

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

الآية

لَا يُكَلِّفُ اللَّهُ نَفْسًا إِلَّا وُسْعَهَا ۗ لَهَا مَا كَسَبَتْ وَعَلَيْهَا مَا اكْتَسَبَتْ ۗ رَبَّنَا لَا تُؤَاخِذْنَا إِنْ نَسِينَا أَوْ
أَخْطَأْنَا ۗ رَبَّنَا وَلَا تَحْمِلْ عَلَيْنَا إصْرًا كَمَا حَمَلْتَهُ عَلَى الَّذِينَ مِنْ قَبْلِنَا ۗ رَبَّنَا وَلَا تُحَمِّلْنَا مَا لَا
طَاقَةَ لَنَا بِهِ ۗ وَاعْفُ عَنَّا وَارْحَمْنَا ۗ أَنْتَ مَوْلَانَا فَانصُرْنَا عَلَى الْقَوْمِ الْكَافِرِينَ

صدق الله العظيم

سورة البقرة الآية ﴿286﴾

Dedication:-

This research is lovingly dedicated to my parents and my supervisor

kawthar who have been my constant source for inspiration.

They have given me enormous personal sacrifice and unconditional

love to make this thesis possible.

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With boundless love and appreciation, I would like to extend my heartfelt gratitude and appreciation to the people who helped me to bring this study into reality.

I would like to express the deepest appreciation to my advisor kawthar Abdelgaleil for all of her guidance, encouragement and wisdom throughout this thesis from inception to completion.

Personally, I thank my mother and sisters for their constant support of my post graduate school and for attending dissertation defense. I also, thank and acknowledgement my father who has been with me throughout step of this incredible journey.

Abstract:-

This was prospective analytical case control study conducted in Khartoum State during the period of March to November 2019. It aimed to determine whether these changes of iron deficiency are related to alteration of IL10 secretion.

Total 88 subjects in this study were included and selected randomly, grouped into 44 case study group who had iron deficiency anemia and 44 control group. Both, they're matched in age and sex. 3ml of venous blood sample were collected from each subject in EDTA container to get CBC result and peripheral blood picture. Then, plasma was separated into cryo-tube and put in refrigerator at -20°C . IL10 concentration was measured using Enzyme Linked Immunosorbent Assay (ELISA)(Biolegend's ELISA MAXTM). The data was analyzed using SPSS programmer (Version 20) using one independent T-test for testing significance and frequencies, mean \pm SD, *p.value* significant ≤ 0.05 .

Mean of age was 31.16 ± 7.7 and 28.30 ± 6.8 for case and control respectively, while the gender was 1.5 ± 0.5 and 1.5 ± 0.5 respectively. Mean \pm SD of Hb (g/dl) and HCT(%) were 9.3 ± 1.3 and 31.1 ± 4.0 respectively for case study group when compared to control group were 13.6 ± 1.3 and 40.2 ± 4 . As well as the mean of MCV (pg),MCH(fL) and MCHC(L/L) in case study group were 70.6 ± 3.4 , 21.4 ± 3.4 and 29.1 ± 4.6 respectively; and for control group were 86.2 ± 4.8 , 29.3 ± 2.2 and 33.6 ± 1.7 respectively.

Mean level of IL10(pg/ml) was 3.5 ± 3.9 in case when compared to control was 1.90 ± 1.92 with statistical significant *p.value* was 0.02.

The *p.value* for correlation of IL10 with Hb, HCT, MCV, MCH, MCHC age and gender were 0.02,0.01, 0.25, 0.16, 0.13, 0.04 and 0.1 respectively.

Independent T-test showed plasma level of IL10 (pg/ml) is significantly higher in IDA patients compared to healthy control group (*p.value* 0.02). As well as, it revealed IL-10 had statistical correlation with Hb, HCT and age, while neither RBCs indices nor gender have no statistical correlation with IL 10.

This study concluded the iron deficiency can alter IL10 concentration so it can be considered as risk factor for IDA patients.

ملخص البحث:

أجريت هذه الدراسة تحليلية في ولاية الخرطوم خلال الفترة من مارس إلى نوفمبر 2019. وكانت تهدف إلى تحديد ما إذا كانت هذه التغييرات في نقص الحديد مرتبطة بتغيير إفراز المادة الخلوية انترليوكين 10 .

تم تضمين مجموعه 88 مريض في هذه الدراسة واختيارهم بشكل عشوائي ، تم تجميعها في 44 مريض لديهم فقر الدم بسبب نقص الحديد و 44 كانت المجموعة الصحية كلاهما متطابقان في العمر والجنس. تم جمع 3 مل من عينة الدم الوريدية من كل مريض في حاوية EDTA للحصول على نتيجة CBC وصورة دم طرفية. ثم تم فصل البلازما إلى كرايو-تيوب ووضعها في الثلجة في -20 درجة مئوية. تم قياس تركيز المادة الخلوية 10 باستخدام مقايصة الممتز المناعي المرتبط بالإنزيم. تم تحليل البيانات باستخدام مبرمج SPSS (الإصدار 20) باستخدام اختبار T واحد مستقل لاختبار الأهمية والترددات والقيمة الاحتمالية ≥ 0.05 .

كان متوسط العمر 7.7 ± 31.16 و 6.8 ± 28.30 في مجموعة فقر الدم والطبيين علي التوالي، بينما كان الجنس $5. \pm 1.5$ و 0.5 ± 1.5 علي التوالي. كان متوسط الهيموكلوبين (جم/دسي) والهيماتوكريبت (1.3%) $9.3 \pm$ و 4.0 ± 31.1 علي التوالي لمجموعة فقر الدم عند مقارنتها بمجموعة الطبيعين كانت 1.3 ± 13.6 و $4. \pm 40.2$ علي التوالي وكذلك متوسط (MCH (FL) ، MCV (pg) و (MCHC (L / L) في مجموعة فقر الدم كانت 70.6 ± 3.4 ، 3.4 ± 21.4 و 4.6 ± 29.1 علي التوالي ؛ وللمجموعة الطبيعية كانت 4.8 ± 86.2 ، 2.2 ± 29.3 و 1.7 ± 33.6 علي التوالي.

كان متوسط مستوى IL10 (جزء من الغرام / مل) 3.9 ± 3.5 في حالة مقارنة 1.92 ± 1.90 في الطبيعين ، مع الإحصائية الاحتمالية كانت 0.02 .

كانت قيمة الاحتماليه لارتباط المادة الخلوية مع Hb ، HCT ، MCV ، MCH ، و MCHC و العمر والنوع كانت 0.02 و 0.01 و 0.25 و 0.16 و 0.13 و 0.04 و 0.1 علي التوالي.

ظهر اختبار T المستقل أن مستوى البلازما للادة الخلوية 10 بيكوجرام بالديسي ليدر أعلى بكثير في مرضى IDA مقارنة بمجموعة السليمة مع القيمة الاحتمالية 0.02 . كما كشفت الدراسة أيضاً أن IL-10 له علاقة إحصائية مع Hb و HCT بدلاً من MCV و MCH و MCHC التي ليس لها علاقة إحصائية.

خلصت هذه الدراسة إلى أن نقص الحديد يمكن أن يغير تركيز المتدة الخلوية 10 بحيث يمكن اعتباره علامة النذير المفيد لمرضى فقر الدم.

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List of Abbreviations:-

ALA	Aminolevulinic acid
ALAs	Aminolevulinic acid synthetase
CSFs	Colony stimulating factors
DC	Dendritic cell
DMT1	Divalent metal transporter 1
ELISA	Enzyme linked immunosorbent assay
EPO	Erythropoietin
g/dl	Gram per deciliter
G-CSF	Granulocyte-colony stimulating factor
GM-CSF	Granulocyte megakaryocyte-colony stimulating factor
Hb	Hemoglobin
HbA	Adult hemoglobin
HbC	Hemoglobin C
HbF	Hemoglobin F
HbS	Hemoglobin S
HGFs	Hematopoietic growth factors
HSCs	Hematopoietic stem cells
IFN- γ	Interferon Gamma
IL10	Interleukin 10
ILs	Interleukins
NK cell	Natural killer cell
NO	Nitric oxide
P.value	Probability value
PAMPs	Pathogen association molecular patterns
PCV	Packed cell volume
PLTs	Platelets
RBCs	Red blood cells
SCF	Stem cell factor
SPSS	Statistical package for social science
STAT	Signal transducer and activation of transcription
TNF	Tumor necrotic factor
TPO	Thrombopoietin

WBCs White blood cells