

Dedication

To source of my life...

To the spirit of my father...

And my mother...

**To source of my interesting in
life...**

My husband...

To source of my happiness..

**My daughter Dania...and her
sisters and brother**

To my sisters and my brother..

I dedicate this works ...

Amani

Acknowledgement

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Finally, lot of thanks to the members of my family and all my friends...

Amani

Abstract

This is cross sectional descriptive analytical study, conducted at River Nile state. During the period from November 2011 - June 2013 to determine the frequency of iron deficiency anemia among Sudanese pregnant women in River Nile state.

Three hundred (300) pregnant women were informed about the study and agreed for participation, a questionnaire was designed to collect information about the study group such as age, number of pregnancies, state of trimesters, miscarried, iron treatment, pathological blood loss and nutritional, economic state, 2.5 ml of venous blood was collected in EDTA anticoagulant container , thin blood film and reticulocyte count were done, screening was done by measurement of HbF and HbA2 levels HbS using capillary Hemoglobin Electrophoresis; CBC was done using a Sysmex™ Kx21n, serum iron .ferritin and TIBC were done using. Biosystems A25. The results were analyzed by statistical package for social science (SPSS version 11.5)

The study showed that the frequency of the anemic group was (42.3%) related to all study groups. The study shows that the incidence of the iron deficiency anemia was (46.5%) thalassic anemia (3.9%) sickle cell anemia was (2.4) and other anemia (46.2%) in anemic group.

The means of Hb level, RBCs count, HCT% Red Cell indices (MCV, MCH, MCHC) were 7.6g/dl \pm 1.2, 3.6 \times 10¹²/ \pm 1.8, 25.3% \pm 2.6, 78.2fl \pm 9.2, 24.5pg \pm 4.1 28.4g/dl \pm 3.8 respectively, and there was

statistical significant difference in the means of those values among anemic study group when compared with control group (P.<0.05).

The means of serum iron and serum ferritin among women of iron deficiency anemia group were $23.2\text{mg/dl} \pm 2.9$, $10.9\text{mg/dl} \pm 1.2$ respectively, were significantly lower than control group ,and total iron binding capacity was $481.4\text{mg/dl} \pm 9.4$, it was significant higher in comparison with means obtained in control group (p value < 0.05),

Iron deficiency anemia is the most common occurring among multiparous pregnant women (29.1%), than in normal child spacing pregnant women (16.5%) and prolonged child spacing pregnant women (0.8%).

In thalassemia carrier group the hemoglobin electrophoresis showed significant increase mean levels of HbA_2 , and HbF were $5.8\% \pm 0.8$, $3.6\% \pm 0.5$, and lower level of HbA $90.6\% \pm 0.5$ in comparison with hemoglobin electrophoresis in control group (P value < 0.04). In homozygous sicklers HbA_2 was $2.2\% \pm 0.5$,and there was no significant differences in comparison with control group (p. value > 0.05), while HbF 26.8 ± 0.3 and HbS 70.3 ± 0.6 ,were showed significant elevation respectively in comparison with control group (p. value < 0.05).

ملخص الدراسة

هذه الدراسة وصفية تحليلية أجريت في ولاية نهر النيل في الفترة ما بين نوفمبر 2011 - يونيو 2013م. وقد هدفت الدراسة إلى تحديد تكرار الإصابة بفقر الدم الناتج عن نقص الحديد والثلاسيميا والأنيميا المنجلية عند السودانيات الحوامل في ولاية نهر النيل. أخذت (300) عينة من نساء حوامل بعد أخطارهن بهذه الدراسة وأهميتها وأخذت موافقتهن على المشاركة . صمم أستبيان لجمع معلومات عن المشاركات في الدراسة بالنسبة للعمر وتاريخ العائلة في الإصابة بالأنيميا عدد مرات الحمل ، فترة الحمل ، تاريخ وجود إجهاض ، علاج الحديد ، تاريخ وجود نزيف والحالة الاقتصادية وحالة التغذية . تم جمع عينة دم 3 مل في حاويه تحتوى على مانع تجلط (ثنائي أمين الإيثيلين رباعي حمض الخليك) تم عمل مسحه رقيقه للدم Hb F Hb A2 Hb S بواسطة الرحلان الكهربى لجهاز (الهيموجلوبين إلكتروفوريسس) كما تم إستخدام جهاز (سيسمكس) لتحليل تعداد الدم الكامل والذى يعمل اوتوماتيكيا,أيضا تم حساب تركيز الحديد فى مصل الدم وتركيز فردين مصل الدم وسعة ارتباط A25A25الحديد الكلى بإستخدام جهاز(بايوسيستم الذى يعمل اوتوماتيكيا وتم تحليل) النتائج إحصائيا باستخدام الحزم الإحصائية (الإصدار 11.5 SPSS).

أوضحت الدراسة أن تكرار المجموعة المصابة بفقر الدم (43.3%) بالنسبة لكل المجموعة تحت الدراسة . كذلك أوضحت الدراسة أن تكرار فقر الدم الناتج عن نقص الحديد (45.5%) وفقر الدم نوع الثلاسيميا (3.9%) وفقر الدم المنجلى المتجانس (2.4%) وفقر الدم نسبة لأنواع أخرى (46.2%) في المجموعة المصابة بفقر الدم . وتم حساب المتوسط مستوى خضاب الدم (الهيموجلوبين) ومتوسط عدد كريات الدم الحمراء ومكdas الدم الأحمر ومؤشرات الخلية الحمراء (متوسط حجم الخلية ، متوسط خضاب الخلية الدموي ، متوسط تركيز خضاب الخلية الدموي) وكانت النتائج كالتى: $3.6 \times 10^{12}/\text{ml} \pm 1.2$, 7.6 ± 1.8 , $28.4\text{g/dl} \pm 3.8$, $24.5\text{pg} \pm 4.1$, $78.2\text{fl} \pm 9.2$, $25.3\% \pm 2.6$, كما بالترتيب, وكانت هذه القيم منخفضه ± 1.2 , $10.9\text{mg/dl} \pm 2.9$, $23.2\text{mg/dl} \pm 4.8$. هناك اختلاف ذو دلالة إحصائية واحتمالية أقل من (0.05%) في هذه القيم لدى النساء الحوامل بالمقارنة مع المجموعة الضابطة .

وفي مجموعة النساء المصابة بفقر الدم الناتج عن نقص الحديد وجد أن متوسط تركيز الحديد في مصل الدم ، ومتوسط تركيز فردين مصل الدم كالتى: بالترتيب, وكانت هذه القيم منخفضه ± 1.2 , $29.1\% \pm 2.6$. بفرق إحصائي معنوي بالمقارنة مع المجموعة الضابطة .

وهي أعلى ، $481.4 \pm 9.4\text{mg/dl}$ وكانت قيمة متوسط سعة ارتباط الحديد الكلى من متوسط المجموعة الضابطة والفرق ذو قيمة إحصائية معنوية . كما أوضحت نتائج الدراسة أيضاً أن فقر الدم الناتج عن نقص الحديد أكثر شيوعاً بين السيدات ذوات الحمل المتعدد (29.1%) مقارنة بذوات الحمل طبيعى الفترات (

(%) 16.5 والحمل طويل الفترات (%0.8). في المجموعة المصابة بفقر الدم التلاسيميا وجد أن الرحلان الكهربائي لخضاب الدم كالآتي : ارتفاع خضاب الدم من بالترتيب, كما $3.6\% \pm 0.5$ للذان كانت قيمتهما HbA_2 $5.8\% \pm 0.8$, HbF $0.5\% \pm 0.5$ وجد أيضاً "انخفاض" 90.6% بالمقارنة مع قيم الرحلات الكهربائي عند HbA . حيث كانا مرتفعان في مرض فقر الدم المجموعة الضابطة والفرق له دلالة إحصائية, وفي النساء المصابة بمرض فقر الدم المنجلی المتجانس وجد أنه لا اختلاف في متوسط الرحلات الكهربائي لخضاب ومتوسطه في المجموعة الضابطة ، كما وجد فرق $2.2\% \pm 0.5$ HbA_2 الدم النوع والنوع Hb F 70.3 ± 0.6 إحصائي بين متوسط الرحلان الكهربائي لخضاب الدم نوع HbS 26.8 ± 0.3 .

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List of abbreviations

ACD	Anemia of chronic disease
ARC	Absolute reticulocyte count
CBC	Complete blood count
CO₂	Carbon dioxide
CRC	Corrected reticulocyte count
ELISA	Enzyme linked immunosorbent assay
Fe⁺³	Ferric ions
Fe⁺²	ferrous ions
FeOOH	Ferric oxyhydroxide
Fl	Femtoliters
HB	Hemoglobin
HB F	Fetal Hemoglobin
HCT	Hematocrit
IDA	Iron deficiency anemia
K2EDTA	Potassium Ethylene Diamine Tri acetic Acid
L/L	Liter per liter
LCD	Lucid Crystal Displayer
MCH	Mean Cell Hemoglobin
MCHC	Mean Cell Hemoglobin Concentration
MCV	Mean cell volume
MPV	Mean Platelet Volume
NRBCs	Nucleated red blood cells

PBP	Peripheral blood Picture
PC	Program computer
PCV	Packed cell volume
Pg	Picogram
RBCs	Red blood corpuscular cell
RC	Reticulocyte count
RE	Reticuloendothelia
RPI	Reticulocyte Production index
SCD	Sickle cell disease
SI	Serum Iron
STFR	Serum Trans Ferrin receptor
TEB	Tris/ EDTA/ Borate
TIBC	Total iron binding capacity
TRF	Transferrin
TWBCs	Total white blood cells