flemming (1989) in Ndola [21], Zambia and Nigeria where about more than 50% of the subjects had PCV values less than 33% [22].

As a result of IDA, it is considered that more than half a billion people of the world have deleterious effects [23]. So, Ogbeide et al [24] recommend a regular review of factors which may contribute to prevent the maternal anemia. However, there is still controversy surrounding the impact of the anemia on outcome of pregnancy, at least in developed countries [25,26]. Nevertheless, Scholl et al [27,28] point out that the relationship between inadequate iron intake and increased likelihood of preterm delivery is kept during the third trimester.

Independently of its impact on fetal health, maternal anemia increases the risk of maternal morbidity [29]. Therefore, it is very important to prevent and to treat maternal anemia. Looker et al [30] report 2% to 5% of American teenagers with iron deficiency. In a recent study in Brasil, in São Paulo, the prevalence of anemia in pregnant adolescents was 14.2%, nevertheless the frequency of ID was high (48.4%)[31]. Regarding Looker´s results, our study showed a prevalence four times higher and in comparison with Brasil it was twice as high [30,32].

Although the pregnant adolescent was not our central objective, we should mention that the adolescent didn't have a statistically significant association with anemia in general or any one of its types. Similar results are shown in a review and Meta-analysis by Scholl et al [32]. Contrary to Beard that points out that adolescence is a risk factor for maternal anemia [33]. We considered that the rational approach to IDA in this group is not different to the other pregnant woman. The evaluation of anemia during pregnancy is not very different than that of any anemic adult.

Age and parity were not a risk factor for anemia in our study.

Mahfouz et al [34,35] found that saudi teenage pregnant femals were not a higher risk of anemia than older women if good prenatal care was provided. Unlike some studies we did not observe any variation in anemia by parity.

Advancing gestational age significantly increased the risk of anemia, wich is similar to the finding of other studies but varient with a related study in zimbabwe [34,36,37], which found that gestational age were not significant predictors of hemoglobin concentration [38].

Compared to the first trimester, a lower hemoglobine level in the second and third trimester is partly artifactual and is due to a physiological expantion of maternal plasma volume, making it more or less difficult to separate out women who are truly anemic.

To prevent depletion of iron stores during pregnancy we favor prophylactic iron supplementation in all pregnant women from the begenning of the second trimester until delivery.

Conclusion

The current study aimed to estimate the prevalence of iron deficiency anemia (IDA) among pregnant women who attend MCH center in SBA.

Anemia is extremely common in pregnant women. It is particularly high in areas of the world that also have high rates of low birth weight (LBW). The results of the present systematic review suggest that prevalence of anemia during pregnancy in SBA is similar than what has been reported by WHO; however, there seems to be the need to implement programmes to reach an reach an ideal state of the disease.

The prevalence of anaemia is all the more high as the age of the pregnancy is more advanced. Therefore, it appears essential to consider a program of systematic iron supplementation from the beginnig the second trimester of the pregnancy.

Hemoglobine concentration is done routinaly for all pregnant women attending ante-natal care clinics in the region. The women are offered iron supplementation routinely. The major obstacle to iron supplementation is compliance with treatment. This is often due to its side effects and women lack awareness that they have a real need for iron during pregnancy. Giving tablets is not enough to ensure success. Women must be convinced of the importance of iron for their health and the health of the baby.

Health education programs MCH center in SBA should be revised to stress the importance of balanced diet and the benifits to be gained from compliance with iron medication . Emphasis should be given to sufficient spacing between subsequent pregnancy.

In conclusion, although the adopted strategy concerning primary health care seems to be well planned and based on international recommendations, it seems to have no noticeable effect on the improvement of the prevalence of IDA and there is a great need for further health education promotional programs in this respect.

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