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Effect Of Maternal Iron Deficiency Anemia On The Baby Anthropometric Measurements And Hematological Indices

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الملخص:

تعتبر الأنيميا من أكثر المشاكل الصحية للمرآة الحامل نتيجة نقص التغذية ومن أكثر الأسباب شيوعاً أنيميا نقص الحديد التي تمثل نسبة 33-75%من حالات الأنيميا للنساء الحوامل .

إن الهدف من هذه الدراسة لتقييم تأثير أنيميا الدم للمرآة الحامل على مقاسات الوزن والطول ومحيط الرأس للطفل و مستوى الدم.

هي عبارة عن دراسة لفئة من الحالات بأثر مستقبلي و تشمل 200 مرآة حامل بكشك الولادة في مستشفى الجمهورية بنغازي من بداية شهر الطير إلى نهاية شهر الماء لسنة 2012 ولادة طبيعية فشملت الأعمار من 18-42 سنة ممن ينطبق عليها المواصفات الصحية من غير المدخنات. و تم أخذ العينة من الحبل السري للمولود لأجراء تحاليل الهيموجلوبين ومستوى الحديد والقريتين وأخذ مقاسات الوزن , الطول ومحيط الرأس) وتم تحليل البيانات وتفسيرها باستخدام (chi squre , Studen's)النسبة المئوية وقيمة p لتحديد الدلالة الإحصائية للعلاقة بين المتغيرات باستخدام (r) ((Pearson's correlation

42.5 % من 200 مرآة حامل تعاني الأنيميا حيث إن 51% مابين 26-36 سنة مع متوسط هيموجلوبين إلام للهيموجلوبين الطبيعي وللأنيميا الخفيفة والمتوسطة هو (8.97±0.74, 10.45± 0.30, 12.15 ±0.82) على التوالي , وحيث إن (88.5%) من الأمهات أخذن الحديد أثناء الحمل. متوسط الحديد للأمهات للكنترول وللأنيميا الخفيفة والمتوسطة هي (86.35±38, 74.77± 2.77, 59.38±35.6) علي التوالي. ومتوسط القريتين للأمهات للكنترول وللأنيميا الخفيفة والمتوسطة هي (40.65±1.88 , 24.03±39.52 , 13.79±13.37) علي التوالي . متوسط هيموجلوبين الأطفال علي حسب مجموعات الأمهات (للكنترول, أنيميا الخفيفة, أنيميا متوسطة هو (15.12±1.88, 14.80±1.80, 14.01±1.13) علي التوالي. وحيث إن متوسطات الحديد والقريتين لأطفال أمهات الكنترول والأنيميا الخفيفة ومتوسطة هم)(38±1.38, 39.3 ± 1.38, 37.4 ±1.34) , (260 ± 2.63, 321 ±2.79, 195 ± 1.91) علي التوالي. وبذلك نستنتج أن هناك علاقة مابين خضاب الأم والطفل, ومابين حديد الأم والطفل في المستوى الطبيعي فقط ,و مابين فرتيين الأم و و حضاب ووزن و فرتيين الطفل.

الكلمات المفتاحية:

انيميا، هيموجلوبين الأم، انثروبومثرية الطفل.

Abstract

Anemia is one of the most prevalent nutritional deficiency problems afflicting pregnant women. Objective: - to evaluate the impact of maternal anemia on the baby anthropometric measurements (B. weight, length, head circumference) & biochemicals (HB, S. iron, S. ferritin). Prospective cross-sectional hospital based study was conducted on 200 Pregnant women attending labor room at AL-Jamhoria hospital from 1st April to end of May 2012, aged between 18-42years old, who delivered vaginally. Maternal venous blood was extracted few hours before delivery for (Hb, S. iron, S. ferritin) and umbilical cord blood immediately after delivery for baby (Hb, s. ferritin, s. iron) and babies' anthropometric measurements (B. weight, Length, Head circumference) were taken. 85(42.5%) of total 200 pregnant women were anemic where (27%, 15.5%, 0%) with mild, moderate and severe anemia respectively, with hemoglobin levels (10- 10.9 g/dL, 7- 9.9 g/dL, ≤ 7 g/dL) respectively. 177 (88.5%) of them received iron supplement where (54%, 21.5%, 13%) among control, mild anemia & moderate anemic groups respectively, the mean maternal hemoglobin for control, mild anemic & moderate anemic groups were (12.15±0.82, 10.45±0.30, 8.97±0.74) respectively. The mean maternal iron level for control, mild anemic & moderate anemic groups were (86.35±38, 74.77±2.77, 59.38±35.6) respectively, the mean babies iron levels were (41.2± 1.38, 39.3± 1.38, 37.4± 1.34) for control, mild anemic & moderate anemic groups respectively. The mean maternal ferritin level for control, mild anemic, moderate anemic groups were (40.65±1.88, 24.03±39.52, 13.79±13.37) respectively with mean babies ferritin level for control, mild anemic & moderate anemic groups were (260± 2.63, 321± 2.79, 195± 1.91) respectively. The Anemia is highly prevalent among pregnant women in our country and reaches 42.5% & have impact on the baby growth & hematological indices.

Keywords: Anemia, maternal hemoglobin, Baby Anthropometric.

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1. INTRODUCTION

Anemia: - It is one of the most prevalent nutritional deficiency problems afflicting pregnant women and iron deficiency anemia is the most common cause in the world and account for 33- 75 % of all cases of anemia in pregnant women and approximately half of all anemia cases worldwide, it is the result of advanced stage of iron deficiency which diminishes erythropoiesis and causes the development of anemia.[1] The world Health Organization reports anemia among the top ten most important contributors to global ill health and deaths. It is estimated that about a third of the world's population of 7 billion have hemoglobin levels below the WHO criteria for diagnosis of anemia.[2] Transfer of iron from the mother to the fetus is supported by a substantial increase in maternal iron absorption during pregnancy and is regulated by the placenta. Serum ferritin usually falls markedly between 12 and 25 wks of gestation, probably as a result of iron utilization for expansion of the maternal red blood cell mass. Most iron transfer to the fetus occurs after 30 weeks of gestation, which corresponds to the time of peak efficiency of maternal iron absorption.[3] where its effect on fetal outcome:-

1. **Fetal and neonatal consequence include**
   - A. Low birth weight.
   - B. Poor mental and psychomotor performance.
   - C. The infant development.
2. **Preterm delivery.**

Patients and methods: - Prospective cross-sectional hospital based study was conducted on 200 Pregnant women attending labor room at AL-Jamhoria hospital from 1st April to end of May 2012, aged between 18-42years old, who delivered vaginally. They were healthy and nonsmoker pregnant women with gestational age (GA) of ≥ 37 weeks. Based on the World Health Organization (2001) reference, the anemic mothers were considered if their pre delivery hemoglobin level: •Non-anemic group (Control) with Hb ≥ 11g/dl. Mild anemic group with Hb (10- 10.9g/dl). Moderate anemic group with Hb (7- 9.9g/dl).

The data collected include - Maternal age, gravidity, parity, H/O abortion, space between pregnancies, bleeding during pregnancy, H\O an iron supplement. Exclusion criteria: - The mothers were excluded if they had H/O chronic renal disease, H/O malabsorption or maldigestion, H/O chronic illness, H/O pre-eclampsia, H/O severe infection during pregnancy, H/O blood transfusion during pregnancy, gestational age < 37 week.

Sitting: - Labour room at AL-Jamhoria hospital (it is a governmental and referral center covering a large number of pregnant women from rural and urban areas of eastern part of Libya).

Study period: - 2 months for data collection and the rest for data analysis and writing.

Blood samples and Measurements: - Maternal biochemicals (Hb, Iron, Ferritin) were taken at least 1hour pre delivery and baby's cord blood for biochemicals (Hb, Iron, Ferritin) were taken with anthropometric measurements (weight, length, head circumference) immediately after birth all done by same person.

2. RESULTS:

1. **Distribution of Mothers according to Hemoglobin level:-**

200 pregnant women divided into 3 groups according to pre-delivery hemoglobin level

1st-Control group (non-anemic): - 115 (57.5%), Mean ± SD (12.15±0.82) with significant P-value.

2nd-Mild anemic group: - 54 (27%), Mean ± SD (10.45±0.30) with non-significant P-value.

3rd-Moderate anemic group: - 31 (15.5%), Mean ± SD (8.97±0.74) with non-significant P-value.

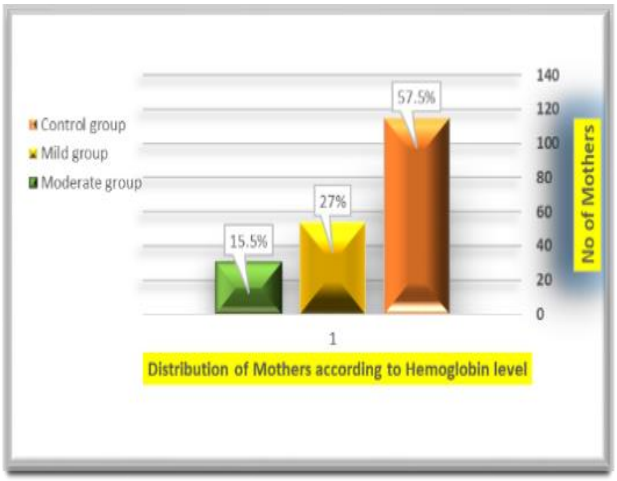


Figure 1: Distribution of Mothers according to Hemoglobin level.

2. **Distribution of mothers according to history of iron supplement:-**

177 (88.5%) of pregnant women received iron supplement, where (108; 54%, 43; 21.5%, 26; 13%) of them among Control group, Mild & Moderate anemic group respectively.

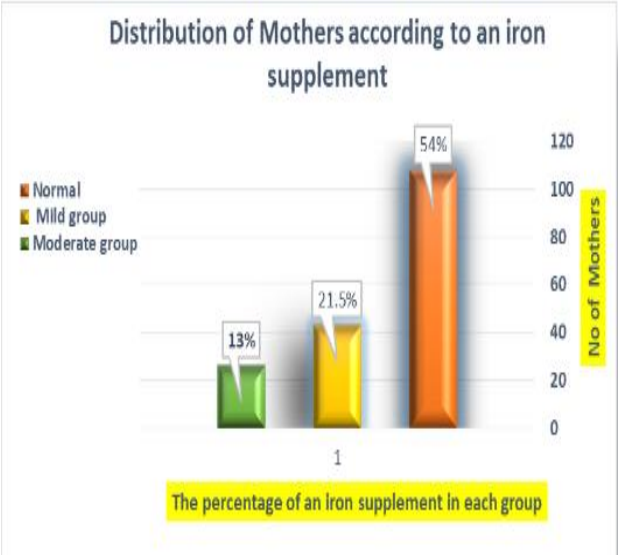


Figure 2: Distribution of Mothers according to an iron supplement.

A-1 – Relationship between Maternal hemoglobin & Baby anthropometric measurements:-

No correlation exists between them in all groups.

A-2- Relationship between Maternal hemoglobin & Baby hemoglobin: -

The correlation were significant between them with significant P- Value.

A-3-Relationship between Maternal hemoglobin & Baby iron & Ferritin:-

There are no correlations that exist between them in all groups.

B-1-Relationship between Maternal iron & Baby anthropometric measurement:-

No correlation existed in all groups.

B-2-Relationship between Maternal iron & Baby iron: -

The correlation exist between them at control group only.

C-1-Relationship between Maternal Ferritin & Baby weight: -

There is significant correlation exists between them among moderate anemic group.

C- 2.& 3. Relationship between Maternal Ferritin & Baby Length & Head circumference:-

No correlation exists between them in all groups.

C- 4. Relationship between Maternal Ferritin & Baby Hemoglobin:-

The correlation found to be present at level of moderate anemic group.

C- 5. Relationship between Maternal Ferritin & Baby iron:-

No correlation exists between them in all groups.

C- 6. Relationship between Maternal Ferritin & Baby Ferritin: -

There are significant correlation that exist between them at control & moderate anemic groups.

D: Comparison of effect of maternal anemia on baby anthropometric measurements

D- 1: Comparison of effect of maternal anemia on Baby weight

The weight of moderate anemic mother's babies were heavier than mild once and those heavier than non-anemic mother's babies as noticed but statistically were non-significant p- value.

Table D-1: comparison of effect of maternal anemia on Baby weight.

D- 2: Comparison of effect of Maternal anemia on Baby Length:-

The length of anemic mother's Babies is less than non-anemic group as noticed but statistically were non-significant p- value.

D- 3: Comparison of effect of Maternal anemia on Baby Head Circumference:-

The head circumference of anemic mother's babies group lesser than non-anemic group as notice but statistically were non-significant p- value.

Table A-2: Relationship between Maternal hemoglobin & baby hemoglobin.

Groups	No	%	Mean ±SD		r	P-value
			Mot.HB	Bab.HB		
Control	115	57.5%	12.15± 0.82	15.12±1.88	0.202	0.030
Mild anemia	54	27%	10.45±0.30	14.80±1.82	0.422	0.04
Moderate anemia	31	15.5%	8.97±0.74	14.01±1.13	0.481	0.006

Table B-2: Relationship between Maternal iron & Baby iron.

Groups	No	%	Mean ±SD		r	P-value
			Mot.iron	Bab.iron		
control	115	57.5%	86.35±38.5	41.2± 1.38	0.405	0.000
Mild anemia	54	27%	74.77±2.77	39.3± 1.38	0.056	0.685
Moderate anemia	31	15.5%	59.38±35.63	37.4± 1.34	0.234	0.206

Table C-1: Relationship between Maternal Ferritin & Baby weight.

Groups	No	%	Mean±SD		r	P-value
			Mot.ferritin	Bab.wt		
Control	115	57.5%	40.65±1.88	3.35±0.47	0.066-	0.483
Mild anemia	54	27%	24.03±39.52	3.58±1.64	0.158	0.255
Moderate anemia	31	15.5%	13.79±13.37	3.63±1.96	0.420	0.019

Table C-4: Relationship between Maternal Ferritin & Baby Hemoglobin.

Groups	No	%	Mean ± SD		r	P-value
			Mot.ferritin	Bab.HB		
control	115	57.5%	40.65±1.88	15.12±1.88	0.000	0.999
Mild anemia	54	27%	24.03±39.52	14.80±1.82	0.034-	0.808
Moderate anemia	31	15.5%	13.79±13.37	14.01±1.13	0.408	0.023

Table C- 5: Relationship between Maternal Ferritin & Baby iron.

Groups	No	%	Mean ± SD		r	P-value
			Mot.ferritin	Bab.ferritin		
Control	115	57.5%	40.65±1.88	260±2.63	0.334	0.00
Mild anemia	54	27%	24.03±39.52	321±2.79	0.171	0.216
Moderate anemia	31	15.5%	13.79±13.37	195±1.91	0.594	0.00

Table C-6: Relationship between Maternal Ferritin & Baby Ferritin.

Groups	mean± SD of non-anemic group	mean± SD B. wt	95% confidence interval		P (2 tail)	
			Lower	Upper		
Mild anemic	3.35± 0.47	3.58± 1.64	-0.652	0.310	0.481	Non-significant
Moderate anemic	3.35± 0.47	3.63± 1.96	-0.828	0.522	0.648	Non-significant

Table D-2: comparison of effect of maternal anemia on Baby Length.

Groups	Mean ± SD of non-anemic group	mean± SD B. Lt	95% confidence interval		P (2 tail)	
			Lower	Upper		
Mild anemic	50.06± 1.75	50.19± 1.35	-0.370	0.748	0.501	non-significant
Moderate anemic	50.06± 1.75	49.85± 1.86	-0.413	1.44	0.266	non-significant

Table D-3: Comparison of effect of maternal anemia on Baby Head Circumference.

Groups	Mean ± SD of non-anemic group	Mean± SD B. Hc	95% confidence interval		P (2 tail)	
			Lower	Upper		
Mild anemic	34.03± 1.44	34.32± 1.40	-0.885	0.237	0.253	non-significant
Moderate anemic	34.03± 1.44	33.85± 1.49	-0.494	0.978	0.507	non-significant

3. DISCUSSION:

The anemia was highly prevalent among pregnant women in our study account for 42.5% of them, this is according to WHO, which states that if the prevalence of anemia is ≥ 40% in any group, severe public health problem exists.[4]

No study was carried out in libya to show the size of this problem and fetal outcome in comparison to other studies which were done mainly in developing countries the prevalence of anemia in Indian studies were 9.59% & 89.9% done by (Samta Gaur, et al. 2015)[5], (Reeta Bora, et al. 2014)[6] respectively. In Iranian studies were 23.3% & 51.4% done by (Leila Alizadeh, et al. 2014)[7] & (Norimah A. et al. 2010)[8] respectively.

88.5% of all pregnant women in our study received iron supplement, where (54%, 21.5%, 13%) were among control, moderate & mild anemic groups respectively, as compared with Gaza study; 65.8% of their women received iron supplement where (93.5%, 38.1%) among non-anemic & anemic group respectively done by (Mohammad EL Hindi. 2011)[9]. From the above-mentioned results, we found that anemia among Libyan women still important issue and need to be solved by educating pregnant women about proper food & iron supplement.

A significant correlation existed between maternal hemoglobin & baby hemoglobin, this found in Iranian study (Norimah A. et al. 2010)[8] & Gaza study (Mohammad EL Hindi. 2011)[9]

At level of iron study, no correlation existed among anemic groups. The significant ones were at control group and this shows the importance of an iron supplement during pregnancy where the baby continues to take up iron from mother even if their stores are depleted. These results found in Gaza study (Mohammad EL Hindi. 2011)(9), Peruvian study (Kimberlyo O, et al. 2003)[10] & Chinese study (Lao TT, et al.1991)[11].

The baby's weight has been affected by ferritin level among moderately anemic group, this result coincides with Indian study (P. N. Singla, et al.1997)[12] & Bangladeshian study (Akhter S, et al. 2010)[13]. Also the correlation between mother ferritn and baby ferritin was strong especially among moderate anemic group and same result has been reported in Bangladeshian study (Akhter S, et al. 2010)[13], Gaza study (Mohammad EL Hindi. 2011)[9]

As consequence of anemia, the weight of anemic mothers' babies were heavier than non-anemic and this result agrees with Russian study (Elena L, et al. 1973-2002)[14]. The baby length & head circumference decreases with increasing degree of anemia & this result agrees with Turkish study (Berrin Telatar, et al. 2009)[15], Indian study (P. N. Singla, et al. 1997)[12], Iraniant study (Norimah A, et al. 2010)[8] & Indian study (Samata Gaur, et al. 2015)[5].

This explains the importance of iron in the improvement of hematological status of women & their fetal outcome.

4. CONCLUSION:-

The Anemia is highly prevalent among pregnant women in our country and reaches 42.5% & have impact on the baby growth & hematological indices.

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