الإستهلال

قال تعالى:

يَٰٓأَيُّهَا ٱلنَّاسُ قَدْ جَآءَتْكُم مَّوْعِظَةٌ مِّن رَّبِّكُمْ وَشِفَآءٌ لِّمَا فِى
ٱلصُّدُورِ وَهُدًى وَرَحْمَةٌ لِّلْمُؤْمِنِينَ ﴿٥٧﴾

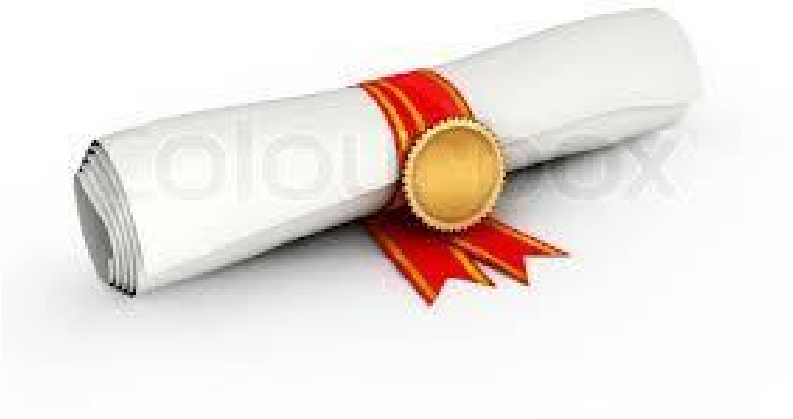
سورة يونس الآية 57

Dedication

This thesis is dedicated to my parents and brothers who have supported meall the way since the beginning of my studies.

Also, this thesis is dedicated to my fiancée who has been a great source ofmotivation and inspiration.

Finally, this thesis is dedicated to all friends who endured this long process with me, always offering support and love and those who believe in the richness of learning.



Acknowledgment

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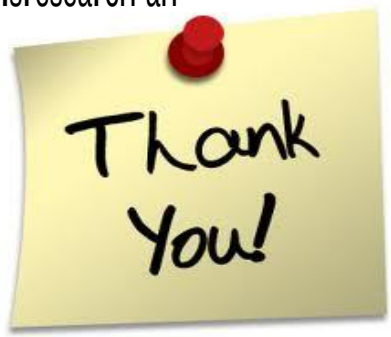

Abstract

Sickle cell anemia is life threat disease andpresence of HbS in homozygous state (SS) influences the red cell stability and rate of survival; this prospective case control analytical and descriptive studyto assess the effect of omega-3 supplementation in Sudanese patients with sickle cell anemia.

Patients aged 5–35 years with HbSS, who were undergoing regular follow-up at the outpatient Sickle Cell Disease Referral Clinic, Ibn-Aoaf Pediatrics and Khartoum Teaching Hospitals, Khartoum (Sudan) from March 2013 up to June 2013.Seventy eight patients recruited from a single center they have randomly assigned to receive omega-3 fatty supplementation for at least two year.

Identification of control group of thirty five individuals havebeen selectedrandomly.5ml of venous blood was collected, into Ethylene Di-amine Tetra-acetic Acid (EDTA) bottles and was used to determine complete blood counts (CBC) within 2 hours of collection using Sysmex KN-21 N, while the remainder was used to prepare haemolysate for haemoglobin electrophoresis and for reticulocyte count.Among the study; hemolytic variables were compared between both groups and revealed that there is significant difference in mean Hb (g/dl) between omega-3 group (.1±7.74) and group free of omega-3 (6.6±0.69) (P.value < 0.0001), also the differences were significant among Total Red Blood Cells count X 10^3C/*M*l (2.7±0.57 / 2.5±0.4), hematocrit %(22.7±4.2 / 21.2±2.3), and Mean Cell Hemoglobin*pg*(28.9.3±1 / .3±27.05) (P.value < 0.05) In contrast there is no difference in levels between study groups at Mean Cell Volume *f*l (85.5±8.6 / 86.99±.8)and Mean Cell Hemoglobin Concentration % (33.9±2.2 / 1.2±33.6)(P.value < 0.05) as well as sex and agehad no difference between study group and control group.

Studying bone marrow activity among the study groups by using Retics count and Reticulocyte production index with significant decrease in omega-3 group compared to control group (P.value < 0.0001) and this mean decrease erythropoiesis and thus haemolysis. These findings suggest that omega-3 fatty acids canbe an effective, safe, and affordable therapy for sickle cell anemia.

المستخلص

الانيميا المنجلية مرض مهدد للحياة مع وجود هيموغلوبين الدم في الحالة المتجانسة HbSSوالذي يؤثر سلبا على معدل حياة كريات الدم الحمراء.

أجريت هذه الدراسة التنبؤية التحليلية الوصفية لتقييم تأثير تناول احماض الاوميغا-3 لدى المرضى السودانيين المصابين بالانيميا المنجلية ذوو النمط HbSS من الهيموغلوبين الذين تتراوح اعمارهم مابين 5-35 سنة وكانوا يقومون بمتابعة منتظمة في العيادات المحولة الخارجية لمستشفى جعفر بن عوف للاطفال ومستشفى الخرطوم التعليمي (الخرطوم - السودان).في الفترةِ مِنْ مارسآذارِ 2013 إلى يونيوحزيرانِ 2013.

ثمانية وسبعون مريض كانوا قد اخضعوابشكل عشوائي لإستِلام وتناول الأوميغا - 3 وقد استمروا في الاخذ لمدة لاتقل عل السنتين .ومجموعة قياسيةمِنْ خمسة وثلاثونفردٍ إختيروا بشكل عشوائي لم تأخذ الاوميغا-3 استعملت كمجموعة تحكم.

تم جمع 5 ملليلترمِنْ الدمالوريديِ ،في إثيلينديأماين ثلاثي حامض الخليك (EDTA) في وعاءوكَان يُستَعملُلتَقْرير حساب الدَمِّ كاملا (CBC) خلال ساعتان باستعمال جهاز Sysmex،بينما البقيّةكَانت تُستَعملُلتَهْيِئة محلولللهيموغلوبينِ لعملية الرحلان الكهربيولإحصاءِ الخلايا الشبكية.

من خلال الدراسةِ ؛المتغيّرات الإنحلاليةقُونتْ بين كلتا المجموعاتوكَشفتْ بأنّ هناك إختلافهامّ في متوسط الهيموغلوبين (Hb (g /dl بين مجموعة الأوميغا -3 (7.7 ± 1.4) ومجموعة خاليةمِنْ الأوميغا - 3 (6.6 ± 0.69) (القيمة التنبؤية <0.0001)أيضاً الإختلافاتكَانت ذات دلالة معنوية بينإحصاءِ العد الكامل لخلايا الدم الحمراء TRBCs (0.57 ±2.7 /0.4±2.5) وحجم الخلايا المضغوط، Hct % (22.7 ± 2.3) / 21.2 ± 4.2 ±ومتوسط هيموغلوبين الخلية الحمراء pg (28.9 ± 3.1 / 27.0 ± 3.5)القيمة التنبؤية <0.05).

على النقيض منذلكهنالاإختلافَ في المستويات بين المجموعاتالدراسيةِ في متوسط حجم الخلية الحمراء (9.8 ± 86.9 / 8.6 ± 85.5) fl ومتوسط تركيزالهيموغلوبين في الخلاياء الحمراء % (33.9 ± 2.2 / 1.2±33.6) (القيمة التنبؤية >0.05) بالإضافة إلىالجنسِ والعُمر التي ليس لها اي اختلاف معنوي على المجموعات تحت الدراسة.

دراسة فعالية نخاع العظم في تصنيع خلايا الدم باستخدام عد الخلايا الشبكية ومعدل انتاجها RPIاوضحت هذه الدراسة انخفاض ملحوظ في مجموعة الاوميغا-3 وبالتالي يعني قلة انتاج الخلايا والذي يشير القلة التكسر الدموي الناتج من الانيميا المنجلية ،تَقترح هذهالنتائجِ بأنّ احماض الأوميغا -3يُمكنُ أَنْتَكُونَ فعّالةَ ،سالمة ،وعلاج رخيص للانيميا المنجلية.

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Glossary of terms

Abbr.	Term
AA	Arachidonic Acid
ACS	Acute Chest Syndrome
ALA	A- Linoleic Acid
ADP	Adenosine Di-Phosphate
ARC	Absolute Reticulocyte Count
CBC	Complete Blood Count
CRC	Corrected Reticulocyte Count
CSSCD	Cooperative Study Of Sickle Cell Disease
DHA	Docosahexaenoic Acid
EPA	Eicosapentaenoic Acid
Hb A	Hemoglobin Phenotype A
Hb C	Hemoglobin Phenotype C
Hb D	Hemoglobin Phenotype D
Hb E	Hemoglobin Phenotype E
Hb S	Hemoglobin Phenotype S
Hct	Hematocrit
MCH	Mean Corpuscular Hemoglobin
MCHC	Mean Corpuscular Hemoglobin Concentration
MCV	Mean Corpuscular Volume
PBP	Peripheral Blood Picture
PCV	Packed Cell Volume
RBC	Red Blood Cell
RPI	Reticulocyte Production Index
SCA	Sickle Cell Anemia
SCD	Sickle Cell Disease