Iraqi JMS

Published by Al-Nahrain College of Medicine
ISSN 1681-6579
Email: iraqijms@colmed-alnahrain.edu.iq
http://www.colmed-nahrain.edu.iq

Effect of Maternal Hemoglobin on Anthropometric Measurements of Full Term Newly Born Babies

Sabah M Ali[1] *MBChB FICPS*, **Ali M Murad**[2] *MBChB, FICOG*, **Adiba M Murad**[2] *MBChB CABP*

[1]Dept. of Pediatrics, College of Medicine, Dayala University, Dayala, [2]Dept. of Gynecology & Obstetrics, [3] Dept. of Pediatrics, College of Medicine, Al-Mustansiriya University, Baghdad.

Abstract

Background Hemoglobin of the mother during pregnancy is well established to be contributors to abnormal prenatal development and pregnancy outcomes.

Objectives To study the effect of maternal anemia on anthropometric measurement of full term newly born babies.

Methods Two hundred pregnant women at time of delivery were investigated for their Hemoglobin. Their newborns were investigated for anthropometric measurement (weight, length, head circumference and chest circumference) immediately after birth. The questionnaire involved questions about age, parity, economy, educational level, and antenatal care of the mothers, and also sex, gestational age, anthropometric measures (weight, length, head circumference and chest circumference) and outcomes of the newborns.

Results From 200 pregnant women who were included in our study, 115 (57.5%) of them delivered by normal vaginal delivery and 85 (42.5%) delivered by caesarian section. Sixty (30%) of mothers were anemic. Five (2.5%) of the newborns were small for gestational age all of them from anemic mothers.

Conclusion Anemia affects neonatal outcomes in full term babies; full term babies of anemic mothers were in the normal anthropometric range, but they were much lower than babies of normal mothers.

Keywords Pregnancy, Anemia, Small for gestational age

Introduction

Anemia is one of most prevalent nutritional deficiency problem afflicting pregnant women [(1)]. This is particularly a major health problem in developing countries, where nutritional deficiency, malaria and worm infestation are common. Prevalence in non-industrialized countries varies between 35 - 75 %, with the average being 56 % [(2)].

Maternal anemia is considered a risk factor for adverse pregnancy outcome [(3)]. It is responsible for 40-60% of maternal deaths in developing countries. Anemia that complicates pregnancy threatens the life of both the mother and the fetus [(4)]. Anemia is hemoglobin (Hb) concentration below 110 g/l [(5)]. The prevalence is higher among the primigravidae than multiparous women [(6)]. Maternal nutritional state is an important predictor of perinatal results. This concept has gained more importance in the recent years as there is now growing acceptance of the 'fetal origin of adult disease' hypothesis [(7)]. The objectives was to study the effect of maternal Hb on anthropometric measurements of full term baby.

Methods

This study is a cross-sectional study included 200 pregnant women who attended to the obstetrical ward in Al-Yarmook Teaching

Hospital, in the period between the 1st of March to the 1st of May 2010; one hundred fifteen delivered by normal vaginal delivery (NVD), and eighty five were delivered by caesarian section (C/S).

All these 200 pregnant women were studied have full term babies, and all pregnant women with chronic diseases had been excluded from the study. For each mother, blood sample was aspirated, before delivery and sent for hemoglobin analysis (PCV was done) at the laboratory in Al-Yarmook Teaching Hospital.

Regarding the newborn of each mother only full term were included in the study, all preterm were excluded as well as, post date and any baby with obvious dimorphic feature .

Four measurements took for each baby (weight, length, head circumference and chest circumference) which were done immediately after birth in the neonatal intense care unit in AL-Yarmook Teaching Hospital.

I. Weight measurement of baby used digital scale.
II. Lengths measurement of baby by Infantometer (studiometery) done by fix baby inside the box in supine position fix the head & lower limbs then attach the lower end of infantometer to sole of the feet.
III. Head Circumference measurements done according the following steps:
   1. Use non-stretch tape, such as flexible metal tape measure.
   2. Warp the tape around the widest part of the child head.
   3. Move the tape around a bit and record the largest possible measurement.

Measure the circumference of the head at the level of the plane passing above the glabella (the most anterior protrusion of the forehead) and over the opisthrocranion (the most posterior protrution from glabella on the back of the head), per-pendicular to the mid-sagittal plane.

Three different measurements take for each baby and record the largest one.

IV. Chest Circumference measurement of baby. The infant lies on back. With an automated tape device, measure the circumference of the chest at the level of the nipples during normal breathing.

Analysis of data was carried out using the available statistical package of SPSS-18 (Statistical Packages for Social Sciences- version 18 "PASW" Statistics). Data were presented in simple measures of frequency, percentage, mean, standard deviation, and range (minimum-maximum values). The significance of difference of different means (quantitative data) was tested using student-t-test for difference between two independent means, while different percentages (qualitative data) were tested using Pearson Chi-square test. Statistical significance was considered whenever the P value was less than 0.05.

Results

From 200 pregnant women who were included in this study, 115 (57.5%) of them delivered by NVD and 85 (42.5%) delivered by C/S. One hundred forty (69.5%) of women with normal Hb, 60 women (30.5%) with anemia, 58 women (29.5%) with mild anemia and 2 women (1%) of them with moderate anemia; we make as anemic and no anemic group figure 1.

The mean of (weight, length and chest circumference) show significant difference between anemic and non-anemic (P = 0.031, P = 0.009, P = 0.004) while head circumference was not significantly affected (P = 0.054) as it is shown in table 1. There was a statistically significant difference in the anthropometrics measurement of new born of anemic and non-anemic groups. The study showed that the (weight, length, head circumference and chest circumference) of neonates in anemic group was less than non-anemic group weight (180 g), length (0.8 cm), head circumference (0.38 cm), chest circumference (0.7 cm) show in table 1.

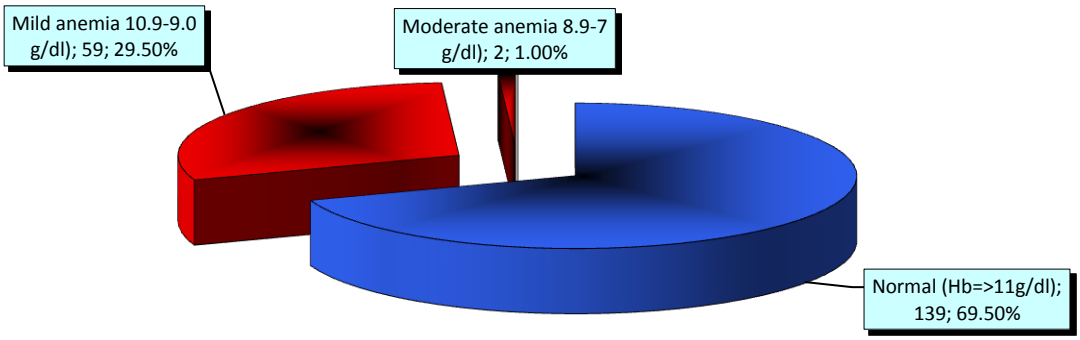

Figure 1. Hemoglobin status of the mothers of new born baby

Table 1. Relation of maternal Hb level and anthropometric measurements of new born

Parameter	Normal (Hb≥11.0)		Anemic (Hb<11.0)		P value
	Mean ± SD	Range	Mean ± SD	Range	
Hemoglobin (g/dl)	11.86 ± 0.92	11.00 - 15.80	10.08 ± 0.57	8.20 - 10.80	0.0001
Weight (Kg)	3.47 ± 0.48	2.75 - 5.00	3.29 ± 0.63	2.25 - 4.50	0.031
Length (cm)	49.52 ± 1.81	45.00 - 55.00	48.72 ± 2.31	42.00 - 54.00	0.009
OFC (cm)	34.46 ± 1.19	31.00 - 38.00	34.08 ± 1.45	30.00 - 37.50	0.054
Chest circumference (cm)	33.13 ± 1.50	30.00 - 38.00	32.43 ± 1.63	28.00 - 35.00	0.004

*Significant difference using t-test for two independent means at 0.05 level of significance

The percentile of (weight for age and length for age) was statistically significantly affected (P = 0.001, P = 0.02), while weight for length and head circumference for age was not significantly affected (P = 0.215, P = 0.063) as show in tables 2 through 5.

Table 2. Relation of weight for age percentile of new born with Hemoglobin of the mother

Weight for age percentile	Normal (Hb≥11.0)		Anemic (Hb<11.0)		P value
	No	%	No	%	
<3rd	1	0.7	4	6.7	0.001*
3rd-50th	74	52.9	40	66.7	
50th-97th	60	42.9	11	18.3	
>97th	5	3.6	5	8.3	

*Significant difference using chi square test for two independent means at 0.05 level of significance

Table 3. Relation of length for age percentile of new born with Hemoglobin of the mother

Length for age percentile	Normal (Hb≥11.0)		Anemic (Hb<11.0)		P value
	No	%	No	%	
$<3^{rd}$	2	1.4	6	10.0	0.02*
3^{rd}-50^{th}	77	55.0	35	58.3	
50^{th}-97^{th}	59	42.1	19	31.7	
$>97^{th}$	2	1.4	0	0	

*Significant difference using chi square test for two independent means at 0.05 level of significance.

Table 4. Relation of weight for length percentile of new born with Hemoglobin of the mother

Weight for length percentile	Normal (Hb≥11.0)		Anemic (Hb<11.0)		P value
	No	%	No	%	
<3rd	2	1.4	4	6.7	0.215
3rd-50th	53	37.5	19	31.7	
50th-97th	65	46.4	27	45.0	
>97th	20	14.3	10	16.7	

Table 5. Relation of OFC for age percentile of new born with Hemoglobin of the mother

OFC for age percentile	Normal (Hb≥11.0)		Anemic (Hb<11.0)		P value
	No	%	No	%	
<3rd	1	0.7	3	5.0	0.063
3rd-50th	92	65.7	43	71.7	
50th-97th	47	33.6	14	23.3	
>97th	-	-	-	-	

Discussion

In this study anemia prevalence in pregnant women was found to be 30.5%. In India the overall prevalence of anemia among pregnant women was estimated to be 72.5 %[8], in Nigeria (61.2%) [9], in Turkey 43% in [10], in Bangladesh (36%) [11], in India another study (34.4%) [12], in New Zealand (13%) [13].

This study focused on the relationship between maternal anemia and perinatal outcome where we found that maternal anemia during pregnancy was associated with low birth weight, affect length and chest circumference but not head circumference that related to duration of anemia first, second or third trimester anemia.

In a study done in Turkey between January 2005 and December 2006[10], on two groups of pregnant women (first group with anemia and second group without anemia), of 3688 pregnant women 1588 (43%) were found to be anemic, the anthropometric measurements (weight, length, head circumference and chest circumference) of newborn of anemic and non-anemic mother groups showed statistically significant difference [10].

In a study done in Pakistan, from January 2004 to December 2005[14], from 860 pregnant women, 402 (46.7%) were anemic, perinatal outcome include preterm delivery, low birth weight and intrauterine growth retardation, low birth weight among anemic women was 1.8 time more than non-anemic [14].

In a study done in Pakistan from October 2001 to October 2002) [16], on 629 pregnant women of these 313 were anemic the risk of low birth weight was 1.9 higher among anemic women [15].

In a study done in India on 102 pregnant women show that (34.3%) of pregnant women were anemic, the maternal hemoglobin concentration showed significant correlation with birth weight ($P = 0.01$) [16].

In a study done in Sri Lanka on 817 pregnant women, about (7.1%) were anemic the study show that anemia during pregnancy was not adversely associated with any of pregnancy outcome, hemoglobin level of > 13.9 g/dl was adversely associated with low birth weight [17].

In a study done in Norway, 877 pregnant women, with low hemoglobin levels at term were closely associated with increased frequency of newborn in heavy weight for date [18].

In this study, the effect of anemia first affect the weight and then affect the length and chest circumference then affect head circumference that may explain why head circumference not affected either due to anemia in last trimester or treated anemia during pregnancy.

In conclusion, anemia affects neonatal outcomes in full terms baby, full term babies of anemic mothers were in the normal anthropometric range, but they were much lower than babies of normal mothers.

References

1. Thangaleela T, Vijayalakshmi P. Impact of anaemia in pregnancy. Indian J Nutr Diet 1994a; 31, 9251-6.
2. World Health Organization. WHO Global Database. Geneva: WHO, 1997.
3. Brabin L, Nicholas S, Gogate A, et al. A high prevalence of anemia among women in Mumbai, India. Food Nutr Bull. 1998; 19: 205-9.
4. Viteri FE. The consequences of iron deficiency and anemia in pregnancy. Adv Exp Med Biol. 1994; 352: 127-39.
5. Thangaleela T, Vijayalakshmi P. Impact of anaemia in pregnancy. Indian J Nutr Diet. 1994b; 31, 26-32.
6. Gambling L, Andersen HS, McArdle HJ. Iron and copper, and their interactions during development. Biochem Soc Trans. 2008 Dec; 36(Pt 6): 1258-61.
7. Wjst M, Popescu M, Trepka MJ, et al., Pulmonary function in children with initial low birth weight. Pediatr Allergy Immunol. 1998; 9: 80-90.
8. Malhota M, Sharma JB, Barta S, et al. Maternal and perinatal outcome in varying degrees of anemia. Int J Gynaecol Obstet. 2002; 79: 93-100.
9. Akinola OI, Fabamwo AO, Tayo AO, et al. Maternal Hemoglobin and Fetal Birth Weight any Relationship? The Experience in Lagos, South Western Nigeria. Nigerian Med Pract. 2008; 54(3-4): 50-52.
10. Telatar B, Comert S, Vitrinel A, et al. The effect of maternal anemia on anthropometric measurements of newborns. Saudi Med J 2009; 30(3):409-412.
11. Akhter S, Momen MA, Rahman MM, et al. Effect of maternal anemia on fetal outcome. Mymensingh Med J 2010 Jul; 19(3):391-8.
12. Singla PN, Tyagi M, Kumar A, et al. Fetal growth in maternal anemia. J Trop Pediatr. 1997 Apr; 43(2): 89-92.
13. Brough L, Rees GA, Crawford MA, et al. Effect of multiple-micronutrient supplementation on maternal nutrient status, infant birth weight and gestational age at birth in a low-income, multi-ethnic population. Br J Nutr. 2010 Aug; 104(3): 437-45.
14. Bakhtiar UJ, Khan Y, Nasar R. Relation between maternal hemoglobin and perinatal outcome. Rawal Med J. 2007 Jul-Dec; 32(2): 102-4.
15. Lone FW, Qureshi RN, Emanuel F. Maternal anemia and its impact on perinatal outcome. Top Med Int Health. 2004 Apr; 9(4): 486-90.
16. Rusia U, Madan N, Agarwal N, et al. Effect of maternal iron deficiency anemia on fetal outcome. Indian J Pathol Microbiol. 1995 Jul; 38(3): 273-9.
17. Abeysena C, Jayawardana P, de A Seneviratne R. Maternal hemoglobin level at booking visit and its effect on adverse pregnancy outcome. Aust N Z J Obstet Gynaecol. 2010 Oct; 50(5): 423-7.
18. Sagen N, Nilsen ST, Kim HC, et al. Maternal hemoglobin concentration is closely related to birth weight in normal pregnancies. Acta Obest Gyne Scand. 1984; 63(3): 245-248.

Correspondence to Dr. Sabah M Ali
E-mail: sabahma2002@yahoo.com
Received 9th Feb. 2012: Accepted 17th Dec. 2012.